Appendix A

Public and Agency Coordination

Appendix A
Public and Agency Coordination

Coordination among the Kansas City and Omaha Districts of the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service (USFWS), and the Missouri Department of Conservation (MDC) has been ongoing throughout the approval and implementation process for the Corning Site. A Site Mitigation Plan (SMP) was prepared for the Corning Site and is included in this appendix. The SMP provides a specific overview of the Corning Site, the methods to implement the mitigation at the site, and financial considerations. Upon completion of coordination among the Kansas City District Corps, USFWS, and MDC the SMP was completed and approved in June 2005.

In 2003, a Cooperative Agreement was entered into between the Kansas City District Corps and MDC for the operation and maintenance of the Corning Site.

In August 2005, the USFWS and MDC were contacted to solicit comments regarding the Corning Site. Correspondence with the NRCS has been ongoing throughout the project, as portions of the Corning Site are under WRP easement. The request for comment letters and the letters received from the agencies in response to the request are included in this appendix. Table A-1 provides a brief summary of the agencies' responses.

On August 22, 2005 the Corps met with members of MDC and NRCS to discuss the Corning Mitigation Site. During the meeting, the Corning SMP prepared by the Corps was reviewed and discussed. Comments were made regarding the best approach to develop the site and development of the PIR. The meeting consisted of a site visit of the Corning Site.

TABLE A-1. AGENCY COMMENTS

Agency	Response
MDC	Records show that sensitive species are known to exist in the immediate vicinity of the Corning Site, but there are no records within its boundaries. Provided a list of species of conservation concern and information from the Heritage Database; recommended actions to minimize potential impacts to sensitive biological resources.
USFWS	Records show that the following species may occur in the project area: Bald eagle (*Haliaeetus leucocephalus*) and Pallid sturgeon (*Scaphirhynchus albus*).

A description of the proposed project was circulated to the public and resource agencies through a Public Notice, No. **To Be Determined (TBD)**, dated **TBD**, with a thirty-day comment period ending on **TBD**. 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, and businesses listed on the NWK-Regulatory Branch's General, State of Missouri and Holt and Atchison counties mailing lists. The Public Notice was also available for public and agency review and comment on the NWK-Regulatory Branch's website and the Mitigation Program's website (http://www.nwk.usace.army.mil/projects/mitigation/).

US Army Corps of Engineers®

Site Mitigation Plan

Corning Fish and Wildlife Mitigation Site
Missouri River
Fish and Wildlife Mitigation Program

June 1, 2005

1. SITE

The Corning Fish and Wildlife Mitigation Site currently consists of 1,887.51 total acres of land owned by the Corps of Engineers. The Corps lands were purchased from private willing sellers during a period from 2000 to 2002. The site also contains land (743.30 acres) under easement with the Natural Resources Conservation Service (NRCS) in the Wetland Reserve Program (WRP). Existing habitat components include agricultural fields, early successional fields, seasonally flooded wetlands, and a narrow band of riparian forest. In general the site is undeveloped. The area has slightly more than 1.0 mile of river frontage. In 2003, a Cooperative Agreement was entered into between the Corps of Engineers and the Missouri Department of Conservation (MDC) to manage the site for fish and wildlife habitats.

2. LOCATION

The Corning Mitigation Site is located approximately one (1) mile west of Corning, Missouri. The area is located within rural Holt and Atchison Counties of Missouri and is adjacent to the left descending bank of the Missouri River, river miles 514 to 517. The area lies in Sections 14, 21, 22, 23, 24 and 25, of T63N, R41W; and in Section 30 of T63N, R40W.

3. RESOURCE PROBLEM

Nearly all the floodplain habitat historically found adjacent to this section of the Missouri River has been lost to agricultural production through channelization and levee construction. Before channelization and levee construction, this site contained riverine, wetland, and floodplain habitats that were vegetated with forest, wetland plants and prairie grasses. Amphibians, reptiles, and various bird species utilized the wetlands and wet prairies for nesting and nursery habitat. Native fish species used diverse river areas for over-winter, spawning, nursery and protection. In addition, bottomland forest areas were important to many mammals and neo-tropical migrant birds. The Missouri River and its floodplain now lack these types of habitat that were once an important part of the ecosystem.

4. OPPORTUNITY

a. The Corning mitigation site is currently divided into two areas with a small tract of private land in between, composed of three separate landowners. The North area is bounded on the north side by various small farm access roads and private lands. The area is bounded on the west and south by Federal Levee Units (FLU) L-536 and L519, private land and a small farm access road. The North area is bounded on the east side by private land. The site is protected from river flooding by FLUs L-536 and L519, a small tributary drainage ditch separates the two levee units. The North area contains land (743.30 acres) under easement with the NRCS in the Wetland Reserve Program. 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 has been in a rotation of crop fields and annual herbaceous vegetation since the site was purchased. The north site also lies adjacent to the Deroin Bend Conservation Area, owned by the Missouri Department of Conservation, which is also in the Missouri River Bank Stabilization and Navigation Fish and Wildlife Mitigation Project.

b. The South area is bounded on the north, east and south sides by private land. The area is bounded on the west side by the Missouri River. The site is protected from river flooding by Federal Levee Unit (FLU) L519. 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 access dirt road. A ground water well exists on this area, with a privately owned center pivot system currently being operated through the agricultural lease. Much of this site has been in a rotation of crop fields and annual herbaceous vegetation since the site was purchased.

c. Existing Land Cover Types

The existing area contains the land cover types shown in the following table. This information is also displayed in the attached map "Corning Mitigation Site Existing Conditions".

Existing Land Type	Acres
Main Channel, Deep Water	
Main Channel, Shallow Water	
Main Channel, sand	
Side Channels or Chutes	
Backwater Areas	5.4
Scour/Blew Holes	Noted above
Tributaries and streams	
Emergent Wetlands	53.3
Scrub-shrub Wetlands	58.3
Forested Wetlands	9.9
Developed	2.4
Barren	
Forested	16.6
Shrubland	84
Orchard/Vineyard	
Grassland	921.1
Cultivated, Levees	736.5
TOTAL	**1887.5**

d. Site goals - The proposed mitigation project would result in an increase of desired habitats in the Missouri River and on the adjacent lands in the Corning site. The work would be accomplished using a combination of construction contractors, in-house Corps of Engineers hired labor and by MDC or its subcontractors through the Annual Implementation Plan process. MDC would propose annual improvements to the Corps of Engineers who would review and approve the work. The creation of new habitats would be funded by Construction, General funds. Long term maintenance of existing and newly created habitats would be funded by O&M funds. The proposed project will greatly enhance the fish and wildlife habitat that exists there. The Corps will work with the Natural Resources Conservation Service (NRCS) to finalize, implement and construct a proposed wetland restoration plan for the land under easement in the Wetland Reserve Program. This site will add to the diversity, quality and quantity of habitat and public use opportunities present when combined with the Deroin Bend Conservation Area.

5. PROPOSED PROJECT

a. The Corning Mitigation Site has good access from multiple locations. Signage for the site and parking for public use opportunities would be desired to better indicate where the site is located and where the public can access the site.

b. The Corps will seek to obtain a permanent easement or fee title on the lands that separate the two areas. Acquisition of this additional area will greatly increase the potential for added improvements of the site and ease maintenance activities. This allows better use of resources to manage the area as well as improving habitat diversity for plants and animals. Acquisition of the existing in-holdings will ease management pressure on MDC. Concerns over crop damage from wildlife and public encroachment onto the adjacent private lands would be minimized.

c. The Omaha District Corps currently maintains the dikes and revetments along the Missouri River shoreline at this location. The existing dikes will be examined for the potential of notching and other changes so that the bankline of this area can be eroded and a more diverse riverine habitat can be created at this location. Adjustments to the dikes will be completed by the Omaha District or its' contractors. Over time, this work will result in an increase of riverine habitat. However, this action may result in some loss of existing habitats, primarily riparian vegetation, as these lands will be eroded away by the river.

d. Habitat Development

Missouri Department of Conservation (MDC) will complete habitat development in several areas. The work would be accomplished through the Annual Management Plan process as described in the PgMP. MDC would propose annual improvements to the Corps of Engineers who would review and approve the work. The creation of new habitats would be funded by CG funds. The anticipated conversions of land cover will result in the land cover types shown in the table below.

Proposed Land Type	Acres
Main Channel, Deep Water	
Main Channel, Shallow Water	151
Main Channel, Sand bars/shore	
Side Channels or Chutes	
Backwater Areas	75.5
Scour/Blew Holes	
Tributaries and Streams	
Emergent Wetlands	188.75
Scrub-shrub Wetlands	188.75
Forested Wetlands	188.75
Developed	18.9
Barren	37.7
Forested	377.5
Shrubland	188.75
Orchard/Vineyard	
Grassland	377.5
Cultivated, Levees	94.4
TOTAL	**1887.5**

- These habitat types and acreages were determined based on the guidance in the PgMP regarding habitat type percentages for mitigation sites in this region. The Corps and the Agency Coordination Team has developed habitat restoration targets to help guide the planning of restoration efforts at individual sites. Native floodplain habitat types were identified using the National Wetland Inventory (NWI) and National Land Cover Database (NLCD). This evaluation provides targets for site-specific habitat restoration planning. Specific habitat types, locations and acreages suitable for the specific conditions at the Corning Mitigation Site will be determined at the Project Implementation Report (PIR) stage.

e. WRP - The North area contains land (743.30 acres) under easement with the NRCS in the Wetland Reserve Program (WRP). The Corps will work with the NRCS to finalize, implement and construct a proposed wetland restoration plan for the land under easement in the Wetland Reserve Program. The NRCS has currently drafted a proposed wetland restoration plan, based on a topographic survey, by designing some small berms, water control structures, borrow areas and blocking some drainage ditches. This draft plan will be finalized in the PIR.

f. Flood Control Structures - The site is protected from river flooding by the existing Federal Levee Units L-536 and L519. Although no modifications are proposed for these levee units, interior drainage ditches and structures may be modified to create/enhance opportunistic wetlands on the site. However, in accordance with the programmatic Final SEIS, no impacts from this activity should be imposed on adjacent landowners.

g. Vegetation Improvements - MDC will re-vegetate disturbed areas with native plant species, as necessary. Hardwood and softwood bottomland forest will be restored on high ground areas throughout the site. A mix of mast producing RPM and bare root seedlings will be utilized in these plantings. Natural succession of cottonwood and willow communities will be allowed to occur in the forest areas. Additionally, MDC will plant prairie grasses in the transition areas between the low lying wetland areas and the high ground forest plantings. Mixes of grass containing water tolerant species will be utilized.

h. Agriculture Lands - MDC will lease portions of the property to private farmers to crop the land. In the short term, this practice maintains open areas until habitat improvements can be made. In the long term, this practice will provide food plots for wildlife. Food sources on the mitigation site are essential to minimizing crop damages from wildlife on adjacent lands. Over time, at least 642 acres of additional land will be taken out of crop production. If wildlife numbers support eliminating cropping altogether, the amount of cropped lands will be further reduced and the areas can be maintained as open areas through discing and burning only.

i. Long-Term Maintenance - Long-term maintenance of existing and newly created habitats would be performed through Cooperative Agreement with MDC. Maintenance of the mitigation features constructed by this project will be 100% O&M funds.

j. Monitoring - Monitoring of the habitat improvements will be conducted according to the M&E plan established for the Mitigation Program in the PgMP. Monitoring is estimated to be limited. Visual observation of the health of the vegetation will be conducted on an annual basis. Physical measurement of the amount of habitat types and any changes over time, such as tree plantings advancing to successional stage, will be conducted on an infrequent basis, every 5 to 10 years.

k. Adaptive Management - Adaptive management efforts may become necessary on the site if drought conditions persist or flooding results in damage to project features or vegetative plantings or would affect the habitat quality or the ability to meet site goals. Additionally, the biotic response of our restoration measures, results of the monitoring program, 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 were needed to restore the area, it would be paid for using Corps CG funds.

l. Recreational Components - There are no recreational components of the proposed project. However, the mitigation sites would be open to the public for a variety of uses including bird watching, hiking, fishing and hunting. The management of recreational activities will be the responsibility of MDC, and will not be funded by the project.

6. PROJECT OUTPUTS

a. This project will result in increases in desirable habitats at the site and improved management of the area. Over time, modification to the river structures along the Missouri River will establish additional shallow water habitat critical to endangered pallid sturgeon and benefiting all native fisheries. Changes through the Annual Management Plan process will result in additional warm season grasses, wetlands, and forested areas that will benefit multiple species and help restore the Missouri River ecosystem.

b. A summary of the expected project outputs are given in the following table.

Change in Land Type	Acres
Main Channel, Shallow	151
Backwater Areas	70.1
Emergent Wetlands	135.45
Scrub-shrub Wetlands	130.45
Forested Wetlands	178.85
Developed	16.5
Barren	37.7
Forested	360.9
Shrubland	104.75
Grassland	-543.6
Cultivated, Levees	-642.1
TOTAL	**0**

7. FINANCIAL DATA

a. Federal Funding - In accordance with the project authority, this project is 100 percent Federally funded. The Corps will be responsible for all costs associated with this mitigation project including future operation and maintenance.

b. Project Costs and Funding - If the three landowners between the two areas become willing sellers, 268 acres, land acquisition costs for those areas adjacent to the existing site are estimated to be $500,000. Because most of the project will be completed through the Annual Implementation Plan process, engineering and design costs are estimated to be low. If the site remains at 1,887 acres in size, the O&M During Construction costs to fund MDC construction activities is estimated to be $150,000. Construction costs for wetland restoration are estimated at $500,000

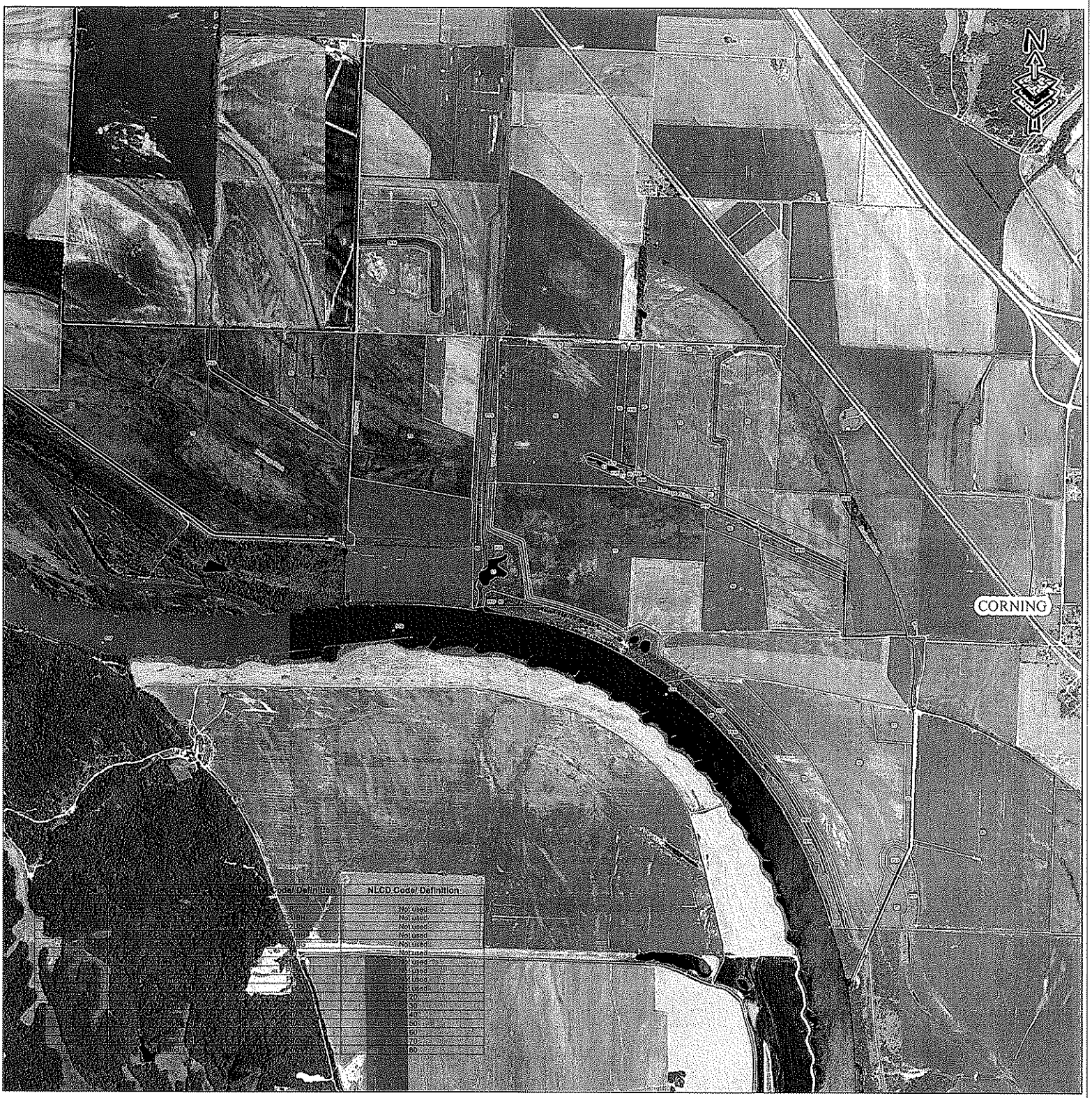
(NRCS involvement with funding the WRP restoration work is unknown at this time and may affect the estimated cost). Estimated Construction, General funding is given below. This estimate will be updated throughout the life of the project as project features are defined.

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**

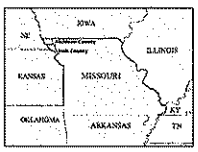
- If the Corning site remains only 1,887 acres in size, annual operation and maintenance costs are estimated at $40,000. This amount will also be updated throughout the life of the project as project features are defined.

FIGURE A: CORNING MITIGATION SITE
EXISTING CONDITIONS

Corning Bend Existing Conditions



USERS SHOULD REFER CORRECTIONS, ADDITIONS, AND COMMENTS FOR IMPROVING THIS PRODUCT TO : GDS COORDINATOR, UNITED STATES ARMY CORPS OF ENGINEERS, KANSAS CITY DISTRICT OFFICE, 601 EAST 12TH, ROOM 812, KANSAS CITY, MISSOURI 64106



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Prepared and Produced by the
U.S. Army Corps of Engineers
Kansas City District

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August 15, 2005

Mr. Charles Scott
U.S. Fish and Wildlife Service
101 Park DeVille Drive, Suite A
Columbia, MO 65203-0007

Re: Request for Threatened and Endangered Species Information
Corning Mitigation Site

Dear Mr. Scott:

HDR Engineering is under contract to the U.S. Army Corps of Engineers (Corps), Kansas City District (KCD), to complete a Project Implementation Report (PIR) for the Corning Mitigation Site (Corning Site) as part of the Missouri River Fish and Wildlife Mitigation Program (Mitigation Program). The Mitigation Program's objectives are to restore Missouri River ecosystem habitat in the floodplain adjacent to the main channel of the Missouri River. Historically, chutes, wetlands, backwater areas, and sandbars contributed to the river ecosystem. The following provides a brief description of the Corning Site.

The Corning Site is generally located approximately one mile west of Corning, Missouri in Atchison and Holt Counties. This site contains approximately 1,887 acres of land owned by the Corps and managed by the Missouri Department of Conservation (MDC). The Legal Description of the site, located on the Corning, Fairfax, and Langdon USGS topographic quadrangles, is as follows, 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.

Under current Corps program management guidelines, a PIR is required for each mitigation site to ensure compliance with National Environmental Policy Act (NEPA) requirements and Corps policy. The focus of the PIR will be conducting an alternatives analysis and NEPA review that consists of an Environmental Assessment (EA). Other additional environmental documentation will be prepared for the EA.

A map of the project area is enclosed. At this time, we are requesting information regarding rare, threatened and endangered species or ecologically sensitive areas within the project area.

Please address all correspondence to HDR at the address on the previous page of this letter. If you have any questions regarding this request, please contact me at (816) 360-2700.

Sincerely,

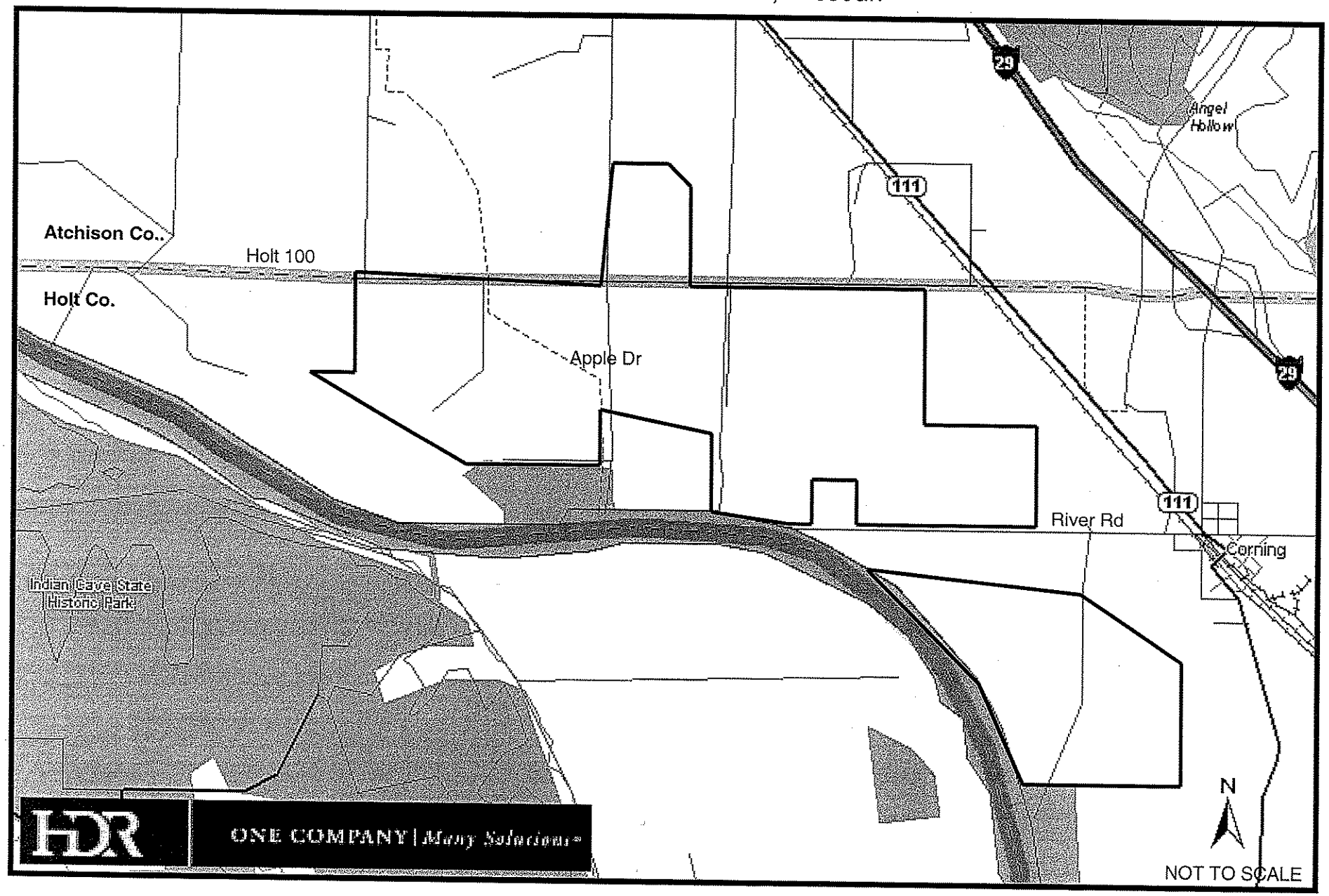
HDR ENGINEERING, INC.

Michael V. Snyder
Environmental Scientist

Enclosure

cc: David Hibbs, Corps
File

Project Location Map
Corning Mitigation Site
Holt and Atchison Counties, Missouri



August 15, 2005

Mr. Shannon Cave
Missouri Department of Conservation
2901 West Truman Boulevard
P.O. Box 180
Jefferson City, MO 65102-0180

Re: Request for Threatened and Endangered Species Information
Corning Mitigation Site

Dear Mr. Cave:

HDR Engineering is under contract to the U.S. Army Corps of Engineers (Corps), Kansas City District (KCD), to complete a Project Implementation Report (PIR) for the Corning Mitigation Site (Corning Site) as part of the Missouri River Fish and Wildlife Mitigation Program (Mitigation Program). The Mitigation Program's objectives are to restore Missouri River ecosystem habitat in the floodplain adjacent to the main channel of the Missouri River. Historically, chutes, wetlands, backwater areas, and sandbars contributed to the river ecosystem. The following provides a brief description of the Corning Site.

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A map of the project area is enclosed. At this time, we are requesting information regarding rare, threatened and endangered species or ecologically sensitive areas within the project area.

HDR Engineering, Inc.

4435 Main Street
Suite 1000
Kansas City, MO 64111-1856

Phone: (816) 360-2700
Fax: (816) 360-2777
www.hdrinc.com

Please address all correspondence to HDR at the address on the previous page of this letter. If you have any questions regarding this request, please contact me at (816) 360-2700.

Sincerely,

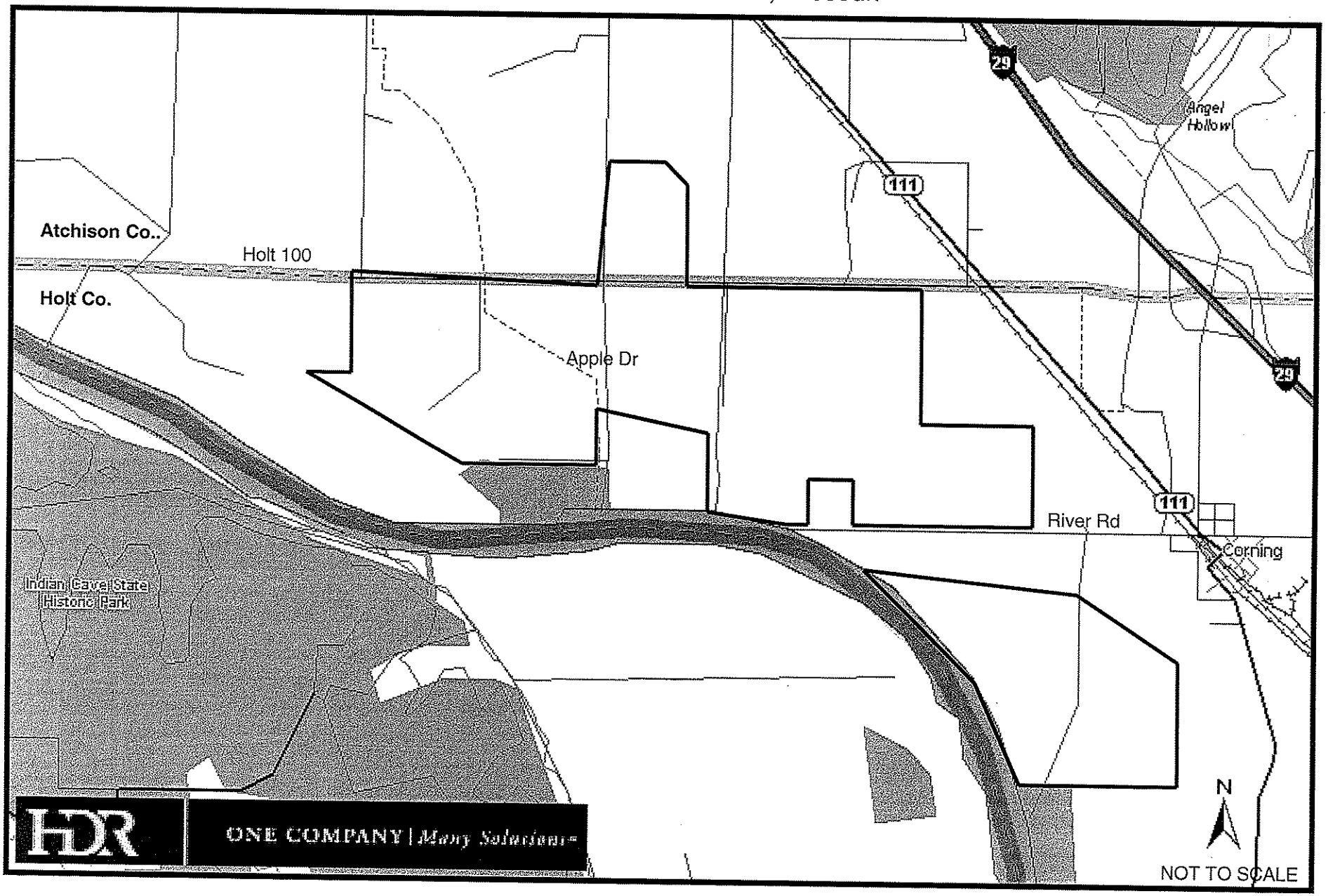
HDR ENGINEERING, INC.

Michael V. Snyder
Environmental Scientist

Enclosure

cc: David Hibbs, Corps
File

Project Location Map
Corning Mitigation Site
Holt and Atchison Counties, Missouri



Heritage Review Report

Missouri Department of Conservation
Attn: Shannon Cave
P. O. Box 180
Jefferson City, MO 65102
Shannon.Cave@mdc.mo.gov
573-522-4115 Ext. 3250

Mr. Michael V. Snyder
HDR Engineering, Inc.
4435 Main Street
Kansas City, Missouri 64111-1856

Project type: Mitigation Site
Location: S3-5, T3N, R17E; S34, T4N, R17E; S30, T63N, R40W; S23-25, T63N, R41W
County: Atchison and Holt
Described in query as: T/E Species Information Corning Mitigation Site
Date query received: August 17, 2005

This is not a site clearance letter, but a report of Missouri Department of Conservation records concerning public lands and sensitive resources known to be near and possibly affected by the proposed project.

Prepared by [signature] Date 8-17-2005

Species/habitats with Federal or State concerns: No records fall within the boundaries, but several species in the immediate vicinity warrant consideration.

Species Name	Common Name	Federal Status	State Status	State Rank	Section	Township/Range
Haliaeetus leucocephalus	Bald Eagle	T	E	S3	99	T99N R99
Platygobio gracilis	Flathead Chub		E	S1	0	
Lactuca tatarica ssp. pulchella	Blue Lettuce			S1	13	T63N R41W
Scirpus pallidus	Pale Bulrush			S2	30	T63N R40W
Hybognathus placitus	Plains Minnow			S2	0	
Spermophilus franklinii	Franklin's Ground Squirrel			S2S3	19	T63N R40W
Macrhybopsis storeriana	Silver Chub			S3	28	T63N R40W
Lythrum salicaria	Purple Loosestrife			SE	99	T99N R99
Alliaria petiolata	Garlic Mustard			SE	99	T99N R99

FEDERAL STATUS - The federal status is derived from the federal Endangered Species Act, administered by the U.S. Fish and Wildlife Service. The ESA provides federal protection for plants and animals listed as: E = Endangered, T = Threatened, C = Candidate, PE = Proposed Endangered for Federal listing.
STATE STATUS is either blank or E, for "endangered" as defined in the Wildlife Code of Missouri.
STATE RANKs refer to species tracked but not listed, S1 = Critically imperiled, S2 = Imperiled, S3 = Rare and uncommon or SE = exotic/invasive species.

Concerns & management recommendations based on site or project details, not related to specific heritage records:

Indiana bats (*myotis sodalis*, Federally endangered, State endangered) roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Additional information to incorporate in planning documents is available at http://www.mdc.mo.gov/documents/nathis/endangered/indianabat.pdf.

Pallid sturgeons (*scaphirhynchus albus*, Federal and State endangered) are big river fish that may range widely in the Mississippi and Missouri River system (including parts of major tributaries). Because the preferred habitat and range of the species are unknown, any project that modifies big river habitat or impacts water quality should consider the possible impact to pallid sturgeon populations. See http://www.mdc.mo.gov/documents/nathis/endangered/p_sturgeon.pdf for best management recommendations.

Nesting, feeding and overwintering bald eagles (*haliaeetus leucocephalus*, Federally threatened, State endangered) may occur in the project area, as they are common winter residents in big river habitats and major lakes where they feed on fish. See http://www.mdc.mo.gov/documents/nathis/endangered/baldeagle.pdf for best management recommendations.

The Missouri River is home to a number of species of state and federal concern, including pallid sturgeon, bald eagles, lake sturgeon, flathead chubs and others. Terrestrial projects that manage construction wastes and include operation plans to avoid runoff of sediment or pollutants are unlikely to affect these species. Projects that place fill in or discharge water to the river are subject to federal permits, and strict observance of conditions required in those permit is important to minimize risk of damage to endangered species. Projects affecting structures in the river can in many cases proceed if they avoid times and conditions tied to spawning or nesting activities.

A HERITAGE REVIEW provides information about species and habitats of concern that could be affected by the project. Heritage records note things that were positively identified at some date and time, marked at a location that may be more or less precise. Animals move quickly but plant communities can move also. To say "there is a record" does not mean the species/habitat is still there. To say that "there is no record" does not mean the project may not encounter something. Because of this, reports include information about records near but not necessarily on the project site. Three different kinds of information are provided.

- **"Species/Habitats With FEDERAL RESTRICTIONS"** lists species that have been known to exist near enough to the project site to warrant concern and protected under the Federal Endangered Species Act. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.
- **"Species/habitats with STATE RESTRICTIONS"** lists species known to exist near enough to the project site to warrant concern and protected under the Wildlife Code of Missouri (RSMo 3 CSR 10). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR10-4.111. "State Rank" is numeric rank of relative rarity, protected under general provisions of the Wildlife Code.
- **"Concerns & management recommendations"** are things one might prudently look for at the identified site, but of which we have no specific record. With 93% of Missouri land in private ownership, most sites in Missouri have never been carefully inspected by conservation professionals, but our knowledge of the surrounding landscape suggests that the project consider these items.

This report is not a site clearance letter. Rather, this letter provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project.

Incorporating information from our Heritage Database into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive natural resources. However, the Heritage Database is only one reference that should be used to evaluate potential adverse impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information and species biological characteristics would additionally ensure that species of conservation concern are appropriately identified and addressed.

If you would like printed copies of best management practices cited as internet URLs, please contact us. Additional information on rare, endangered and watched species may be found at http://www.mdc.mo.gov/nathis/endangered/

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Columbia Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

September 8, 2005

Mr. Michael Snyder
Environmental Scientist
HDR Engineering, Inc.
4435 Main Street, Suite 1000
Kansas City, Missouri 64111-1856

Dear Mr. Snyder:

Please refer to your August 15, 2005, letter requesting information on federally listed species to assist the U.S. Army Corp of Engineers (Corps) in preparing a Project Implementation Report for the Corning Mitigation Feature of the Missouri River Bank Stabilization and Navigation, Fish and Wildlife Mitigation Project, in Holt and Atchison Counties, Missouri. The U.S. Fish and Wildlife Service (Service) has reviewed that information and submits the following comments pursuant to the Fish and Wildlife Coordination Act (FWCA)(16 U.S.C. 661 et seq.) and the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

The following species may occur in the project area:

Bald eagle *(Haliaeetus leucocephalus)*, Threatened – Bald eagles are common migrants and winter residents throughout the Lower Missouri River and are uncommon breeders along some of the major rivers. During winter, they congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. Wintering eagles usually occupy river habitats between November 15 and March 1, and use large diameter riparian tree species as daytime perches and night roosts. They usually perch within a riparian corridor or along lakeshores and prefer areas with limited human activity. At night, wintering bald eagles may congregate at communal roosts and will travel as much as 12 miles from feeding areas to a roost site. The period January 1 to March 1 is important for initiating nesting activity; March 1 to May 15 is the most critical time for incubation and rearing of young.

Bald eagles are known to prefer trees greater than 11 inches diameter at breast height 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 (*Populus deltoides*) and sycamore (*Platanus occidentalis)* are often selected over other trees for perching and roosting. We recommend the project be designed to avoid the loss of trees matching these criteria.

Pallid sturgeon *(Scaphirhynchus albus)* - The pallid sturgeon's range is primarily the Missouri River and the Mississippi River downstream of its confluence with the Missouri River. Limited data is available concerning preferred habitats in Missouri, but the species has been captured in

tributary mouths, over sandbars, along main channel borders, and in deep holes elsewhere in the Missouri and Mississippi Rivers. Small sturgeon have been captured in off-channel backwaters.

Thank you for the opportunity to provide these comments. We look forward to continued coordination with the Corps as this project progress. If you have questions regarding our comments, please contact Jane Ledwin at 573-234-2132, extension 109.

Sincerely,

Charles M. Scott

Charles M. Scott
Field Supervisor

cc: MDC, Jefferson City, MO (Canaday)

O:\Ledwin\Letters\20050894corning list ltr.doc

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Telephone Record

Project:	Corning Mitigation Site	Project No:	HDR Project No. 29759
Date:	Tuesday, March 28, 2006	Subject:	Potential Prime Farmland Impacts
Call to:	David Kacirek, NRCS	Phone No:	(816) 232-6555 x 138
Call from:	Chad Babcock, HDR	Time:	10:30 AM

Document3

Discussion, Agreement and/or Action:

I contacted David Kacirek to discuss potential conversions/impacts to prime farmlands resulting from development of the Corning Mitigation Site.

Mr. Kacirek stated that if the proposed activity (i.e. construction of earthen berms and installation of control structures) would render the prime farmlands non-farmable or if the activity restricts access to the prime farmlands that the activity would be considered a conversion/impact to prime farmlands. If this is the case, Form AD-1006 would need to be filled out and submitted to the NRCS. See excerpt below from previous discussion with Mr. Kacirek.

> 'Direct Conversion means acres that can no longer be farmed due to physical structures -- concrete, water, buildings, roads, etc.; actual acres made non-farmable by the action'
>
> 'Indirect Conversion means acres that will be made non-farmable because of restricted access to them. The land is still farmable but the project restricts access to them for farming.'

Based on a discussion with Jeff Turner and Mike Snyder, it is our professional opinion that the earthen berms could be farmed and that the earthen berms would not restrict access to prime farmlands. With this, we do not think it would be necessary to submit Form AD-1006 for the earthen berms.

Impacts to prime farmlands resulting from installation of the control structures should be considered and Form AD-1006 should be submitted for these impacts if applicable.

cc: Jeff Turner
Mike Snyder

Appendix B

Technical Documents

Preliminary Wetland Feasibility Assessment

Introduction

This assessment is a preliminary feasibility evaluation of the proposed development of non-WRP wetlands on the Corning Site that would result from constructing a water control structure and earthern berm(s) as discussed in Chapter 2 of the PIR. This preliminary assessment evaluates the proposed wetland location designated in the Full Development alternative. The proposed location of this wetland development is shown on Figure 1 included in Attachment 1. There is limited overlap with WRP lands; however, these areas are not specifically identified. Wetland development would consist of creating a wetland in the eastern area of the Corning Site by installing a water control structure in a drainage slough near the east boundary and earthern berms for containment (Figure 1 of Attachment 1). Water supply would primarily be from surface water runoff and direct precipitation. The control structure would be used to manage water elevations and corresponding acres of standing water. Should the private inholding that separates the Corning Site into north and south areas become available, consideration should be given for wetlands development on portions of the south tract.

Assessment

The information presented below is based in part on Attachment 1 (Wetland Area Assessment). This analysis was based on a Digital Terrain Model (DTM) modified with NRCS survey data, assuming that a water control structure would regulate water between five elevations at one foot intervals from elevation 867 to 871 feet NGVD and earthern berms would help contain water on the Corning Site. The analysis evaluated potential wetland area (acres) from each of the five elevations. The following items will be discussed in this assessment as applicable:

- Hydrology
- Wetland size
- Soils
- Vegetation

<u>Hydrology</u> - No hydrology analysis was conducted as part of the wetland area assessment, as no useful information was available for preliminary analysis and no hydrology analysis was requested under the current scope of services. The Missouri River was not considered as a source of wetland hydrology for this project at this time because a federal flood control levee

prevents floodwater migration across the Corning Site. An assumption was made that there was adequate surface runoff coupled with the electrification and operation of an existing well to supply sufficient water for wetland development. The technical feasibility of this development could be better assessed through a water budget evaluation.

Wetland Size - The size of the wetland development would be dependant on the impoundment conditions created (at a given control structure elevation). Based on the DTM analysis (Attachment 1), it was estimated that at elevation 867 approximately 16.9 acres of land would be impounded, 43.9 acres at 868 feet, 81.9 acres at 869, 154.5 acres at 870 feet, and 369 acres at 871 feet. The inundation areas depicted on Figure 1 of Attachment 1 are only estimates based available survey data. Therefore, they may not be as accurate or representational of the actual contour conditions present on site. This analysis does not take into account any hydrology analysis that would assist in determining the realistic number of wetland acres that could be created.

TABLE 1

Potential Wetland Area Development

Water Surface Elevation (ft, NGVD)	Potential Wetland Area (Acres)
867	16.9
868	43.9
869	81.9
870	154.5
871	369.0

Soils - The soil mapping units from the Soil Survey of Holt County, Missouri for the proposed wetland area are the Leta silty clay, rarely flooded, Grable very fine sandy loam, rarely flooded, Gilliam silt loam, rarely flooded, and Haynie silt loam, rarely flooded. None of these soils have hydric components, but all have various hydric inclusions. The predominant soil of the proposed wetland area is the Leta silty clay. The hydric criteria for the Leta silty clay is that it is frequently ponded for long or extremely long durations during the growing season. The hydric criteria for the Grable very fine sandy loam, and Gilliam and Haynie silt loam, is that they are frequently flooded for long or extremely long durations during the growing season. Based on the Holt County Soil Survey (USDA, 1997) engineering index properties, all soils appear to have adequate unified classification and percentage passing sieve properties in most all or portions of the upper 60 inches, though the Leta silty clay appears to be the best soil for wetland

development and the least desireable is Grable very fine sandy loam. Based on the soil survey, it would appear that all soils can be hydric under prolonged flooding and/or ponding conditions; therefore, it would appear that soil conditions are potentially suitable for wetland development. However, caution should be exercised in assuming that all the site's soils will hold water based on the hydric soils list. Based on personal communications with Doug Helmers of the NRCS (Fobes, 2004), soils being considered for wetland development ideally should have 6 - 8 inches of high clay content in the upper one to two feet of the soil horizon and soil permeability should be equal to or less than 0.02 in/hr. Helmers recommended using caution when using the soil surveys in wetland planning. He recommended taking geotechnical boring samples to evaluate the actual soil conditions. Helmers said that wetland soils should ideally have some clay as a textural component. He also stated that loamy soils are typically more marginal soils for wetlands and sandy and loamy sand soils are poor wetland soils due to high permeability and drainage.

Based on the textural descriptions of both soils, the Leta silty clay appears to be a good hydric soil for wetland development based on the listed textural description of silty clay loam to silty clay in the upper 22 inches, high clay content between 35-48% in the upper 28 inches, and permeability of 0.06 - 0.20 inches/hour in the upper 28 inches. The drainage classification for this soil is somewhat poorly drained. The Gilliam silt loam has a textural description of loam, silt loam and silty clay loam in the upper 23 inches, moderate clay content between 10-20% in the upper 30 inches, and permeability of 0.6 - 2.0 inches/hour in the upper 23 inches. The drainage classification is somewhat poorly drained. The Haynie silt loam has a textural description of silt loam and very fine sandy loam in the upper 60 inches, moderate clay content between 15-25% in the upper 60 inches, and permeability of 0.6 - 2.0 inches/hour in the upper 60 inches. The drainage classification for this soil is somewhat excessively drained and well drained. The Grable very fine sandy loam has a textural description of very fine sandy to silt loam in the upper 30 inches, low clay content between 12 - 20% in the upper 30 inches, and permeability of 0.6 - 2.0 inches/hour in the upper 30 inches. The drainage classification for this soil is well drained to somewhat excessively well drained. Overall, the Leta silty clay will most likely hold water the best of all the soils considered and thus support more ideal wetland hydric soil conditions. The Grable very fine sandy loam is the least desireable soil for wetlands, though it still has some potential hydric qualities. The majority of the proposed wetland development would occur on Leta silty clay loam; therefore, the preliminary recommendation is that the planned wetland development is feasible based on the hydric soils list, but we acknowledge that the Grable very fine sandy loam may not be as suitable for hydric soil conditions. Future field

review of the soils, geotechnical soil borings, and analysis should be performed. The water control structure elevations that would best maximize the use of Leta silty clay would be approximately 870 - 871 feet.

Vegetation - The primary vegetation communities that currently exist in the area of the proposed wetland development inundation consists of two planted warm season grass strips next to the drainage slough, corn, soybeans, grassland (fallowed cropland), and emergent and scrub-shrub hydrophytic wetland vegetation. The following assessment assumes that the wetland areas depicted in Figure 1 are fully inundated and that the polygons are approximately correct in shape, depth and size.

In general, all existing condition vegetation community types, except perhaps upland grassland plantings, corn and soybeans are likely compatible with the proposed wetland development. Should the warm season grasses used in upland grassland plantings become flooded or inundated for an extended period of time, it is possible that they would perish.

One of the most important keys to re-establishing wetlands is to understand and predict the wetland hydrology and knowing which areas will be inundated and/or saturated on a regular basis. Once the hydrology is better understood either through studies and analysis and/or careful post construction field observations, better judgment can be applied to determine the most appropriate types of vegetation that can be established and their locations. Because insufficient hydrologic information was available for this report, it is unlikely that an accurate portrait of vegetation establishment can be made at this time beyond some generalized recommendations.

The predominant desired wetland habitat condition type is emergent wetlands. Top priority should be given for establishing emergent wetlands in areas having reliable inundation periods with water depths ideally no more than about 12 inches. Emergent wetlands can be developed either through natural succession or plantings. Typical common species that could be expected to develop through natural succession include smartweeds (*Polygonum* spp.) and cattails. Should the Corps and MDC desire a more immediate and diverse emergent wetlands establishment, consideration should be given to specialized seeding mixes. Table 2 lists some potential emergent wetland species (JF New, 2006) that should be considered for seeding to create emergent wetlands.

Table 2. Possible Emergent Wetland Seed Mix Species.

Scientific name	Common Name
Carex comosa	Bristly Sedge
Carex lurida	Bottlebrush Sedge
Eleocharis obtusa	Spike Rush
Juncus effusus	Common Rush
Leersia orzyoides	Rice Cut Grass
Scirpus acutus	Hard-Stemmed Bulrush
Scirpus validus	Great Bulrush
Acorus calamus	Sweet Flag
Asclepias incarnata	Swamp Milkweed
Alisma spp.	Water Plantain, various
Eupatorium maculatum	Spotted Joe Pye Weed
Lobelia cardinalis	Cardinal Flower
Peltandra virginica	Arrow Arum
Pontederia cordata	Pickerel Weed
Sagittaria latifolia	Common Arrowhead
Sparganium americanus	American Bur Reed
Zizania aquatica	Wild Rice

The species shown in this table are a sample of what could be established, as many other compatible and commercially available species would substitute or enhance wetland seeding shown in Table 2. The Corps and MDC should consult with a reputable native plant nursery to determine the most appropriate species plantings and seeding rates for the project area.

In tandem and consistent with emergent wetland development, consideration should be given for wet to mesic prairie development in those areas lacking regular inundation, but where medium to wet saturated soils may be more the norm during portions of the growing season. Due to the substantial loss of wet and mesic prairie habitats and seed banks in the Missouri River floodplain, it is recommended the Corps and MDC pursue seeding as the primary means

of establishing wet to mesic praries. Table 3 lists example species (JF New, 2006) that may be considered for establishment.

Table 3. Possible Wet-to-Mesic Prairie Seed Mix Species.

Scientific name	Common Name
Elymus canadensis	Canada Wild Rye
Scripus pendulus	Red Bulrush
Sorghastrum nutans	Indian Grass
Spartina pectinata	Prairie Cord Grass
Aster novae-angliae	New England Aster
Coreopsis tripteris	Tall Coreopsis
Desmodium illinoiense	Illinois Tick Trefoil
Eryngium yuccifolium	Rattlesnake Master
Helianthus grosseserratus	Saw-Tooth Sunflower
Liatris spicata	Marsh Blazing Star
Physostegia virginiana	False Dragonhead
Rudbeckia hirta	Black-Eyed Susan
Silphium laciniatum	Compass Plant
Silphium terebinthinaceum	Prairie Dock
Solidago rigida	Stiff Goldenrod
Vernonia altissima taeniotricha	Ironweed
Zizia aurea	Golden Alexanders

The species shown in this table are only of a sample of what could be established, as many other compatible and commercially available species would substitute or enhance wetland seeding shown in Table 2. The Corps and MDC should consult with a reputable native plant nursery to determine the most appropriate species plantings and seeding rates for the project area.

A forested wetland development is identified on the sites proposed habitat development plan shown in Chapter 2 of the PIR along the Missouri River on the south area. Because much of this forested area is already mature forested wetlands and MDC has established additional tree

seedlings in several open areas of this forested wetland, no additional forested (or scrub-shrub) wetland habitat development recommendations are required on non-WRP portions of the Corning Site. The primary habitat goals of the non-WRP areas of the Corning Site are emergent wetlands and grasslands, with scattered areas of food plots and shrubland.

Recommendations

The proposed development of wetlands on non-WRP areas of the Corning Site appear to be feasible based on preliminary information provided. Wetland development plans shown in Chapter 2 of this PIR are recommended to be carried forward for further feasibility investigation and design. Specific items to be addressed for further investigation include a water budget analysis, more detailed soils analysis, planting details, and design concepts for a water control structure and earthern berms.

References

Fobes, T. 2004. Personal communications. Doug Helmers, Natural Resources Conservation Service.

New, JF. 2006. 2006 Resource Catalog. www.jfnew.com.

U.S. Department of Agriculture. 1997. *Soil Survey of Holt County, Missouri*. USDA, Natural Resource Conservation Service.

Attachment 1 - Wetland Area Assessment

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Technical Memorandum

Subject:	Preliminary Wetland Area Assessment		
Client:	Kansas City District Corps of Engineers		
Project:	Missouri River Mitigation – Corning Site PIR	Project No:	000000000029759
Date:	06/05/2006		
By:	Raziul Mollah, HDR Kansas City		

Document2

Distribution:

John Denlinger, HDR Kansas City; Tim Fobes, HDR Kansas City; Jeff Turner, HDR Kansas City

Introduction

The purpose of this assessment is to evaluate the approximate number of wetland acres that could be developed utilizing an existing drainage slough at the Corning Mitigation Site (Corning Site). The Corning Site is located adjacent to the left descending bank of the Missouri River between RM 514 and 517. The Corning Site has a slough that may represent a local drainage channel or a historic overflow channel location. This slough is oriented in a northwest-southeast direction based on available topographic data. It appears that water supply to this slough is limited to direct surface runoff on the site. Water supply to the slough from the Missouri River appears to be limited to infrequent flood events, due to levees and water control structures. An existing groundwater well is located near the upper end of the slough. This memorandum presents preliminary estimates of the wetland acres that may be developed along the slough and adjacent areas. These wetland acres may be developed through the construction of a water control structure in the slough near the east boundary of the Corning Site, and the construction of earthen berms as necessary to control the inundation area extents.

Estimated Wetland Acres

Wetland acres have been estimated along the slough using the best available information. A Digital Terrain Model (DTM) was developed from limited available point elevation data provided by the Omaha District Corps of Engineers. This DTM was found to be inadequate in defining the slough; as very few data points were located along and in the slough. The DTM was modified based on available NRCS survey data. The NRCS survey data does not cover all the project area. For the area that does not have NRCS survey data, we used USGS topographic mapping and on-site observations to more adequately represent the slough geometry.

Table 1 shows the water surface elevation and the corresponding inundated wetland acres that may be developed from the construction of water control structures.

TABLE 1

Potential Wetland Area Development

Water Surface Elevation (ft, NGVD)	Potential Wetland Area (Acres)
867	16.9
868	43.9
869	81.9
870	154.5
871	369.0

Discussion

The information presented in this memorandum suggests creating additional wetland acres using simple control structures. This will sustain existing wetland habitat, while developing additional habitat in the slough and surrounding areas of the available land (Figure 1). From the limited data, it is not conclusive as to whether there is an existing levee along the south side of the Corning Site to prevent inundation on adjacent private property. Therefore, a levee along the private property may be required to contain the inundation area and prevent flooding of the adjacent private property.

The acres and types of wetlands developed would be determined in part based on the available hydrologic inputs, topographic feature of the slough and adjacent areas, water control structures installed, and other design features that would be further developed during the design phase of the project.

Further Considerations

The wetland acres presented above are based on limited available data. NRCS survey data is not available for the entire project area. The accuracy of this assessment could be greatly improved by obtaining more detailed topography of the entire site. Further, the development of these wetland acres is dependent on sufficient water supply to the slough. The technical feasibility of this wetland development could be better assessed through a water budget evaluation that considers surface runoff, direct precipitation, groundwater interactions, evapo-transpiration, and related hydrologic components.

References

USGS topographic mapping (1984), Langdon Quadrangle, MO.-NEBR.

USGS topographic mapping (1981), Fairfax Quadrangle, MO.

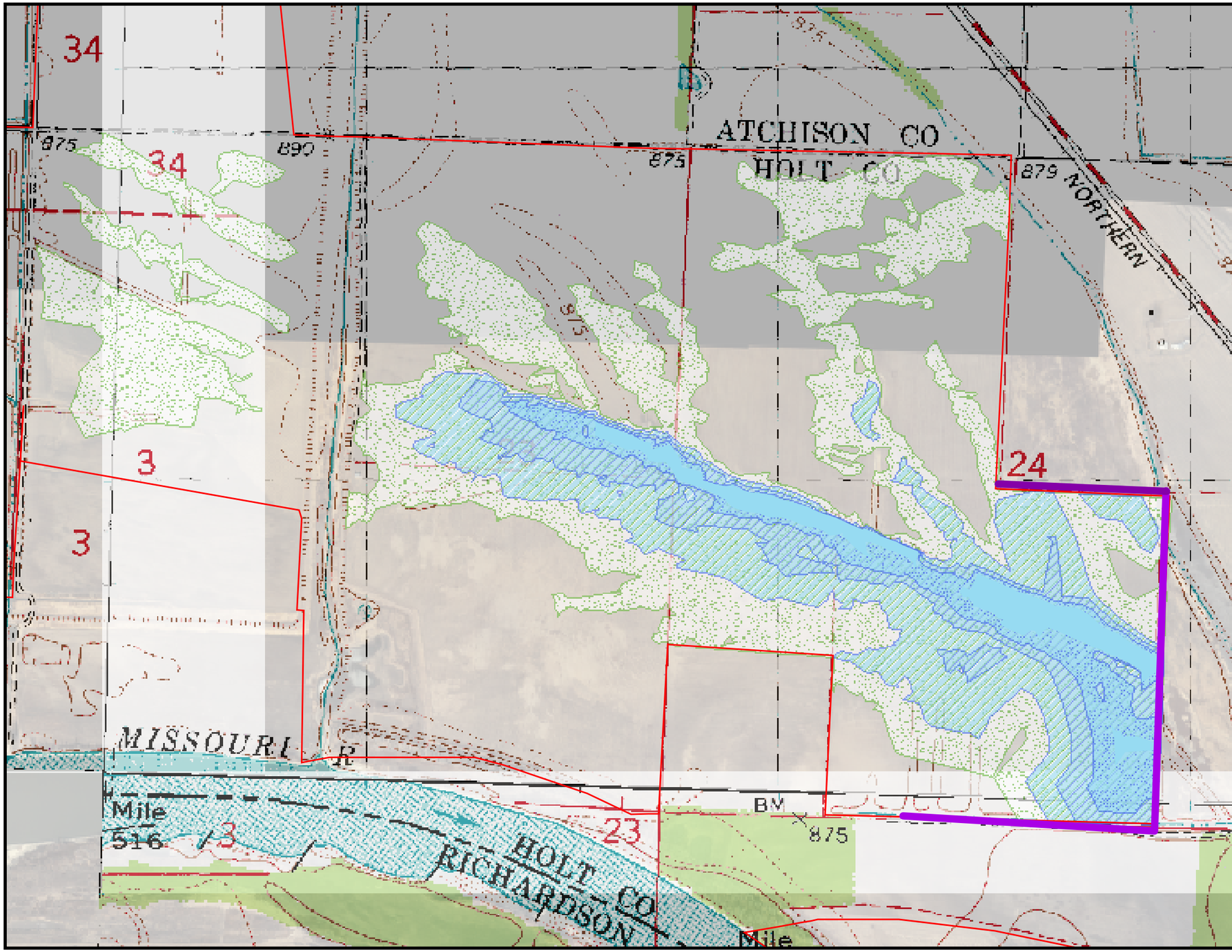
USGS topographic mapping (1984), Corning Quadrangle, MO.-NEBR.

USACE Omaha District (1994). Missouri River Sounding Data.

USACE Omaha District. Point Elevation Data at Corning Site.

USACE Kansas City District. Aerial Photography for the Corning Site.

NRCS, Limited GPS survey in the Corning Site



US Army Corps of Engineers
Kansas City District

Corning Fish and Wildlife Mitigation Site

Figure 1 : Inundated Wetland Acres

Legend

- Inundation at WSEL 867
- Inundation at WSEL 868
- Inundation at WSEL 869
- Inundation at WSEL 870

F

0 1,000 2,000 Feet

HDR

From: Buechler, Kathy
Sent: Wednesday, February 01, 2006 1:07 PM
To: Fobes, Tim; Snyder, Michael; Babcock, Chad E.; Turner, Jeff
Cc: Denlinger, John; Besinger, David
Subject: Corning Mitigation Site - Electrical Service

I spoke with Jerry Clemens of Atchison-Holt Electric Cooperative regarding the electrical utility service at the abandoned well site. He informed me that there is an abandoned circuit that was cut off and buried below ground. His records indicate that it previously served a 50hp motor at 480V with a phase converter. The primary voltage of this line is 7200V, single-phase, and would be capable of supplying either 240/480V or 120/240V single-phase secondary voltage.

In order to determine the line's serviceability, it would be necessary for the co-op to locate it and dig it up to visually inspect it for damage and to energize it for testing. His approximation was that the line is 5-8 years old. If the line is found to have damage, a new installation would cost $4.50/ft for underground line and $3.50/ft for overhead line. The length is approximately 1500 ft. resulting in a cost estimate of $6750 UG, $5250 OH.

Since the existing line has the capacity to power a future 480V, 3-phase, 15hp motor if a phase converter is installed, it is recommended that the existing line be re-used if found to be in serviceable condition. This would result in the lowest cost.

Kathy Buechler, P.E.

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2
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Planned habitat conditions Corning WRP

Field 1	32ac	ew					
Field 2	53ac	ew	7 ac	ss			
Field 3	157ac	ew	15ac	ss			
Field 4					133ac	nat regen trees	
Field 5	62ac	ew	6ac	ss			
Field 6					32ac	nat regen trees	
Field 7	33ac	ew					
Field 8			13ac	ss			71ac prairiecordgrass
Field 9					33ac	nat regen ~~herb~~ trees	
Field 10					48ac	nat regen trees	

- Totals

emergent wetland	337 ac
shrub/scrub	41 ac
natural regen trees	213 ac
prairie cordgrass	71 ac
natural regen ~~herb~~ trees	33 ac
total	695 ac

Warm Season Grass Mix – planted @ 5lbs/acre
Little Bluestem, Aldous = 38%
Eastern Gama Grass = 17%
Sideoats Grama = 16%
Indiangrass = 12%
Big Bluestem, Kaw = 17%

Forbs
Blackeyed Susan
Blanket Flower
Purple Coneflower
Tall Gayfeather
Pale Purple Coneflower
Lead Plant
Lance Leaf Coreopsis
Purple Prairie Clover
White Prairie Clover
Roundhead Lespedeza
False Dragonhead
Spiderwort, Ohio
Junegrass
Ashy Sunflower
Prairie Dock
Rattlesnake Master
Aster, New England
Showy Tick Trefoil
Compass Plant
Pitcher Sage
Prairie Penstemon
Grayhead Coneflower
Ox-eye Sunflower
White Wild Indigo
Blazing Star
Illinois Bundleflower
Partridge Peas
Cardinal Flower
Royal Catchfly
Purple Poppy Mallow
Fringed Poppy Mallow
Purple Beardtongue
Rosin Weed
Alfalfa
Partridge Peas

I couldn't find a list of seedling species that we planted in the spring of 2002. In the past, on the other mitigation areas we have planted Black Walnut, Pecan, Bur Oak, Swamp

White Oak, Overcup Oak, Kentucky Coffee tree, Hackberry, Sycamore, Pin Oak, Persimmon, Red Oak, and Black Cherry.

Vegetation Management Guideline

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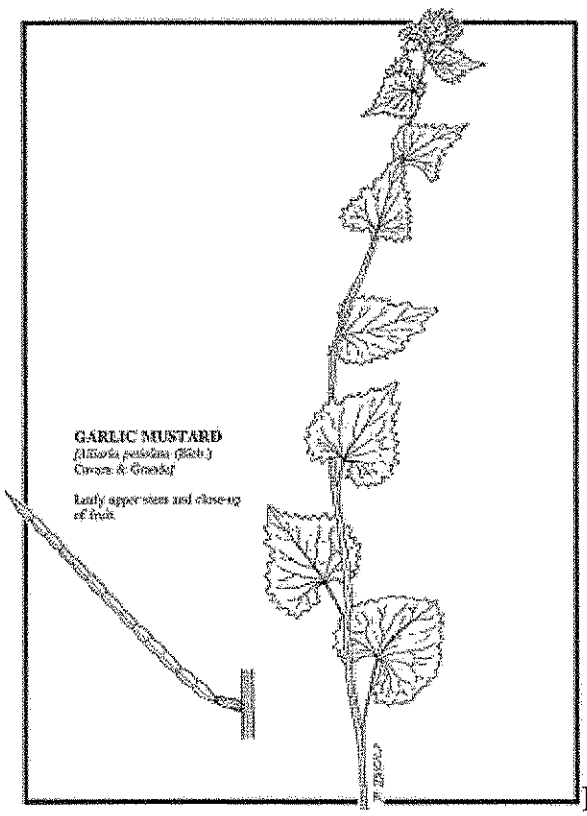
Garlic Mustard *[Alliaria petiolata (Bieb.) Cavara Grande*

Species Character



DESCRIPTION

Garlic mustard produces a characteristic fragrance of garlic from all parts of the plant. Adult flowering or fruiting plants grow 24-48 inches (61-125 cm) high. Basal rosettes have dark green, kidney-shaped leaves that differ somewhat in shape from the sharply-toothed, triangular, alternate, petioled leaves on the stems. Garlic mustard usually blooms in May. Numerous small white flowers, 0.25 inches (6-7 mm) across, are borne in a terminal raceme at the apex of the stem, and also at some leaf axils. Plants usually produce 1 flowering stem, but may have as many as 10 stems from a single root. Each flower is composed of 4 white petals that narrow abruptly at the base. Black seeds are produced in 1-4.7 inch (3-12 cm) long, narrow, linear capsules called siliques.

SIMILAR SPECIES

Garlic mustard is easily distinguished from all other woodland mustard plants by its characteristic odor of garlic and the 2-4 foot (0.6-1.2 m) tall flower stalks covered with numerous small, four-petalled, white flowers in May. The alternate, coarsely toothed, broadly triangular stem leaves with a distinct petiole are also characteristic. The garlic odor gradually dissipates by autumn, and garlic mustard rosettes may then be mistaken for violets *(Viola* spp.) or immature white avens *(Geum canadense*). Garlic mustard can be distinguished from these species by examining the roots. Garlic mustard has a

white slender taproot, with a characteristic crook or "s" shape at the top of the root, just below the base of the stem. Garlic mustard should be accurately identified before attempting any control measures. If identification of the species is in doubt, the plant's identity should be confirmed by a knowledgeable individual and/or by consulting appropriate books.

DISTRIBUTION

Garlic mustard is native to Europe, and also occurs in northern Africa, Sri Lanka, and India. In North America, garlic mustard is now distributed from Quebec and Ontario, south to North Carolina and Kentucky, and west to Kansas and North Dakota. It is scattered in mesic woodlands in Missouri, and will probably become more widespread in the near future. It occurs in at least 41 counties in Illinois, mostly in the northern half of the state.

HABITAT

This species occurs most frequently in upland and floodplain forests, savannas, and along roadsides. It invades shaded areas, especially disturbed sites, and open woodland. It is capable of growing in dense shade and occasionally occurs in areas receiving full sun.

LIFE HISTORY

Garlic mustard is a biennial herb. Seeds germinate in early spring, young plants overwinter as basal rosettes, and adults bloom from May-June the following year. Each plant dies after producing seed. Seeds disperse when the siliques burst at maturity in August. Seeds have a 20- month dormancy period and do not germinate until the second spring after ripening. The species reproduces readily from the numerous seeds produced.

EFFECTS UPON NATURAL AREAS

Garlic mustard aggressively has invaded numerous forested natural areas and is capable of dominating the ground layer in many areas. It is a severe threat to many natural areas where it occurs because of its ability to grow to the exclusion of other herbaceous species.

Control Recommendations

Initial effort in areas of heavy infestation

Fall or early spring burning is an effective control treatment in oak woods. Repeated burns over several years may be necessary to achieve adequate control and to eliminate plants produced from the seed bank. Removal of leaf litter by burning will increase the survival of seedlings the following spring, therefore, burning in consecutive years may be necessary to deplete the seedbank. Prescribed fires should be of sufficient intensity to burn the affected site thoroughly. A clean fire that burns down to the root crown when the spring rosettes are up is recommended. Low intensity fires that leave unburned areas will not control garlic mustard effectively. Any isolated plants that are not burned should be removed by hand prior to flower production.

Research by Victoria Nuzzo indicates that cutting flowering stems at ground level results in 99% mortality, while cutting at 4 inches (10 cm) above ground level produces 71% mortality and reduces total seed production by 98%. Plants cut near ground level when in full flower usually do not resprout. Viable seed may be produced after stems are cut: pending further research, cut stems should be removed from the site when possible.

The control method used over the last three years at The Nature Conservancy's Trice-Dedman Woods nature preserve in northwest Missouri has been a combination of hand pulling and prescribed fire. The Nature Conservancy has successfully controlled or eliminated this plant from several such sites by a combination of spring burning, hand-pulling, and cutting flowering stems with a scythe. When garlic mustard occurs in nearly pure populations with few other plants, scything is advantageous in that large areas can be covered quickly and the soil is not disturbed.

Spot application of 1% Roundup (a formulation of glyphosate) to the foliage of individual plants is effective during spring and fall when most native vegetation is dormant but garlic mustard remains green. Herbicide should be applied when air temperatures are above 32 deg. F (0 deg. C). Managers should exercise caution when applying herbicide to garlic mustard to avoid contacting nontarget plants. Roundup is a nonselective herbicide (kills all vegetation) and should not be used during the growing season in high-quality areas because of the possibility of harming nontarget plants. **Do not spray so heavily that herbicide drips off the target species.** The herbicide should be applied while backing away from the treated areas to avoid contacting the wet herbicide. Basagran (generic name Bentazon) has also been used effectively as a foliar spray and may have less impact on semi-evergreen forbs which may be active in late fall or early spring. By law, herbicides only may be applied as per label instructions.

Initial effort in areas of light infestation

Removal of plants by hand-pulling is effective if the root is removed. If the stem snaps off from the root crown of a non-flowering plant, the plant may resprout. When hand-pulling, disturb the soil as little as possible, and tamp the soil firmly after removing the plant. Soil disturbance can bring garlic mustard seed to the surface and create a favorable environment for garlic mustard germination and growth.

Maintenance control

Vigilant monitoring and hand removal of first- and second-year plants prior to flower production can be effective. A regular burning regime in oak woods can control garlic mustard.

Recommended practices on lands other than high-quality natural areas

Fall or early spring burning in oak woods can control this species. Repeated burns may be necessary over several years. Spot application of 2% Roundup to individual plants as described above can be used in severely disturbed woods. Cutting or scything flowering stems, as described above, is effective. Maintenance control is the same as given above.

In addition, hand spraying individual plants with an amine formulation of 2,4-D is an effective control when applied according to label instructions. To reduce vapor drift, use an amine formulation of 2,4-D rather than an ester formulation. A 1% solution of Mec Amine-D (2,4-D plus Dicamba) applied to the foliage of young plants is also effective. Either herbicide should be applied only during spring or fall when most native vegetation is dormant but garlic mustard remains green. The herbicide 2,4-D amine is selective for broadleaf plants. As with Roundup, managers should exercise caution when applying these herbicides to garlic mustard to avoid contacting nontarget plants. Do not spray so heavily that herbicide drips off the target species.

Failed or Ineffective Practices

Low intensity fires that do not burn through the leaf litter have no effect on garlic mustard.

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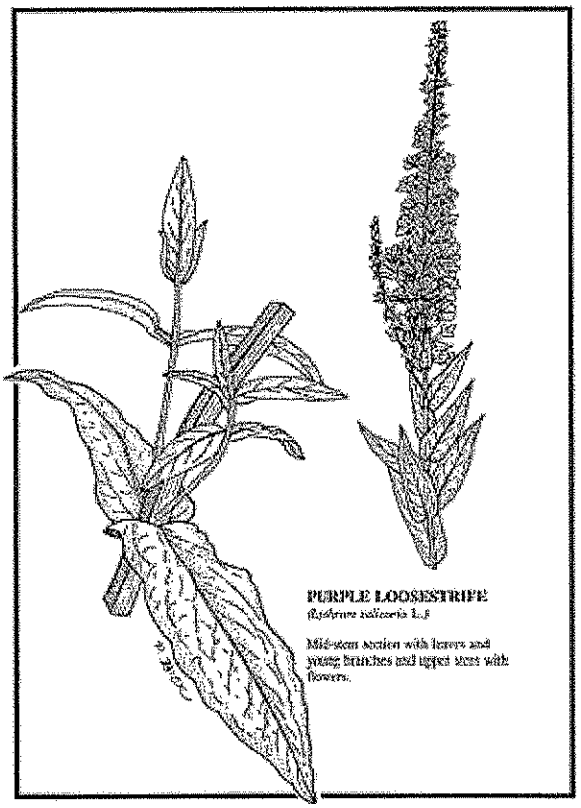
Purple Loosestrife *(Lythrum salicaria L.)*

Species Character



DESCRIPTION

Purple loosestrife is a stout, erect perennial herb with a strongly developed taproot. It may grow from 3 to 10 feet tall, with an average height of 5 feet. Its most notable characteristic is its showy spike of rose-purple flowers that are present in mid-to-late summer (early June thru early September). There are , however, several native species that also produce purple spikes of flowers that superficially resemble those of purple loosestrife. Purple loosestrife can be differentiated from these species by a combination of other characteristics. Purple loose-strife has flowers with 5 to 7 purple petals (petals are occasionally pink or white also); the leaves are opposite or in whorls of 3, all lacking teeth; and it has a stiff 4-sided stem that may appear woody at the base of large plants.

SIMILAR SPECIES

Purple loosestrife may be distinguished from the native winged loosestrife *(Lythrum alatu*m), which it most closely resembles, by its generally larger size (native loosestrife has an average height of only 2 feet) and its opposite leaves (native loosestrife's upper leaves are usually alternate). The flowers of native loosestrife are also more widely spaced than those of purple loosestrife. Purple loosestrife should be accurately identified before attempting any control measures. If identification of the species is in doubt, the plant's identity should be confirmed by a knowledgeable individual and/or by consulting

appropriate books.

DISTRIBUTION

Purple loosestrife is a perennial herb native to Europe and Asia. It was introduced to North America in the 1800's for use as an ornamental and by beekeepers. For nearly a century it occurred as a pioneering species on the northeastern seaboard, then, about 60 years ago the range of purple loosestrife began rapidly expanding, reaching the upper-Midwest in the 1930's. The species appears to go through a period of acclimation after each range expansion during which the invasive character of the species is not expressed. Heaviest U.S. concentrations are in the glaciated wetlands of the Northeast, but it occurs in nearly all sections of the country. Botanists have been aware of purple loosestrife populations in Missouri since the early 1950's.

HABITAT

Purple loosestrife occurs widely in wet habitats, such as freshwater marshes, fens, sedge meadows, and wet prairies, but it also occurs in roadside ditches, on river and streambanks, and at the edges of lakes and reservoirs. It thrives best in moist soil conditions in full sun, but it can survive in as much as 50% shade.

LIFE HISTORY

The reproductive capacity of purple loosestrife is one of the most significant and relevant life history characteristics of this herbaceous perennial plant. A single stalk can produce 300,000 seeds, and densities as high as 80,000 stalks per acre have been recorded, with the potential of producing as many as 24 billion seeds per acre. The seeds can remain viable even after 20 months of submergence in water. Seed set begins in mid-to-late July and continues through late summer. Seeds may be dispersed by water, wind and in mud attached to animals. Purple loosestrife also spreads vegetatively. Root or stem segments can form new flowering stems. Muskrat cuttings and mechanical clipping can also contribute to rapid spread by floating in riverine and lacustrine systems. Purple loosestrife lacks natural enemies in the United States.

EFFECTS UPON NATURAL AREAS

Purple loosestrife quickly crowds out most native vegetation in marsh, fen, sedge meadow, and wet prairie communities, creating a monoculture that provides little food or shelter for native wildlife. Once established, it can destroy marshes and wet prairies and choke waterways.

CURRENT STATUS

Purple loosestrife was declared a noxious weed by the Missouri Legislature in 1989. As such, the sale in Missouri of purple loosestrife or any of its hybrids is prohibited. It is also unlawful to distribute or plant seeds, plants or plant parts in the state.

Control Recommendations

Current mechanical and chemical control methods have only limited success. Smaller infestations are more likely to be controllable, therefore early diagnosis is critical.

Biological control of purple loosestrife is being studied by Dr. Richard Malecki of the New York Cooperative Wildlife Research Unit at Cornell University. Three beetles, two leaf-eaters and a root miner, that are natural predators of purple loosestrife in Europe have been approved for release in the

U.S. after extensive testing. Initial releases will probably take place in Minnesota and Washington. These insects were selected for their specificity to purple loosestrife as a host plant. In Missouri, other species that may be affected are *Lythrum alatum* (winged loosestrife) and *Decodon verticillatus* (swamp loosestrife).

RECOMMENDED PRACTICES IN NATURAL COMMUNITIES WITH NO KNOWN INVASION

Potential loosestrife habitat should be searched annually during late July and August for the plant. Early detection is the best approach!

RECOMMENDED PRACTICES IN NATURAL COMMUNITIES WITH INVASIONS

Effort in areas with individual plants and clusters of up to 100 plants

Younger plants (1-2 years old) can be hand-pulled. Do not pull after flowering because this will scatter seed. Older plants, especially those in fens or in deep organic soils, can be dug out. Roots of older plants can be "teased" loose with a hand cultivator. Bag and remove the plants from the site. Failure to place the removed plants in a bag could result in spreading the plant along your exit route because fragments may be dropped. Dispose of the plant by burning (preferable) or in an approved landfill. Follow-up treatments are recommended for three years after the plants are removed. Clothing, equipment and personnel should be cleaned to insure no seeds are spread on them, if seeds were present on plants.

If the above control method is not feasible in areas with relatively small infestations, spot application of glyphosate herbicides can be used as described below.

Effort in areas with clusters in excess of 100 plants (up to 4 acres in size)

Spot application of a glyphosate herbicide to individual purple loosestrife plants is the recommended treatment where hand pulling is not feasible. Glyphosate is available under the trade names Roundup and Rodeo, products manufactured by Monsanto. Only Rodeo is registered for use over open water. By law herbicides may only be applied according to label directions.

Glyphosate is non-selective so care should be taken not to let it come in contact with non-target species. Glyphosate application is most effective when plants have just begun flowering. Timing is crucial, because seed set can occur if plants are in mid-late flower. Where feasible, the flower heads should be cut, bagged, and removed from the site before application to prevent seed set. Roundup should be applied by hand sprayer as a one and one-half% solution (2 oz. Roundup per gallon of clean water). Rodeo should also be applied as a one and one-half% solution (2 oz. Rodeo per gallon clean water) with the addition of a wetting agent, as specified on the Rodeo label.

Another option is to apply glyphosate twice during the growing season. Foliage should be sprayed as described above, once when flowering has just started and a second time 2-3 weeks later. With this procedure control is likely more effective, because plants are not allowed to set seed and those missed because they were not flowering the first time are treated the second time.

Excessive application of herbicide (causing dripping from the plant) can kill desirable plants under the loosestrife. These plants, left unharmed, will be important in recolonizing the site after the loosestrife has been controlled. If the desirable plants are killed, the vigorously resprouting and growing purple loosestrife seeds present in the soil will fill the void. Since purple loosestrife is usually taller than the surrounding vegetation, application to the tops of plants alone can be very effective and limit exposure

of non-target species. Complete coverage is not required to affect control.

The herbicide should be applied while backing away from treated areas to avoid walking through the wet herbicide. Equipment, clothing and personnel should be cleaned completely before entering other uninfested sensitive areas, if seeds were present in the treated area. It will be necessary to treat the same area again annually until missed plants and plants originating from the seed bank are eliminated. Relatively young populations seem to be almost eliminated in 2-3 years of consecutive treatment while older stands will require more treatment. Cutting purple loosestrife and subsequently flooding the area so that cut plant stalks are completely immersed has controlled purple loosestrife in at least one case. However, flooding may encourage the spread of purple loosestrife if seed are present in the soil. Artificial flooding should not be used in high-quality natural communities with an intact natural flooding regime.

Effort in areas with large monocultures (greater than 4 acres in size)

For large purple loosestrife populations, an assessment should be made to determine if the loosestrife can be eradicated with available resources. If it can not be controlled, then efforts should be placed on keeping the loosestrife out of the highest quality areas. Applying glyphosate from a vehicle mounted sprayer is usually necessary in areas with extensive stands of purple loosestrife. The most effective control can be achieved by beginning treatment at the periphery of large patches and working towards the center in successive years. This allows peripheral native vegetation to reinvade the treated area as the loosestrife is eliminated.

Failed or Ineffective Practices

Mowing, burning, and flooding have proven largely ineffective. A single known exception is cutting followed by flooding as described above. Mowing and flooding can actually contribute to further spread of the species by disseminating seed and cut plant stems. Do not mow because cut parts may re-root.

Efforts to eliminate Purple Loosestrife in Missouri

Botanists have been aware of purple loosestrife populations in parts of Missouri since the early 1950s. An active eradication program began in 1990 when herbicide was distributed, free of charge, to landowners with purple loosestrife populations. Successful control was limited, probably due to poor application techniques or poor timing of treatment.

Since 1991, a more aggressive approach has been used in which the Missouri Department of Conservation (MDC) personnel conduct the chemical treatment. MDC treatment crews use Rodeo at a 1% solution with a surfactant. The age of purple loosestrife infestations seems to be a major factor in determining the effectiveness of control. Early treatment, excellent landowner cooperation and dedicated treatment crews are in large part responsible for good progress toward control of purple loosestrife in Missouri.

Landowners or managers who know of sites of purple loosestrife infestations in Missouri should contact the Missouri Department of Conservation so that treatment can be initiated.

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Appendix C

Cultural Resources Report

CORNING MITIGATION SITE CULTURAL RESOURCES[1]

Historic properties records review and accretion analysis of a proposed 1,887 ac (763.6 ha) fish and wildlife habitat mitigation site along the Missouri River from RM 514 – RM 517
in the Missouri 5/Nishnabotna Study Unit, Atchison and Holt Counties, Missouri

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INTRODUCTION

This report documents Historic Preservation Associates (HPA) investigations for the Corning Mitigation Site (Corning) located in Atchison and Holt Counties, Missouri. The investigations reported here were oriented toward determining whether the proposed habitat mitigation project would affect any National Register-eligible or culturally significant sites in the proposed Area of Potential Effect (APE). This report follows the guidelines contained in the *Management of Archeological Resources: The Airlie House Report* (McGimsey and Davis 1977) and the guidelines listed in the Missouri *Master Plan* (Weston and Weichman 1987).

The APE is situated less than 1 mi (1.6 km) west of Corning, Missouri. The Corning Mitigation Site is adjacent to the left descending bank of the Missouri River between RM 514 and RM 517, and lies in portions of sections 3, 4, and 5 in T3N R17E, portions of sections 33 and 34 in T4N R17E, in portions of Section 30 in T63N R40W, and in sections 14, 23, 24, and 25 in T63N R41W. The APE is in the Nishnabotna Watershed of the Missouri 5/Nishnabotna Study Unit (Figure 1) identified in the Missouri *Master Plan* (Wright 1987: B-15-1 – B-15-5) and is part of the Missouri River Watershed. HPA conducted the cultural resources investigations, the objective of which was to discover and determine the nature and extent of cultural resources that might be affected by the project. This documentation was conducted in the last quarter of 2005.

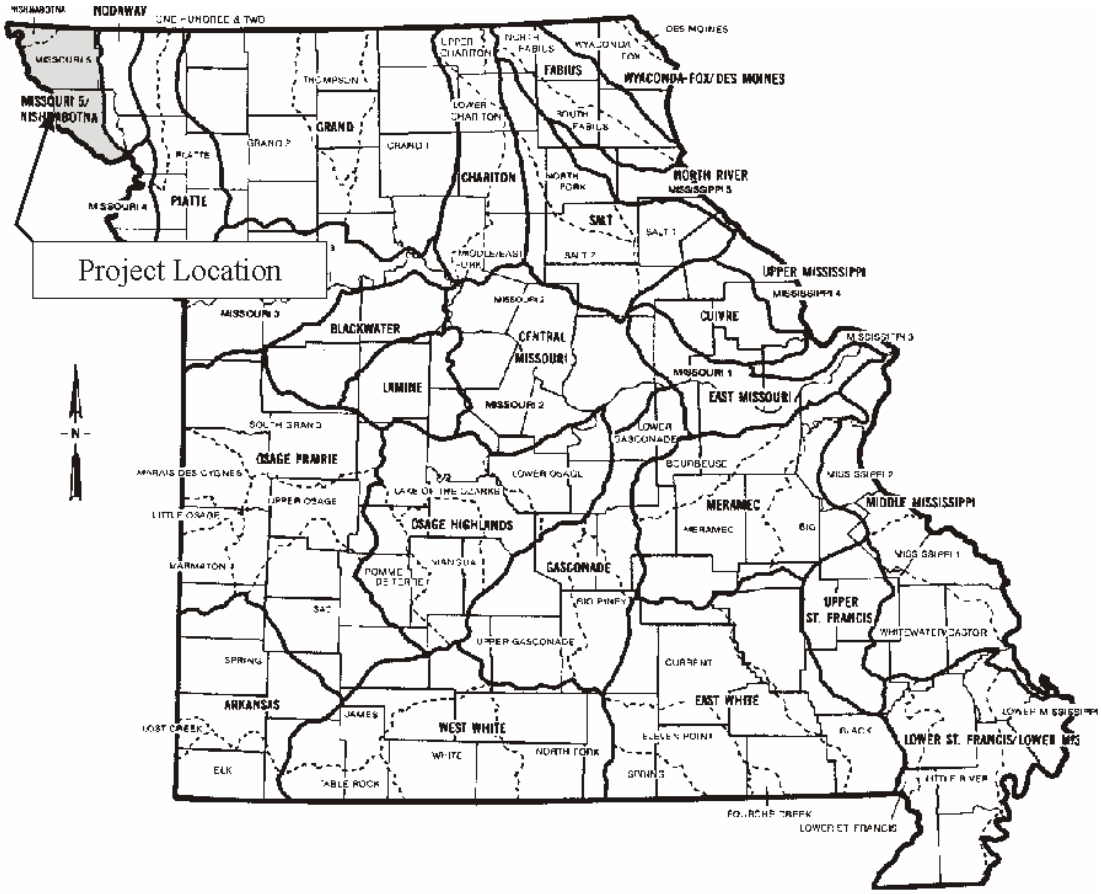


Figure 1. General location of the Corning Mitigation Site.

SITE MITIGATION PLAN

(based on the 1 July 2005 *Site Mitigation Plan* pages 1-2 and Map 1 – see the text of the PIR for additional information)

The Corning Fish and Wildlife Mitigation Site currently consists of two parcels of land owned by the Corps of Engineers. The Corps lands were purchased from private willing sellers during a period from 2000 to 2002. The site also contains 743.3 acres under easement with the Natural Resources Conservation Service (NRCS) in the Wetland Reserve Program (WRP). Existing habitat components include agricultural fields, early successional fields, seasonally flooded wetlands, and a narrow band of riparian forest. In general the site is undeveloped. The area has slightly more than 1.0 mile of river frontage. In 2003, a Cooperative Agreement was entered into between the Corps of Engineers and the Missouri Department of Conservation (MDC) to manage the site for fish and wildlife habitats.

AREA OF POTENTIAL EFFECT

The APE for the project includes a single tract of 1,887 acres (763.6 hectares) adjacent to the left descending bank of the Missouri River [36 C.F.R. § 800.2(c)]. This APE was documented for previously recorded archeological and historic resources including standing architectural resources to assist the planning team (Table 1 and Table 2).

Table 1. Specific characteristics of the APE.
(all Kansas City District – Corps of Engineers)

Area	Total Area
Corning Mitigation Site (northern parcel)	±1,412 ac (±571.4 ha)
Corning Mitigation Site (southern parcel)	±475 ac (±192.2 ha)
Total APE	±1,887 ac (±763.6 ha)

Table 2. USGS quadrangles included in and near the APE.

No.	Quadrangle	Relationship to Project
1	Corning, MO.-NEBR. 7.5' 1966 PR 1984	APE quadrangle
2	Barada, NEBR.-MO. 7.5' 1966	Adjacent to APE and included in figures 4-14
3	Fairfax, MO. 7.5' 1981	APE quadrangle
4	Langdon, MO.-NEBR. 7.5' 1966 PR 1984	APE quadrangle

FIELD CONDITIONS

A comprehensive review of the natural environment for this part of the northwest Missouri Region is beyond the scope of the current investigation.

Soil Conservation Service scientists have mapped 50 soil units in Holt County, Missouri. The project APE crosses 4 soil types in Atchison County, Missouri (Table 3) (Young and Kowalewycz 1994), and 7 soil types in Holt County, Missouri (Table 4) (Holbrook 1997). All of the APE soils in Atchison County are found on flood plains and levees, and include the moderately drained and rarely flooded Haynie silt loam (16) with 0% - 2% slopes, the somewhat poorly drained and rarely flooded Paxico silt loam (35) with 0% - 2% slopes, the somewhat poorly drained and rarely flooded Percival silty clay (36) with 0% - 2% slopes, and the excessively drained and rarely flooded Sarpy loamy fine sand (loamy substratum) (38) with 1% - 3% slopes (Young and Kowalewycz 1994). All of the APE soils in Holt County are found on flood plains and include the somewhat poorly drained and rarely flooded Gilliam silt loam (28) with 0% - 1% slopes, the somewhat excessively drained and rarely flooded Grable fine sandy loam (29) with 0% - 1% slopes, the well drained and frequently flooded Haynie silt loam (30) with 0% - 1% slopes, the somewhat poorly drained and rarely flooded Leta silty clay (64) with 0% - 1% slopes, the somewhat poorly drained and rarely flooded Leta silty clay (66) with 0% - 1% slopes, the excessively drained and rarely flooded Sarpy fine sandy loam (74) with 0% - 1% slopes, and the excessively drained and frequently flooded Sarpy fine sand (75) with 0% - 1% slopes (Holbrook 1997).[2]

Table 3. Soils mapped in the APE in Atchison County, Missouri.
(Young and Kowalewycz 1994)

Symbol	Soil Name	Drainage	Flooding	Local Setting
16	Haynie silt loam, 0% - 2% slopes	moderate	rare	flood plains
35	Paxico silt loam, 0% - 2% slopes	somewhat poor	rare	flood plains
36	Percival silty clay, 0% - 2% slopes	somewhat poor	rare	flood plains
38	Sarpy loamy fine sand (loamy substratum), 1% - 3% slopes	excessive	rare	levees and flood plains

Table 4. Soils mapped in the APE in Holt County, Missouri.
(Holbrook 1997)

Symbol	Soil Name	Drainage	Flooding	Local Setting
28	Gilliam silt loam, 0% - 1% slopes	somewhat poor	rare	flood plains
29	Grable fine sandy loam, 0% - 1% slopes	somewhat excessive	rare	flood plains
30	Haynie silt loam, 0% - 1% slopes	well	frequent	flood plains
64	Leta silty clay, 0% - 1% slopes	somewhat poor	rare	flood plains
66	Leta silty clay, 0% - 1% slopes	somewhat poor	rare	flood plains
74	Sarpy fine sandy loam, 0% - 1% slopes	excessive	rare	flood plains
75	Sarpy fine sand, 0% - 1% slopes	excessive	frequent	flood plains

[2] Relative ages of the APE soils are not known and the relationship of these surfaces to prehistoric and historic use of the project area are unknown.

PREVIOUSLY RECORDED RESOURCES

REVIEW OF THE GLO RECORDS

Instructions given to the surveyors of public lands by the Surveyor General United States and the General Land Office (GLO) concerned their responsibilities while mapping the states and territories (Tiffin 1815 in Minnick n.d.:1-10). These instructions were to clarify and standardize the routines of the surveyors of public land. These instructions are valuable in reconstructing the footsteps of the original surveyors and in interpreting the meanings of the original notes and plats.

Specific instructions were issued to cover the state of Missouri in 1834 (U.S. Surveyor General 1834 in Minnick n.d.:79-98). This set of information was known as the "General Instructions (1834) To Deputy Surveyors in Illinois and Missouri." Described in these notes are all land characteristics necessary in interpreting the General Land Office plats of the project townships and ranges from the Office of the Surveyor General for Illinois and Missouri on 30 December 1852. These plats contain notes and drawings, including the current APE. The relevant characteristics to be noted by all surveyors are described in the instructions from a letter in 1834:

> All rivers, creeks, springs and smaller streams of water, with their width and the course they run in crossing the lines of surveys, and whether navigable, rapid or otherwise; also, all swamps, ponds, stone quarries, coal beds, peat or turf grounds, mounds, precipices, caves, rapids, cascades or falls of water, minerals, ores, salt springs, salt licks and fossils, prairies, hills and mountains, towns, villages and settlements, forges, factories and cotton gins; also, all uncommon, natural or artificial productions, which may come to your knowledge, are to be particularly regarded and noted in your Field Book. You will likewise note when the lines enter and when they leave creek or river bottom.

The current APE includes parts of portions of sections 3, 4, and 5 in T3N R17E, portions of sections 33 and 34 in T4N R17E, in portions of Section 30 in T63N R40W, and in sections 14, 23, 24, and 25 in T63N R41W in Atchison and Holt Counties, Missouri (Figure 2).

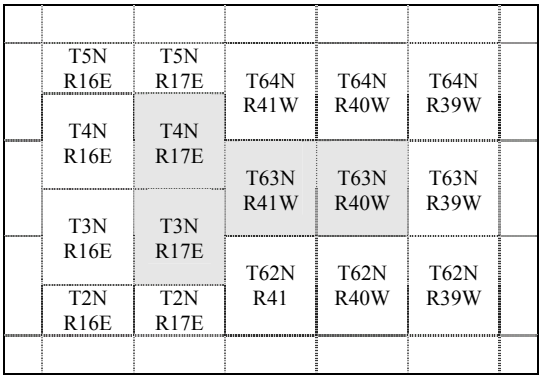


Figure 2. GLO plats included in the APE.

T3N R17E (July 17, 1854)

The predominant feature on the 1854 plat of T3N R17E (Figure 3) is the *Missouri River*[3] that defines the eastern boundary of this plat and the boundary between the state of Missouri and the state of Nebraska.

A vast network of creeks and streams were noted throughout the township by the early surveyors. Most all of the watercourses noted by the surveyors were generally flowing to the east to drain into the *Missouri River*. One of these steams was recorded to emanate from a Spring located in the NE¼ of Section 17. The early surveyors also recorded *Half Breed Cr.* entering the western border of Section 31, and exiting the township through the southern border of that same section. Additionally, a small lake was noted at the shared border of sections 26 and 35. The pronounced bluff line on the western side of the *Missouri River* was also noted by the early surveyors, but the feature was not labeled on the plat. No additional natural features were noted on this plat.

Vast networks of roads or paths were recorded within the boundaries of the township. Two main points of convergence for this network of roads include: the *Hawke X Dillons Ferry* (depicted as a side-wheel steamer) with it's landing located in the southern portion of Section 3, and the structure labeled as *Joseph Reladeau* in the SW¼ of Section 22. One road was recorded in the SW corner of the township and was labeled as the road *From Nemaha City to St. Stephens*. Additional cultural improvements recorded within the township included two agricultural fields. The first field was noted along the shared border of sections 3 and 4, and the second field was noted along the shared boundary of sections 26 and 27. Both of the noted fields lie within the Missouri River floodplain.

There are no other cultural improvements or landforms noted on this plat. The Corning APE is located in T4N R17E in sections 3, 4, and 5, (Figure 3).

[3] Note that italicized words and phrases in this discussion of GLO records indicate words and phrases as written on the GLO plates themselves. Capitalization, abbreviations, punctuation and spelling accurately reflect information recorded on the GLO.

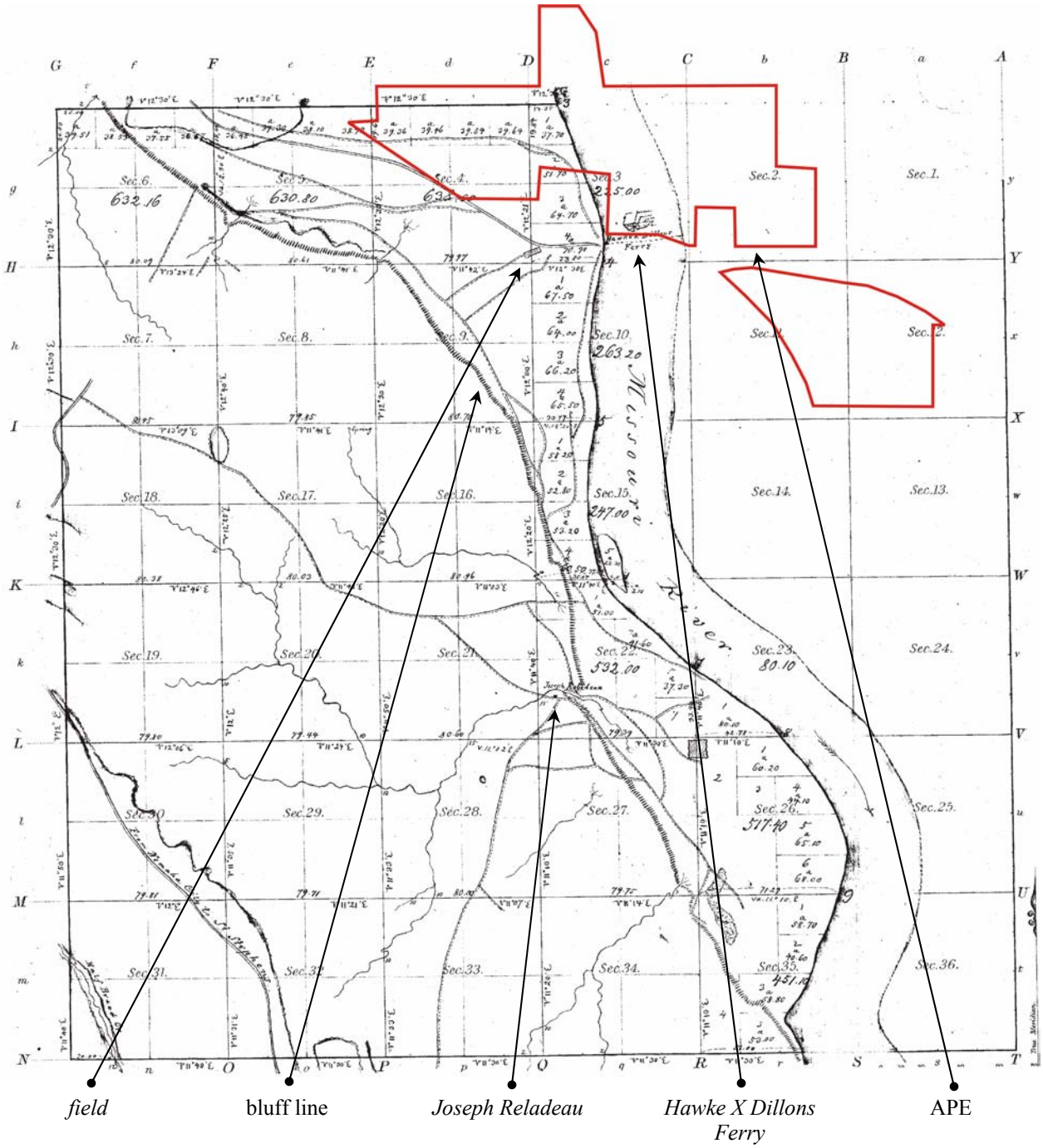


Figure 3. GLO plat of T3N R17E (July 17, 1854).
(call-outs limited to APE and vicinity; area east of the Missouri River is in T63N R41W on this plat)

T4N R17E (July 17, 1854)

The predominant feature on the 1854 plat of T4N R17E (Figure 3) is the *Missouri River* that defines the eastern boundary of this plat and the boundary between the state of Missouri and the state of Nebraska. A small stream was recorded entering the township through the southern border of Section 31. No additional natural features were noted on this plat.

Five segments of roads or paths were recorded within the boundaries of the township. The largest segment of road was noted as running along the northern boundary line of sections 31, 32, and 33 adjacent to the *Missouri River*. One small segment of road was recorded running east – west at the shared boundary of sections 31 and 32. A third road segment was noted entering the township at the southern border of Section 32. Two final segments of road enter the township from the south and from the west through the southern and western borders of Section 31. A field owned by *Jas Deroin* was documented along the western border of Section 31, T4N R17E, extending into Section 36, T4N R16E.

There are no other cultural improvements or landforms noted on this plat. The Corning APE is located in T4N R17E in sections 33 and 34 (Figure 4).

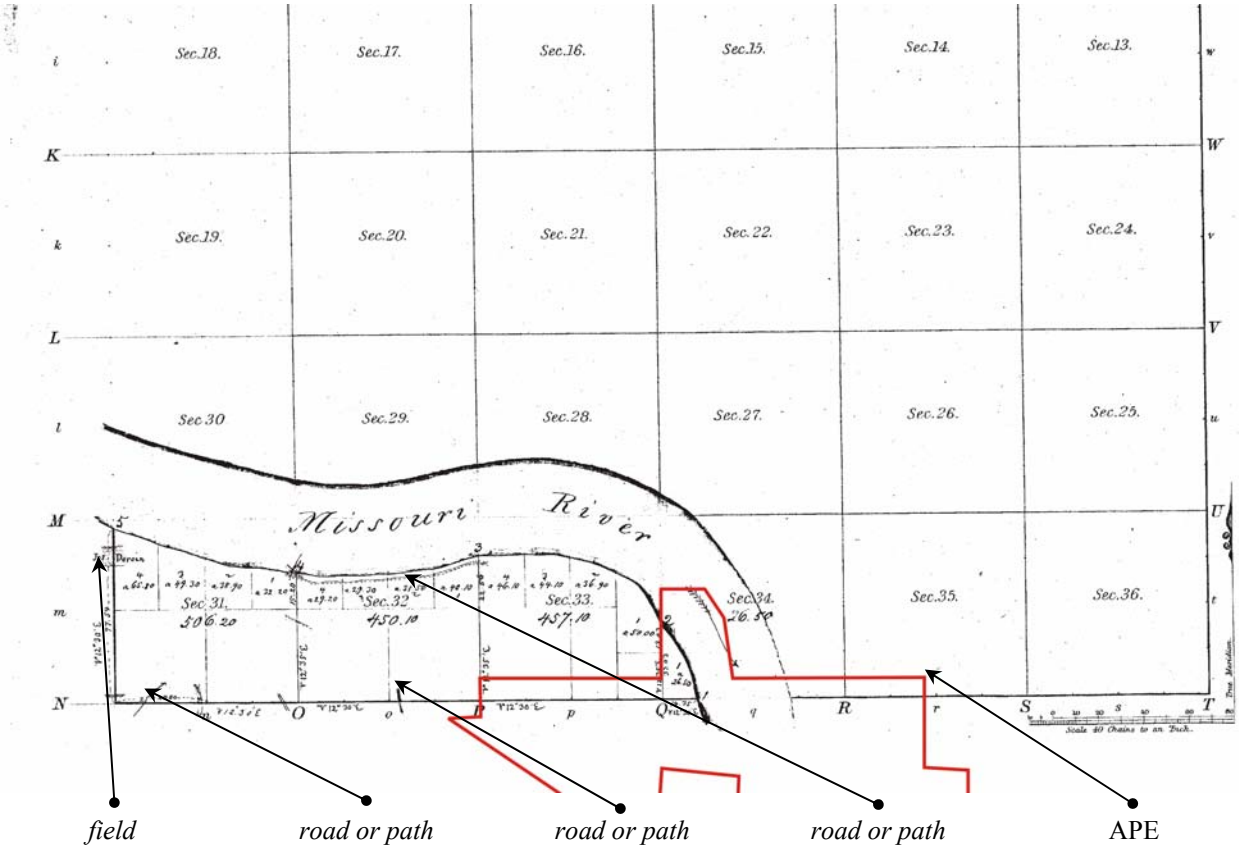


Figure 4. GLO plat of T4N R17E (July 17, 1854).
(call-outs limited to APE and vicinity; areas north and east of the Missouri River are in T63N R41W on this plat)

T63N R40W (October 13, 1845)

The predominant feature on the 1845 plat of T63N R40W (Figure 3) is *Big Tarcio Creek* that runs from north to south and generally divides the township in half. *Big Tarcio Creek* enters the township through the northern border of Section 3, and was recorded to meander its way southward through sections 4, 9, 10, 16, 21, 20, 28, and 33, finally exiting the township through the southern border of Section 34.

Additional water resources were noted throughout the township by the early surveyors. A large *pond* was noted at the shared corner of sections 14, 15, 22, and 23. Two areas of marsh or wetlands were noted by the early surveyors. The first wetlands area was recorded along the western border of the SW¼ of Section 18. The second wetlands area plotted along the eastern border of the SE¼ of Section 36. Additionally, the surveyors noted several small streams or creeks along the perimeter of the township; these were recorded in sections 6, 7, 18, 24, and 35. Additionally, a *slough* was recorded at the southern border of Section 36.

Other natural features noted within the township by the original surveyors included areas of *Prairie* and *Timber*. A large area of *Prairie* was recorded in the southwest portion of the township. This *Prairie* was plotted west of *Big Tarcio Creek* possibly covering portions of sections 28, 29, 30, 31, 32, 33, and 34. An additional area of *Prairie* was documented east of *Big Tarcio Creek* in the NE¼ of the township in the vicinity of sections 10, 11, 12, 13, 14, 15, 22, 23, and 24. A prominent *Timber* line was recorded in the eastern half of the township. The line was plotted as running from the NE¼ of Section 21, through sections 27, 26, 35, and continuing into the SE¼ of Section 36. A second *Timber* line was recorded in the western half of the township involving sections 4, 5, 8, 17, and 18. Several additional lines similar to these timber lines were noted (but not labeled) in portions of sections 31, and 34. No additional natural features were noted on this plat.

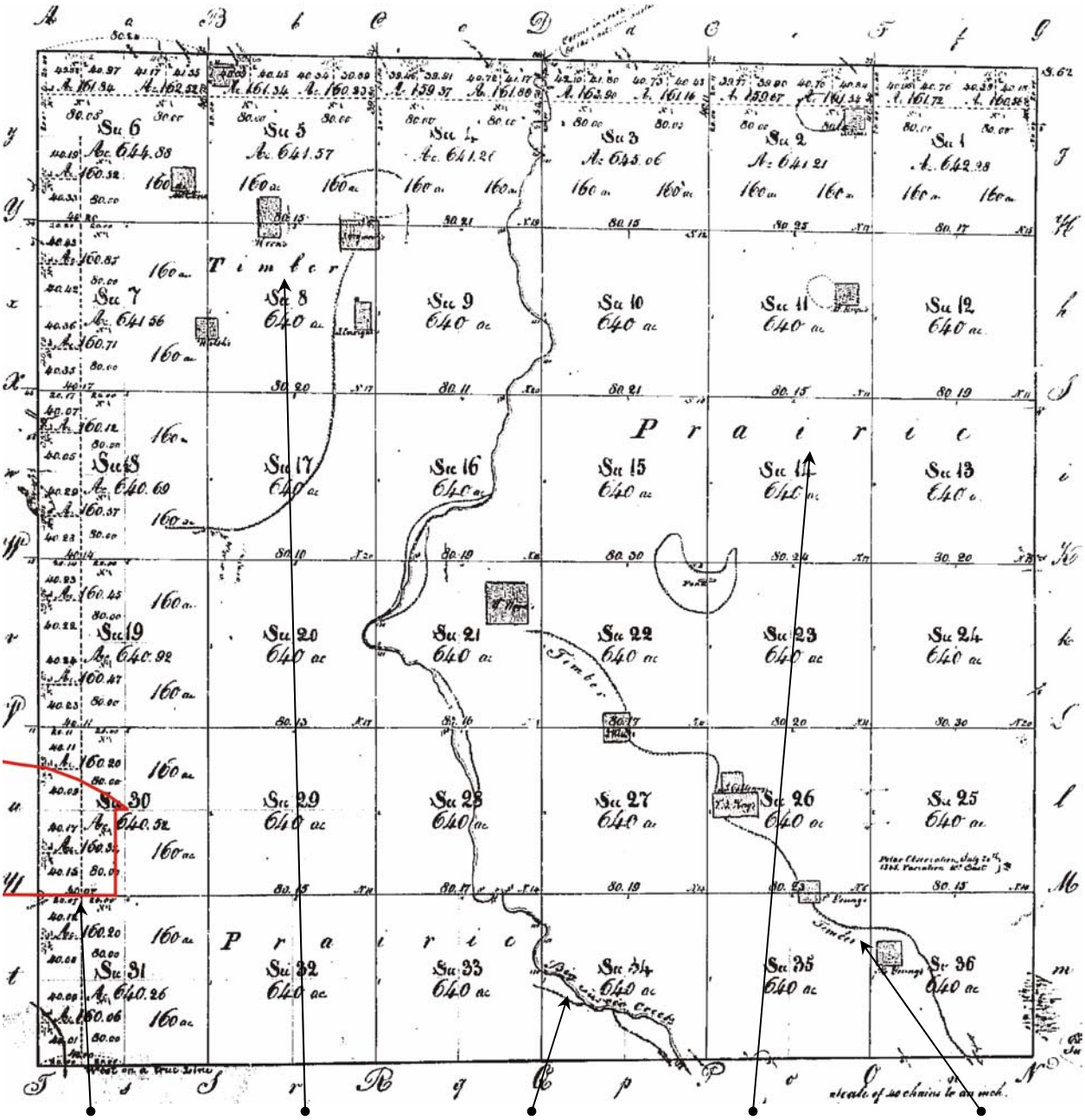
By the time of the original survey, it was quite clear that the township had already been heavily settled by the mid-19th Century. A total of fourteen fields were noted by the early surveyors, most of them were situated in the NW¼ and the SE¼ of the township. The early surveyors also recorded the property owners name with the plotted field, but, unfortunately, the quality of the map is poor and many of the names are illegible. In the NW¼ of the township surveyors recorded six fields, all situated within a rectangular block of sections 4, 5, 6, 7, 8, and 9. The first field was recorded in the NW¼ of Section 5, and was labeled as *Norris* or *Morris*. A second field was recorded in the SE¼ of Section 6, but the label is illegible. A third field was recorded along the shared border of sections 7 and 8, and was labeled as *Walsh's* or *Welsh's*. A fourth field was recorded along the eastern border of Section 8, and was labeled as possibly *J. Conright's*, but portions of the label are illegible. A fifth field was plotted along the shared border of sections 5 and 8, but the label is illegible. The sixth and final field in the NW¼ of the township was recorded in portions of sections 4, 5, 8, and 9, with the label again being illegible.

In the general SE¼ of the township the surveyors recorded an additional six fields, all plotted along the timber line previously noted. The first field was plotted in the NE¼ of Section 21, the field is labeled, but the label is illegible. The second field was recorded along the shared

border of sections 22 and 27, again with an illegible label. The third and fourth fields were plotted as being immediately adjacent, in the western half of Section 26. The fifth field was recorded along the shared border of sections 26 and 35 with an illegible label. The sixth field was recorded in the NW¼ of Section 36, again with an illegible label. The fifth and sixth fields label appear to have the same last name (though illegible), suggesting that the property owners were related.

Finally, two additional fields were noted in the NE¼ of the township. The first field was recorded in the NE¼ of Section 2, with an illegible label. The second field was recorded in the NE¼ of Section 11, again, with an illegible label.

There are no other cultural improvements or land forms noted on this plat. The Corning APE is located in T63N R40W in Section 30 (Figure 5).



APE *Timber* and fields *Big Tarcio Creek* *Prairie* *Timber* line

Figure 5. GLO plat of T63N R40W (October 13, 1845).
(call-outs limited to APE and vicinity)

T63N R41W (June 19, 1862)

The predominant feature on the 1854 plat of T3N R17E (Figure 3) is the *Missouri River* that defines the western boundary of this plat and the boundary between the state of Missouri and the state of Nebraska.

The *Nishnabotna River* was recorded as running south from the northern border of Section 4, to a point of confluence with the *Missouri River* in the SE¼ of Section 9. Two smaller streams, one from the north and one from the east, were recorded to flow into a large lake that covered portions of sections 1, 2, 11, 12, 13, and 24. Two additional small unlabeled streams were recorded as exiting the township through the eastern borders of sections 1 and 12. The surveyors also recorded a small Lake on the northern border of Section 2, extending into the southern portion of Section 35 T64N T41W. The surveyors also noted an area of *Prairie* covering portions of sections 2, 3, 10, and 11. The only additional natural feature noted on this plat is an unlabeled line on the east side of the aforementioned large lake, and appears to correspond with the bluff line shown on the modern USGS Fairfax, MO. 7.5' 1981 quadrangle.

Cultural features noted within the township by the original surveyors include three segments of paths or trails. The first path or trail was recorded along the western edge of the Nishnabotna River in sections 5, 4, and 9. The second trail or path was plotted as entering the township through the northern border of Section 2, and traveling southeast through Section 12 and exiting the township through the NE¼ of Section 13. This path runs along the bluff line on the east side of the large lake. The third and final segment of trail or path was recorded in the NE¼ of Section 36, running generally to the southwest.

There are no other cultural improvements or land forms noted on this plat. The Corning APE is located in T63N R41W in sections 14, 23, 24, and 25 (Figure 6).

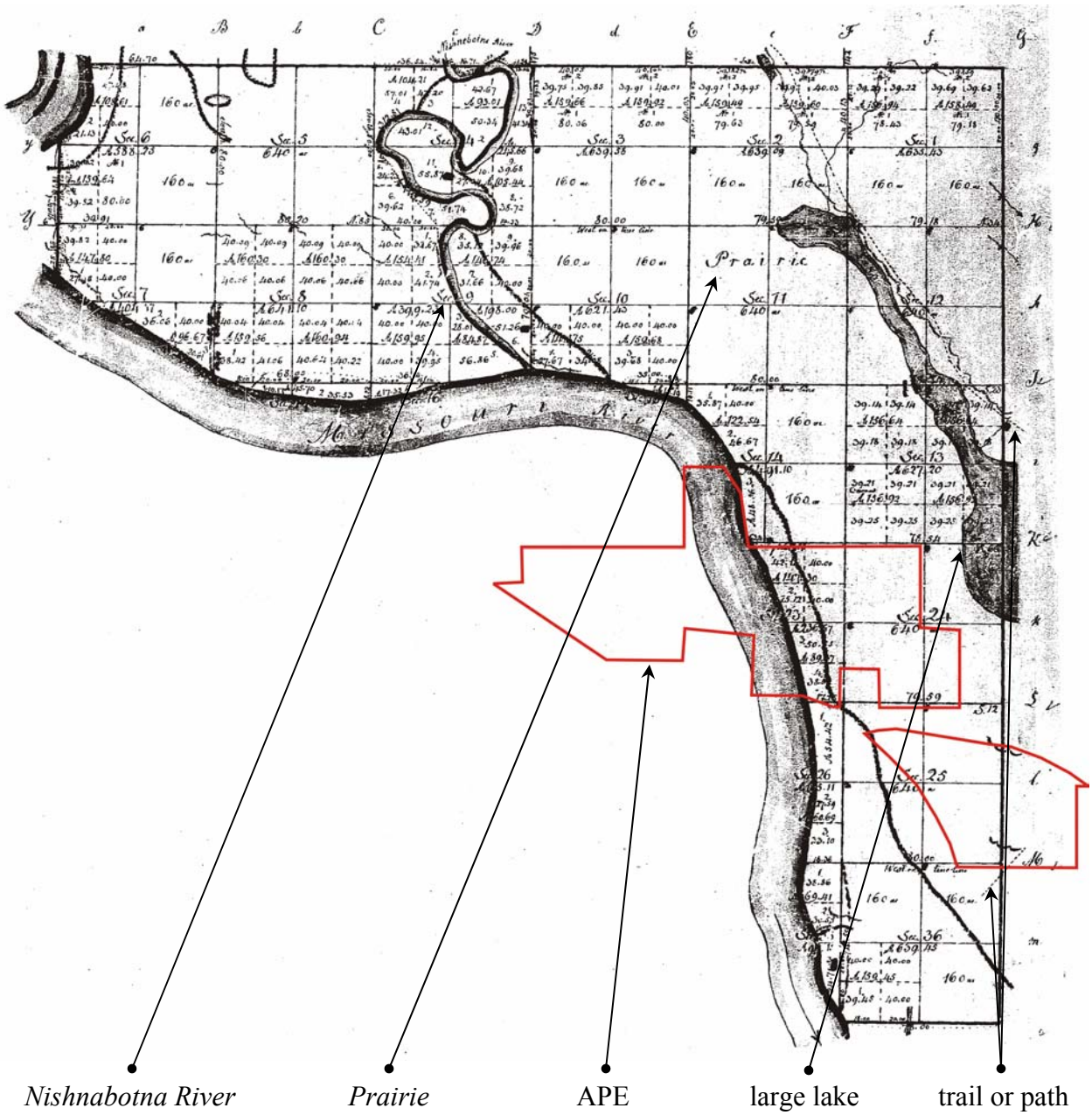


Figure 6. GLO plat of T63N R41W (June 19, 1862).
(call-outs limited to APE and vicinity)

RECORDS REVIEW

The project team requested the Archaeological Survey of Missouri (ASM), and the Nebraska State Historical Society (NSHS) to conduct a file search for information regarding recorded archeological or historic sites that may be located in or adjacent to the APE. No previously recorded sites are on record in the APE (see attached file search results in Appendix 2 and Appendix 4) (Table 5)[4].

Table 5. Previously recorded sites.
(in or adjacent to the APE sections based on ASM records search dated 12 December 2005 and NSHS search dated 13 December 2005)

Township	Section	Results
T3N R17E	3	no previously recorded sites[5]
	4	no previously recorded sites
	5	no previously recorded sites
T4N R17E	33	no previously recorded sites
	34	no previously recorded sites
T63N R40W	30	no previously recorded sites[6]
T63N R41W	14	no previously recorded sites
	23	no previously recorded sites
	24	no previously recorded sites
	25	no previously recorded sites

STEAMBOAT WRECKS

A review of information regarding steamboat wrecks along this portion of the Missouri River indicated that one wreck is potentially located in or near the APE. Capt. H.M. Chittenden's *List of Steamboat Wrecks on the Missouri River* (1897) indicates that on September 4, 1858 the *St. Mary* "was bound from St. Joseph to Omaha, when she struck a snag and broke in two." Captain Chittenden's report also shows that both boat and cargo totaling $18,000.00 were a total loss, but no lives were lost in the accident. These records indicate that the St. Mary was a 300-ton, side-wheeled vessel belonging to owner and Captain, Sam Cabell, and was engaged in Missouri River Trade.

According to the plots from the maps accompanying the Capt. H.M. Chittenden's *List of Steamboat Wrecks on the Missouri River* (1897) the remains of the *St. Mary* are located in the vicinity of "Hemmes Landing," and lies within the eastern portion of the APE (Figure 7). As a result, the wreckage of the *St. Mary* could be affected by the proposed undertaking. No other steamboat wrecks were noted in the vicinity of the APE.

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[4] In addition to the ASM review, Missouri DNR-HPP Section 106 reviewer Judith Deel was contacted for cultural resources information in connection with the referenced project (specifically about previously surveyed areas, recorded site locations, and steamboat wrecks). A review of the records consulted was discussed and Ms. Deel was satisfied with the scope and completeness of the documentation effort.

[5] Based on records search by the Archeological Collections Manager, Nebraska State Historical Society (see appendix).

[6] Based on records search by the Archaeological Survey of Missouri (see appendix).

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 (MRC) 1891 – 1895], 1939 and 1974 USACE river maps, and aerial photographs from 1993 was performed in order to assess the area of accretion occurring in the limits of the APE. River channel maps and the aerial photographs were digitized and overlaid on the base map (comprised of the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangles) to show areas where erosion and deposition has occurred due to natural meandering by, and man-induced changes to, the Missouri River.

The 1803 – 1804 Missouri River map (Figure 7) assembled during the Lewis and Clark Expedition (http://lewisclark.geog.missouri.edu/website/lewisclark1/viewer.htm; Curator of the University of Missouri 2002a) shows that the river passed through roughly 15.3% (288.7 ac; 116.8 ha) of the APE. These maps indicate that a Lewis and Clark campsite was located "On a Sand Island Opposite an Extensive Prairie, July 13, 1804", approximately 2 mi (3.2 km) due west of the modern town of Corning, Missouri (http://lewisclark.geog.missouri.edu/campsites/1804/july13camp.shtml; Curator of the University of Missouri 2002b). The July 13, 1804 campsite is located west of the proposed Corning APE on the Nebraska side of the Missouri River.

The Missouri GLO plat of T3N R17E from 1854 (Figure 8), T4N R17E from 1854 (Figure 9), T63N R40W from 1845 T63N R41W from 1862 (Figure 10) are not considered to be accurate enough to be used for this accretion study. The biggest concern with this map is that the opposite banks of the Missouri River were just drawn as parallel to the bank being recorded. Thus, we have accurate bank lines for Nebraska from the plats of T3N R17E and T4N R17E, and for Missouri with the plat of T63N R41W, but no good way to combine the two. Had both banks of the Missouri River been represented accurately on the GLO plats, they would have been incorporated in the accretion study. Attempting to superimpose these GLO plats onto the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps resulted in a composite of the Missouri River that roughly corresponds with the 1803 – 1804 maps, but was not deemed accurate enough to use.

The 1879 MRC maps (Figure 11) show that the river passed through roughly 29.8% (562.3 ac; 227.6 ha) of the APE. This illustrates a major shift in the river channel from the earlier Lewis and Clark maps of 1803 – 1804 (Figure 7). This change is illustrated as the abandonment of the westward bend that coincided with the western boundary of the APE to run straight south through the APE. The river channel south of the former bend was shown to have shifted to run along the bluff line to the west.

The 1893 MRC maps (Figure 12) show that the river crossed roughly 16.9% (318.9 ac; 129.1 ha) of the APE. There are two notable changes in the 1893 river channel from the 1879

MRC maps (Figure 11). The first is that the channel had shifted to the east, creating a much smoother bend in the river. Second, a small back channel was documented in the eastern portion of the APE (Figure 12).

The 1939 USACE alluvial plain maps (sheets 12 and 13 used in Figure 13) show that the river did not cross any portion of the APE. These maps illustrate that the river course had undergone changes as it was now flowing in one main channel. The 1939 river alignment, for the most part, follows the current river bed shown on the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps. The exception to this is located north of the APE where the channel was shown as being east of the current channel.

The 1940 USACE (Omaha District) Missouri River maps (sheets 10 - 13 used in Figure 14) show that the river crossed roughly 1% (18.9 ac; 7.6 ha) of the APE. These maps illustrate that the river course had undergone changes primarily south of the APE where the channel shifted to the west forming a broad bend in the river as it is today. These maps also show that the river channel had shifted to the south and west, west of the APE. The 1940 river alignment, for the most part, follows the current river bed shown on the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps. This map illustrates the impact of bank stabilization and navigation projects along this portion of the river.

The 1974 USACE (Omaha District) Missouri River maps (sheets 3 - 5 used in Figure 15) show that the river crossed roughly 1% (18.9 ac; 7.6 ha) of the APE. By this time, the Missouri River had been fully channelized and followed the course shown on the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps. This map illustrates the impact of bank stabilization and navigation projects along this portion of the river.

The 1974 USACE (Omaha District) Missouri River maps (sheets 3 - 5 used in Figure 16) show the presumed accretion limits based on the depicted USACE river control structures. These maps show that the river, and the USACE control structures crossed roughly 17.7% (334.0 ac; 135.1 ha) of the APE.

The 1993 USACE aerial photographs show that the river crossed roughly 1% (18.9 ac; 7.6 ha) of the APE. By this time, the Missouri River had been fully channelized and followed the course shown on the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps (Figure 17). This map illustrates the impact of bank stabilization and navigation projects along this portion of the river.

A composite image was created by showing each of the previously described maps layered over the base map comprised of the modern Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984 USGS quadrangle maps (Figure 18). Areas in the APE that are covered by former river channels or bank revetments and dike fields are considered to be accreted lands, and those areas

not covered by the superimposed river channels or bank revetments and dike fields are considered to be non-accreted lands. The composite river mapping data indicates that approximately 38.7% (730.0 ac; 295.4 ha) of the APE has been accreted since the early 19th Century (Figure 18). Approximately 61.3% (1157.0 ac; 468.2 ha) of the APE is non-accreted (Figure 19).

LIKELIHOOD OF UNRECORDED SITES

At least half of the APE has not been accreted since the early 19th Century. These non-accreted areas may have been relatively stable for some time during the prehistoric past as well. Because of this condition, evidence of historic and perhaps prehistoric activities may occur in portions of the APE. Based on this possibility (and the fact that this area has never been reviewed by a professional archeologist), it is recommended that a Phase I cultural resources survey be conducted prior to project implementation (with monitoring as may be required during project implementation) on those areas of non-accreted land that would be affected by land disturbing activities.

UNANTICIPATED DISCOVERY PLAN

If any cultural and/or human remains are uncovered during construction, the work in the site area will be halted until the site area can be evaluated for National Register of Historic Places significance. The Kansas City District, cultural resources personnel will be notified of the discovery and will be responsible for determining site significance. The Corps will coordinate the site findings with the appropriate State Historic Preservation Officer and/or Indian Tribe(s).

CONCLUSIONS AND RECOMMENDATIONS

In accordance with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* and standard protocol for the investigation of potential effects to cultural resources, those previously recorded resources that may be affected by the proposed project have been identified [36 C.F.R. § 800.4(b)]. The APE for the project includes a single tract of land adjacent to the left descending bank of the Missouri River. The entire project results in a total APE of 1,887 ac (763.6 ha) [36 C.F.R. § 800.2(c)]. This APE was documented for previously recorded archeological and historic resources including standing architectural resources to assist the planning team.

The intensity and scope of the investigations in connection with the APE were sufficient to determine whether historic or prehistoric properties were previously recorded that either are on or may be eligible for inclusion on the National Register of Historic Places, or whether additional investigations are necessary to make such a determination. No architectural resources are currently known to be located in or near the APE. It is possible that the remains of the *St. Mary* are located within the eastern portion of the APE. In addition to this possibility, approximately 61.3% (1157.0 ac; 468.2 ha)of the APE has not been accreted since the 1803 - 1804 mapping and should be the focus of Phase I documentation (Table 6, Table 7, and Table 8) in any areas where ground disturbance is planned or may occur.

Table 6. Summary of investigations in the Corning Mitigation Site.

Area	County	Waterway Name	Type of Study Conducted	Results/Recommendation
Corning Mitigation Site	Atchison and Holt Counties, MO	Missouri River	Records Only and Accretion Analysis	Wreckage of the *St. Mary* (side-wheeled steamer that sank on September 4, 1858); Phase I documentation of non-accreted lands in any areas where ground disturbance is planned or may occur; search for and document wreckage of the *St. Mary*

Table 7. Summary of resources in the Corning Mitigation Site.

Resources	Relationship to APE	Recommendations
Wreckage of the *St. Mary* (side-wheeled steamer that sank on September 4, 1858); non-accreted lands	In APE	Phase I documentation of non-accreted lands in any areas where ground disturbance is planned or may occur; search for and document wreckage of the *St. Mary*

Table 8. Summary of results in the Corning Mitigation Site.

Area	Resources	Recommendations
Corning Mitigation Site	Wreckage of the *St. Mary* (side-wheeled steamer that sank on September 4, 1858); non-accreted lands	Phase I documentation of non-accreted lands in any areas where ground disturbance is planned or may occur; search for and document wreckage of the *St. Mary*

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PROJECT PARTICIPANTS

JOHN L. GRAY IV produced the report graphics, authored various sections of the report, and assisted in archival research for the report. Mr. Gray received a B.A. in Anthropology from the University of Arkansas in 1991 and has extensive experience in archeology throughout the Midwest.

TIMOTHY C. KLINGER served as principal investigator and authored various sections of the report. Mr. Klinger received an M.A. in Anthropology from the University of Arkansas in 1977 and a J.D. from the University of Arkansas School of Law in 1982. He is a member of the Registry of Professional Archeologists and is an attorney at law licensed by the State of Arkansas.

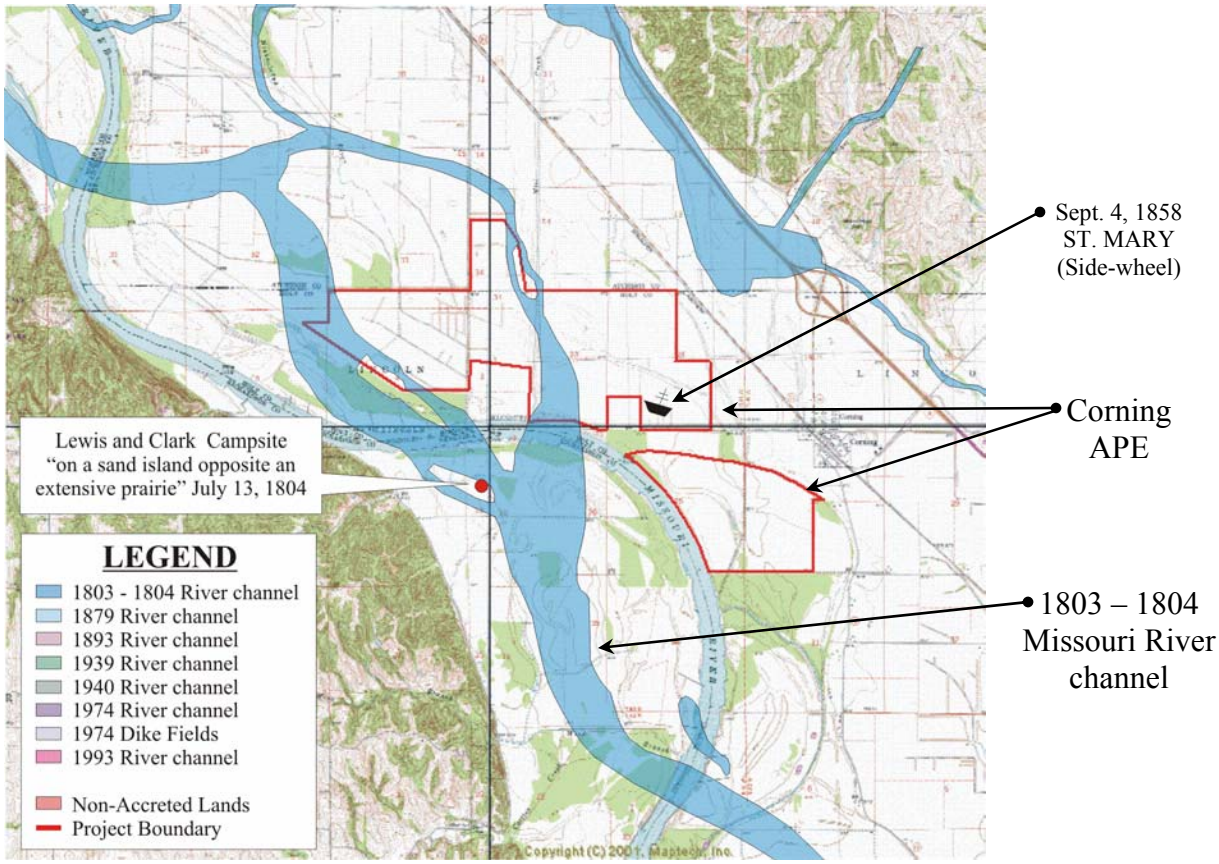

Figure 7. Course of the Missouri River based on the 1803 – 1804 Lewis and Clark map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from http://lewisclark.geog.missouri.edu/website/lewisclark1/viewer.htm; Curators of the University of Missouri 2002a;
wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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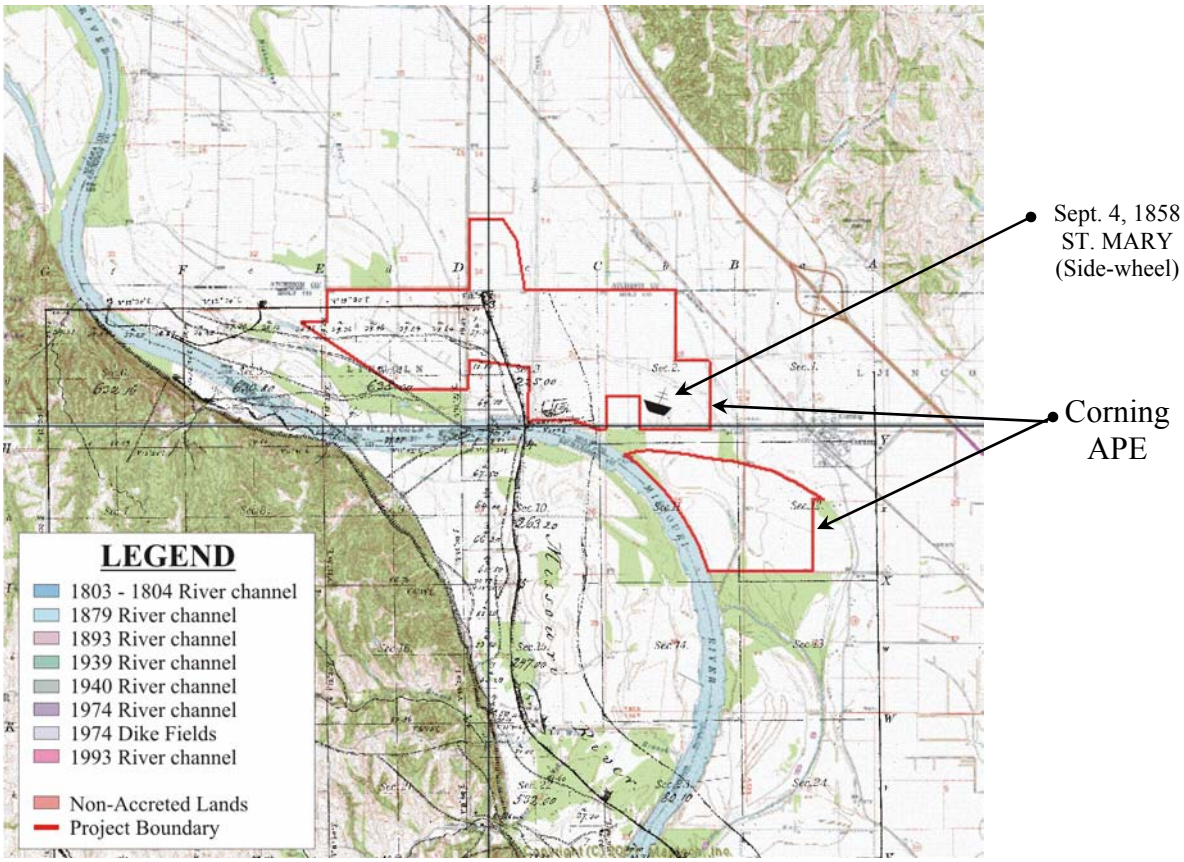

Figure 8. Course of the Missouri River based on the 1854 GLO plat of T3N R17E.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from GLO plat T3N R17E dated July 17, 1854; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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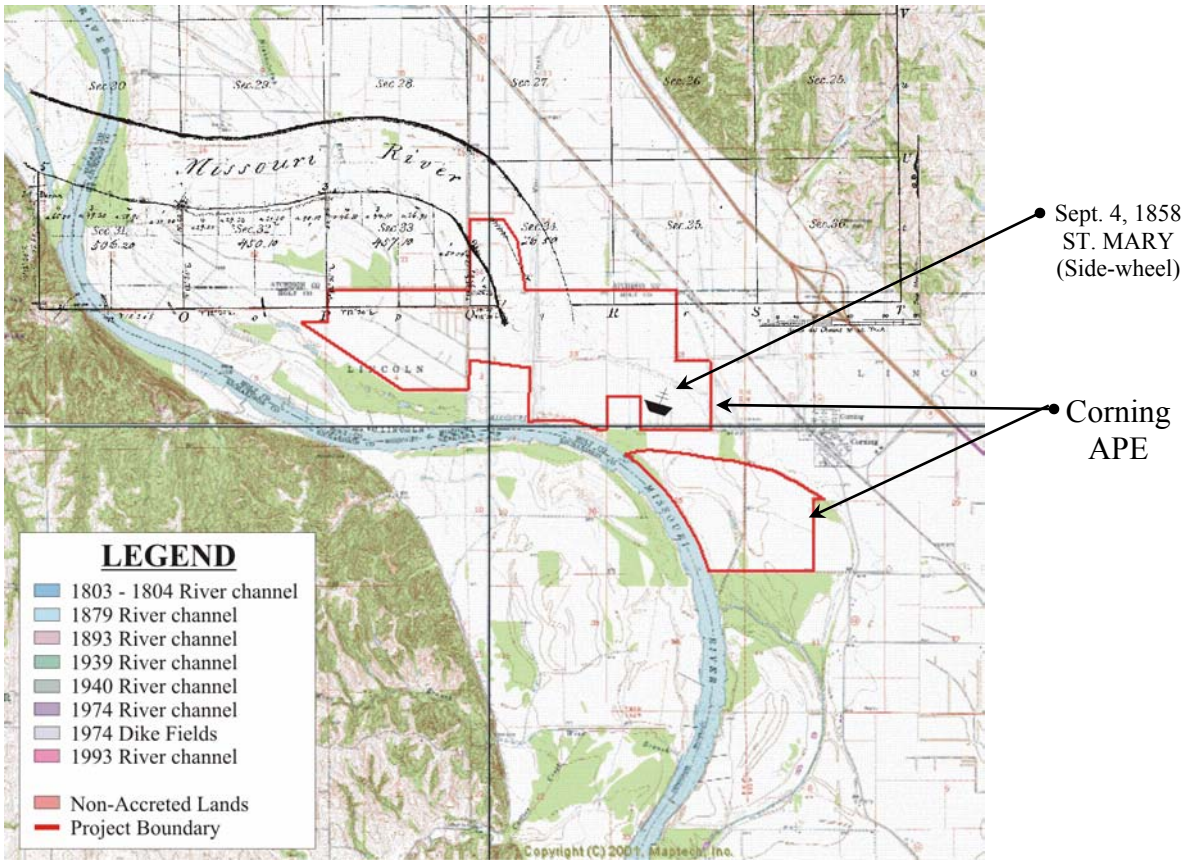

Figure 9. Course of the Missouri River based on the 1854 GLO plat of T4N R17E.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from GLO plat T4N R17E dated July 17, 1854; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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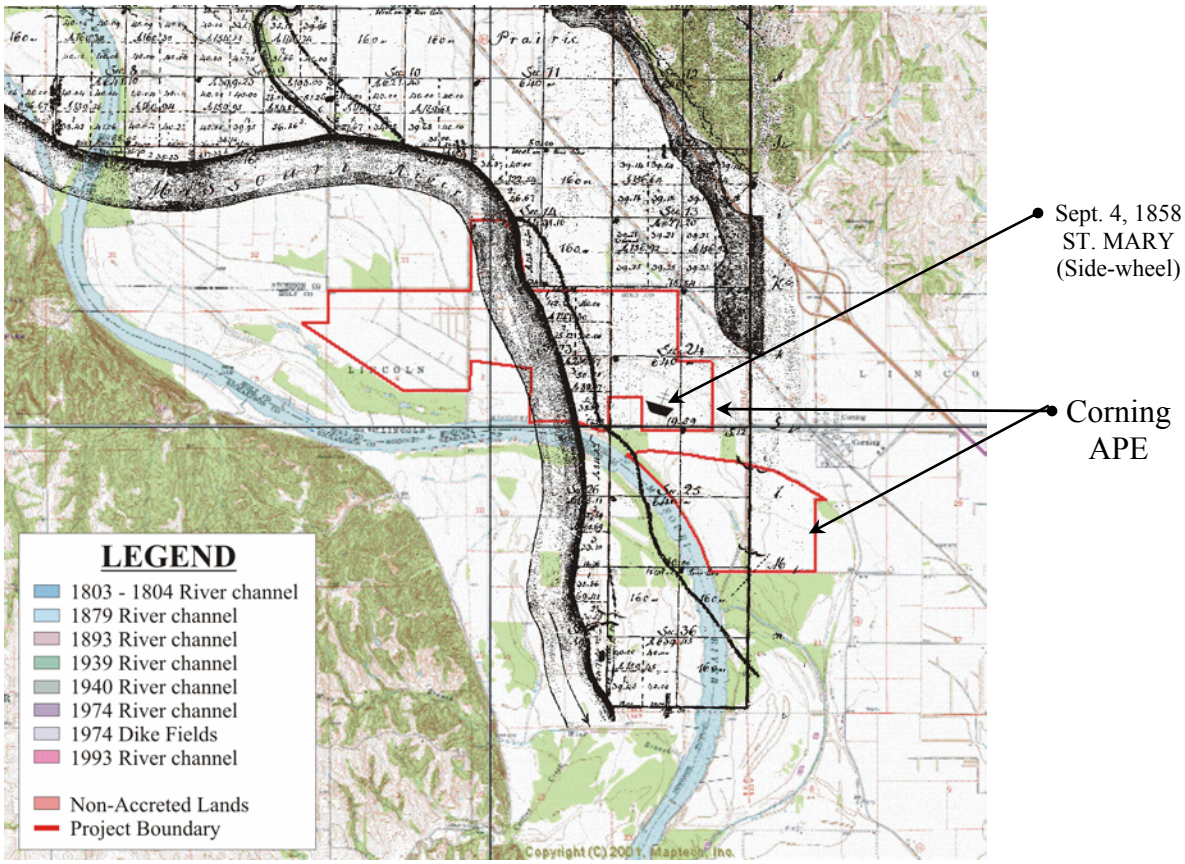

Figure 10. Course of the Missouri River based on the 1862 GLO plat of T63N R41W.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from GLO plat T63N R41W dated June 19, 1862; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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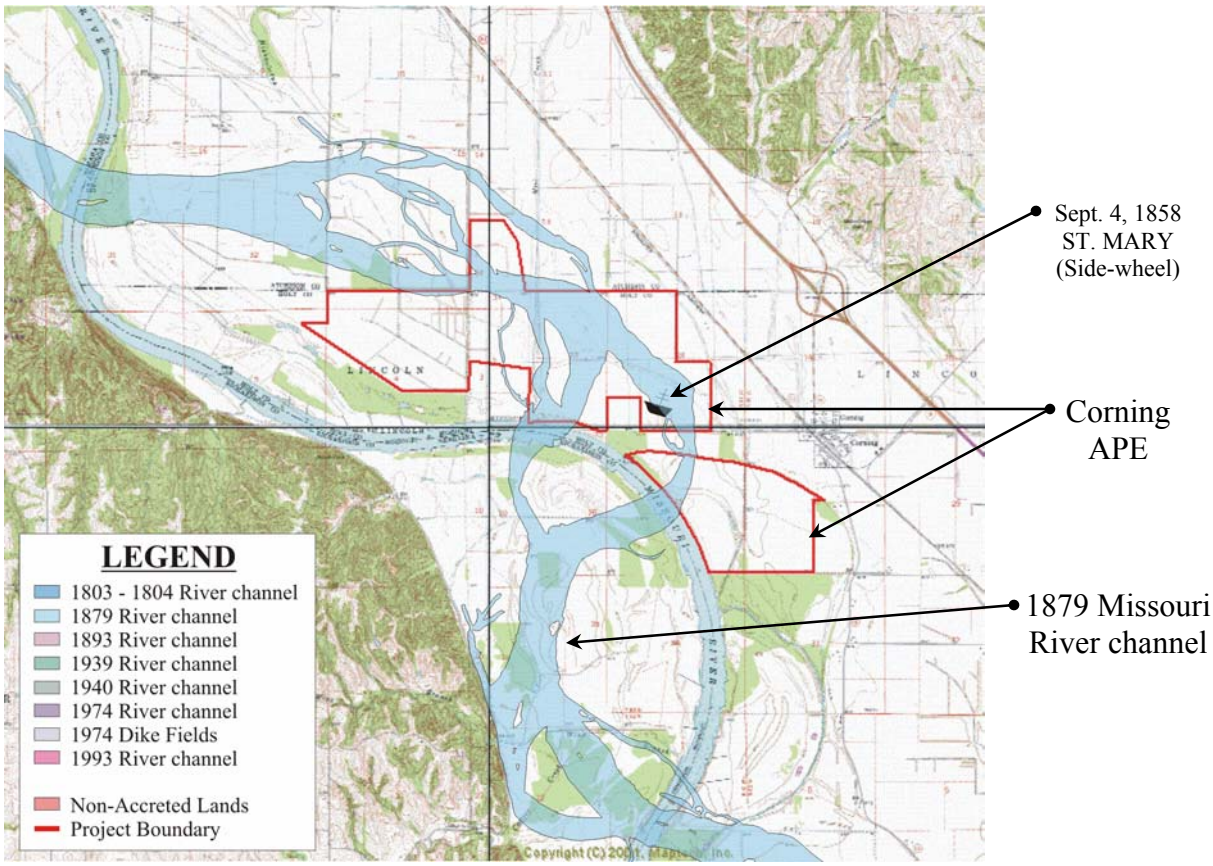

Figure 11. Course of the Missouri River based on the 1879 MRC map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from Missouri River Commission 1879: Plates XIX & XX; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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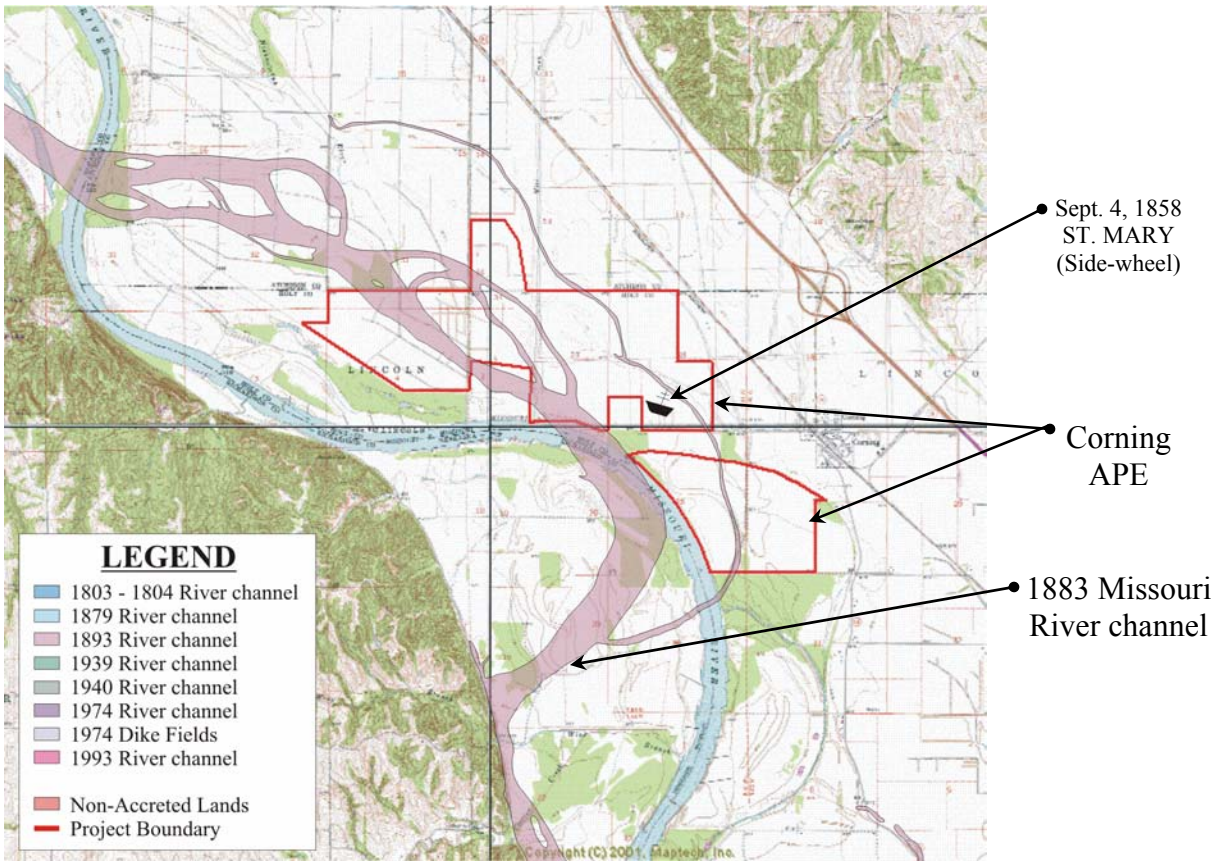

Figure 12. Course of the Missouri River based on the 1893 MRC map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from Missouri River Commission 1893: Plates XIX & XX; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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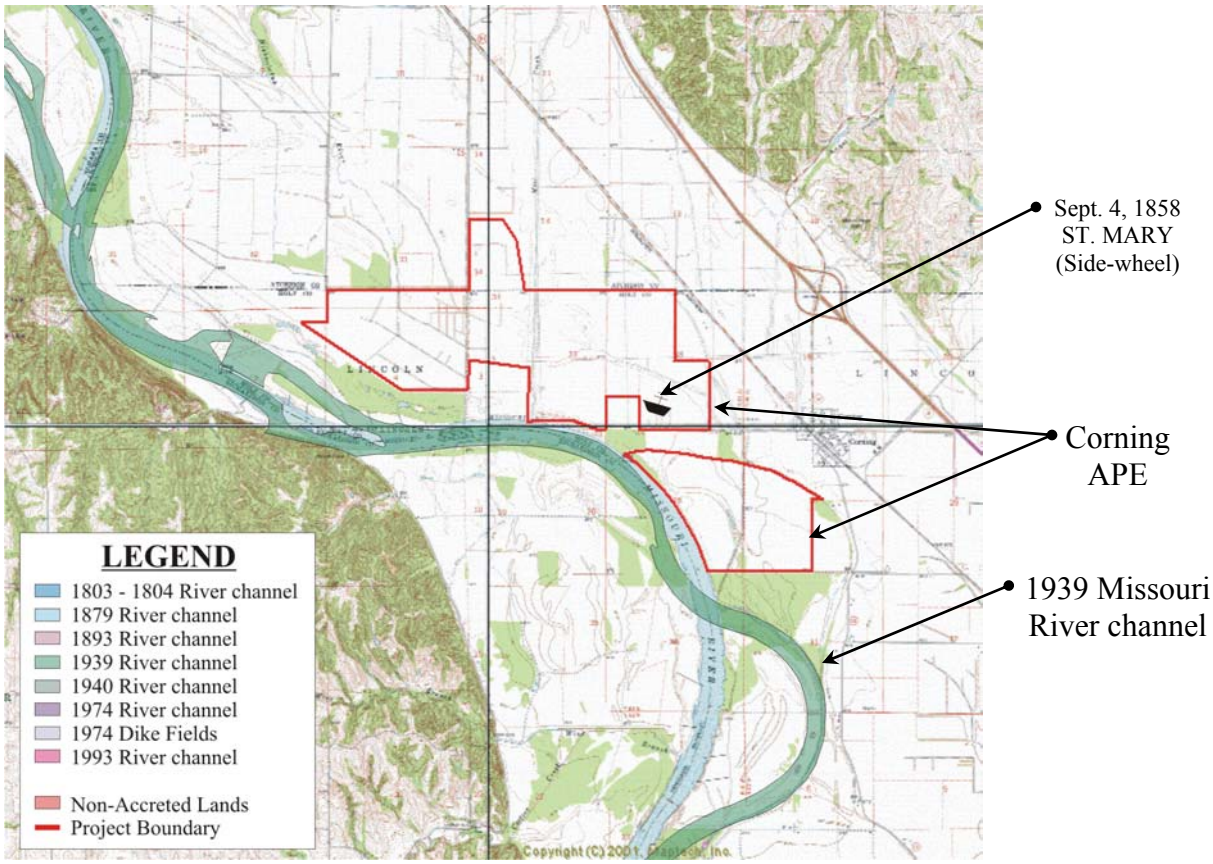

Figure 13. Course of the Missouri River based on the 1939 USACE alluvial plain map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from USACE, Omaha District, alluvial plain map 1939: Sheets 12 & 13; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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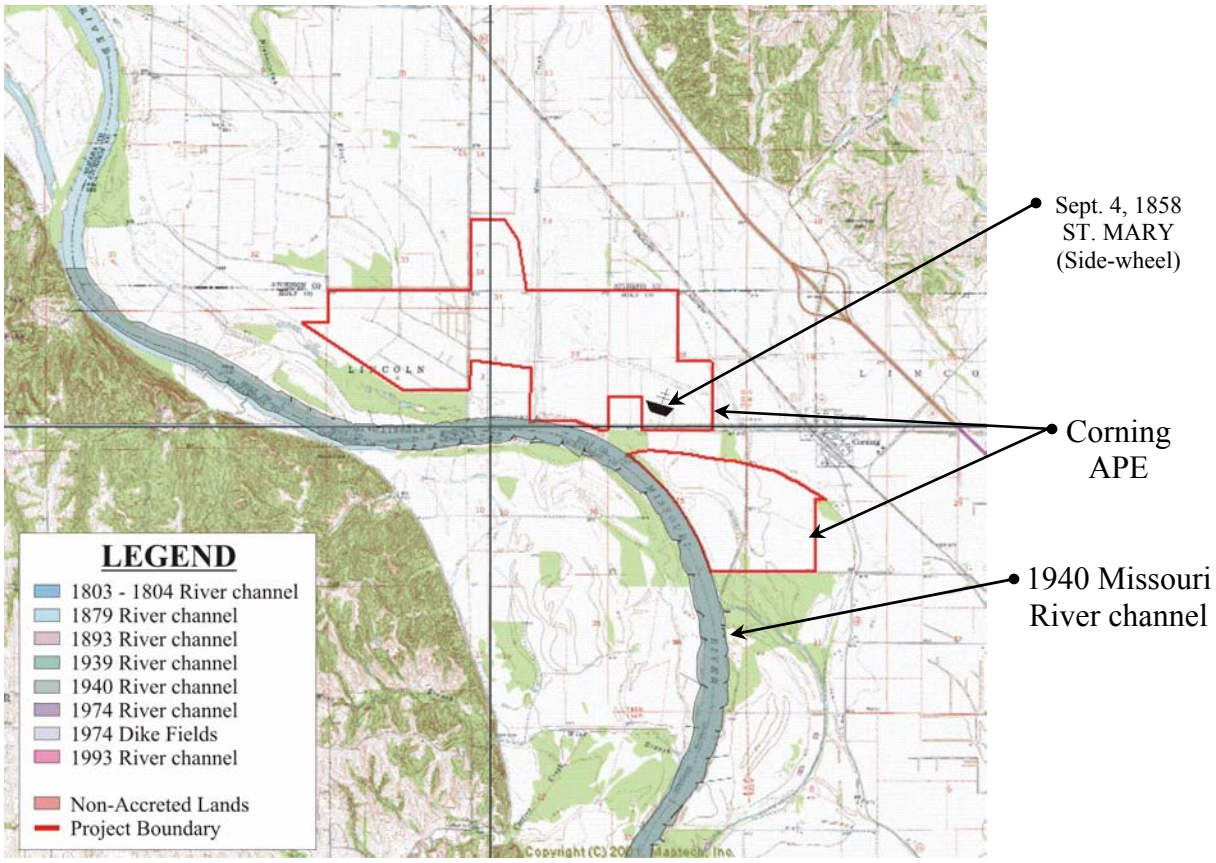

Figure 14. Course of the Missouri River based on the 1940 USACE River Banks map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from USACE, Omaha District, Missouri River map 1940: Sheets 10-13;
wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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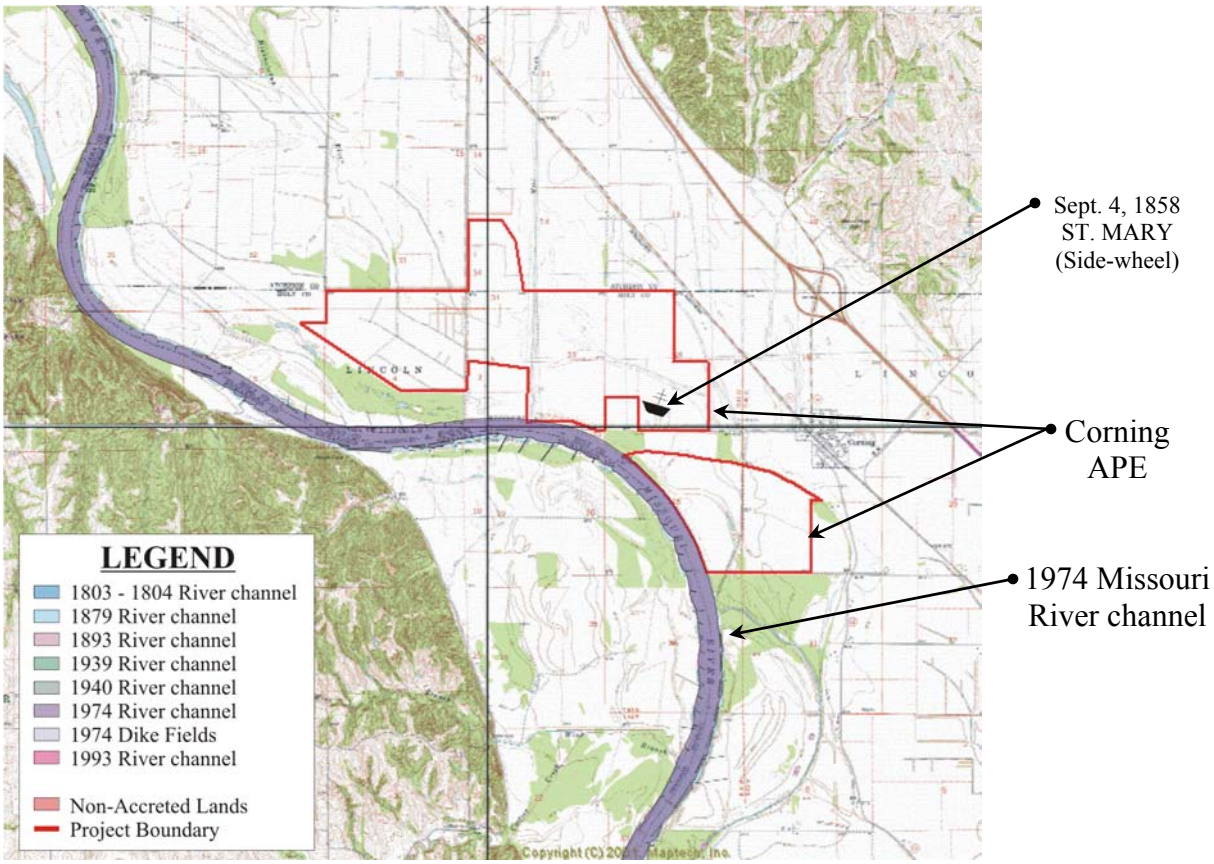

Figure 15. Course of the Missouri River based on the 1974 USACE map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from USACE, Omaha District, Missouri River map 1974: Sheets 3-5;
wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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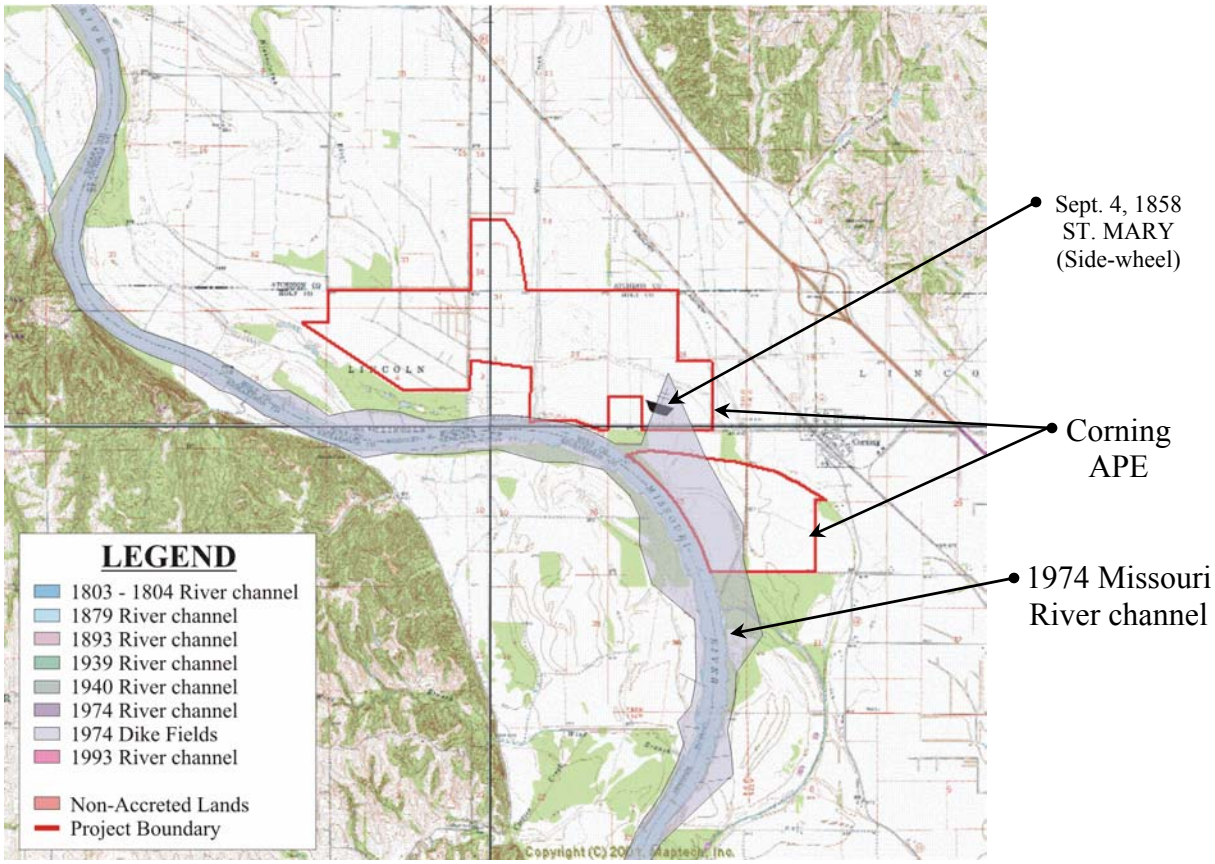

Figure 16. Bank revetments and dike fields based on the 1974 USACE map.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from USACE, Omaha District, Missouri River map 1974: Sheets 3-5;
wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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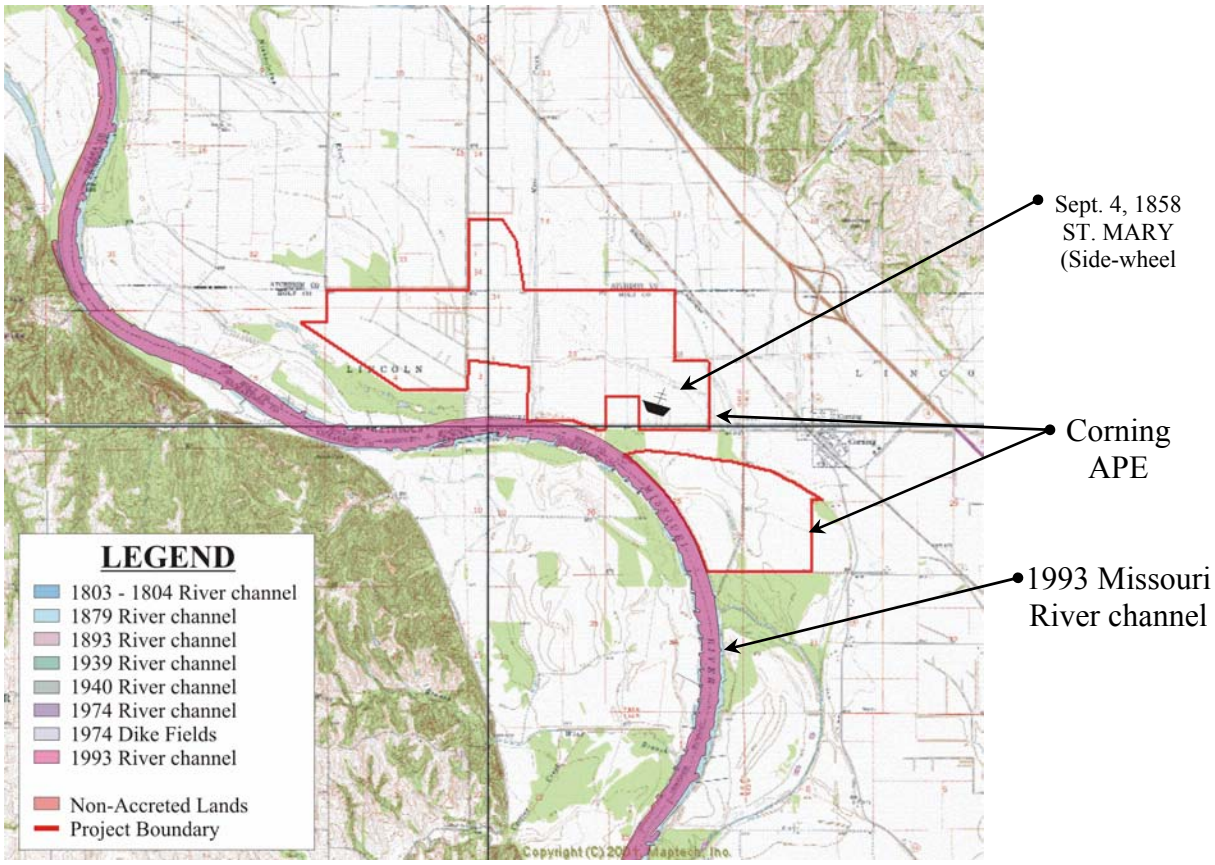

Figure 17. Course of the Missouri River based on 1993 USACE aerial photographs.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from USACE, Omaha District, aerial photograph 1993; wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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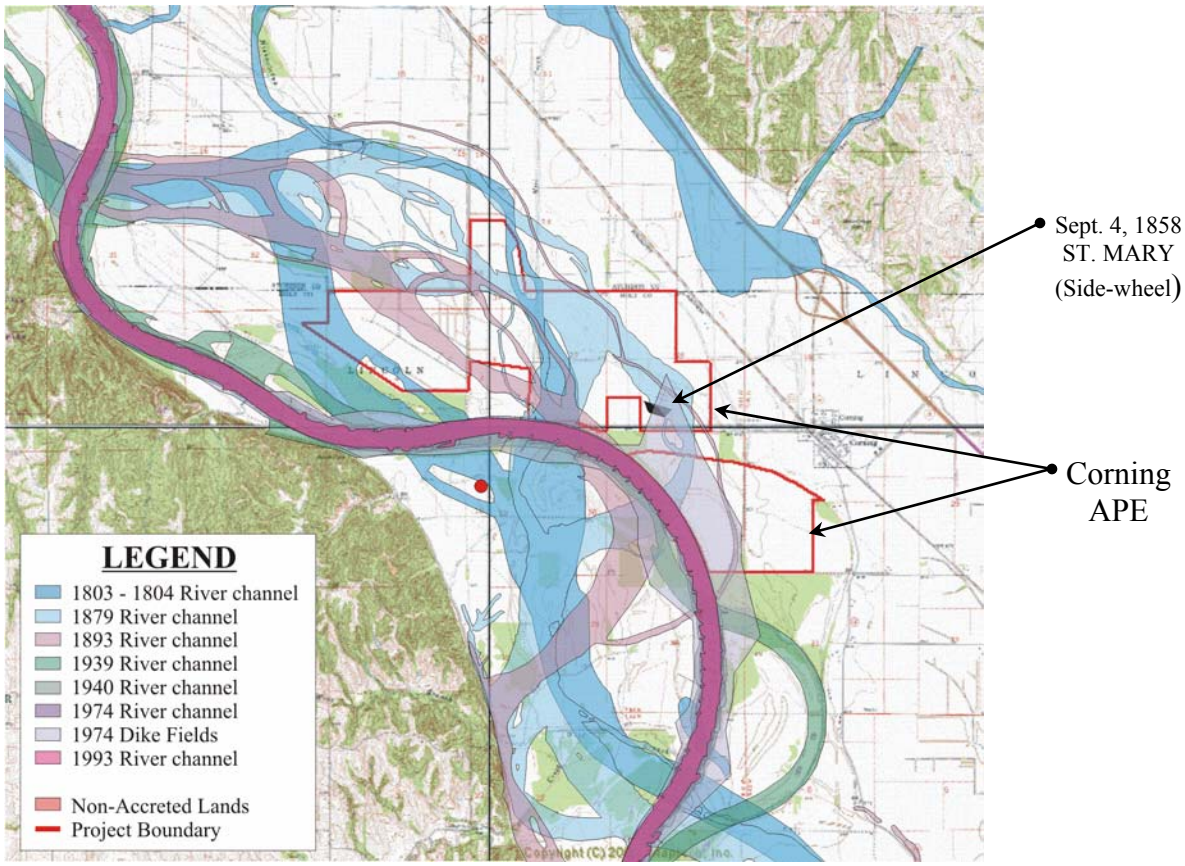

Figure 18. Accreted lands.

(Channels from 1803, 1879, 1893, 1939, and 1974 maps, 1944 and 2000 aerials, and 1996 aerial with bank revetments and dike fields)
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966,
Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[from http://lewisclark.geog.missouri.edu/website/lewisclark1/viewer.htm; Curators of the University of Missouri 2002a; from Missouri River Commission 1879: Plates XIX & XX; from Missouri River Commission 1893: Plates XIX & XX; from USACE, Omaha District, alluvial plain map 1939: Sheets 12 & 13; from USACE, Omaha District, Missouri River map 1940: Sheets 10-13; from USACE, Omaha District, Missouri River map 1974: Sheets 3-5; from USACE, Omaha District, aerial photograph 1993;
and from wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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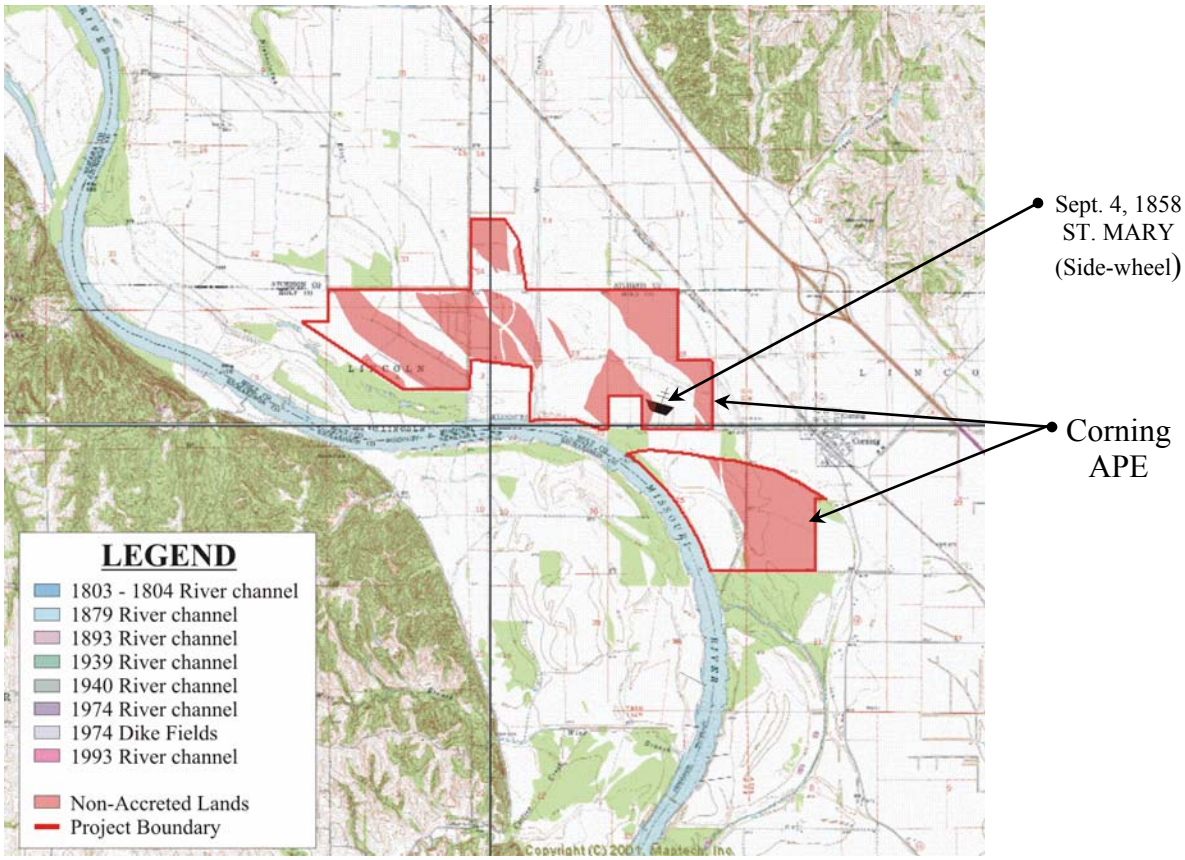

Figure 19. Non-accreted lands.
(USGS Corning, MO.-NEBR. 7.5' 1966 PR 1984, Barada, NEBR.-MO. 7.5' 1966, Fairfax, MO. 7.5' 1981, and Langdon, MO.-NEBR. 7.5' 1966 PR 1984)
[wreck data from MRC Steamboat Wrecks on the Missouri 1897: Plate 69]

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Archaeological Survey of Missouri
Request for Information

ASM Identification Number_____ **Date** 12-8-2005

This ASM file search was requested by Timothy C. Klinger

Organization **Historic Preservation Associates**

Address **P.O. Box 1064, Fayetteville, Arkansas 72702**

Project Type CRM ☒ MAS Member ☐ Other ☐

Project Name **COE-KCD Corning Fish & Wildlife Mitigation Site (W912DQ-05-D-0004) - Holt & Atchison Counties. Missouri**

Federal Agency/Project Sponsor **Kansas City District, Corps of Engineers**

ASM file search specification supplied by user (List by County, Township, Range, and Section):

T3N R17E 6th PM Section(s) – 3, 4, 5, 6
T4N R17E 6th PM Section(s) – 31, 32, 33, 34
T63N R41W 5th PM Section(s) – 13, 14, 15, 16, 17, 23, 24, 25, 36
T63N R40W 5th PM Section(s) – 18, 19, 20, 29, 30, 31, 32

University of Missouri–Columbia

Appendix 1. ASM Request for Information (12-08-05).

Archaeological Survey of Missouri
Request for Information
© University of Missouri–Columbia

ASM Identification Number: 05-12-161 **Date:** December 12, 2005

Requested by: Timothy C. Klinger Organization: Historic Preservation Associates

Address: P.O. Box 1064, Fayetteville, Arkansas 72702

Project Type: CRM (x) MAS Member ( ) Other ( )

Project Name: COE-KCD Corning Fish & Wildlife Mitigation Site (W912DQ-05-D-0004)- Holt & Atchison Counties

Federal Agency/Project Sponsor: Kansas City District, Corps of Engineers

ASM file search specifications supplied by user (List by County, Township, Range, and Section)

Holt and Atchison Counties T3N, R17E, S3, 4, 5
T63N, R41W, S23, 24, 25, 32, 33, 34
T63N, R10W, S30

Results of ASM File Search

No sites located

University of Missouri-Columbia

Appendix 2. ASM Request for Information Results (12-12-05).

John L. Gray, IV

From: Timothy C. Klinger [tklinger@hpa-106.com]
Sent: Friday, December 09, 2005 3:39 PM
To: 'Rene Botts'
Cc: 'John L. Gray, IV'
Subject: COE-KCD Corning Fish & Wildlife Mitigation Site (W912DQ-05-D-0004) - Holt & Atchison Counties. Missouri

Records Search Request

1. Your name – Timothy C. Klinger
2. Your telephone number and fax number – 479-442-3779, 479-582-3779 FAX
3. Project – KCD COE Missouri River Nishnabotna Mitigation Area
4. Affiliation, company, or government agency – Historic Preservation Associates
5. Mailing address – P. O. Box 1064, Fayetteville, Arkansas 72702
6. Billing address (if different from mailing address) – same
7. Indication if you want the information mailed or faxed to you – Both plus e-mail if possible
8. Section, Township, Range and section portion (¼ or ½; if applicable) for each location –
   T4N R17E 6th PM Section(s) – 31
   T4N R17E 6th PM Section(s) – 3, 4, 5, 6, 7, 8, 9, 10, 15
   T63N R41W 5th PM Section(s) – 25, 26, 35, 36
9. Limits of search (i.e. just sections listed; listed sections and sites directly adjacent to those sections; radius from location in meters or miles; or other means of identifying the entire area)

Thanks in advance for your quick attention to this request. Please e-mail and/or mail the results. Tim

[*Rene – This request supercedes the requested we made via e-mail on 6 December 2005. The attached file illustrates the area of interest. We are conducting this bi-state review to more fully document the context of the project and also take into account the changing course of the Missouri River – the GLO teams worked off of both the 5th and the 6th PM in this area and the river has made what was at the time on the west, now on the east, and visa versa. This is a complicated area and we appreciate your assistance. Since this is a new request, please charge as appropriate.*]

Your Cultural Resources Professionals throughout the Southeast, Southwest, Midwest, and Plains including Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, Tennessee, Kentucky, Missouri, Iowa, Kansas, Oklahoma, Texas, and New Mexico

Timothy C. Klinger, JD, CEP, REP, RPA, NREP
Associate
Director and Principal Investigator

HISTORIC PRESERVATION ASSOCIATES, LLC
P. O. Box 1064
Fayetteville, AR 72702
90 South College Avenue
Fayetteville, AR 72701

tel: 479-442-3779

1/9/2006

Appendix 3. Nebraska State Historical Society Request for Information (12-09-05).

12/13/2005 04:19 4024713316 ARCH AND SHPO PAGE 01

NEBRASKA STATE HISTORICAL SOCIETY
1500 R STREET, P.O.BOX 82554, LINCOLN, NE 68501-2554
(402) 471-3270 Fax: (402) 471-3100 1-800-833-6747 www.nebraskahistory.org

FAX COVER SHEET

This fax is considered a confidential document.

			FROM:
TO:	**Timothy C. Klinger**		**Administration** Fax: 402-471-3100
Fax:	**479-582-3779**	X	**Archeology** Fax: 402-471-3316
From:	**René Botts**		**Gerald R. Ford Conservation Center** Fax: 402-595-1178
Phone:	**402-471-4766**		**Historic Preservation** Fax: 402-471-3316
Date:	**December 7, 2005**		**Library/Archives** Fax: 402-471-8922
Time:	**3:00 PM**		**Museum of Nebraska History** Fax: 402-471-3314
Pages:	**Including cover sheet 13**		**Research & Publications** Fax: 402-471-3100

Visit our website at: www.nebraskahistory.org

The mission of the Nebraska State Historical Society is to safeguard and interpret Nebraska's past and make it accessible in ways that enrich present and future generations.

MESSAGE:

Dear Tim,

Attached please find a copy of your request, three GIS produced maps, and copies of two site forms (25NH51 and 25NH510). I should have sent NH51 and NH510 before. There will be no additional charges for this information.

The survey references are still:

93-0039 Bozell, John R. 1993 An Archeological Survey of a Proposed Development Near St. Deroin Townsite, Indian Cave State Park, Nemaha County, Nebraska.

01-0008 Nelson, Trisha 2000 NHAP-PSS STPB-64(19), Lincoln Bend Wetland Bank.

Sincerely,

René A. Botts
Archeological Collections Manager
Nebraska State Historical Society
P.O. Box 82554
Lincoln, NE 68501

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Appendix 4. Nebraska State Historical Society Request for Information Results (12-13-05).

Appendix D

Baseline Habitat Assessment

Appendix D
Baseline Habitat Assessment

The following documents are included within this appendix: Baseline Shallow Water Habitat Assessment and Baseline Terrestrial Habitat Assessment.

Baseline Terrestrial Habitat Assessment

for the Corning Mitigation Site

Introduction

The Corning Mitigation Site (Corning Site) is comprised of 1,887.50 total acres owned by the U.S. Army Corps of Engineers (Corps). Parcels for the Corning Site were acquired from private willing sellers from 2000 - 2002. Approximately 743.30 acres of the total is enrolled as a Natural Resources Conservation Service (NRCS) Wetlands Reserve Program (WRP) easement. Existing habitat components include agricultural fields, early successional fields and grasslands, seasonally flooded wetlands, and a narrow band of riparian forest. The site is generally undeveloped with over one mile of river frontage. Federal levee units 519 and 536 currently protect land on the floodplain. The Corning mitigation site is generally divided into two areas separated by a small strip of private land owned by three separate landowners. Management responsibilities for the Corning Site are contracted to MDC under a Cooperative Agreement. Habitat development at the Corning Site to date has generally included warm season grass plantings and fallowing farmland.

Methods

Methodology used to evaluate baseline (pre-project) habitat conditions for the year 2000 follows the guidance established in the Missouri River Fish and Wildlife Mitigation Program Draft Monitoring and Evaluation Plan (Corps, 2004). The methodology generally consists of a desktop photo interpretation evaluation using aerial photography (or infrared photography if available) from specific years (or best available data) and classifying the habitat types on the Corning Site using the National Wetland Inventory (NWI) and National Land Cover Data (NLCD) classification systems. This methodology relies on skills to photo interpret imagery and on knowledge of land use types and land management typical of the region and on the Corning Site. The Corps of Engineers performed the existing conditions analysis using 2003 color infrared aerial photography. Pre-project conditions were evaluated by using 2000 color aerial photography data. The 2000 aerial photography consisted of aerial photos taken in both winter and summer conditions. The winter aerial photography was flown by the Corps of Engineers down the Missouri River and the summer photography was flown by USDA for crop compliance purposes.

Results and Discussion

The baseline (year 2000) habitat conditions of the Corning Site are found in Table 1 below and in Figure 1.

TABLE 1: Baseline Terrestrial Habitat Conditions at the Corning Mitigation Site

Baseline Habitat Type	Acres
Main Channel, Deep Water	N/A
Main Channel, Shallow Water	N/A
Main Channel, Sand bars/shoreline	N/A
Side Channels or Chutes	N/A
Backwater Areas	N/A
Scour/Blow Holes	3.72
Tributaries and streams	N/A
Emergent Wetlands	54.76
Scrub-shrub Wetlands	59.63
Forested Wetlands	8.76
Developed	4.96
Barren	N/A
Forested	16.49
Shrubland	1.83
Orchard/Vineyard	N/A
Grassland	4.39
Cultivated, Levees	1732.96
Total	1887.50

Although there are a variety of habitats on the Corning Site as shown in Table 1, the predominant habitat type (92%) was cultivated land in crop production.

Literature Cited

US Army Corps of Engineers. 2004. Missouri River Fish and Wildlife Mitigation Program Draft Monitoring and Evaluation Plan. Kansas City and Omaha Districts.

US Army Corps of Engineers. 2000. Mr. Sids mosaic images along the Missouri River.

US Department of Agriculture, FSA. 2000. Crop compliance slides, Holt County, Missouri.

HDR | ONE COMPANY *Many Solutions*℠

Technical Memorandum

Subject:	Baseline Shallow Water Habitat Analysis		
Client:	Kansas City District Corps of Engineers		
Project:	Missouri River Mitigation - Corning Site PIR	Project No:	000000000029759
Date:	09/28/2005		
By:	Raziul Mollah, HDR Kansas City		

Document2

Distribution:

John Denlinger, HDR Kansas City; Tim Fobes, HDR Kansas City; Jeff Turner, HDR Kansas City

Introduction

The amount of existing shallow water habitat (SWH) was estimated at the Corning Mitigation Site (Corning Site). Shallow water habitat is defined by the US Fish and Wildlife Service (USFWS) 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 velocity of flow for most of the year. The Corning Site is adjacent to the left descending bank of the Missouri River, between River Miles (RM) 514 and 517. A portion of this bank area is privately-owned property. Therefore, the bank area used to estimate the SWH is generally limited to RM 514 to 515 (Figure 1). The existing SWH was estimated from the best available data.

Median August Discharge and Corresponding Water Surface Elevations

For the purposes of this baseline SWH analysis, the median August discharge and corresponding Missouri River water surface elevations were developed along the Corning Site. Discharge records along the Missouri River were available from U.S. Geological Survey (USGS) gaging stations. The nearest USGS gaging station to the Corning Site is located approximately 16 river miles downstream near Rulo, Nebraska (USGS 06813500). The gage records at Rulo were used for the Corning Site.

Hydraulic rating curves were then developed for the Corning Site. These rating curves were developed from Missouri River cross-sectional data including the following sources:

- Sounding data provided by the Omaha District
- Point elevation data provided by the Omaha District
- 1994 hydrographic survey report
- USGS topographic mapping

At the Corning Site, the calculated water surface elevations at the median August discharge ranged from 863.2 ft NGVD at the downstream end to 863.5 ft NGVD at the upstream end of the shallow water habitat location.

Baseline Shallow Water Habitat

The baseline SWH was estimated for the Corning Site from the data sources listed above. Two representative cross section locations were selected to estimate the baseline SWH. At each of these cross sections, the amount of baseline SWH was calculated at the water surface elevation corresponding to the median August discharge, and at several elevations both above and below. The SWH measured at each cross section was then translated into acres of SWH based on the distance between the cross sections and the overall riverbank length of the site. The overall riverbank length and the corresponding SWH acres are based on Corps-owned lands along the Missouri River bank. The available SWH acres existing at the Corning Site are provided in Table 1.

TABLE 1
Effects of Water Depth on Existing Shallow Water Habitat Availability at the Corning Site

+/- Water Surface Elevation at Median August Discharge (feet)	Shallow Water Habitat Available (acres)
-5	2.8
-4	2.8
-3	2.9
-2	2.9
-1	3.0
0	3.2
1	3.2
2	3.7
3	5.9
4	7.9
5	10.0

NOTES:

Average main river channel velocity used in the analysis was 3 - 5 ft/sec. Water velocity along the bank would be expected to be significantly less.

Further Considerations

The baseline SWH estimates presented above are based on limited available data. The majority of the SWH is located directly along the riverbank. The Omaha District sounding data and the Missouri River Hydrographic Survey provided riverbed elevations along the Corning Site. The USGS topography and the Omaha District mapping provided elevation data for the overbank and floodplain areas. However, there is no data available to define the geometry of the existing riverbank at the site. The available data has been used to develop approximations of the riverbank geometry, and the SWH was estimated using this approximated riverbank geometry data. The accuracy of the SWH estimates could be greatly improved by obtaining more detailed riverbank geometry data from site-specific field survey consisting of bank cross sections from the toe of the riverbank to the top of the federal levee along the Missouri River.

References

USACE Omaha District (1994). Missouri River Hydrographic Survey, Ponca State Park to Rulo Nebraska.

USACE Kansas City District. Aerial Photography for the Corning Site.

USACE Northwest Division. Missouri River Shallow Water Habitat Report for 2004.

USGS Topographic Mapping (1984), Langdon Quadrangle, MO.-NEBR.

USGS Topographic Mapping (1981), Fairfax Quadrangle, MO.

USGS Topographic Mapping (1984), Corning Quadrangle, MO.-NEBR.

USACE Omaha District (1994). Missouri River Sounding Data.

USACE Omaha District. Point Elevation Data at Corning Site.

HABITAT CLASSIFICATIONS

HABITAT TYPE	DESCRIPTION	NWI CODE	NLCD CODE	ACRES
AQUATIC	MAIN CHANNEL, DEEP WATER	R2	NOT USED	N/A
AQUATIC	MAIN CHANNEL, SHALLOW WATER	R2UBH	NOT USED	N/A
AQUATIC	MAIN CHANNEL, SAND BARS/SHORE	R2US	NOT USED	N/A
AQUATIC	SIDE CHANNELS OR CHUTES	R2UBN	NOT USED	N/A
AQUATIC	BACKWATER AREAS	R2UBG	NOT USED	N/A
AQUATIC	SCOUR/BLOW HOLES	L1	NOT USED	3.94
AQUATIC	TRIBUTARIES AND STREAMS	R2	NOT USED	N/A
WETLAND	EMERENT WETLANDS	PEM	NOT USED	54.76
WETLAND	SCRUB-SHRUB WETLANDS	PSS	NOT USED	59.41
WETLAND	FORESTED WETLANDS	PFO	NOT USED	8.76
UIPLAND	DEVELOPED	N/A	20	16.46
UIPLAND	BARREN	N/A	30	N/A
UIPLAND	FOREST	N/A	40	16.61
UIPLAND	SHRUBLAND	N/A	50	1.83
UIPLAND	ORCHARD/VINEYARD	N/A	60	N/A
UIPLAND	GRASSLAND	N/A	70	4.39
UIPLAND	ULTIVATED, LEVEES	N/A	80	1721.35
			TOTAL ACRES	1887.50

HDR
HDR ENGINEERING INC.
4435 MAIN, SUITE 1000
KANSAS CITY, MISSOURI 64111
PHONE: (816)360-2700

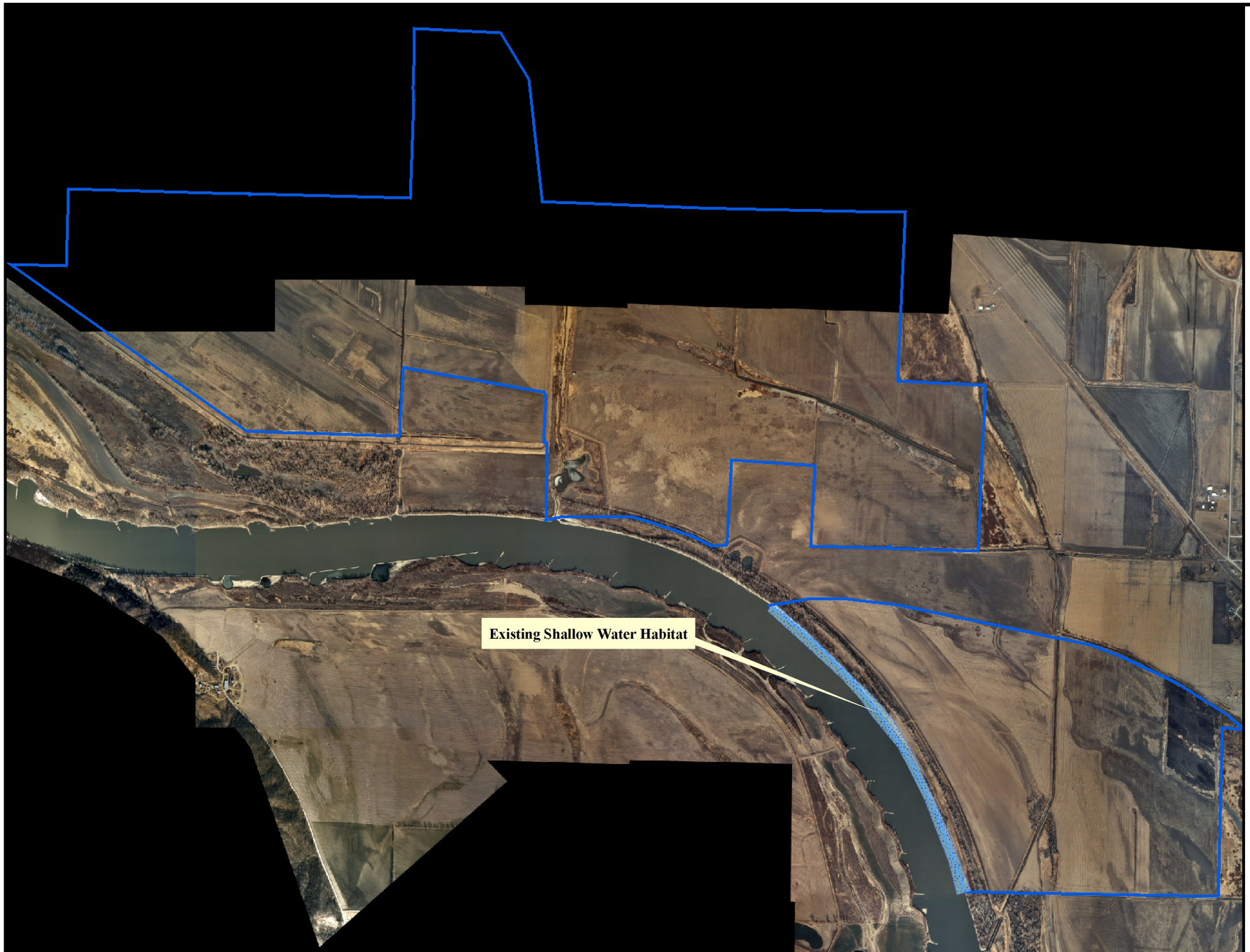
US Army Corps of Engineers

CORNING BASELINE TERRESTRIAL HABITAT

DATE
SEPT., 2005

FIGURE
1

C:\WINDM\29759\DWG\CORNING BEND.DWG, plot, 9/28/2005 10:01:51 AM, scampbel



US Army Corps of Engineers
Kansas City District

Corning Site

Missouri River
Fish and Wildlife Mitigation

Figure 1: Estimated Shallow Water Habitat at the Corning Site

Legend

Existing SWH

Corning Site

N

0 1,000 2,000 Feet

HDR

Appendix E

Biological Assessment

Appendix E
Biological Assessment

The following documents are included within this appendix: Biological Assessment.

BIOLOGICAL ASSESSMENT
FOR THE CORNING MITIGATION SITE

1.0 INTRODUCTION

Under provisions of the Endangered Species Act of 1973 (16 U.S.C. Section 1531 et seq., as amended), Federal agencies are directed to conserve threatened and endangered species and the habitats in which these species are found. Federal agencies are required to ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened and endangered (T&E) species or their critical habitat. This Biological Assessment (BA) provides documentation to meet Federal requirements for the proposed action. This BA only addresses Federally-listed T&E species.

The proposed habitat development of the Corning Mitigation Site (Corning Site) is considered a construction activity, thus a BA must be prepared to address potential impacts to Federally-listed or proposed T&E species. This BA has been prepared in accordance with Section 7 of the Endangered Species Act and in accordance with the 1998 procedures set forth by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service.

1.1 PURPOSE AND NEED

The purpose of the Missouri River Fish and Wildlife Mitigation Program (Mitigation Program), and site-specific projects, is to mitigate the loss of fish and wildlife habitat due to the Missouri River Bank Stabilization and Navigation Project (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 including diverse fish and wildlife habitat and species, and

the changing public values that have placed significant importance on 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 and flooding of the river and thus have allowed for land clearing and 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 be lost as a result of the construction, operation, and maintenance of the BSNP.

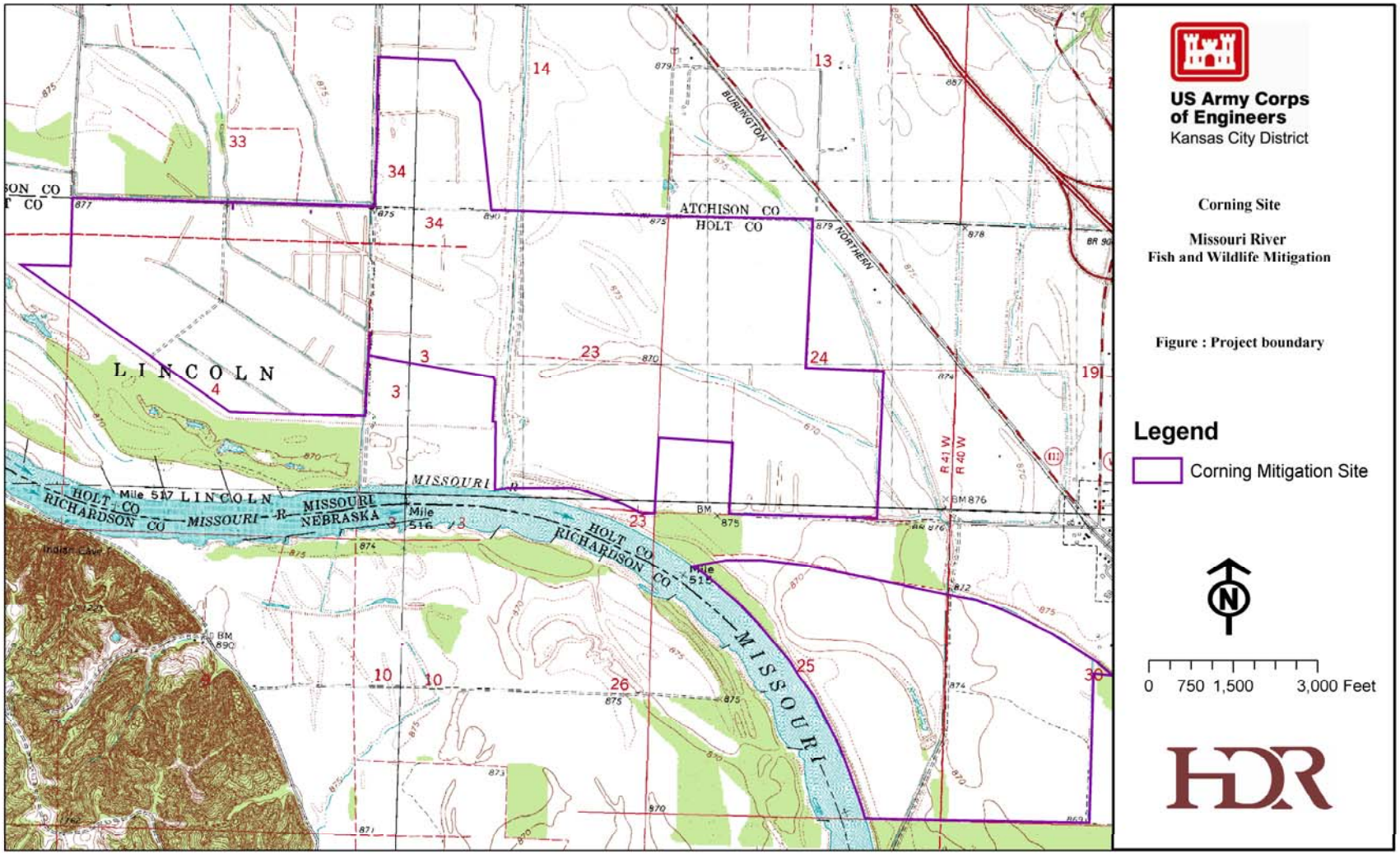
Habitat loss and resultant adverse impacts to fish and wildlife resources need to be mitigated as authorized by the U.S. Congress through the Water Resources Development Acts of 1986 and 1999. Acquisition and development of lands along the Missouri River need to occur to adequately mitigate the resources lost to channelization and bank stabilization.

To achieve the objective of the Mitigation Program, public and non-public lands suitable for developing, restoring, and preserving aquatic and terrestrial habitats were identified. One site identified for acquisition and habitat development was the property now known as the Corning Site. Development of the Corning 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.

1.2 PROJECT DESCRIPTION

The Corning Site is located approximately one mile west of Corning, Missouri (Figure B-1). The Corning Site is comprised of 1,887 acres and is owned by the U.S. Army Corps of Engineers (Corps). The Corning Site has approximately one mile of river frontage. The Corning Site is located within rural Holt and Atchison Counties, Missouri and is adjacent to the left descending bank of the Missouri River approximately between river miles (RM) 514 to 517.

Figure B-1. Corning Site, Project Location



The Corning Site lies in portions of 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. The Corning Site is currently divided into two areas with small tracts of private land in between owned by three separate landowners. The northern area of the Corning Site 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 Corning Site is protected from flooding by FLUs L-536 and L519, a small tributary drainage ditch separates the two levee units. The Corning Site's 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 Corning Site is protected from flooding by FLU L-519.

The project would include the use of various activities to develop fish and wildlife habitat on the Corning Site. These methods would include incorporation of the Natural Resource Conservation Service (NRCS) wetland restoration plan for land under easement in the Wetland Reserve Program (WRP); modifications to Mill Creek; creation of shallow water habitat, and wetlands; tree plantings; food plots; and development of terrestrial habitats. In addition, limited amounts of agricultural leasing would likely be required to maintain open areas until habitat improvements begin. This practice would also provide some cropland for food plots and provide protection from wildlife damage on adjacent lands. Natural succession would be allowed to take place on the Corning Site 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. In addition to the development of wetlands as part of the NRCS wetland restoration plan, other suitable locations for wetlands on Corning were determined by conducting an inundation analysis. A majority of the proposed tree plantings would likely occur on the western boundary of the southern area of Corning.

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, using mixes of grass containing water tolerant species. As previously stated, natural succession, including cottonwood and willow communities in forest areas, would be allowed to take place on Corning the Corning Site where favorable conditions exist.

2.0 THREATENED AND ENDANGERED SPECIES

Information regarding species biology, habitat, and range was gathered from USFWS and publications referenced herein. The information provided through these various sources was assumed to be correct in context and data. No intensive surveys of the Corning Site or vicinity were conducted. The status, conservation measures, and determination of effect for each species are also summarized in this document. As previously noted, this BA only addresses Federally-listed T&E species.

The list of Federal T&E species that are reported to occur in the project area was provided by the USFWS in correspondence dated September 8, 2005 and included in Appendix A. The following species were identified:

- Bald eagle (*Haliaeetus leucocephalus*)
- Pallid sturgeon (*Scaphirhynchus albus*)

An impact assessment was conducted for T&E species known to, or thought likely to, occur within the project area based on current available information. Habitat requirements, distribution, project impacts, conservation measures, and determination of effect for each species are discussed in this section.

2.1 BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*)

Federal Status:	Threatened	Critical Habitat:	No
State Status:	Endangered	Recovery Plan:	Yes

2.1.1 Species Biology and Habitat Requirements

Adult bald eagles are large, dark brown, with a white head, white tail, and large yellow beak. During the first four years, the plumage of immature bald eagles is dark brown

with varying amounts of white. The immature has a white streaked wing lining and a mottled white tail with a wide dark band at the tip. Bald eagles have tan upper wing coverts that contrast with the dark brown primaries and secondaries (Jacobs 2001). Females generally weigh up to 14 pounds and have a wingspan up to 8 feet. Males are smaller, weighing 7 to 10 pounds with a wingspan of 6 ½ feet. Life span of bald eagles in the wild can reach 30 years (Corps 2003).

Bald eagles nest in large trees with specific size and structural characteristics. Proximity to shorelines of lakes, rivers, or seacoasts and sufficient distance from human activity also influences their selection of nesting sites. Bald eagles usually nest in the same territories each year and often use nests repeatedly (Corps 2001). Wintering bald eagles require night roosts located in sheltered timber stands near an abundant food supply such as fish, waterfowl, or carrion.

Bald eagles are uncommon breeders along some of the major rivers and larger reservoirs in the state. The period from January 1^{t} to March 1^{t} is important for initiating nesting activity. The most critical time for incubation and rearing of young is from March 1 to May 15 (USFWS 2005).

During the winter, bald eagles congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. Wintering eagles usually occupy river habitats between November 15 and March 1 and use large diameter [greater than 11 inches diameter breast height (dbh)] cottonwoods, sycamores, and other riparian trees as daytime perches and night roosts. Eagles tend to roost on trees greater than 63 feet above ground level. They usually perch within a riparian corridor or along lakeshores and prefer areas with limited human activity. At night, wintering bald eagles may congregate at communal roosts and will travel as much as 20 kilometers (12 miles) from feeding areas to a roost site (USFWS 2005).

2.1.2 Distribution

Bald eagles occur over most of North America at some time during the year and breed at specific locations over at least half of the continent. The largest populations occur in the Pacific Northwest, western Canada, and southern Alaska. Bald eagles are common migrants and winter residents throughout the lower Missouri River and are uncommon breeders along some of the major rivers. A Bald eagle nest is known to exist at the

Thurnau Mitigation Site located approximately five miles down stream from the Corning Site.

There is potential for the bald eagle to be present within the project limits, predominantly during the winter months.

2.1.3 Effects of the Proposed Project

The proposed project is located in a geographic area with potential habitat and potential presence of the bald eagle. The bald eagle would likely benefit indirectly from construction of the proposed project because the increased terrestrial and 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 could cause a relatively minor adverse affect by causing disruptions of normal behavior and by displacing eagles to non-preferred, marginal habitat (Stalmaster 1978). However, no known nests occur in the vicinity of the Site, and any disturbance would be temporary in nature and would cease when construction has been completed.

During the construction of shallow water habitat there would potentially be clearing of a few potential roosting/perching trees, however, selection of locations where the revetment would be notched and construction of a pilot channel would attempt to avoid removal of roosting/perching trees. Therefore, construction of shallow water habitat would have minimal impact on the species due to an abundance of alternative roosting/perching sites within the project area and along the Missouri River.

The proposed project would result in long-term beneficial effects to the bald eagle from the restoration of shallow water habitat and terrestrial habitat including bottomland forest that would provide additional roosting and nesting trees and increased prey.

2.1.4 Conservation Measures

A field survey would be conducted prior to construction activities to identify existing bald eagle roost, perch, or nest sites. If these are discovered, the Corps would coordinate with USFWS to establish buffer zones in construction area(s) to prevent adverse impacts on eagles.

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 (USFWS 2005). Measures would be taken to minimize the loss of trees matching this description such as locating revetment notches to minimize the potential loss of perching and roosting trees.

2.1.5 Determination of Effect

The proposed project may affect, but is not likely to adversely affect, the bald eagle. Mitigation measures outlined as conservation measures in Section 2.1.4 Conservation Measures and in the proposed action would reduce the level of impact to insignificant.

2.2 PALLID STURGEON (*SCAPHIRHYNCHUS ALBUS*)

Federal Status:	Endangered	Critical Habitat:	No
State Status:	Endangered	Recovery Plan:	Yes

2.2.1 Species Biology and Habitat Requirements

Pallid sturgeon have a flattened, shovel-shaped snout; a long, slender, and completely armored caudal peduncle; and they lack a spiracle (USFWS 1993). The mouth is toothless, protrusible, and ventrally positioned under the snout. The principal features distinguishing the pallid sturgeon from the shovelnose sturgeon are the paucity of dermal ossifications on the belly, 24 or more anal fin rays, and 37 or more dorsal fin rays (Pflieger 1975). Pallid sturgeon is one of the largest freshwater fish in North America and specimens have been reported approaching 86 pounds (USFWS 1993).

Pallid sturgeon is well adapted to life on the bottom in swift waters of large, turbid, free-flowing rivers (USFWS 1993). Pallid sturgeon prefer riverine habitat with rocky or sandy substrate and water depths of 4 to 5 meters (Duffy et al. 1996). Limited data is available concerning preferred habitats in Missouri, but the species has been captured in tributary mouths, over sandbars, along main channel borders, and in deep holes elsewhere in the Missouri and Mississippi Rivers (USFWS 2005). Small sturgeon have been captured in off-channel backwaters (USFWS 2005). The ratio of wild pallid sturgeon to all river sturgeon collected has dropped from 1 in 398 (0.25%) previously collected to 1 in 647

(0.15%) collected from 1996-2000 (Grady et al. 2001). All but one of the pallid sturgeon collected by Grady et al. (2001) were collected in deep holes associated with wing dikes and the remaining fish was collected in a side channel border habitat.

Sexual maturity for males is estimated to be 7 years to 9 years with intervals between spawning of 2 years to 3 years. Females are not expected to reach sexual maturity until 7 years to 15 years with up to 10-year intervals between spawning. Pallid sturgeons are long lived with individuals perhaps reaching 50 years of age (USFWS 1993).

2.2.2 Distribution

The range of the pallid sturgeon is primarily the Missouri River and the Mississippi River downstream of its confluence with the Missouri River (USFWS 2005). The pallid sturgeon is very rare throughout its range.

2.2.3 Effect of the Proposed Project

The proposed project is located in a geographic area with potential habitat and potential presence of the pallid sturgeon. The goal of the Mitigation Program, of which the Corning Site is a component, is to create fish and wildlife habitat. The proposed project at the Corning Site is primarily intended to be development of terrestrial habitat, however, some shallow water habitat along the Missouri River bank or at the mouth of Mill Creek may be developed that would provide additional habitat for the pallid sturgeon. The proposed project is anticipated to result in beneficial effects to the pallid sturgeon.

2.2.4 Conservation Measures

The pallid sturgeon may benefit from project actions therefore no conservation measures are required for this species.

2.2.5 Determination of Effect

The proposed project may affect, but is not likely to adversely affect the pallid sturgeon. Project actions would be beneficial to the species.

3.0 CONCLUSION

The T&E species identified in this BA have potential to occur or the species habitat potentially occurs on the Corning Site. 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 terrestrial and aquatic habitat at the Corning Site. These activities would result in long-term benefits to both of the listed species discussed herein. Project actions would be beneficial to the pallid sturgeon, therefore this species is classified as "may affect, but is not likely to adversely affect." Without conservation measures, there is a potential for impacts to the bald eagle, however, long-term benefits are anticipated. With planned conservation measures in place, potential impacts to the species can be classified as "may affect, but is not likely to adversely affect."

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U.S. Fish and Wildlife Service (USFWS). 1993. Pallid sturgeon recovery plan. U.S. Fish and Wildlife Service, Bismarck, North Dakota.

U.S. Fish and Wildlife Service (USFWS). 2005. Personal communication, Letter from Charles M. Scott. September, 8, 2005.

Appendix F

Environmental Permits and Clearances

Appendix F
Environmental Permits and Clearances

The final version of the Environmental Permits and Clearances appendix will include the following documents: MDNR, Water Pollution Control Program, Form E – Application for General Permit (Form E); MDNR, Water Pollution Control Program, Form G – Application for Storm Water Permit Under the General Permit: Land Disturbance (Form G); and Missouri Emergency Management Agency (SEMA), Engineering "No-Rise" Certification. For this Draft PIR submittal, this appendix includes the following document: Storm Water Pollution Prevention Plan (SWPPP).

Section 402 of the CWA requires that a NPDES permit be acquired for discharge of storm water on construction sites that disturb one or more acres of land. The Water Pollution Control Program of the MDNR maintains authority over this permit program for the state of Missouri. The MDNR general permit Form G covers storm water discharges for land disturbances over one acre. MDNR Form E must be submitted concurrently.

MDNR permit requirements include the preparation of a SWPPP. The SWPPP is prepared to ensure the design, implementation, management and maintenance of Best Management Practices in order to reduce the amount of sediment and other pollutants in storm water discharges associated with land disturbance activities; comply with the Missouri Water Quality Standards; and ensure compliance with the terms and conditions of the general land disturbance permit.

Section 60.3 (d) (3) of the National Flood Insurance Program (NFIP) regulations states that a community shall "prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed

encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood discharge." (1995 SEMA; http://www.sema.state.mo.us/) Submittal of the "No Rise" Certification satisfies this requirement.

STORM WATER POLLUTION PREVENTION PLAN

Corning Mitigation Site
Atchison and Holt Counties, Missouri

Prepared for:

U.S. Army Corps of Engineers

June 2006

Prepared by:

HDR

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CORNING MITIGATION SITE
STORM WATER POLLUTION PREVENTION PLAN
PROJECT NO: 29759

1.0 INTRODUCTION

This Storm Water Pollution Prevention Plan (SWPPP) has been prepared for the Corning Mitigation Site (site), as part of the Missouri River Fish and Wildlife Mitigation Program to ensure the design, implementation, management, and maintenance of Best Management Practices (BMP) in order to reduce the amount of sediment and other pollutants in stormwater discharges associated with land disturbance activities; comply with the Missouri Water Quality Standards; and ensure compliance with the terms and conditions of the general land disturbance permit.

This SWPPP was written with the assistance of and information from the September 1992 EPA guidance document *Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices;* and the 1995 Missouri Department of Natural Resources' (MDNR) guidance document *Protecting Water Quality: A field guide to erosion, sediment and storm water best management practices for development sites in Missouri*.

This SWPPP also incorporates the requirements of MDNR's stormwater discharge permitting requirements (a copy of the general permit and the respective Notice of Termination (NOT) are included in Appendix A to this plan).

All contractors and subcontractors must read and follow the SWPPP for the project.

2.0 SITE DESCRIPTION

2.1 Location

The Corning Site is located approximately one mile west of Corning, Missouri. 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.

2.2 Owner and Operator

The owner of the project is the U.S. Army Corps of Engineers (USACE), Kansas City District. Their address is:

U.S. Army Corps of Engineers
Kansas City District
700 Federal Building
601 East 12th Street
Kansas City, Missouri 64106-2896
Attn: David R. Hibbs
Phone: (816) 389-3136

The primary operator of the site is the Missouri Department of Conservation (MDC). Their Address is:

Missouri Department of Conservation
St. Joseph Conservation Center
701 N.E. College Drive
St. Joseph, MO 64507
Attn: Nate Mechlin
Phone: (660) 744-6201

The Corps would be in charge of all aspects of construction for this project. A contractor or contractors would do the actual construction, but the Corps would oversee the work. All decisions would be made by the Corps. The Corps and MDC entered into a cooperative agreement in 2003 for the operation, maintenance, repair, and rehabilitation of the site.

2.3 Construction Description

Construction would consist of river structure modifications (revetment notches with associated pilot channels) and modifications to the scour hole near the mouth of Mill Creek to create shallow water habitat and installation of a water control structure.

2.4 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).

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).

2.5 Runoff Coefficient

The current and final runoff coefficient for the site is approximately 0.20.

2.6 Site Area and Estimated Disturbance

The site is approximately 1,887 acres of which approximately 0.1 to 3.0 acres would be disturbed by modifications to river structures, Mill Creek, and installation of a water control structure. Wetlands would be protected by silt fencing or similar sediment control measures.

2.7 Site Map

A topographic map showing the site boundaries is included in Appendix B.

2.8 Sequence of Major Activities

The typical order of activities would be as follows:

1. Installation of the necessary erosion and sediment control devices prior to construction. These control devices (i.e., silt fence, straw bales, diversion dikes, etc.) would remain in place until all soil disturbing activities have been completed and a uniform perennial vegetative cover with a density of 70 percent has been established, or equivalent measures have been implemented;
2. Clearing of designated areas for construction;
3. Construction of access roads;
4. Modifications to river structures, modifications to the scour hole on Mill Creek, installation of a water control structure,; and
5. Final stabilization.

2.9 Name of Receiving Waters

The receiving waters for this project would be the Missouri River and Mill Creek. The Missouri River borders the south and west boundary of the site.

2.10 Pollutants

The primary pollutant sources are disturbed soils and subsequent surface water runoff within the construction area. Other potential pollutant sources could include petroleum products associated with the construction equipment. However, it is not anticipated that petroleum products would likely be stored in bulk on-site.

2.11 Construction Access

The site is easily accessible by existing roads from the east. If necessary, additional access roads would be constructed. These roads would have a soil base and could be topped with gravel. All on-site parking and equipment staging areas would be graveled.

3.0 EROSION AND SEDIMENT CONTROLS

Erosion and sediment controls are implemented during the construction period to prevent and/or control the loss of soil from the construction site into receiving waters associated to the project. Erosion and sediment control devices would be temporary or permanent features.

It is unlikely that temporary stabilization would be required due to the short duration of the proposed construction activities associated with this project. If needed however, temporary stabilization practices could include temporary seeding, mulching, sand bagging, vegetative buffer strips, erosion control mats, protection of trees, preservation of mature vegetation, etc. to maintain soils in disturbed areas so that they are less apt to be carried off-site by storm water runoff or wind. Disturbed areas of the site where construction activities temporarily cease for 21 days would be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in the area. Disturbed areas would be seeded with a native grass mix approved by the MDC.

Permanent stabilization practices would include seeding, mulching, fertilizing, topsoil, erosion control blankets, compost, erosion stabilization mats, etc. Disturbed areas of the

site where construction activities cease permanently would be stabilized with permanent seed no later than 14 days after the last construction activity in the area. Disturbed areas would be seeded with a native grass mix approved by the MDC. Additionally, trees and shrubs could be planted to help stabilize the soil by holding soil particles in place.

Mulches which would include straw, woodchips, and soil adhesives, etc. would be used to protect recently seeded areas from raindrop impacts, increase soil infiltration, and provide seeded areas with cover, organic matter and greater moisture holding capacity. Additionally, gravel would be used on temporary access roads and parking areas.

3.1 Structural Practices

Structural practices such as silt fences, straw bales, diversion dikes, etc. would be used to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices would be implemented during construction to minimize erosion and sediment runoff.

3.1.1 Silt (Filter) Fences

Silt fences would be installed to effectively retain sediment-laden runoff from leaving the project site immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (clearing and grubbing, excavation, embankment, and grading). Additionally, these fences slow down the velocity of the runoff. Silt fences would be placed perpendicular to the flow of runoff, parallel to the contours, and down slope of disturbed areas. Additionally, silt fences could be placed around spoil piles in work areas.

3.1.2 Straw Bales

Straw bales would be used during construction in areas where erosion is visible to control sedimentation and erosion. Additionally, these bales would slow down the velocity of the runoff. Straw bales would be placed perpendicular to the flow of runoff, parallel to the contours, and down slope of disturbed areas. Additionally, straw bales could be placed around spoil piles in work areas.

3.1.3 Diversion Dikes

Diversion dikes would be used to divert uncontaminated runoff away from disturbed areas or to divert contaminated runoff towards a stabilized outlet or containment structure.

3.1.4 Sediment Basin

It is unlikely that a sediment basin would be required for this project. If necessary, a temporary or permanent sediment basin would be installed in any drainage location where more than 10 acres in the upstream drainage area would be disturbed at one time (wetland area). This basin(s) would provide at least 3,600 cubic feet of storage for every acre of land which it drains (flows from upland areas that are undisturbed could be

diverted around the basin). Drainage locations with 10 or fewer disturbed acres would require that sediment traps, filter fences, or equivalent measures be installed along the downhill boundary of the construction site.

3.2 Storm Water Management

It is not anticipated any stormwater management activities would be required in order to construct the project.

3.3 Final Stabilization and Clean Up

Upon completion of construction activities, disturbed areas would be graded, permanently stabilized, and areas requiring revegetation would be revegetated with a natural grass mixture approved by the MDC. Wherever possible, topsoil will be preserved prior to construction. This topsoil would be used to help re-establish vegetation at the site. Final/permanent stabilization practices would be implemented within 14 days of final construction. When a uniform perennial vegetative cover with a density of 70 percent has been established or equivalent measures (riprap, gabions, or geotextiles) have been employed, final stabilization would be deemed complete.

All temporary soil erosion and sediment control measures would be disposed of within 30 days after final site stabilization is achieved. Trapped sediment and other disturbed soil areas resulting from the disposition of temporary measures would be permanently stabilized to prevent further erosion and sedimentation or redistributed onto stabilized areas of the site.

4.0 OTHER CONTROLS

4.1 Waste Materials

Waste materials would be collected and placed in dumpsters with securable lids. These dumpsters would meet all local and State solid waste management regulations. All trash and construction debris from the site would be deposited into a dumpster. A schedule would be followed detailing how many times a week the dumpster needed to be emptied. If necessary, the dumpster would be emptied more often than scheduled. Waste materials would be hauled to a specified local dump. No waste materials would be buried on-site. All site personnel would be made aware of the disposal procedures. Proper disposal procedures would be posted on-site.

4.2 Hazardous Waste Materials

Hazardous waste materials would be disposed of in the manner specified by federal, state, and local regulations and/or by the manufacturer. All site personnel would be instructed to be aware of this requirement.

4.3 Sanitary Waste

Sanitary waste would be collected from portable units as required and disposed of off-site.

5.0 MAINTENANCE AND INSPECTIONS

Routine inspections would be performed to determine the condition and effectiveness of erosion and sediment control measures. Based on these inspections, destroyed vegetative cover would be restored, and damaged control measures would be repaired. These restorations and repairs would take place within 24 hours of identification.

Inspections would take place at least once every seven calendar days. Additionally, inspections would take place within 72 hours of the end of any storm that produces a half-of-an-inch or more of rainfall at the site. Inspections should take place at least once a month on sites that have been finally stabilized.

Disturbed areas should be inspected for evidence of, or the potential for pollutants entering the drainage system. All control measures should be inspected to ensure that they are operating properly. Points where vehicles exit the site should be inspected for signs of off-site sediment tracking.

Inspection report forms should be completed for each inspection. These reports should be retained within a project file and kept on-site or at an “agency approved” locale. Based on these reports, revisions to the SWPPP could be required and should be made accordingly within seven calendar days following the inspection. All incidences of non-compliance should be noted within the report.

Sediment would be removed from control measures when it reaches one-third the height of the silt fence or straw bale. An inspector would initiate immediate installation of any additional temporary erosion control measures in any area deemed in need of protection.

Temporary erosion control measures would be left in place until the site is permanently stabilized with vegetation (at least 70 percent ground cover). Following the completion of construction and planting activities, an inspector would conduct periodic site reviews to ensure that vegetation has satisfactorily established on-site. If vegetation cover is not adequate, special steps to correct the problems would be implemented such as over-seeding, mulching, sodding, or the use of erosion control blankets.

Copies of the report forms to be completed by the inspector are attached in Appendix C and will be photocopied and used as needed for individual inspections.

6.0 OTHER POLLUTION PREVENTION CONTROLS

6.1 Product Specific Practices

This section covers control measures and practices that would be used for specific materials associated with the construction activity including fuels and petroleum products associated with construction equipment.

6.2 Petroleum Products

All on-site vehicles would be monitored for fuel and oil leaks and receive proper preventative maintenance to reduce the chance of leakage. It is not anticipated that petroleum products would be stored in bulk on-site. However, if storage on-site becomes necessary, storage areas would likely be located on the landward side of flood control levee if possible. All storage containers would be clearly labeled and tightly sealed. Any spills would be cleaned up immediately after discovery. Waste oil and other petroleum products would not be discharged onto the ground or into water bodies. Other petroleum products used on-site would be applied according to the manufacturers' recommendations. Petroleum containers would be stored properly.

Although not anticipated, bulk storage tanks having a capacity of greater than 55-gallons would not likely be situated on the river side of the flood control levee. Any such bulk storage tanks should be provided with secondary containment such as a temporary earthen berm or other means. After each rainfall, the contractor would inspect the contents of the secondary containment area. If a sheen is not visible on the collected water, the water can be pumped to the ground in a manner that does not cause scouring. If a sheen is present, the water must be containerized for appropriate off-site disposal.

Although not anticipated to be present, bulk fuel or lubricating oil dispensers would have a valve that must be held open (manually) to allow the flow of fuel. During fueling operations the contractor would have personnel present to detect and contain spills.

6.3 Non-Storm Water Discharges

No non-storm water discharges are anticipated with this project. Non-storm water discharges include uncontaminated groundwater, natural springs, process waste waters, cooling waters, wash waters, and sanitary wastewater. These wasters can carry substances such as paint, oil, fuels, chemicals and other pollutants.

6.4 Good Housekeeping

The proper use of materials and equipment along with the use of general common sense greatly reduces the potential for contaminating storm water runoff. The following is a list of good housekeeping practices to be used during the construction project:

- Storing of hazardous materials, chemicals, fuels, and oils, and fueling of construction equipment would not be performed within 150 feet of any stream bank, wetland, water supply well, spring, or other water-body.
- An effort would be made to store only enough product required to do this job.
- Materials stored on the site would be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products would be kept in their original containers with the original manufacturer's label.
- Substances would not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of the product would be used before disposing of the container.
- Manufacturer's recommendation for proper use and disposal of a product would be followed.
- If surplus product must be disposed, the manufacturers or local and state recommended methods for proper disposal would be followed.

6.5 Product Handling

Because of the chemical makeup of specific products, certain handling and storage procedures are required to promote the safety of handlers and prevent the possibility of pollution. Care would be taken to follow all directions and warnings for products used on-site. All relevant information can be found on the Material Safety Data Sheet (MSDS) for each product. The MSDS should be located with each product container.

7.0 Spill Prevention and Control Plan (SPCC)

7.1 Spill Control and Cleanup

The following spill control and cleanup practices would be followed to prevent storm water pollution in the event of a spill:

- Spills would be contained and cleaned up immediately after discovery.
- Manufacturer's methods for spill cleanup of a material would be followed as described on the material's MSDS.
- Materials and equipment needed for cleanup procedures would be kept readily available on the site, either at an equipment storage area or in the contractor's trucks.
- Personnel on the site would be made aware of cleanup procedures and the location of spill cleanup equipment.
- If a spill occurs that is reportable to the federal, state, or local agencies, the contractor would be responsible for making the notifications. A procedure for determining a federally reportable spill is included in Appendix E along with a copy of the Spill Report Form to be filled out in case of a spill. A spill of a reportable quantity would be documented and a record of the spills would be kept with this SWPPP.

The federal reportable spill quantity for petroleum products is defined in 40 CFR 110 and is any oil spill that:

- Violates applicable water quality standards
- Causes a film or sheen upon or discoloration of the water surface or adjoining shoreline
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

Missouri requires that notification of reportable spills also be made to MDNR.

7.2 Who to Contact

If a spill is reportable, the contractor's superintendent will notify the Corps project representative and the following authorities:

Federal: National Response Center - 1-800-424-8802
EPA Regional Emergency Response Center – 1-913-551-7050

State: Missouri Environmental Emergencies - 1- 573-634-2436

If a reportable release occurs, a modification to the SWPPP's SPCC must be made within 14 days. The modification would include: a description of the release; the date of the release; an explanation of why the spill happened; a description of procedures to prevent future spills and/or release from happening; and a description of response procedures should a spill or release occur again. These modifications to the SWPPP's SPCC would be made following notification from the contractor and would be documented on the spill reporting form in Appendix D.

A written description of the release must be submitted to the permitting authority that includes a description of the release. This description must include the type of material; an estimated amount of spill; the date of the release; an explanation of why the spill happened; and a description of the steps taken to prevent and control future releases.

8.0 RETENTION OF RECORDS

A copy of this SWPPP, site inspection forms, and records of construction activities would be maintained on-site from the date of the project initiation to the date of final stabilization.

9.0 STANDARD PERMIT CONDITIONS

In order to obtain a storm water discharge permit under the NPDES program, pursuant to Section 402 of the CWA (as amended) in the state of Missouri, the following measures would be taken, implemented and managed on a regular basis:

- Best management practices (BMPs) would be put into operation (i.e., implementing, installing, inspecting, and cleaning silt fence and other erosion control devices of eroded sediment).
- Temporary and permanent stabilization (i.e., groundcover) would be installed.

- Following construction, temporary erosion controls (i.e., silt fence, hay bales, etc.) would be left in place until at least 70 percent density of the vegetative cover has been established.
- Inspections after every half-inch or greater rainfall would be performed and documented.
- Routine site inspections would be performed every seven calendar days.
- Stabilized construction entrances would be installed and/or an alternative method of cleaning mud from vehicles exiting the disturbed area should be selected.
- Following clean up and when appropriate groundcover has been established a notice of termination (NOT) would be filed.

9.1.1 Compliance with Permit Conditions

The EPA, as well as the state of Missouri, has substantial penalties for non-compliance with the storm water permit. Any permit non-compliance constitutes a violation of the CWA and becomes grounds for enforcement action including: permit termination, revocation, re-issuance, modification; or denial of a permit renewal application. Individuals responsible for such violations are subject to criminal, civil, and administrative penalties, including fines up to $27,500 per day for non-compliance.

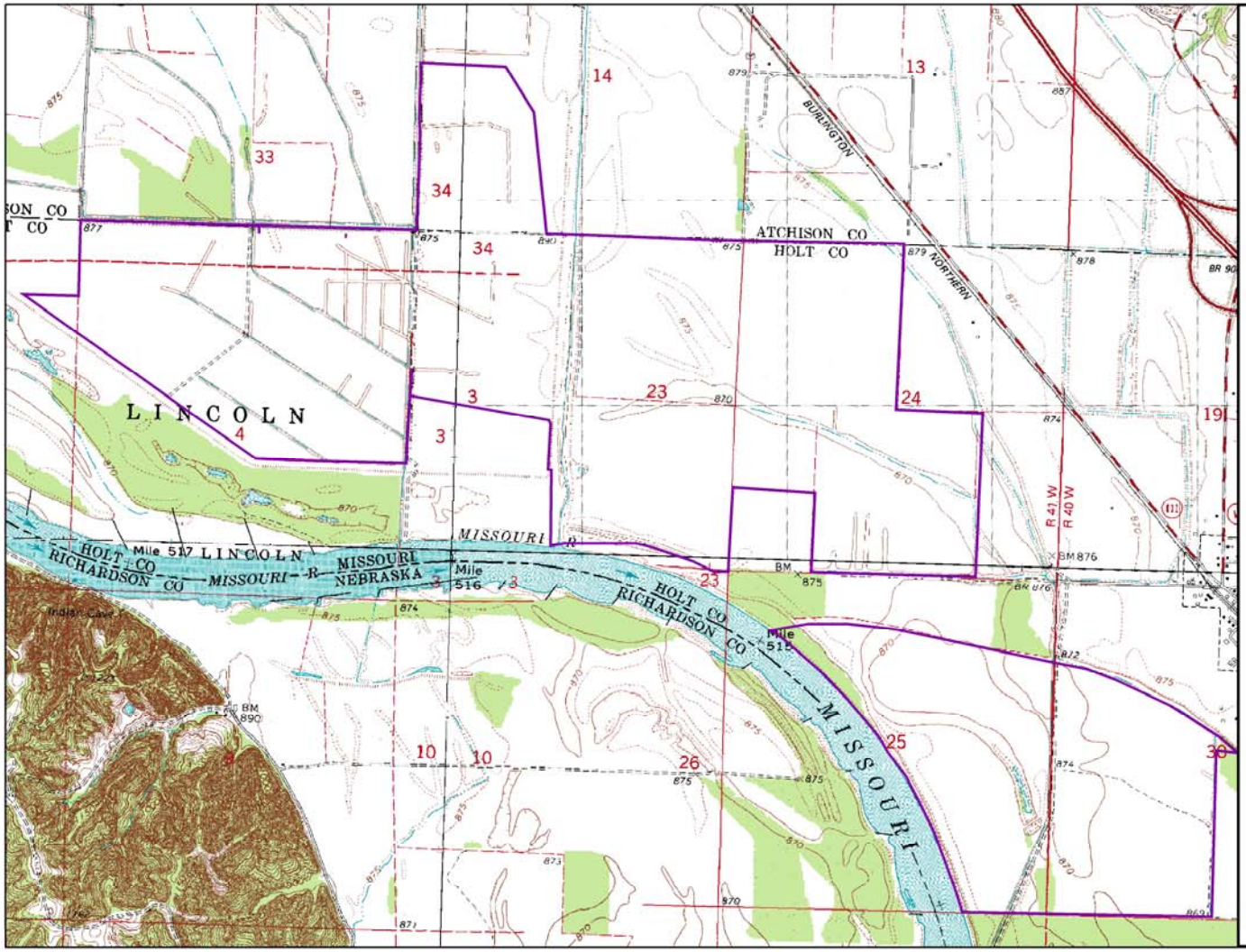
10.0 NOTICE OF TERMINATION

The implementation of this SWPPP and applicability of the conditions of the storm water permit will continue until the site has been fully stabilized and all storm water discharges from construction activities authorized by this permit are eliminated. At that time, a Notice of Termination would be filed with the permitting authority, the MDNR.

APPENDIX A
MISSOURI OPERATING PERMIT
NOTICE OF TERMINATION

TO BE ADDED ONCE RECEIVED/COMPLETED

APPENDIX B
SITE LAYOUT



US Army Corps of Engineers
Kansas City District

Corning Site

Missouri River
Fish and Wildlife Mitigation

Figure : Project boundary

Legend

Corning Mitigation Site

N

0 750 1,500 3,000 Feet

HDR

APPENDIX C
INSPECTION FORMS

U.S. Army Corps of Engineers
Kansas City District
Corning Mitigation Site

Inspection Report Form A
Storm Water Pollution Prevention Plan
(SWPPP)

Control	Location of Device	Is Control Stabilized/ Functioning Properly?	Is There Evidence Of Any Problems	Describe Any Problems	Describe Maintenance or Corrective Action Required {Include Date(s) and Responsible Person(s)}
Straw or Hay Bales/Silt Fences					
Timber Mats/Stone Pads/Bridges					
Waste Disposal					
Off-Site Vehicle Tracking					
Revegetation Condition (After Temporary or Permanent Planting)					
Changes Required to Erosion and Sediment Control Plan? Circle One Yes No					

U.S. Army Corps of Engineers Kansas City District	**Inspection Report Form B** Storm Water Pollution Prevention Plan (SW3P)

Start Date: ***/2006

Name of Construction Site: Corning Mitigation Site

Location of Construction Site: Atchison and Holt Counties, Missouri

Inspection Report Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations"

INSPECTION ACTIVITY

DATE	LOCATION		INSPECTOR

APPENDIX D
SPILL REPORT FORMS

Procedures for Determining if a Hazardous Material Spill is a Reportable Quantity

1) First determine the type and quantity of material that has been spilled.
2) Obtain a material safety data sheet (MSDS) for the spilled material and determine whether any of the constituents are listed in Table 302.4 in 40 CFR 302.
3) If none of the constituents in the spilled material are listed in the table (excluding) ethylene glycol), the spill is not reportable.
4) If the constituents in the spilled material are listed in the table, use the following equation to determine the pounds of material spilled:

Pounds Spilled = (V) (Wt %) (Sg) (0.0834)

Where:

V = Volume of the material spilled, in gallons

Wt% = The weight percent of the constituents in the spilled material (see the MSDS)

Sg = Specific gravity of spilled material (see MSDS)

For Example:

V = 7 gallons

Wt% = 3.5

Sg = 1.04

Pounds Spilled = (7) (3.5) (1.04) (0.0834) = 2.13 pounds

5) If, based on the calculation, the pounds spilled are greater than the Final RQ (reportable quantity) value listed in Table 302.4 of 40 CFR 302 or the State's reportable quantity minimum amount, the spill must be reported to the appropriate federal, state, and local agencies.

Corning Mitigation Site
Erosion and Sediment Control Plan
Spill Report Form

Spill Reported By: _____ _____
Name Phone Number

Date Reported: _____ Time: _____

Date of Spill: _____ Time: _____

Name of Facility:

_____

Legal Description: ____ 1/4 ____ 1/4 ____ 1/4 SEC ____, TWP _____, Range ____

County _____

Describe Spill Location and Events Leading to Spill:

_____

_____

_____

_____

_____

Material Spilled:

_____

Source of Spill:

_____

Amount Spilled (Gallons or Pounds):

_____

Amount Spill to Waterway (Gallons or Pounds):

_____

Nearest Municipality:

_____

Containment or Cleanup Action:

_____

_____

List Environmental Damage (fish kill, etc.):

_____

_____

List Injuries or Personal Contamination:

_____

_____

Date and Time Cleanup Completed or Terminated:

_____

If Cleanup Delayed, Nature and Duration of Delay:

_____

_____

Description of Materials Contaminated:

_____

_____

Approximate Depth of Soil Excavation:

_____

Action To Be Taken to Prevent Future Spills:

_____

_____

Agencies Notified:

Local: _____ Date: _____

State: _____ Date: _____

Federal: _____ Date: _____

Signed: _____

Contractor Superintendent or
Environmental Inspector

Appendix G

404(b)(1) Evaluation

Appendix G
404 (b)(1) Evaluation

Section 404(b)(1) of the Clean Water Act (33 U.S.C. 1344) provides guidelines required in specifying disposal sites for discharges of dredged or fill material into waters of the United States. The evaluation within the appendix satisfies these guidelines and evaluates the proposed disposal sites for this project.

US Army Corps of Engineers
Kansas City District

Section 404 (b)(1) Evaluation (40 CFR 230)

Applicant U.S. Army Corps of Engineers | **Applicant Number** _____

Activity Habitat Restoration | **Waterway** Missouri River

Legal Description: See below | **County** Holt and Atchison **State** MO

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.

1. REVIEW OF COMPLIANCE (§230.10[a]-[d]) A review of the permit application indicates that:

		PRELIMINARY [1]		FINAL [2]	
		Yes	No	Yes	No
a.	The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in, the aquatic ecosystem to fill its basic purpose information gathered for EA alternative (if no, see Section 2, and information gathered for EA alternative);……	☒	☐ [3]	☐	☐
b.	The activity does not appear to (1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of CWA; (2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and (3) violate requirements of any Federally designated marine sanctuary. (If no, see Section 2b and check responses from resources and water quality certifying agencies);……..	☒	☐ [3]	☐	☐
c.	The activity will not cause or contribute to significant degradation of waters of the United States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, esthetic, and economic values (if no, see Section 2);…….	☒	☐ [3]	☐	☐
d.	Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (If no, see Section 5). ……....	☒	☐ [3]	☐	☐

2. TECHNICAL EVALUATION FACTORS (SUBPARTS C-F)

	ADVERSE EFFECTS				
	N/A	None	Minimal	Substantive	Cumulative
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)					
1. Substrate impacts…..……..	☐	☐	☒	☐	☐
2. Suspended particulates/turbidity impacts…….……	☐	☐	☒	☐	☐
3. Water column impacts…..……..……	☐	☐	☒	☐	☐
4. Alteration of current patterns and water circulation……..……	☐	☒	☐	☐	☐
5. Alteration of normal water fluctuations/hydroperiod……..……	☐	☒	☐	☐	☐
6. Alteration of salinity gradients.……...	☒	☐	☐	☐	☐
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)					
1. Effect on threatened/endangered species and their habitat……	☐	☒	☐	☐	☐
2. Effect on the aquatic food web…..……	☐	☒	☐	☐	☐
3. Effect on other wildlife (mammals, birds, reptiles, and amphibians) ……	☐	☒	☐	☐	☐
c. Special Aquatic Sites (Subpart E)					
1. Sanctuaries and refuges…….……..	☒	☐	☐	☐	☐
2. Wetlands…….……..	☐	☒	☐	☐	☐
3. Mud flats…….……..	☒	☐	☐	☐	☐
4. Vegetated shallows……...	☒	☐	☐	☐	☐
5. Coral reefs…….……..	☒	☐	☐	☐	☐
6. Riffle and pool complexes……	☒	☐	☐	☐	☐
d. Human Use Characteristics (Subpart F)					
1. Effects on municipal and private water supplies…….……	☐	☒	☐	☐	☐
2. Recreational and commercial fisheries impacts……..	☐	☒	☐	☐	☐
3. Effects on water-related recreation…….……	☐	☒	☐	☐	☐
4. Esthetic impacts…….……	☐	☐	☒	☐	☐
5. Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves……..……..	☐	☒	☐	☐	☐

REMARKS: Explain on the attached sheet any substantive or cumulative adverse effects.

3. EVALUATION OF DREDGED OR FILL MATERIAL (SUBPART G) [4]

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material (Check only those appropriate).

1.	Physical characteristics……	☒
2.	Hydrography in relation to known or anticipated sources of contaminants…….……	☒
3.	Results from previous testing of the material or similar material in the vicinity of the project……	☐
4.	Known, significant sources of persistent pesticides from land runoff of percolation……	☒
5.	Spill records for petroleum products or designated (Section 311 or CWA) hazardous substances……..……	☐
6.	Other public records of significant introduction of contaminants from industries, municipalities, or other sources ..……	☐
7.	Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities……	☐
8.	Other sources (specify)……	☐

List appropriate references (see attached sheet).

b. Testing Exclusion: An evaluation of the appropriate information in 3a above indicates that the proposed discharge material meets testing exclusion criteria for the following reason: **Yes** ☒ **No** ☐ [3]

1. Based on the information above, there is reason to believe the proposed dredge or fill material is not a carrier of contaminants…… ☒
2. The levels of contaminants are substantially similar at the extraction and disposal sites and not likely to result in degradation of the disposal site, and pollutants will not be transported to less contaminated areas; and/or…… ☐
3. Acceptable constraints are available and will be implemented to reduce contamination to acceptable levels within the disposal site and to prevent contaminants from being transported beyond the boundaries of the disposal site…… ☐

4. DISPOSAL SITE DELINEATION (§230.11[f])

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

1. Depth of water at disposal site…… ☒
2. Current velocity, direction, and variability at disposal site…… ☒
3. Degree of turbulence…… ☒
4. Water column stratification …… ☐
5. Discharge vessel speed and direction…… ☐
6. Rate of discharge…… ☒
7. Dredged material characteristics (constituents, amount and type of material, settling velocities)…… ☒
8. Number of discharges per unit of time…… ☐
9. Other factors affecting rates and patterns of mixing (specify)…… ☐

List appropriate references on attached sheet.

b. Mixing Zone Determination: An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable…… **Yes** ☒ **No** ☐

5. ACTIONS TO MINIMIZE ADVERSE EFFECTS (SUBPART H) All appropriate and practicable steps, as warranted, have been taken through application of recommendations of §230.70-230.77 to insure minimal adverse effects of the proposed discharge. **List Actions Taken (see attached sheet)**…… ☒ ☐

RETURN TO SECTION 1 FOR FINAL COMPLIANCE REVIEW.

6. FACTUAL DETERMINATIONS (§230.11)

A review of the appropriate information as identified in items 2-5 above indicates that there is minimal potential for short-term or long-term environmental effects of the proposed discharge as related to:

	Yes	No
a. Physical substrate at the disposal site (review sections 2a, 3, 4, and 5)……	☒	☐
b. Water circulation, fluctuation, and salinity (review sections 2a, 3, 4, and 5)……	☒	☐
c. Suspended particulates/turbidity (review sections 2a, 3, 4, and 5)……	☒	☐
d. Contaminant availability (review sections 2a, 3, and 4)……	☒	☐
e. Aquatic ecosystem structure and function (review sections 2b and c, 3 and 5)……	☒	☐
f. Disposal site (review sections 2, 4, and 5)……	☒	☐
g. Cumulative impact on the aquatic ecosystem……	☒	☐
h. Secondary impacts on the aquatic ecosystem……	☒	☐

7. EVALUATION RESPONSIBILITY

a. This evaluation was prepared by: _____ Date: _____

Position: _____

b. This evaluation was reviewed by: _____ Date: _____

Position: _____

8. FINDINGS

a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines…… ☐

b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions (see attached sheet)…… ☐

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):

1. There is a less damaging practicable alternative…… ☐
2. The proposed discharge will result in significant degradation of the aquatic ecosystem…… ☐
3. The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem …… ☐

Signature__ _____ Date ____ _____
Colonel, Corps of Engineers
Commanding

By_____

[1] A negative, significant. or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

[2] Negative responses to three or more of the compliance criteria at this stage indicates that the proposed projects may not be evaluated using this "short-form procedures." Care should be used in assessing pertinent portions of the technical information of items 2 a-d below, before completing the final review of compliance.

[3] Negative responses to one of the compliance criteria at this stage indicate that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short -form" evaluation process if inappropriate.

[4] If the dredged or fill material cannot be excluded from individual testing, the "short-form" evaluation process if inappropriate.

Section 404 (b)(1) Evaluation (40 CFR 230)
Attachment Page

References:

☐ Application File Number (RAMS)_____

☒ U.S. Geological Survey Maps

☐ U.S. Geological Survey Water Resources Data

☐ U.S. Environmental Protection Agency Fish Kill Data

☐ Missouri Department of Conservation Fish Kill Data

☐ U.S. Environmental Protection Agency Inquiry / Data / Administrative Notice

☐ U.S. Environmental Protection Agency Water Quality Data

☒ Other: U.S. Department of Agriculture, Soil Survey of Atchison County, Missouri, Soil Survey of Holt County

PRELIMINARY EVALUATION:

Impacts to aquatic ecosystems will be minimized by performing construction work in the fall and winter coinciding with low stages of the Missouri River. Additionally, increased sediment load in the Missouri River is desired to help simulate natural historic conditions of the river.