

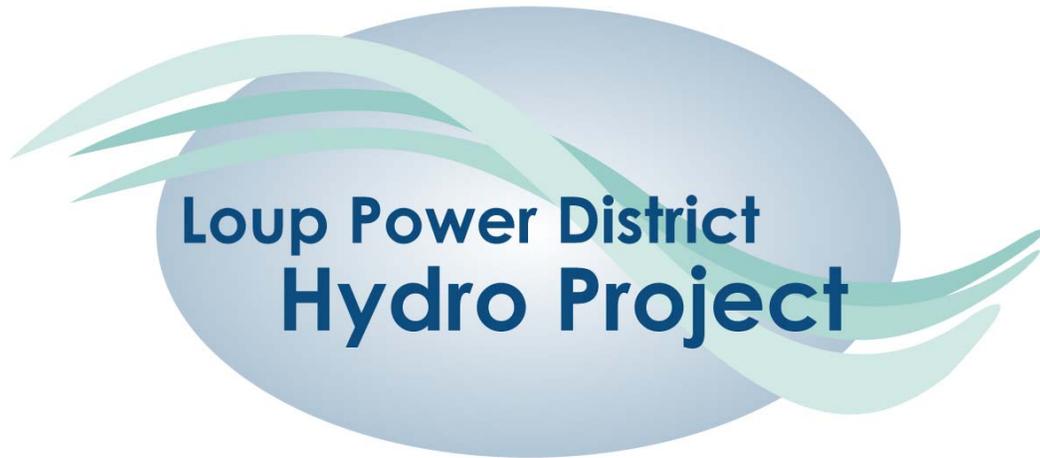
LOUP RIVER HYDROELECTRIC PROJECT FERC PROJECT No. 1256

PROPOSED STUDY PLAN



Loup Power District
Hydro Project

MARCH 27, 2009



**Loup River Hydroelectric Project
FERC Project No. 1256**

Proposed Study Plan

March 27, 2009

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Prepared by:
Loup Power District
2404 15th Street
Columbus, NE 68602

With assistance by:
HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, NE 68114

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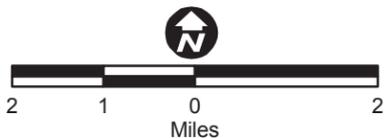
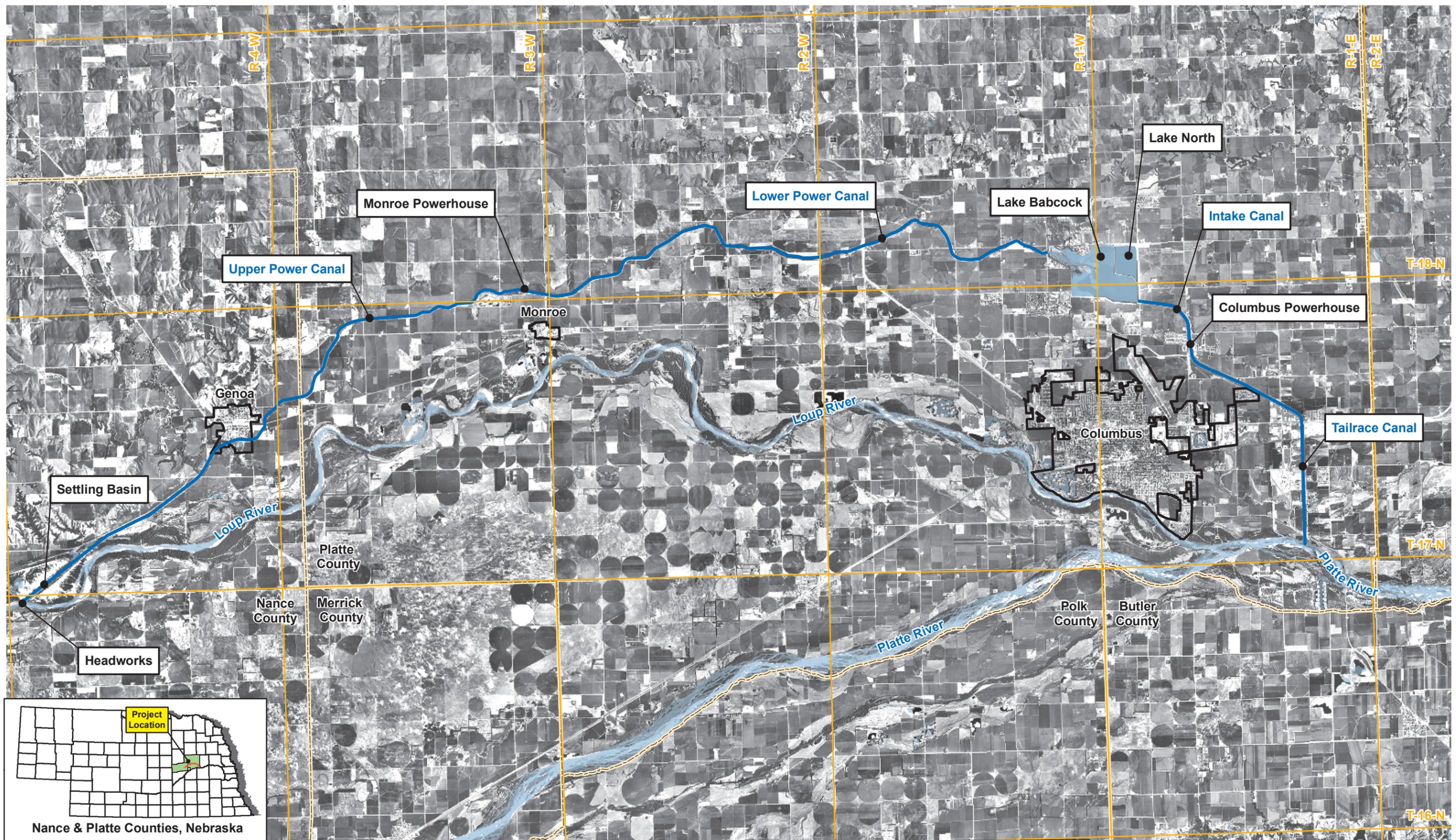
PROPOSED STUDY PLAN

1. BACKGROUND AND PROCESS TO DATE

Loup River Public Power District (Loup Power District or the District) has prepared this Proposed Study Plan (PSP) for filing with the Federal Energy Regulatory Commission (FERC) as part of relicensing the Loup River Hydroelectric Project (FERC Project No. 1256). The Loup River Hydroelectric Project (Project) is located in Nance and Platte counties, Nebraska, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs, as shown in Figure 1. The current license for the Project expires on April 15, 2014. Therefore, the District is seeking a new license to continue to operate the Project.

In May 2008, the District initiated a formal outreach effort to provide stakeholders with information about the Project and the relicensing process, to identify resource issues, and to develop preliminary study concepts prior to filing the Notice of Intent (NOI) and Pre-Application Document (PAD). Agency meetings were held on May 7 and June 25, 2008, to introduce the agencies and other stakeholders to the relicensing process and to discuss and compare the hydropower-related issues and concerns identified by the agencies and other stakeholders. Public open houses were held on June 10 and 11, 2008, to provide information about the Project and the relicensing process to the public and solicit input.

In June 2008, the District established two workgroups: Water Rights and Recreation/Land Use/Aesthetics. The purpose of these workgroups was to help define the questions and issues that are to be addressed and then to report back to the larger group at agency meetings. In July 2008, each workgroup conducted a conference call during which participants discussed issues related to their respective resource areas and identified potential study requests. On July 24 and August 19, 2008, agency meetings were held to discuss potential studies to be performed to address Project-related issues. This process provided agencies, other stakeholders, and the District an opportunity to have open dialogue about issues in advance of the rigorous timeline that began once the NOI and PAD were filed. At the conclusion of these meetings the District sorted, combined, and compiled the issues, concerns, questions, and study requests into 11 proposed studies, which were listed and described in the PAD. An additional 22 issues, concerns, questions, and comments were listed in the PAD; however, for various reasons discussed in the PAD, these did not warrant additional formal studies.



Aerial Imagery: 2006 National Agricultural Inventory Project, Nance and Platte Counties Mosaic.
 Streams/Lakes: 2000 Tiger Line Files, Platte and Nance Counties.

Legend

- Loup Power Canal
- Corporate Limits
- Township/Range
- County Line



Project Location

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

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DATE	March 2009
FIGURE	1

The NOI and PAD were filed on October 16, 2008, which initiated the relicensing process for the Project under FERC's Integrated Licensing Process (ILP) (18 Code of Federal Regulations [CFR] 5). The PAD summarizes the initial list of potential issues, concerns, and questions identified during the agency and workgroup meetings; lists and briefly describes proposed studies or information-gathering efforts to address these issues; and describes the identified issues that the District believes can be resolved with available existing information or that are not related to Project relicensing and provides discussion as to why no formal study is necessary for these issues.

Following acceptance of the PAD, FERC issued Scoping Document 1 (SD1) on December 12, 2008. The purpose of SD1 is to provide information on the Project and to solicit comments and suggestions on the preliminary list of issues and alternatives to be addressed in the Environmental Assessment (EA). On January 12 and 13, 2009, FERC conducted a site visit and public and agency scoping meetings. The site visit and scoping meetings were held to provide FERC and other agencies and stakeholders an opportunity to become familiar with the Project and to provide and receive direct input on the proposed scope of the EA.

Subsequent to the FERC scoping meetings, 56 letters and e-filed comments were submitted by agencies, other stakeholders, and the public. Letters were submitted by the following agencies: FERC, U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS), Nebraska Game and Parks Commission (NGPC), Nebraska Department of Natural Resources (NDNR), Tern and Plover Conservation Partnership, Nebraska Off Highway Vehicle Association (NOHVA), and Columbus Area Recreational Trails, Inc. (CART). The following summarizes the number of letters and e-filed comments received, by topic:

- Off-Highway Vehicle Recreation – 36
- Recreational Trails – 6
- General Recreation – 3
- Irrigation – 7
- Threatened or Endangered Species – 3
- Ice Jams – 1

This PSP was prepared in accordance with 18 CFR 5.11. It consists of study plans for the 11 studies proposed in the PAD as well as for an additional study proposed by NDNR, as described below. In addition, the PSP discusses the reasons why some study requests were not adopted by the District. The PSP also includes a schedule for the remainder of the study plan process.

2. PROPOSED STUDIES

The studies proposed by the District to provide additional information to address issues, concerns, and questions raised by agencies and other stakeholders are summarized in Table 1, and detailed plans for these studies are included in Appendix A. These studies are being conducted to provide information for development of the EA prepared as part of Project relicensing as well as information for use in preparing a biological assessment in compliance with Section 7 of the Endangered Species Act. These studies will provide a better understanding of how Project operations may affect sediment, water resources, and other issues related to river ecology and habitat as well as recreational and cultural resources. All proposed studies are slated to be performed over approximately 1 year following FERC's Study Plan Determination (first study season). Depending on the initial results, some studies may need to be modified or extended for an additional year (second study season) to better understand the effects of the Project.

Table 1. Proposed Studies

Study No.	Proposed Study	Study Goal
1.0	Sedimentation	Determine the effect, if any, that Project operations have on stream morphology and sediment transport in the Loup River bypass reach and in the Lower Platte River; compare the availability of sandbar nesting habitat for interior least terns and piping plovers to their respective populations and to compare the general habitat characteristics of the pallid sturgeon in multiple locations.
2.0	Hydrocycling	Determine if Project hydrocycling operations adversely affect or benefit the habitat used by interior least terns, piping plovers, and pallid sturgeon in the Lower Platte River.
3.0	Water Temperature in the Platte River	Determine if Project operations materially affect water temperature in the pallid sturgeon's associated habitat reach of the Lower Platte River.
4.0	Water Temperature in the Loup River Bypass Reach	Determine if Project operations (flow diversion) materially affect water temperature in the Study Reach.
5.0	Flow Depletion and Flow Diversion	Determine if Project operations result in a flow depletion on the Lower Platte River and to what extent the magnitude, frequency, duration, and timing of flows affect the Loup River bypass reach.
6.0	Fish Sampling	Cooperate with the Nebraska Game and Parks Commission (NGPC) in fish sampling efforts independent of Project relicensing and in accordance with a future schedule to be determined by NGPC.

Study No.	Proposed Study	Study Goal
7.0	Fish Passage	Determine if a reasonable pathway exists for fish movement upstream and downstream of the Diversion Weir.
8.0	Recreation User Survey	Determine the public awareness, usage, and demand of the Project's existing recreation facilities to determine if potential improvements are needed.
9.0	Creel Survey	Determine the status of Project fisheries and how the fisheries are used by anglers.
10.0	Land Use Inventory	Determine specific land uses of Project lands and adjacent properties to identify potential conflicts and/or opportunities relating to Project operations, public access, recreation, and environmental resource protection.
11.0	Section 106 Compliance	Achieve NHPA Section 106 compliance through a programmatic, ongoing consultation relationship between the District and the Nebraska SHPO.
12.0	Ice Jam Flooding on the Loup River	Qualitatively determine if the operation of the Loup Power Canal has a material effect on the formation of ice jams or a material effect on the severity of flooding caused by ice jams in the Loup River bypass reach.

In accordance with the regulations of the ILP and as described in the FERC-approved Process Plan and Schedule for the Project, the PSP is being filed electronically with FERC and appropriate agencies and stakeholders. In addition other agencies and stakeholders known to have an interest in the proceeding have been notified via email of the availability of the PSP on the District's relicensing website at <http://www.loup.com/relicense>.

3. STUDY REQUESTS

The letters received from agencies included several formal and informal requests for expanded or new studies. Table 2 summarizes the requests and indicates which requests were incorporated into new or existing study plans. For those requests that have not been adopted, a brief explanation is provided.

Table 2. Study Requests

Request No.	Requestor	Topic of Study	Status
1	FERC	Requested detailed recreation user survey.	Recommended study scope was largely incorporated into the scope of Study 8.0, Recreation User Survey.
2	Nebraska Game and Parks Commission	Requested that District perform Study 6.0, Fish Sampling, and expand to include all fish species rather than just sport fish.	At NGPCs request, the District had previously agreed to facilitate NGPC access to the Project to perform fish sampling. The District is still willing to facilitate NGPC access for sampling but believes this routine periodic data collection effort is unrelated to Project operation and is not needed for relicensing.
3	Nebraska Game and Parks Commission	Requested that Study 4.0, Water Temperature in the Loup River Bypass Reach, include collection of sufficient data to develop a predictive model to determine when temperature-related fish kills may occur.	The District's proposed Study 4.0, Water Temperature in the Loup River Bypass Reach, includes collection of data and comparison to critical thermal maximums for fish species. In addition, a relationship between flow, ambient air temperature, and water temperature will be developed for use in determining when temperatures may exceed acceptable levels and the appropriate response to avoid fish kills. The District is not proposing development of a predictive model.

Request No.	Requestor	Topic of Study	Status
4	Nebraska Department of Natural Resources	Requested a detailed study to determine if Project operations affect ice jam flooding, including development of a predictive model and identification of prevention, alleviation, and mitigation strategies for such flooding.	The District's proposed Study 12.0, Ice Jams, will use ice data gathered by NDNR over the past 15 years to qualitatively analyze potential relationships between Project operations and ice jam formation and resulting flooding in the Loup River bypass reach. The District is not proposing development of a predictive model because NDNR could use the procedures and methodology outlined in the 1994 U.S. Army Corps of Engineers (USACE) <i>Lower Platte River Ice Jam Study</i> report to develop predictive ice jam models at other gaging stations in the USACE study area (including the Loup River downstream of Genoa and the Lower Platte River) whenever needed.
5	U.S. Fish and Wildlife Service	Requested that studies 1.0, 2.0, and 5.0 include evaluation of the un-quantified effects of Tailrace Canal operations on Lower Platte River hydrology and effects of Lost Creek inflows and outflows.	The District has incorporated this request into Study 5.0, Flow Depletion and Flow Diversion.

Request No.	Requestor	Topic of Study	Status
6	U.S. Fish and Wildlife Service	Requested that all transmission and distribution lines owned by the District and all lines within the Project Boundary be evaluated for potential impact on the migration of endangered whooping cranes.	The District is not proposing a study of whooping crane collisions with transmission and distribution lines because the District does not own any transmission lines and the vast majority of the District's sub-transmission and distribution lines are not interrelated to or interdependent with the Project. Furthermore, the Project is located outside the primary migration corridor of the species, and there have been no documented whooping crane powerline collisions east of the primary migration corridor. Further response to this study request is provided in Appendix B.
7	U.S. Fish and Wildlife Service	Requested a study of the quantity and quality of sandbars in the Lower Platte River in relation to hydrocycling fluctuations.	The District is proposing a systemwide analysis of sediment aggradation and degradation, as explained in the methodologies for proposed studies 1.0, 2.0, and 5.0.
8	U.S. Fish and Wildlife Service	Requested a study of hydrocycling effects on pallid sturgeon in the Lower Platte River similar to the study of hydrocycling effects on lake sturgeon by Auer (1996).	The District is not proposing a hydrocycling study similar to the Auer study because the conditions of the Auer study are substantially different from those in the Lower Platte River. The Auer study was of lake sturgeon in extremely shallow rocky rapids immediately downstream of a power dam in Michigan's Sturgeon River, whereas the requested study would be of pallid sturgeon in the deeper sandy channels of the Platte River more than 80 free-flowing stream miles downstream of the Project.
9	U.S. Fish and Wildlife Service	Requested that Project operations be evaluated to determine if there is an effect on ice formation and transport in the Loup River bypass reach with potential impact on sandbar habitat for the interior least tern and piping plover.	The District has incorporated this request into Study 1.0, Sedimentation.

Request No.	Requestor	Topic of Study	Status
10	U.S. Fish and Wildlife Service	Requested that the sediment yield analysis be aligned with the life cycle requisites of the pallid sturgeon, interior least tern, and piping plover.	The District is proposing a systemwide analysis of sediment aggradation and degradation, as explained in the methodologies for proposed studies 1.0, 2.0, and 5.0.
11	U.S. Fish and Wildlife Service	Requested a study of the Loup River bypass reach and the Lower Platte River to ascertain if the size of sandbar habitats for interior least terns and piping plovers fits predictions made by Williams and Wolman (1984) and Parker and Wilcock (1993).	The District is not proposing such a study because USFWS's goal for the study is not defined nor is it clear how the results would be used. Further, there is no clear nexus to the Project.
12	U.S. Fish and Wildlife Service	Requested that studies 1.0 and 5.0 be integrated into a single Loup River bypass reach flow and sediment transport modeling and evaluation exercise to address likely past, present, and future effects of Project operations on sediment budgets and channel morphology.	The District is not proposing a combined study of flow and sediment in the Loup River bypass reach because, as explained in the methodologies for proposed studies 1.0 and 5.0, a more system-wide analysis is proposed based on system sediment aggradation or degradation. Further, Project operations have remained consistent for over 70 years, and with the anticipated NDNR determination of full appropriation in the Platte River basin, future changes in river flow and sediment transport are highly unlikely.

Request No.	Requestor	Topic of Study	Status
13	U.S. Fish and Wildlife Service	Requested a study of the impact of future flow depletions on the Loup River above the Diversion Weir on Federally listed species.	The District is not proposing a study of flow depletions on the Loup River above the Diversion Weir because the District has no control over upstream water use; further, the preliminary NDNR determination of full appropriation of the Platte River basin will ensure that proposed new consumptive uses within and upstream of the basin will have to be offset by retiring an equivalent amount of a current use within the basin. This action by NDNR should ensure that depletion of flows in the Lower Platte River does not continue into the future. Further response to this study request is provided in Appendix B.
14	U.S. Fish and Wildlife Service	Requested a study of net depletive or accretive effects on Platte River streamflow.	The District has incorporated this request into Study 5.0, Flow Depletion and Flow Diversion.
15	U.S. Fish and Wildlife Service	Requested a detailed study of water quality.	The District is not proposing a detailed study of water quality because existing Nebraska Department of Environmental Quality (NDEQ) sampling data shows a generally decreasing trend in polychlorinated biphenyl (PCB) concentrations in fish tissue samples collected in the Loup Power Canal and NDEQ is opposed to sediment sampling because it could result in the resuspension of sediment-bonded PCBs (if PCBs are indeed present in benthic sediment) to the water column and ultimately result in conditions more environmentally damaging than those that currently exist. Further response to this study request is provided in Appendix B.
16	Tern and Plover Conversation Partnership	Requested that studies 1.0, 2.0, and 5.0 include a detailed study of sandbar numbers, sizes, and heights.	The District is proposing a system-wide analysis of sediment aggradation or degradation to determine the Project's effect on sandbars, as explained in the methodologies for studies 1.0, 2.0, and 5.0.

Request No.	Requestor	Topic of Study	Status
17	Tern and Plover Conversation Partnership	Requested that Study 6.0, Fish Sampling, include analysis of all fish species present in the Loup Power Canal and their sizes relative to fish consumed by interior least terns.	Interior least terns do not forage in the Loup Power Canal; therefore, there is no need to conduct fish sampling related to interior least tern foraging. However, the District will facilitate access for whatever sampling effort NGPC plans to conduct.
18	Tern and Plover Conversation Partnership	Requested that Study 10.0, Land Use Inventory, include questions about potential future land development outside the Project Boundary.	The District is not proposing to include future development questions in Study 10.0, Land Use Inventory, because the subject of potential future development of non-Project lands is speculative and unrelated to Project relicensing.
19	Tern and Plover Conversation Partnership	Requested a study of interior least tern tissue samples for the presence of PCB contamination.	The District is not proposing a study of PCB contamination of interior least tern tissue because no evidence has been presented showing PCB contamination in the resident interior least tern population in the Project area. Furthermore, if PCBs were detected in interior least tern tissue, there could be no certainty that it originated from within the Project Boundary.

4. SCHEDULE FOR STUDY PLAN PROCESS

The study plan process includes filing this PSP, conducting an initial study plan meeting, accepting comments on this PSP, holding additional study plan meetings as needed to resolve differences, developing a Revised Study Plan, and providing quarterly progress reports on the status of all studies once the studies begin. The schedule for the study plan process is shown in Table 3, and each task in this process is described below.

Table 3. Study Plan Process

Date(s)	Task
March 27, 2009	File Proposed Study Plan
April 21, 2009	Conduct initial study plan meeting
May 28, 2009 July 1, 2009	Conduct additional study plan meetings
July 27, 2009	File Revised Study Plan
August 26, 2009	FERC issues Study Plan Determination
December 2009, March 2010, and June 2010	File study progress reports

4.1 Study Plan Meeting

Consistent with requirements under 18 CFR 5.11(e), the District will conduct an initial study plan meeting with agencies and other stakeholders within 30 days of the deadline for filing the PSP. This initial meeting is scheduled for April 21, 2009. The purpose of the study plan meeting is to provide agencies and other stakeholders with an opportunity to comment on the District's PSP and to allow the District to field questions related to study requests, goals, objectives, methods, and anticipated results. The goal of the meeting is to attempt to resolve any outstanding issues with respect to the PSP. It is anticipated that FERC staff will attend and participate in the initial study plan meeting.

Subsequent study plan meetings are scheduled for May 28 and July 1, 2009, if needed to resolve any outstanding issues. In addition, several workgroup meetings and/or conference calls will be conducted to address studies and information-gathering efforts with minor comments and revisions.

4.2 Comments on the Proposed Study Plan

The District prefers to receive and respond to comments on this PSP through the study plan meeting and conference call process, described above. It is the District's intent to use this process to work collaboratively with agencies and other stakeholders to resolve issues and concerns related to proposed studies. However, written comments on the PSP, including any revised information or study requests, will be accepted for 90 days from the filing of this PSP (18 CFR 5.12), or no later than June 26, 2009, and should be submitted to:

Neal Suess, President/CEO
Attn: Relicensing
Loup Power District

PO Box 988
2404 15th Street
Columbus, NE 68602

Comments on the PSP should clearly explain any concerns with individual study plans as well as any accommodations reached with the District regarding those concerns. Any proposed modifications to the PSP must address the criteria in 18 CFR 5.9(b).

Upon receiving comments on the PSP, the District will revise the study plans as necessary and will prepare and distribute to agencies and other stakeholders a summary of the District's proposed responses to all of the comments received. At the study plan meeting scheduled for July 1, 2009, the District will meet with agencies and other stakeholders regarding its proposed responses to PSP comments and will attempt to resolve any remaining study disputes to the extent that time allows.

4.3 Revised Study Plan

A Revised Study Plan (RSP) will be filed within 30 days of comment closing, or no later than July 27, 2009. The RSP will specifically address all comments received on the PSP. In accordance with 18 CFR 5.13(a), the RSP will also include a description of the efforts made to resolve differences over study requests. For any requested study that the District does not adopt in the RSP, the District will explain the rationale for its decision with reference to the criteria set forth in 18 CFR 5.9(b).

4.4 Study Plan Determination

FERC will issue its Study Plan Determination by August 26, 2009, within 30 days from filing of the RSP (18 CFR 5.13(c)). If no notice of study dispute is filed in accordance with 18 CFR 5.14 within 20 days of the Study Plan Determination, the RSP as approved in the Study Plan Determination shall be deemed to be approved and the District will proceed with the approved studies. If any portions of the Study Plan Determination are disputed by Federal agencies with authority under Section 4(e) or Section 18 of the Federal Power Act (16 United States Code [USC] 797(e); 16 USC 811) or agencies or Native American tribes with authority to issue Section 401 water quality certification for the Project (42 USC 1341), a formal dispute resolution process will be initiated, as provided for under 18 CFR 5.14, and a final study dispute determination (constituting amendment of the approved study plan) will be issued for the disputed study components.

4.5 Study Progress Reports

The District will prepare study progress reports on a quarterly basis (in December 2009, March 2010, and June 2010). These reports will be filed with FERC and distributed to relicensing participants. One of the main purposes of the quarterly reports will be to inform and obtain input from relicensing participants regarding

potential resource conflicts and potential mitigation opportunities as studies are conducted. Documentation of study results will be provided to relicensing participants upon request in accordance with 18 CFR 5.15(b).

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STUDY 1.0 SEDIMENTATION

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach.

When water is diverted from the Loup River, it enters the 2-mile-long Settling Basin. The Settling Basin is designed for very slow flow velocity to allow heavier sediment materials to settle out of the water before it enters the Upper Power Canal. A Sluice Gate Structure adjacent to the Diversion Weir is operated periodically to mobilize accumulated sediment in front of the Intake Gate Structure. This process conveys sediment into the Loup River bypass reach. As documented in the PAD, a Hydraulic Dredge removes approximately 1 million to 1.5 million tons of sediment from the Settling Basin annually. It has been suggested that the removal of sediment resulting from Project dredging operations at the Settling Basin may affect sediment transport in the Loup River bypass reach and the Platte River downstream of the Tailrace Canal. In addition, a U.S. Army Corps of Engineers (USACE) report on ice jam formation in the Lower Platte River states that changes in sediment regime due to Project operations may have impacted ice formation and transport processes (USACE, July 1994).

This study will evaluate the physical effects of Project operations on sediment transport within the Loup River bypass reach and the Platte River downstream of the Tailrace Canal.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the sedimentation study is to determine the effect, if any, that Project operations have on stream morphology and sediment transport in the Loup River bypass reach and in the Lower Platte River. In addition, the goal is to compare the availability of sandbar nesting habitat for interior least terns (*Sterna antillarum*) and piping plovers (*Charadrius melodus*) to their respective populations and to compare the general habitat characteristics of the pallid sturgeon (*Scaphirhynchus albus*) in multiple locations.

The objectives of the sedimentation study are as follows:

1. To develop a sediment budget from existing data sources.
2. To characterize sediment transport in the Loup River bypass reach and in the Lower Platte River through effective discharge calculations.

3. To characterize stream morphology in the Loup River bypass reach and in the Lower Platte River by reviewing existing literature on channel aggradation/degradation and cross sectional changes over time.
4. To determine if a relationship can be detected between sediment transport parameters and interior least tern and piping plover nest counts (as provided by the Nebraska Game and Parks Commission [NGPC]).
5. To compare the availability of sandbar nesting habitat to interior least tern and piping plover nest counts on the Lower Platte River and to compare these results to the relationship of interior least tern and piping plover nest counts and the availability of sandbar habitat in the Missouri River downstream of Gavins Point Dam.
6. To determine if sediment transport is a limiting factor for pallid sturgeon habitat in the Lower Platte River below the Elkhorn River.
7. To investigate the relationship between sedimentation and ice jam flooding.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

The U.S. Fish and Wildlife Service (USFWS) is responsible for the conservation and management of migratory, threatened, and endangered fish and wildlife resources under a number of authorities, including the Endangered Species Act of 1973 (16 USC 1531 et seq.), the Fish and Wildlife Coordination Act (16 USC 661 et seq.), the Bald and Golden Eagle Protection Act (16 USC 703-712, as amended), and the Migratory Bird Treaty Act (16 USC 703-712, as amended). Compliance with all of these statutes and regulations is required to be in compliance with the National Environmental Policy Act (NEPA) (42 USC 4321-4347).

In addition, the Nebraska Department of Natural Resources (NDNR) has resource goals related to sedimentation because of its potential effects on ice jam formation and related flooding.

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Relevance to Threatened and Endangered Species

The proposed study area includes the Loup River bypass reach and the Lower Platte River from the confluence with the Loup River to the U.S. Geological Survey (USGS) gage at Louisville (see Section 5, Study Area and Study Sites).

The Loup and Platte rivers have characteristics typical of braided river channels (Donofrio, 1982). A braided river is defined as a river channel in which have been deposited bars and islands around which the river flows. It has been shown that, for a given discharge, braided channels slope more steeply than meandering channels. Braiding occurs when the discharge fluctuates frequently, when the river cannot carry its full sediment load, where the river is wide and shallow, where banks may be easily eroded, and where there is copious bedload. The position of the bars is changeable; sediment may be entrained by scour at channel junctions and then be re-deposited down-channel as flows diverge again and new channels are cut by overbank flooding (Mayhew, 2004). The braiding in the channels allows for the development of emergent sandbar habitat. High sandbars and wide channels are common on the Lower Platte River (Ziewitz et al., 1992).

It has been speculated that some aspects of Project operations may affect wildlife habitat through possible material changes in the sediment transport regime in the Loup River bypass reach and the Lower Platte River. Emergent sandbar habitat in braided channels is important to a variety of life stages of fish and wildlife, including interior least tern, piping plover, and pallid sturgeon, three species that are Federally listed as threatened or endangered.

Sandbar habitat in the Loup and Platte rivers is considered primary habitat for interior least terns and piping plovers and is used by these birds for breeding, nesting, loafing, and foraging. These birds migrate to the Nebraska rivers in mid-April to early June, with breeding, nesting, and egg-laying commencing in mid-May to early July (USFWS, September 1990 and June 28, 1994). After chicks have fledged in mid- to late August, interior least terns and piping plovers abandon the habitat and migrate to their wintering grounds along the Gulf of Mexico.

Riverine nesting areas of interior least terns and piping plovers are sparsely vegetated sand and gravel bars within a wide unobstructed river channel. Nesting locations are usually at higher elevations and away from the water's edge because nesting is typically initiated when river flows are high and small amounts of sand are exposed. Interior least terns and piping plovers have been observed to nest on sandbar habitats with less than 25 percent vegetative cover and an abundance of bare or sparsely vegetated sand and gravel (Sidle and Kirsch, 1993) with an average area of 1.45 hectares and at an average height of 0.49 meters (Ziewitz et al., 1992).

The interior least tern is piscivorous, feeding in shallow waters of rivers, streams, and lakes, along sandbars and sandy shores. Interior least terns usually feed close to their nesting sites but have been known to travel up to 3.2 kilometers to fish. Fish prey is small sized, usually between 2 and 8 centimeters long. Interior least terns are believed to be opportunistic feeders, exploiting any fish within an edible size range (USFWS, September 1990). Piping plovers feed primarily on exposed beach substrates by pecking for invertebrates at, or less than, 1 centimeter below the surface.

Piping plovers are believed to be opportunistic feeders, consuming a variety of invertebrate genus and species.

The pallid sturgeon is considered to be a large turbid river species. The habitat used by different life stages of this species varies widely. Historically, most rivers comprising the range of the pallid sturgeon were characterized by shallow channels with shifting sandbars. The Lower Platte River still retains this type of habitat over most of its length. Pallid sturgeon have been captured in the Platte River up to the confluence with the Elkhorn River. Pallid sturgeon in the Lower Platte River use areas associated with the downstream ends of sandbars and in deeper channels along the edge of sandbars (Peters and Parham, 2008). The amount and accessibility of habitat is related to discharge. High-discharge events produce flow velocities that scour deeper channels and deposit sandbars, which create and maintain the habitats favored by pallid sturgeon. Pallid sturgeon have been found to use the deepest water available in the Platte River, using depths ranging from 0.33 to 1.27 meters, with average column velocities in the range of 0.52 to 0.82 meters per second (Peters and Parham, 2008). Many studies have noted the preponderance of use of sand substrate by pallid sturgeon. In the Platte River, average percentages of sand, silt, and gravel at pallid sturgeon telemetry contacts were 99.9 percent, 0.4 percent, and 0 percent, respectively (Peters and Parham, 2008).

3.2 Existing Sediment and Stream Morphology Information

Both the Loup and Platte rivers are considered braided rivers; therefore, sediment transport is an important factor in retaining their natural characteristics (Donofrio, 1982). There have been numerous sedimentation and geomorphology studies on the central Platte River but limited study on the Lower Platte River and Loup River. One report, prepared by the Missouri River Basin Commission (September 1975), includes a sediment yield analysis of the Platte River Basin, which includes the Loup River Basin. A selection of studies and reports that will be used to gather data include:

- Chen, Rus, and Stanton, 1999, “Trends in Channel Gradation in Nebraska Streams, 1913-95,” U.S. Geological Survey Water-Resources Investigations Report 99-4103.
- Ginting and Zelt, 2008, “Temporal Differences in Flow Depth and Velocity Distributions and Hydraulic Microhabitats Near Bridges of the Lower Platte River, Nebraska, 1934-2006,” USGS Scientific Investigations Report 2008-5054.
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- Rus, Dietsch, and Simon, 2003, “Streambed Adjustment and Channel Widening in Eastern Nebraska,” U.S. Geological Survey Water-Resources Investigations Report 03-4003.
- U.S. Department of the Interior, Bureau of Reclamation, April 2004, “The Platte River Channel: History and Restoration.”
- U.S. Department of the Interior, Bureau of Reclamation, August 2000, “Physical History of the Platte River in Nebraska.”

3.3 Flow and Gage Data

Flow data from USGS and NDNR gage stations will be used for this sedimentation study. Each gage station is accompanied by the associated rating curves and velocity and cross-sectional data used to create the rating curves. Flow data that will be used for this study include:

- USGS Gage 06793000, Loup River near Genoa, NE – Available discharge and gage height data from April 1, 1929, to current includes daily and 30-minute interval data.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available discharge and gage height data from January 1, 1937, to current includes daily and 30-minute interval data.
- NDNR Gage 00082100, Loup River Power Canal Return [Tailrace Canal] at Columbus, NE – Available discharge and gage height data from October 1, 2002, to current includes daily and 15-minute interval data.
- USGS Gage 06794500, Loup River at Columbus, NE – Available daily discharge and gage height data from April 1, 1934, to October 10, 1978. This gage was restarted by NDNR on September 23, 2008.
- USGS Gage 06774000, Platte River near Duncan, NE – Available discharge and gage height data from May 3, 1895, to current includes daily and 30-minute interval data.

- USGS Gage 06796000, Platte River at North Bend, NE – Available discharge and gage height data from April 1, 1949, to current includes daily and 30-minute interval data.
- USGS Gage 06796500, Platte River at Leshara, NE – Available discharge and gage height data from June 29, 1994, to current includes daily and 30-minute interval data.
- USGS Gage 068010000, Platte River near Ashland, NE – Available discharge and gage height data from September 1, 1928, to current includes daily and 30-minute interval data.
- USGS Gage 06805500, Platte River at Louisville, NE – Available discharge and gage height data from June 1, 1953, to current includes daily and hourly interval data.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

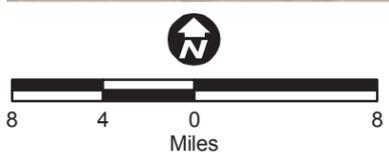
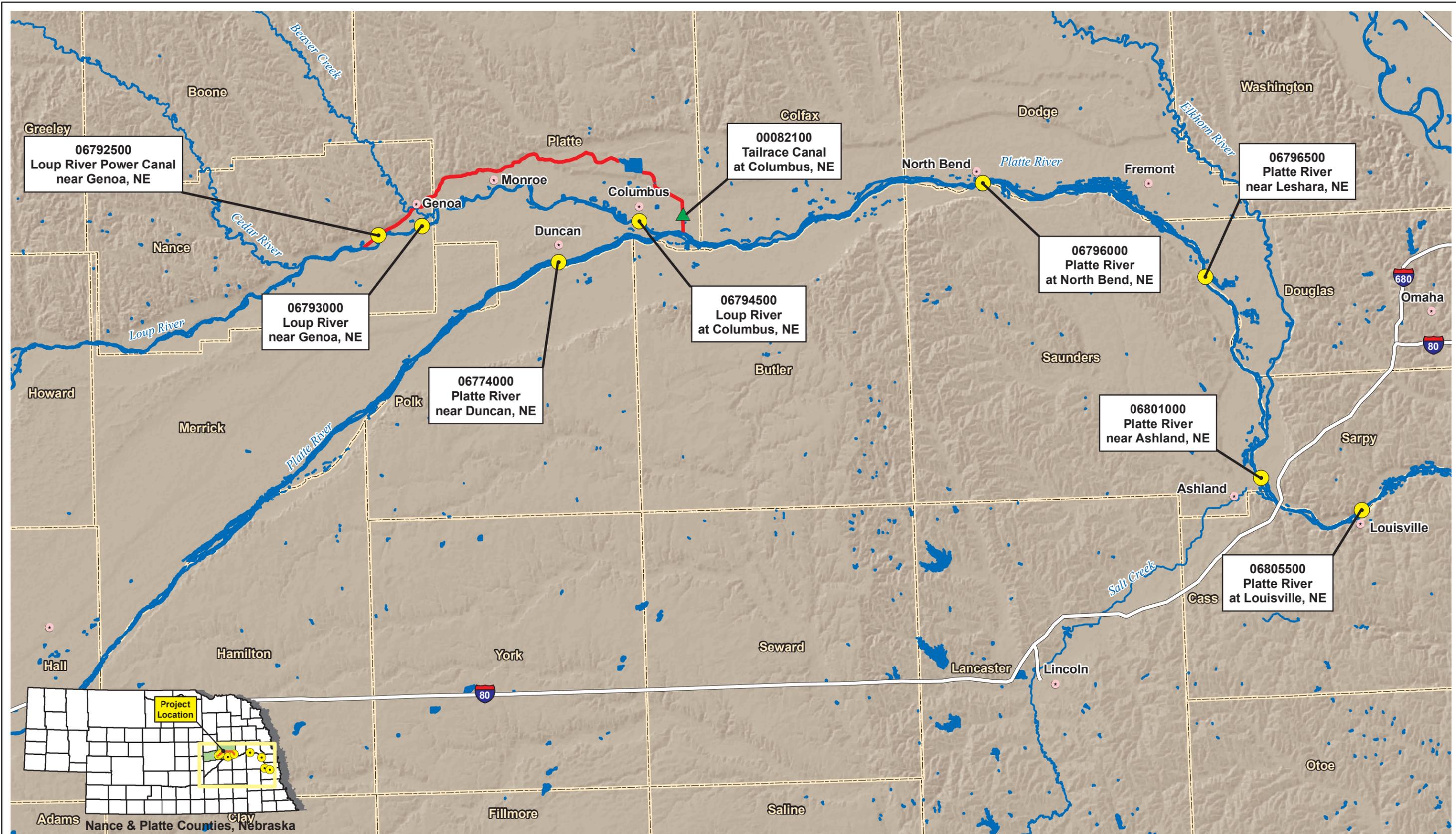
A portion of the flow and sediment in the Loup River is diverted to the Loup Power Canal. The remaining portion of the flow and sediment continues down the Loup River bypass reach. The majority of the total sediment diverted settles out in the Settling Basin. A lesser quantity of finer sediments settles out in the canal segments and regulating reservoirs. The balance of sediment remains in suspension and is conveyed through the Project to the Lower Platte River. Project operations have reduced the amount of sediment in the Platte River downstream of the Tailrace Canal. Sediment is dredged from the Settling Basin to the North and South Sand Management Areas. The sediment dredged to the South Management Area eventually returns to the Loup River bypass reach. The majority of sediment dredged to the North Sand Management Area is removed from the system. Sediment removal during Project operations may affect characteristics of the Loup River bypass reach and the Platte River downstream of the Tailrace Canal.

5. STUDY AREA AND STUDY SITES

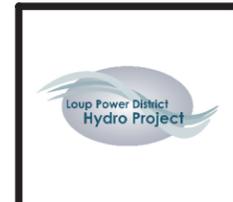
The proposed study area includes the Loup River bypass reach and the Lower Platte River from the confluence with the Loup River to the USGS gage at Louisville.

Figure 1-1 shows the extent of the study area and the study sites. The study sites will be those gages listed in Section 3.3, Flow and Gage Data, as well as a point upstream of the Diversion Weir. Flow at the Diversion Weir will be synthesized by using USGS Gage 06793000 on the Loup River near Genoa and USGS Gage 06792500 on the Loup Power Canal near Genoa. Conveyance losses between the gages and the point upstream of the Diversion Weir will be determined and applied appropriately.

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- Legend**
- City
 - NDNR Gaging Station
 - USGS Gaging Station
 - Interstate
 - Stream/River
 - Loup Power Canal
 - Waterbody
 - County



Sedimentation Study Area

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

© 2009 Loup River Public Power District

DATE	March 2009
FIGURE	1-1

Source: Stream Gage, Nebraska Department of Natural Resources; Streams/Waterbodies, 2000 Tiger Files

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the sedimentation study includes eight tasks, described below.

Task 1 Data Collection and Evaluation

Sedimentation studies relevant to this study will be researched. USGS flow, stage, and rating curve data will be collected. Cross sectional measurements performed by USGS to create the rating curves will be obtained and reviewed. One cross section will be surveyed at a point upstream of the Diversion Weir. District sediment (dredging and stockpiling) records will also be analyzed. Interior least tern and piping plover population and habitat information will be obtained from NGPC (for the Lower Platte River) and from USACE (for the Missouri River below Gavins Point Dam).

Task 2 Sediment Budget

An updated sediment budget will be determined based on the sediment budget and sediment yield analysis completed by the Missouri River Basin Commission in September 1975. In that report, the Platte River Basin was divided into subwatersheds, one of which was the Loup River Basin. Annual sediment yields for each subwatershed were calculated by determining the sediment production from all erosion processes (sheet and rill, gully, and streambank). The sediment yield analysis was then used to create an annual sediment budget for the river system.

Since 1975, various studies have provided updated sediment load estimates on the sediment budget completed by the Missouri River Basin Commission. Information from these studies will be used to revise the sediment budget as appropriate. Updated information includes the sediment load upstream of the Loup River confluence at Duncan (U.S. Department of the Interior, Bureau of Reclamation, August 2000) and District dredge records, which are recorded and summarized annually.

Task 3 Effective Discharges

This methodology follows the procedure described in Hey’s “Channel Response and Channel Forming Discharge: Literature Review and Interpretation” (1997). The median discharge is the discharge associated with the 50 percent exceedance on the flow duration graph while the effective discharge is the flow, or range of flows, that transports the greatest amount of sediment.

Flow Frequency Curves

Annual and seasonal flow frequency curves will be generated for each gage site listed in Section 5, Study Area and Study Sites, for Project operations and alternative conditions. The analysis will be limited to years in which adequate interior least tern and piping plover population information exists. The flow frequency curve that will be used in this analysis is a plot of the mean daily discharge on the x-axis and flow frequency (number of days a particular ranked and grouped mean daily discharge occurred) on the y-axis.

Sediment Discharge Rating Curves

Sediment discharge rating curves will be generated at each study site to coincide with the flow frequency curves for Project operations and alternative conditions. A sediment discharge rating curve shows sediment (both bed load and suspended load) in units of weight per unit of time versus discharge on a log-log scale. Analyses performed by Leopold and Maddock (1953), Yang (1974), Hey (1997), and others show a relationship between sediment discharge and water discharge through the use of known values such as channel slope, width, and shear stress.

There are several well-established methods describing this relationship. However, Yang (1974) showed that for the Middle Loup River, the Unit Stream Power method and the modified Einstein method both adequately predicted sediment discharge. This sedimentation study will use the Unit Stream Power method to plot sediment discharge rating curves. This method employs a relationship between the rate of energy expenditure and rate of sediment transport. Variables used in this method include velocity, slope, sediment particle gradation, and viscosity. The data to support these variables will come from the USGS rating curve surveys and the sediment information sources listed in Section 3.2.

Effective Discharge and Collective Sediment Discharge

Effective discharge is defined as the flow that transports the bulk of the sediment in a channel. It is found by developing a collective sediment discharge curve. A collective sediment discharge curve is developed by combining the flow frequency and sediment discharge rating curves developed in the previous tasks. The flow corresponding to the peak of the collective sediment discharge curve is the effective discharge. The area under the collective discharge curve is the total sediment transported during the period of analysis. The collective discharge curve can be developed on a daily, monthly, seasonal, or annual basis.

Exhibit 3.1 illustrates the concept of using the flow and sediment rating curves to create the collective sediment discharge curve. The collective sediment discharge curve can also show trends in sediment loading if the loading is flow- or supply-limited or if the system is in a state of quasi-equilibrium.

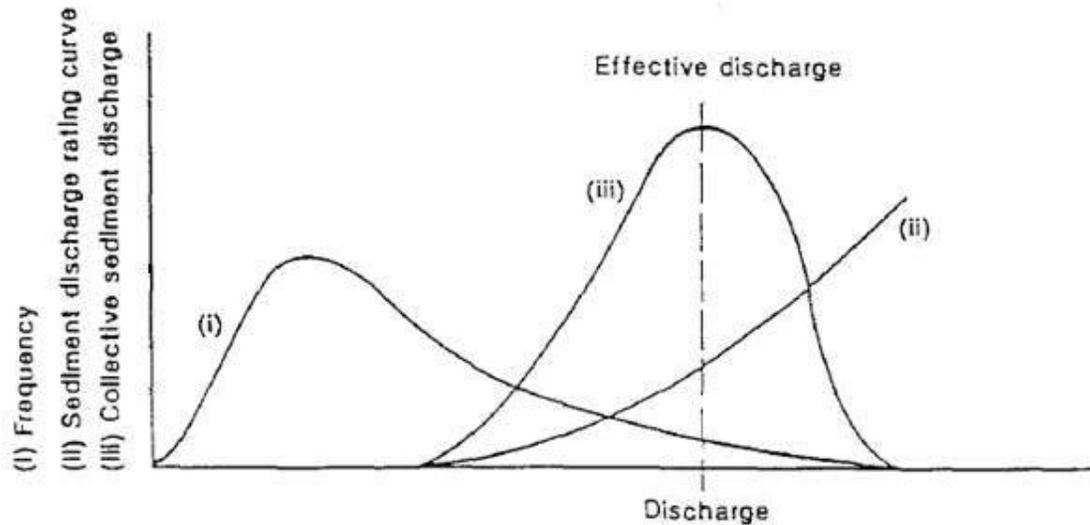


Exhibit 3.1. Effective discharge determination from typical sediment rating and flow duration curves. (Hey, 1997)

A sensitivity analysis will be performed around the variability of the parameters used in the creation of the sediment discharge rating curves and how varying each parameter affects the outcome of the effective discharge calculation.

Effective discharge and collective sediment discharge will be determined for each study site for Project operations and alternative conditions. The period examined will correspond with years in which adequate interior least tern and piping plover population information exists.

Task 4 Stream Channel Morphology

Stream morphology information measured and reported by USGS will be reviewed and evaluated. The stream morphology information includes channel cross sectional area changes, channel aggradation/degradation changes, and the rate at which these changes, if any, occur over time. Based on this information and the results of Task 3, Effective Discharges, the Loup River bypass reach and the Lower Platte River will be characterized as aggrading, degrading, or in quasi-equilibrium. If the channel morphology information shows that the Loup River bypass reach and Lower Platte River are in quasi-equilibrium, then it will be concluded that Project operations do not adversely impact channel morphology. If the channel morphology information shows that the Loup River bypass reach and Lower Platte River are not in quasi-equilibrium, Project operations will be evaluated to determine to what extent, if any, the Project may affect channel morphology as compared to alternative conditions.

Task 5 Interior Least Tern and Piping Plover Nesting and Sediment Transport Parameters

Available interior least tern and piping plover nesting population information will be plotted against sediment transport parameters calculated in Task 3, Effective Discharges. The plots will be evaluated to determine if a relationship can be detected. If no relationship can be detected through this analysis, the conclusion will be made that the effective discharge and total sediment transported have no material effect on interior least tern and piping plover populations. If a relationship is found, the degree to which Project operations affect the determining parameter will be reviewed.

Task 6 Interior Least Tern and Piping Plover Populations and Habitat in the Lower Platte River and Other Rivers

Data on interior least tern and piping plover nesting exist for both the Lower Platte River and the Missouri River downstream of Gavins Point Dam. Similarly, data exist on the amount of sandbar habitat for these two areas. Interior least tern and piping plover populations will be compared to the availability of sandbar habitat in both rivers. Because the availability of sandbar habitat normally increases following high flows, flows in the two reaches will be used to help establish when increases in sandbar habitat have occurred. The intent is to determine whether availability of sandbar nesting habitat is limiting interior least tern and piping plover populations in the Lower Platte River. If sandbar nesting habitat is found to be limiting, the degree to which Project operations affect the formation of sandbar habitat will be reviewed in context with Task 3, Effective Discharges, and Task 5, Interior Least Tern and Piping Plover Nesting and Sediment Transport Parameters.

Task 7 Pallid Sturgeon Habitat

Because pallid sturgeon also use the upper Missouri River and the Yellowstone River, existing information will be gathered on the use of these rivers by pallid sturgeon and the corresponding habitat characteristics (flow, sediment transport, temperature, morphology) of these rivers, including a qualitative assessment of sandbar abundance. These habitat characteristics will be compared to those of the Lower Platte River below the confluence with the Elkhorn River. The intent is to determine if there is a differentiating factor between the upper Missouri River and the Yellowstone River habitats and the characteristics of the Lower Platte River below the confluence with the Elkhorn River. If a differentiating factor is sandbar habitat, then Project effects on sandbar habitat will be reviewed in context with the results of Task 3, Effective Discharges, and Task 5, Interior Least Tern and Piping Plover Nesting and Sediment Transport Parameters, to determine if a change in Project operations could materially affect sandbar formation in the Lower Platte River below the confluence with the Elkhorn River.

Task 8 Sediment Impacts on Ice Jam Flooding

A potential link between sediment and ice transport will be evaluated. Frazil ice¹ transport can be described in a similar manner as low density bed load transport according to Shen and Wang (1995) and Beltaos (1995). Therefore, any flow regime changes relative to alternative conditions that could lead to a change in bed load transport could alter frazil ice transport in the channel. Total sediment transport analyses from Task 3, Effective Discharges, will be reviewed. This information will be used to qualitatively evaluate the potential for increased severity of ice jam flooding.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the sedimentation study is a study report. The study report will document the existing and past sediment regime in the Loup River bypass reach and the Platte River downstream of the Tailrace Canal. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the hydrocycling study will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the sedimentation study will cost approximately \$340,000. This work will be completed by qualified water resources engineers and biologists.

¹ Frazil ice, also known as slush ice because of its appearance, is formed only in turbulent supercooled water. Frazil ice is most often seen in early to mid-winter and can accumulate to form an ice cover or an ice jam (USACE, July 1994).

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The sedimentation study is scheduled to begin in the fourth quarter of 2009, and the final study report is to be submitted in the third quarter of 2010.

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STUDY 2.0 HYDROCYCLING2-1

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STUDY 2.0 HYDROCYCLING

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach.

Upstream of the regulating reservoirs, the Loup Power Canal and the Monroe Powerhouse operate in a run-of-river mode with no storage capacity. Average daily flow in this reach is 1,610 cfs; maximum flow is limited by water rights and hydraulic capacity to 3,500 cfs. The interconnected regulating reservoirs, Lake Babcock and Lake North, accumulate water and build head during a portion of each day. Accumulated water is then released through the Columbus Powerhouse to produce energy during the high demand period of the day as directed by the Nebraska Public Power District (NPPD), the exclusive purchaser of Project power. This sub-daily manipulation of daily flow at the Columbus Powerhouse is called hydrocycling.

Except during brief ramp-up and ramp-down periods, operating discharge from the Columbus Powerhouse ranges from a minimum of about 1,000 cfs with one turbine operating to a high of about 4,800 cfs with all three turbines operating at high efficiency. Water discharged from the powerhouse flows down the 5-mile-long Tailrace Canal and enters the Platte River at the Outlet Weir. This weir is located approximately 2 miles downstream of the confluence of the Loup and Platte rivers. Tailrace Canal flow is recorded at the Nebraska Department of Natural Resources (NDNR) gage at the 8th Street bridge in Columbus. Including local inflows unrelated to the Project, Tailrace Canal discharge to the Platte River ranges from less than 100 cfs to over as 6,300 cfs.

Hydrocycling flows entering the Lower Platte River may or may not affect riverine habitat and morphology, including habitat used by the interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and pallid sturgeon (*Scaphirhynchus albus*). These possible effects are derived from the sub-daily variability, rate of change, and proportion of hydrocycling flows relative to flows already in the Platte River. Therefore, this study will evaluate the physical effects of hydrocycling operations in the Lower Platte River.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the hydrocycling study is to determine if Project hydrocycling operations adversely affect or benefit the habitat used by interior least terns, piping plovers, and pallid sturgeon in the Lower Platte River. The physical effects of hydrocycling will be quantified and compared to alternative conditions.

The objectives of the hydrocycling study are as follows:

1. To conduct a gage analysis using existing U.S. Geological Survey (USGS) and NDNR flow and stage data to accurately determine the timing, frequency, rate of change, travel time, and magnitude of sub-daily flow and stage changes attributable to Project hydrocycling at established gage locations in the Tailrace Canal and the Lower Platte River.
2. To compare the sub-daily Project hydrocycling operation values (maximum and minimum flow and stage) to daily values (mean flow and stage). In addition to same-day comparisons, periods of weeks, months, and specific seasons of interest to protected species will be evaluated to characterize the relative degrees of variance between hydrocycling (actual) and alternative conditions in the study area.
3. To determine the flow characteristics (magnitude and occurrence) during the interior least tern and piping plover nesting season compared to a maximum (benchmark) flow event occurring just prior to, or during, initiation of the nesting season. This will indicate the potential for nest inundation due to both hydrocycling and alternative conditions.
4. To assess effects, if any, of hydrocycling on sediment transport parameters (see Study 1.0, Sedimentation).
5. To compare river stage variations of Project hydrocycling with flow and stage variations of the every-third-day cycling program on the Missouri River below Gavins Point Dam (or another relevant example) to identify material differences in potential effects on inundation of interior least tern and piping plover nests and pallid sturgeon habitat.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

The U.S. Fish and Wildlife Service (USFWS) is responsible for the conservation and management of migratory, threatened, and endangered fish and wildlife resources under a number of authorities, including the Endangered Species Act of 1973 (16 USC 1531 et seq.), the Fish and Wildlife Coordination Act (16 USC 661 et seq.),

the Bald and Golden Eagle Protection Act (16 USC 703-712, as amended), and the Migratory Bird Treaty Act (16 USC 703-712, as amended). Compliance with all of these statutes and regulations is required to be in compliance with the National Environmental Policy Act (NEPA) (42 USC 4321-4347). The mission of USFWS is “working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” (USFWS, June 15, 1999).

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Relevance to Threatened and Endangered Species

Flow in the Loup and Platte rivers is seasonally influenced. Flows are relatively high in the spring and early summer due to snow melt and weather events, and flows are low during the late summer and fall due to irrigation and infrequent rainfall. The Lower Platte River retains many of the important flow characteristics of its historical natural hydrograph. The variable timing of water inputs from upstream sources provides baseflow throughout much of the year. The channel of the Lower Platte River still contains a wide range of habitats, from large sandbars to woody islands to shallow sandbars and swift channels (Parham, 2007). The combinations of ample sediment and flows in the effective discharge range alternatively create transverse bars and then dissect the macroforms, lending support to the development and maintenance of habitat used by interior least tern and piping plover populations.

It is possible that Project operations may affect wildlife habitat diversity, connectivity, and suitability in the Lower Platte River due to erosion of sandbars and inundation of nests. The amount of flow is important to a variety of life stages of fish and wildlife, including the interior least tern, piping plover, and pallid sturgeon, three species Federally listed as threatened or endangered.

Sandbar habitat in the Lower Platte River is considered primary habitat for interior least terns and piping plovers and is used by these birds for breeding, nesting, loafing, and foraging. These birds migrate to the Nebraska rivers in mid-April to early June, with breeding, nesting, and egg-laying commencing in mid-May to early July (USFWS, September 1990 and June 28, 1994). After chicks have fledged in mid- to late August, interior least terns and piping plovers abandon the habitat and migrate to their wintering grounds along the Gulf of Mexico.

Riverine nesting areas of interior least terns and piping plovers are sparsely vegetated sand and gravel bars within a wide unobstructed river channel. Nesting locations are usually at higher elevations and away from the water’s edge because nesting is typically initiated when river flows are high and small amounts of sand are exposed. Interior least terns and piping plovers have been observed to nest on sandbar habitats

with less than 25 percent vegetative cover and an abundance of bare or sparsely vegetated sand and gravel (Sidle and Kirsch, 1993) with an average area of 1.45 hectares and at an average height of 0.49 meters (Ziewitz et al., 1992). Sandbar habitat is favored for nesting because it is usually surrounded by the channel during sufficient flows, which allows for a degree of protection for young from terrestrial predators, such as mink, raccoons, and bull snakes.

The interior least tern is piscivorous, feeding in shallow waters of rivers, streams, and lakes, along sandbars and sandy shores. Interior least terns usually feed close to their nesting sites but have been known to travel up to 3.2 kilometers to fish. Fish prey is small sized, usually between 2 and 8 centimeters long. Interior least terns are believed to be opportunistic feeders, exploiting any fish within an edible size range (USFWS, September 1990). Interior least terns have been noted to nest near large areas of water for proximity to foraging habitat. Piping plovers feed primarily on exposed beach substrates by pecking for invertebrates at, or less than, 1 centimeter below the surface. Piping plovers are believed to be opportunistic feeders, consuming a variety of invertebrate genus and species. Proximity of feeding areas to nests is important to piping plover chicks. Chicks are mobile within 3 to 5 days of hatching and begin foraging immediately after becoming mobile (USFWS, June 28, 1994).

The pallid sturgeon is considered to be a large turbid river species. The habitat used by different life stages of this species varies widely. Although no recorded spawning grounds have officially been mapped or documented for the pallid sturgeon, there is evidence that the Platte River is used by this species as spawning habitat (Peters and Parham, 2008a). Fertilized eggs of sturgeon sink to the bottom of a river and adhere to the substrate (Simpkins and LaBay, 2007, as cited in Peters and Parham, 2008b). After hatching, embryos drift downstream in water currents. The period of drift may carry them over 300 kilometers downstream (Kynard et al., 2007, as cited in Peters and Parham, 2008b). When sturgeon embryos have developed fin rays, they are considered in a larval stage. During this stage, they begin to actively move to different habitat for feeding. As they lose their fin folds and develop caudal fin rays, they transition to a juvenile stage, where they begin to transition to consuming fish. Pallid sturgeon are considered adults after gonadal development. In the juvenile and adult stage, they mainly use large, fast flowing, turbid rivers such as the Missouri for feeding.

Pallid sturgeon have been captured in the Platte River up to the confluence with the Elkhorn River. Pallid sturgeon in the Lower Platte River use areas associated with the downstream ends of sandbars and in deeper channels along the edge of sandbars (Peters and Parham, 2008a). It is speculated that accessibility of habitat is related to river discharge and flow. High discharge events produce flow velocities that scour deeper channels, which create and maintain the habitats favored by pallid sturgeon. Pallid sturgeon have been found to use the deepest water available in the Platte River, using depths ranging from 0.33 to 1.27 meters, with average column velocities in the range of 0.52 to 0.82 meters per second (Peters and Parham, 2008a).

3.2 Project Operations and Hydrocycling

As described in the PAD, the Project operates in a run-of-river mode from the Headworks to the regulating reservoirs. The interconnected regulating reservoirs, Lake Babcock and Lake North, accumulate water and build head during a portion of each day. Accumulated water is then released through the Columbus Powerhouse to produce energy during the high demand period of the day. This sub-daily manipulation of Columbus Powerhouse flow releases is called hydrocycling. Unless prevented from doing so (such as by ice, flooding, or equipment problems), the Project hydrocycles nearly every day of the year. The specific times, durations, and magnitudes of sub-daily Project flow releases are directly related to the power generation requested by NPPD.

There is no spillway or alternative bypass flow path at the Columbus Powerhouse. All flow exiting the regulating reservoirs must pass through the three powerhouse turbine units. Except during brief turbine ramp-up and ramp-down periods, operating discharge from the powerhouse ranges from a minimum of about 1,000 cfs with one turbine operating to a high of about 4,800 cfs with all three turbines operating at high efficiency. Releasing flows less than 1,000 cfs is possible for short periods. However, it makes inefficient use of the water and increases wear on the generating equipment. Water discharged from the powerhouse flows down the 5-mile-long Tailrace Canal and enters the Platte River at the Outlet Weir. This weir is located approximately 2 miles downstream of the confluence of the Loup and Platte rivers.

Tailrace Canal flow is recorded at the NDNR gage at the 8th Street bridge in Columbus approximately 2 miles before discharging into the Platte River at the Outlet Weir. Total Tailrace Canal discharge to the Platte River ranges from less than 100 cfs to over 6,300 cfs. Differences between powerhouse discharge and the total Outlet Weir discharge are due to non-Project canal inflows from the Lost Creek Flood Control Project and local surface drainage.

3.3 Available Flow Data

Flow data from USGS and NDNR gage stations in the vicinity of the study area will be used for this hydrocycling study. Each gage station is accompanied by the associated rating curves and velocity and cross-sectional data used to create the rating curves. Flow data that will be used for this study include:

- USGS Gage 06793000, Loup River near Genoa, NE – Available discharge and gage height data from April 1, 1929, to current includes daily and 30-minute interval data.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available discharge and gage height data from January 1, 1937, to current includes daily and 30-minute interval data.

- NDNR Gage 00082100, Loup River Power Canal Return [Tailrace Canal] at Columbus, NE – Available discharge and gage height data from October 1, 2002, to current includes daily and 15-minute interval data.
- USGS Gage 06794500, Loup River at Columbus, NE – Available daily discharge and gage height data from April 1, 1934, to October 10, 1978. This gage was restarted by NDNR on September 23, 2008.
- USGS Gage 06774000, Platte River near Duncan, NE – Available discharge and gage height data from May 3, 1895, to current includes daily and 30-minute interval data.
- USGS Gage 06796000, Platte River at North Bend, NE – Available discharge and gage height data from April 1, 1949, to current includes daily and 30-minute interval data.
- USGS Gage 06796500, Platte River at Leshara, NE – Available discharge and gage height data from June 29, 1994, to current includes daily and 30-minute interval data.
- USGS Gage 068010000, Platte River near Ashland, NE – Available discharge and gage height data from September 1, 1928, to current includes daily and 30-minute interval data.
- USGS Gage 06805500, Platte River at Louisville, NE – Available discharge and gage height data from June 1, 1953, to current includes daily and hourly interval data.

4. PROJECT NEXUS

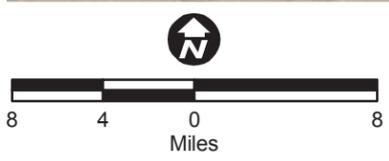
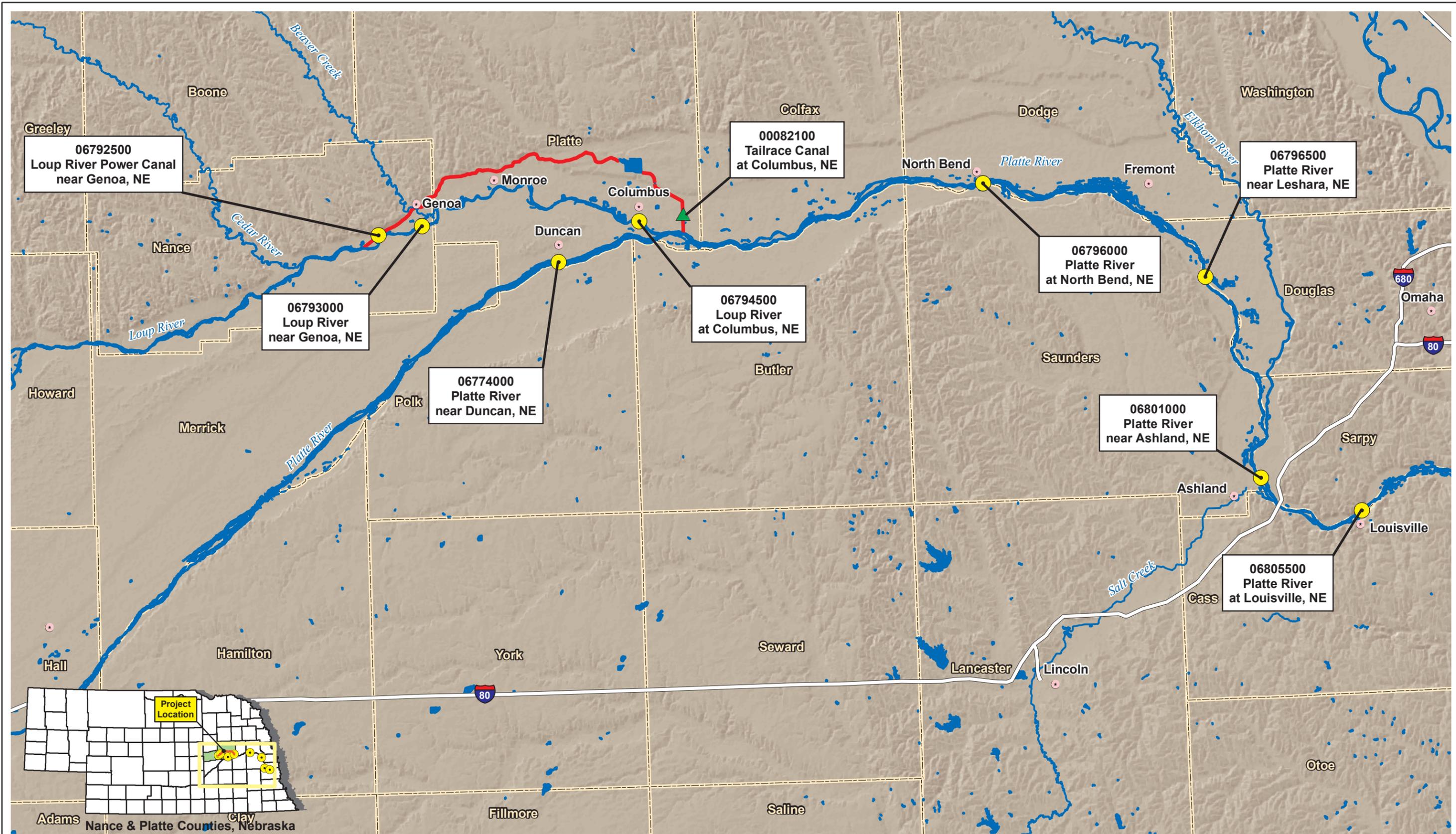
“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The Columbus Powerhouse is operated in a sub-daily hydrocycling mode to generate power as requested by NPPD. Project flow releases enter the Platte River from the Tailrace Canal near Columbus. This hydrocycling operation may result in impacts, whether adverse or beneficial, on habitat used by interior least terns, piping plovers, and pallid sturgeon.

5. STUDY AREA AND STUDY SITES

The proposed study area includes the Tailrace Canal and the Lower Platte River from the Project Outlet Weir to the USGS gage on the Platte River at Louisville, shown in Figure 2-1. Stream gage information from upstream locations on both the Loup and Platte rivers will be used in development of total flow information at the Outlet Weir location. Existing stream gage locations on the Lower Platte River will serve as study sites for analyses.

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- Legend**
- City
 - ▲ NDNR Gaging Station
 - USGS Gaging Station
 - Interstate
 - Stream/River
 - Loup Power Canal
 - Waterbody
 - County



Hydrocycling Study Area

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

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DATE	March 2009
FIGURE	2-1

Source: Stream Gage, Nebraska Department of Natural Resources; Streams/Waterbodies, 2000 Tiger Files

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the hydrocycling study includes six tasks, described below.

Task 1 Data Collection

Flow and gage height data will be collected for each USGS and NDNR gage listed in Section 3.3, Available Flow Data, for the respective periods of record.

Task 2 Gage Analysis

A gage analysis will be performed using existing USGS and NDNR flow and stage data from the listed study sites to accurately determine the timing, frequency, rate of change, travel time, conveyance losses or gains, and magnitude of sub-daily flow and stage changes attributable to Project hydrocycling. The period of analysis for this task will be the time period during which the NDNR gage at the 8th Street bridge in Columbus has been in operation.

Task 3 Hydrographs for the Project versus Alternative Conditions

Hydrographs for each Platte River study site as well as the Tailrace Canal will be plotted for periods of weeks, months, and specific seasons of interest to protected species for the period of record for each site. Daily maximum, minimum, and mean flows and their respective stage heights will be plotted for each time interval. The overall time period that will be used to create these plots will be the time period during which the NDNR gage at the 8th Street bridge in Columbus has been in operation. A synthetic hydrograph will be developed at the Tailrace Canal for current Project operations. The conveyance losses or gains will be determined and applied appropriately.

Synthetic hydrographs will be developed for alternative conditions. The conveyance losses or gains will be determined and applied appropriately. The synthetic hydrographs for each study site will be plotted for periods of weeks, months, and specific seasons of interest to protected species for the period of analysis. Maximum, minimum, and mean flow and stage height will be plotted.

Synthesized alternative conditions flow and stage variations that occur over a week, month, or specific seasons of interest to protected species will be compared with weekly, monthly, and seasonal summaries of subdaily variations due to hydrocycling.

Comparisons will be made between the weekly, monthly, and seasonal maximum, minimum, and mean flows and stage heights between the hydrographs for the Project and for alternative conditions. The results of this analysis will be reviewed in context with the life requisites of the pallid sturgeon.

Task 4 Seasonal Inundation Heights

Pre-nesting high flow (benchmark) events will be identified for each interior least tern and piping plover nesting season by identifying the highest river stage that occurred from May 1 to May 21. Subsequent flow events occurring from May 22 to August 1 that are equal to or greater than the benchmark events will be identified and counted. These subsequent flow events are those that could potentially inundate sandbar nests built at or below the benchmark event elevation. This information will be compared to alternative conditions to identify any scenarios in which the exceedence of the benchmark event elevation could have been avoided by modified Project operations. The time period that will be used to perform this analysis will be the time period during which the NDNR gage at the 8th Street bridge in Columbus has been in operation.

If the benchmark stage is not exceeded after May 21 as a result of normal Project operations, then it can be concluded that Project operations do not negatively impact sandbar nests for that period of analysis. In addition, if Project operations do not increase the number of nest inundation events after May 21 relative to alternative conditions, then it can be concluded that the Project does not adversely impact sandbar nests.

Task 5 Effects of Hydrocycling on Sediment Transport Parameters

Effects of hydrocycling on sediment transport parameters will be evaluated using methodologies outlined for Study 1.0, Sedimentation. The total sediment transport will be calculated for a series of representative days with hydrocycling. The results will be compared to alternative conditions for the same series of representative days to maintain conservation of mass. If the total sediment does not materially differ between hydrocycling and alternative conditions, then it can be concluded that hydrocycling does not impact daily sediment transport.

Task 6 Effects of Hydrocycling on Interior Least Tern and Piping Plover Nesting and Forage and Isolation of Backwaters and Side Channels

Hydrocycling or fluctuating river conditions will be evaluated at selected locations in other rivers, such as the Missouri River below Gavins Point Dam and the Yellowstone River below Intake, Montana, to determine if similarities exist that will permit specific comparison of impacts on interior least tern and piping plover nesting and foraging, on isolation of backwater and side channel areas, and on effects on the pallid sturgeon.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the hydrocycling study is a study report. The study report will document the physical magnitude, if any, of Project hydrocycling in the Lower Platte River. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the hydrocycling study will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the hydrocycling study will cost approximately \$230,000. This work will be completed by qualified water resources engineers and biologists.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The hydrocycling study is scheduled to begin in the fourth quarter of 2009 and to be completed in the third quarter of 2010. The final study report is to be submitted in the third quarter of 2010.

11. REFERENCES

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STUDY 3.0 WATER TEMPERATURE IN THE PLATTE RIVER 3-1

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STUDY 3.0 WATER TEMPERATURE IN THE PLATTE RIVER

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs.

Because of the configuration and operation of the Project, water temperatures may be altered to some extent in the Platte River downstream of the Outlet Weir. Resource agencies have expressed concern that changes in water temperature resulting from hydrocycling operations may affect spawning and migration cues of pallid sturgeon in the Lower Platte River. The pallid sturgeon (*Scaphirynchus albus*) is Federally and state-listed as endangered, and temperature is thought to influence the behavior of the pallid sturgeon as well as its use of habitat. No critical habitat is designated for the species in Nebraska. However, the Lower Platte River, between its confluence with the Elkhorn River and its confluence with the Missouri River, is considered to be “associated habitat” for the pallid sturgeon as defined by the Platte River Recovery Implementation Program (PRRIP) (PRRIP, October 24, 2006). This associated habitat reach begins approximately 68 stream miles downstream of the Project.

The U.S. Geological Survey (USGS) has monitored both stream flow and water temperature at key gaging stations on the Platte River, Elkhorn River, and Salt Creek in the study area (see Section 5, Study Area and Study Sites). In addition, weather station data are available for ambient air temperatures in the area. However, no study has investigated specific thermal effects of Project operations on the pallid sturgeon’s associated habitat reach. This study will fill this information gap.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the study of water temperature in the Platte River is to determine if Project operations materially affect water temperature in the pallid sturgeon’s associated habitat reach of the Lower Platte River.

The objectives of the study of water temperature in the Platte River are as follows:

1. To collect existing flow and temperature data from selected USGS gages on the Platte River, the Elkhorn River, and Salt Creek.
2. To analyze gage data to determine if the water temperatures monitored at the Platte River gage at Louisville, Nebraska, are consistent with water temperatures monitored at the Elkhorn River gage and the Salt Creek gage.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

USFWS is responsible for the conservation and management of fish and wildlife resources under a number of authorities, including the Endangered Species Act of 1973, the Fish and Wildlife Coordination Act, the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. In particular, USFWS has concern for endangered and threatened species, migratory birds, and other important fish and wildlife resources as well as for Federal and state wildlife refuges, management areas, and other areas that support sensitive habitats. USFWS gives special attention to proposals that include modifications to wetlands, streams, and riparian woodlands. USFWS recommends methods to avoid, minimize, rectify, reduce, or compensate for damaging impacts on important fish and wildlife resources and their habitats that may be attributed to land and water resource development proposals.

USFWS has developed a recovery plan for the pallid sturgeon that is continually updated as newer information on the species becomes available (USFWS, 1993).

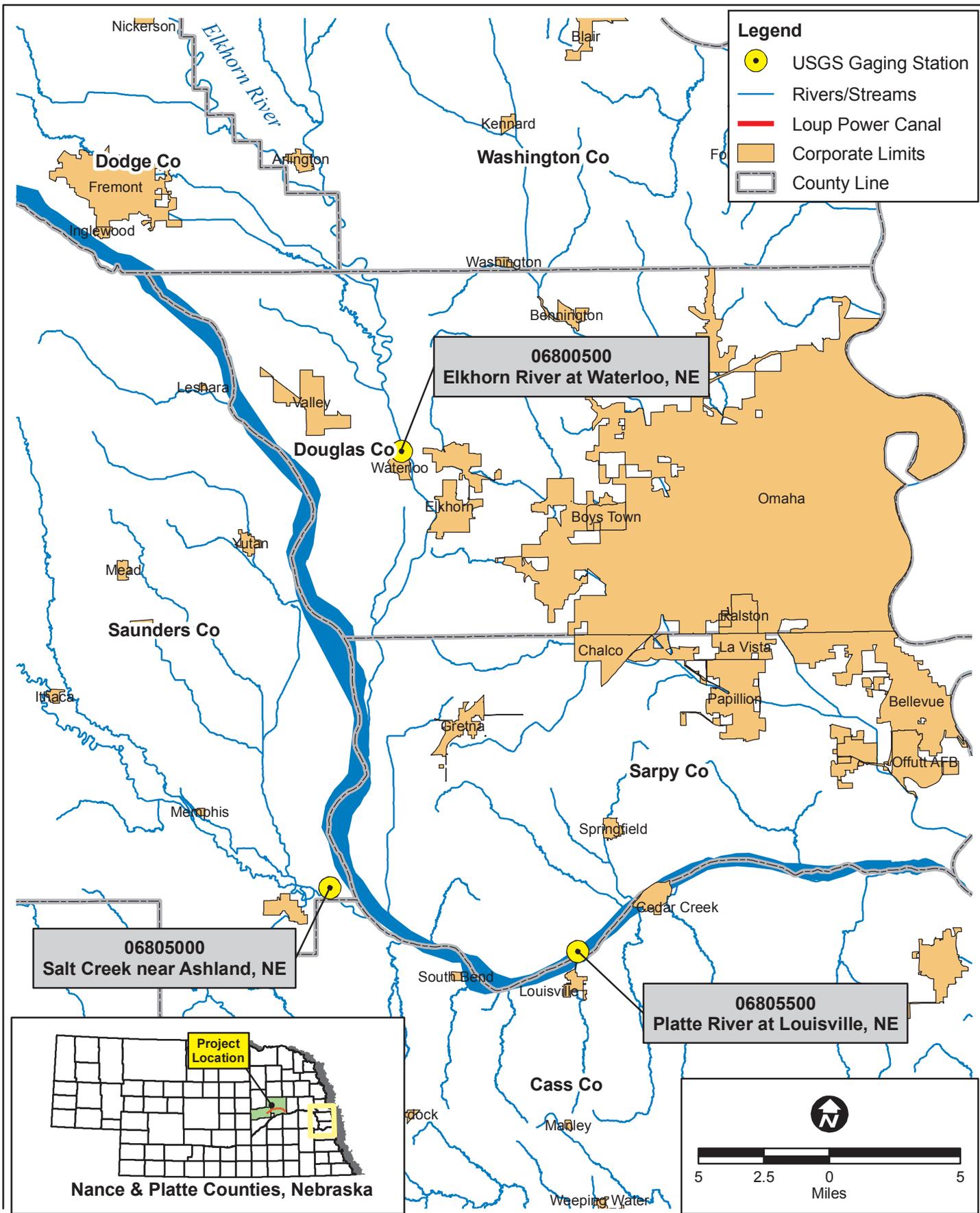
3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

Atmospheric data is an important factor exerting influence on the temperature of the water in the Lower Platte River. Atmospheric data is available through the High Plains Regional Climate Center in Lincoln, Nebraska, from their weather gage at Mead, Nebraska. Air temperature is collected on an hourly basis and can be found at <http://www.hprcc.unl.edu/>.

Flow is another important factor exerting influence on the temperature of the water in the Lower Platte River. USGS data at the following gage stations, shown in Figure 3-1, will provide temperature and flow data relevant to this study:

- USGS Gage 06805500, Platte River at Louisville, NE – At this flow station, 15-minute increment temperature data collection began on May 16, 2007, and are still being collected. Hourly discharge and gage height data are also available during the same time period for this location.
- USGS Gage 06805000, Salt Creek near Ashland, NE – At this temperature gage station, 15-minute increment temperature data collection began on August 29, 2007, and are still being collected. Although no flow or gage data are being collected at this site, USGS Gage 06803555, Salt Creek at Greenwood, NE, is a flow station at which discharge and gage height data are available during the same time period as the temperature collected at the Ashland gage.



Lower Platte River Temperature Study Area

Loup River Hydroelectric Project
FERC Project No. 1256
Proposed Study Plan

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DATE	March 2009
FIGURE	3-1

- USGS Gage 06800500, Elkhorn River at Waterloo, NE – At this flow station, 15-minute increment temperature data collection began on April 25, 2002, and are still being collected. Discharge and gage height data are also available during the same time period for this location.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The Project diverts water from the Loup River near Genoa into the Loup Power Canal and then releases diverted water into the Platte River through the Tailrace Canal at Columbus, just downstream of the confluence of the Loup and Platte rivers. The Columbus Powerhouse and the Tailrace Canal are designed for the flow variation of hydrocycling operation. Hydrocycling refers to the method of producing hydroelectricity “on-demand” by temporarily ponding water in a regulating reservoir until the water is needed to produce electricity, typically within the same 24-hour period. Hydrocycling has the potential to affect the temperature in the Lower Platte River because canal flows leaving the Project may be cooler than the naturally shallow river flows experienced in this type of river. Therefore, a nexus exists between Project operations and thermal effects on the aquatic environment in the pallid sturgeon’s associated habitat reach of the Lower Platte River.

A variety of environmental cues, including water temperature, are important guidance mechanisms for fish migration, which begins in April (Swigle, 2003). Therefore, assessing water temperature measured at the USGS gage at Louisville is necessary to determine if Project operations impact water temperature in the pallid sturgeon’s associated habitat reach of the Lower Platte River.

5. STUDY AREA AND STUDY SITES

The study area includes the Lower Platte River between its confluence with the Elkhorn River and its confluence with the Missouri River. It also includes the Elkhorn River and Salt Creek as they drain to the Platte River. The focal point of the study is the USGS gage at Louisville. It is the only established temperature and flow monitoring location within the pallid sturgeon’s associated habitat reach.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the study of water temperature in the Platte River includes two tasks, described below.

Task 1 Data Collection

Existing pertinent temperature and flow data from 2007 to the present will be collected from identified sources and organized in a database by week, month, and season. Any data gaps will be described. The descriptive statistics add-in available in Microsoft Excel will be used to provide descriptive statistics, such as count, maximum, mean, minimum, and standard deviation, for the grouped data.

Task 2 Data Analysis

Data will be plotted to identify general patterns and distinguish trends. These plots will consist of the data that was measured in the shortest time interval that is available grouped by week, month, and season for the migration time frame of the pallid sturgeon. The time period that will be assessed will be March through June. A select number of daily plots will also be created. The types of plots that will be created for each grouping of data are as follows:

- Plot temperature of the water in the Elkhorn River measured at the USGS gage at Waterloo against the time the data were collected. On the same graph, plot temperature of the water in the Platte River measured at the USGS gage at Louisville against the time the data were collected. These two lines will be compared to discern differences in the time series trends. For example, if the plot of temperature of the water in the Platte River measured at the USGS gage at Louisville shows a sub-daily sinusoidal pattern that is not present in the plot of temperature of the water in the Elkhorn River measured at the USGS gage station at Waterloo, then that pattern is most likely not explained by normal diurnal temperature changes. The two lines will be compared in terms of the peak temperature measured, the lowest temperature measured, the number of peaks and troughs, and the time each peak and trough occurs.
- Plot temperature of the water in Salt Creek measured at the USGS gage near Ashland against the time the data were collected. On the same graph, plot temperature of the water in the Platte River measured at the USGS gage at Louisville against the time the data were collected. These two lines will be compared to discern differences in the time series trends. For example, if the plot of temperature of the water in the Platte River measured at the USGS gage at Louisville shows a sub-daily sinusoidal pattern that is not present in the plot of temperature of the water in Salt Creek measured at the USGS gage near Ashland, then that pattern is most likely explained by hydrocycling at the Project. The smaller size of the watershed upstream of the Salt Creek USGS gage near Ashland may result in the water temperature of the water of Salt Creek measured at the USGS

gage near Ashland having a shorter response time to ambient conditions; this characteristic will be taken into account in this analysis. The two lines will be compared in terms of the peak temperature measured, the lowest temperature measured, the number of peaks and troughs, and the time each peak and trough occurs.

- Plot ambient air temperature obtained at the Mead weather station against the time the data were collected. On the same graph, plot temperature of the water in the Platte River measured at the USGS gage at Louisville against the time the data were collected. These two lines will be compared to discern differences in the time series trends. The ability of the atmosphere to change temperature more rapidly than water will be taken into account.
- Plot all four data series—ambient air temperature obtained at the Mead weather station, temperature of the water in Salt Creek measured at the USGS gage near Ashland, temperature of the water in the Elkhorn River measured at the USGS gage at Waterloo, and temperature of the water in the Platte River measured at the USGS gage at Louisville—against the time the data were collected and compare the plotted time series to discern differences in the time series trends.

If it is found that one or more of the above-described plots show a direct and distinct relationship, then it can be assumed that the temperature of the Platte River at Louisville is not affected by Project operations.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the study of water temperature in the Platte River is a study report. The study report will document the thermal effects of Project operations on the pallid sturgeon’s associated habitat reach. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the study of water temperature in the Platte River will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the study of water temperature in the Platte River will cost approximately \$50,000. This work will be completed by qualified water resources engineers.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The collection of data is scheduled to begin in the fourth quarter of 2009, and the final study report is to be submitted in the second quarter of 2010.

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STUDY 4.0 WATER TEMPERATURE IN THE LOUP RIVER BYPASS REACH..... 4-1

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STUDY 4.0 WATER TEMPERATURE IN THE LOUP RIVER BYPASS REACH

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach.

According to the Nebraska Department of Environmental Quality (NDEQ), there have been three documented fish kills in the Loup River bypass reach: one in July 1995, one in July 1999, and one in July 2004 (NDEQ, 2007). A combination of low flow and thermal stress are the suspected causes of these fish kills. In 1995, in response to the fish kills in the Loup River bypass reach, the District, in coordination with the Nebraska Game and Parks Commission (NGPC), began voluntarily allowing for a flow of 50 cfs in the Loup River bypass reach when ambient temperature conditions warrant. This voluntary flow was increased to 75 cfs in 2003 based upon discussions and agreements with the NGPC. This flow increase is intended to prevent temperature-related fish mortality from occurring in the Loup River bypass reach.

Water temperature in the Loup River bypass reach was identified as a potential issue for the Project as it is believed to have been a factor in fish kills in the bypass reach. NGPC has identified the portion of the Loup River bypass reach from the Diversion Weir to the confluence with Beaver Creek as the “main affected area for fish kills”(NGPC, February 6, 2009). In this study, this main affected area will be referred to as the Study Reach. The purpose of this study is to evaluate whether, and to what extent, water temperature in the Loup River bypass reach is affected by Project operations.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the study of water temperature in the Loup River bypass reach is to determine if Project operations (flow diversion) materially affect water temperature in the Study Reach.

The objectives of the study of water temperature in the Loup River bypass reach are as follows:

1. To coordinate with the U.S. Geologic Survey (USGS) to install temperature sensors in the Loup River at the Diversion Weir and in the Loup River bypass reach at USGS Gage 06793000, Loup River near Genoa, NE.
2. To collect and review ambient air temperature data at the National Weather Service (NWS) atmospheric station located at Genoa.

3. To collect and review flow data at USGS Gage 06793000, Loup River near Genoa, NE, and USGS Gage 06792500, Loup River Power Canal near Genoa, NE.
4. To analyze the collected ambient air and water temperature and flow data.
5. To estimate the relationship between flow in the Loup River bypass reach, ambient air temperature, and water temperature.
6. To describe and quantify the relationship, if any, between diversion of water into the Loup Power Canal and water temperature in the Study Reach of the Loup River bypass reach.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

Resource agencies with an interest in preventing future fish kills in the Loup River bypass reach are USGS, U.S. Fish and Wildlife Service (USFWS), NGPC, NDEQ, and the Nebraska Department of Natural Resources (NDNR). The Loup River bypass reach has been assigned a warmwater aquatic life designation, as stated in Nebraska Administrative Code, Title 117, Nebraska Surface Water Quality Standards. As with all classified waters in Nebraska, there are water quality standards that are applied to the Loup River bypass reach. NDEQ has set a water quality standard for water temperature in the Loup River bypass reach, which states “For warm waters, the maximum limit is 90°F (32°C).” This standard is applied to all waters in Nebraska with the same warmwater designation and was established to prevent fish mortality events. This temperature value is set below the critical thermal maximum value for the majority of fish species (Beitinger et al., 2000).

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 District Operating Procedures

Low flow conditions on the Loup River generally occur during the hot summer months when river flow is reduced by upstream irrigation withdrawals. During these periods, the Project continues to operate normally, utilizing the flow available for diversion and generation. According to District observations, the minimum leakage rate from the Diversion Weir and Sluice Gate Structure is approximately 50 cfs.

Since 1995, the District’s primary Project operating response to hot weather conditions has been to allow for a flow of 50 to 75 cfs in the Loup River bypass reach when conditions warrant. This has been done voluntarily by the District (in accordance with mutual understandings and informal letter agreements with NGPC)

to prevent temperature-related fish mortality from occurring in the Loup River bypass reach. The Headworks Supervisor monitored ambient air temperatures and initiated the reduced flow diversion when air temperature reached 98° Fahrenheit. Previously, on occasion, the District has voluntarily reduced the amount of flow diverted into the Loup Power Canal to provide additional flow in the Loup River bypass reach during hot weather to prevent fish kills based on a request from NGPC. In 2008, the District temporarily suspended this practice due to water accounting issues raised by NDNR. The District is currently working with NDNR to resolve these issues.

3.2 Available Atmospheric Data

Atmospheric data is an important factor exerting influence on the temperature of the water in the Loup River bypass reach. Atmospheric data will be collected from the NWS station at Genoa during the proposed period of temperature sampling in the Loup River bypass reach. Daily maximum ambient atmospheric temperature data is available at this station and can be found at <http://www.ncdc.noaa.gov/oa/climate/stationlocator.html>.

3.3 Available Flow Data

Flow is another important factor exerting influence on the temperature of the water in the Loup River bypass reach. USGS data at the following two locations will provide flow data that will be used for this study:

- USGS Gage 06793000, Loup River near Genoa, NE – Available data for this station includes 30-minute interval data for discharge and gage height.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available data for this station includes 30-minute interval data for discharge and gage height.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The Project diverts water from the Loup River near Genoa into the Power Canal and then releases diverted water into the Platte River through the Tailrace Canal at Columbus, just downstream of the confluence of the Loup and Platte rivers. The nexus between Project operations and water temperature effects is that a combination of water diversion from the Loup River to the Loup Power Canal and high ambient air temperatures may lead to an exceedance of the 90° F (32°C) water quality standard. This study will evaluate and quantify effects of the Loup Power Canal flow diversion on water temperature in the Study Reach.

5. STUDY AREA AND STUDY SITES

The study area is the aforementioned Study Reach, which begins at the Diversion Weir, located west of Genoa, where water is diverted from the Loup River, and ends at the confluence with Beaver Creek (see Figure 4-1).

There are two study sites within the study area where water temperature data will be collected. The first site will be in the Loup River on the upstream side of the Diversion Weir, and the second site will be at USGS Gage 06793000 on the Loup River near Genoa. In addition, a second USGS gage site, USGS Gage 06792500, Loup River Power Canal near Genoa, NE will be used to estimate flow in the Loup River just upstream of the Diversion Weir.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the study of water temperature in the Study Reach of the Loup River bypass reach includes three tasks, described below.

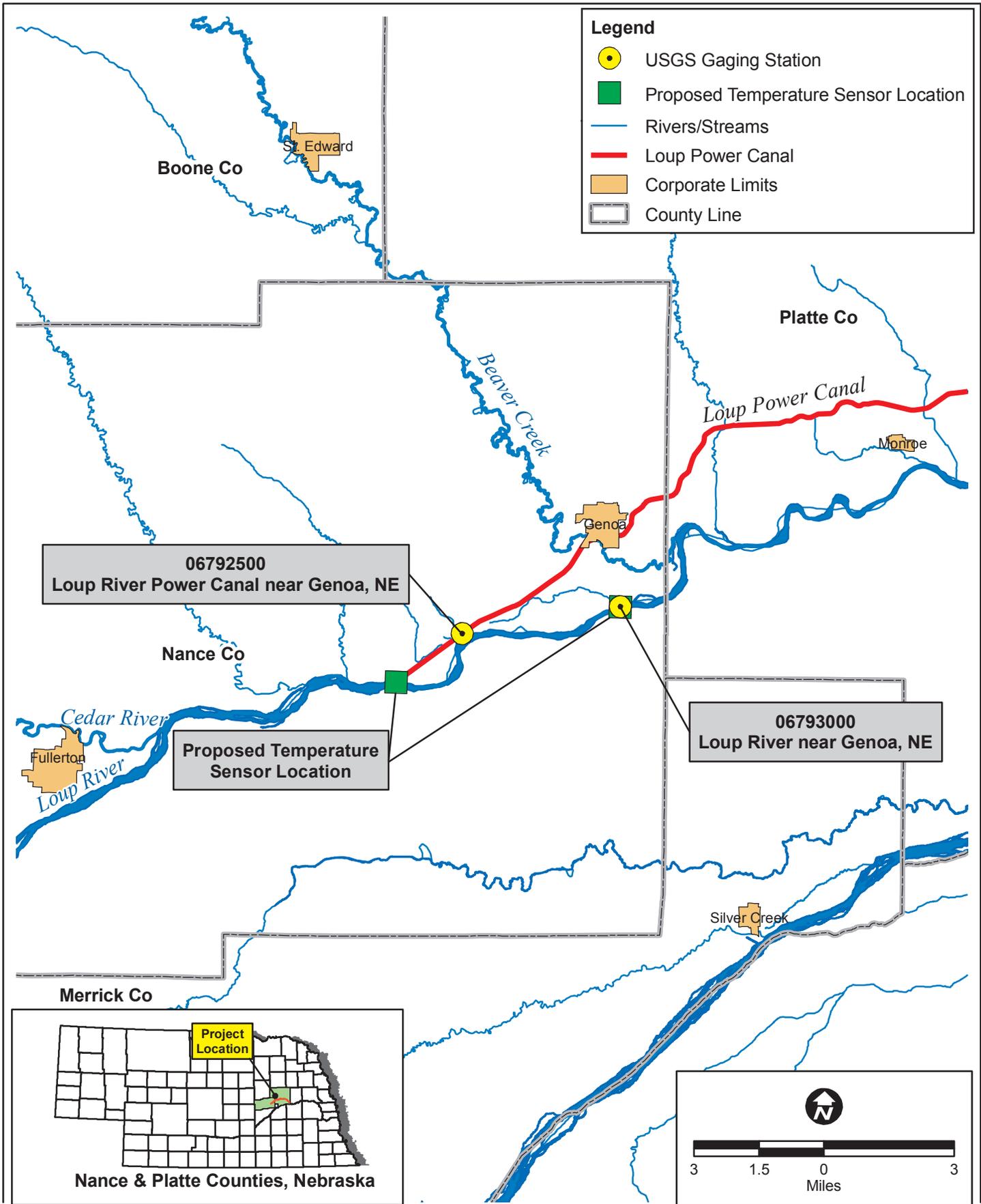
Task 1 USGS Coordination

The District will coordinate with USGS to install temperature sensors at two locations: 1) Loup River at the Diversion Weir, and 2) USGS Gage 06793000 on the Loup River near Genoa. Temperature sensors and recording devices will be installed in the spring of 2010 and will record data from May 1, 2010 through September 30, 2010.

Task 2 Data Collection

Flow data will be obtained from USGS Gage 06793000, Loup River near Genoa, NE, and from USGS Gage 06792500, Loup River Power Canal near Genoa, NE for the May through September time period. Ambient air temperature data will be obtained from the NWS station at Genoa. The data will be organized in a database by day, week, and month, and any data gaps will be described. The descriptive statistics available in Microsoft Excel will be used to provide descriptive statistics, such as count, maximum, mean, minimum, and standard deviation, for the grouped data.

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Loup River Temperature Study Reach

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

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DATE	March 2009
FIGURE	4-1

The descriptive statistics information will also note whether the temperature measured at either location exceeded the NDEQ temperature standard of 90°F (32°C) and, if so, how often and by how much.

Task 3 Data Analysis

Data will be plotted to identify general patterns and distinguish trends, as follows:

- Estimate a relationship between flow volume and water temperature upstream of the Diversion Weir. Plot flow derived volume of water in the Loup River measured at the diversion against the temperature of the water in the Loup River measured at the diversion for the period of record. The flow volume upstream of the diversion structure will be estimated based on the USGS gages on the Loup River near Genoa and Loup River Power Canal near Genoa. Regressions will be calculated on hourly data grouped by week and month. A select number of daily plots will also be created. These regressions will also be plotted.
- Estimate a relationship between flow volume and water temperature in the Study Reach. Plot flow derived volume of water in the Study Reach versus water temperature measured at the USGS gage on the Loup River near Genoa for the period of record. Regressions will be calculated on hourly data grouped by week and month. A select number of daily plots will also be created. These regressions will also be plotted.
- Estimate a relationship between water temperature in the Study Reach and water temperature upstream of the Diversion Weir. Plot water temperature in the Study Reach versus water temperature upstream of the Diversion Weir. Regressions will be calculated on hourly data grouped by week and month. A select number of daily plots will also be created. These regressions will also be plotted.
- Estimate a relationship between ambient air temperature and water temperature in the Study Reach. Plot ambient air temperature against the temperature of the water in the Study Reach measured at the USGS gage on the Loup River near Genoa for the period of record. Regressions will be calculated on hourly data grouped by week and month. A select number of daily plots will also be created. These regressions will also be plotted.
- Estimate a relationship between ambient air temperature and water temperature upstream of the Diversion Weir. Plot ambient air temperature against the temperature of the water upstream of the Diversion Weir for the period of record. Regressions will be calculated on hourly data grouped by week and month. A select number of daily plots will also be created. These regressions will also be plotted.

Regression analyses on each described plot will be performed to determine relationships between the water temperature in the Study Reach, ambient air temperature, and flow in the Study Reach.

The first single regression that will be completed will have flow in the Study Reach versus water temperature. The second analysis will have ambient air temperature versus water temperature. The multiple regression analysis will have flow volume in the Study Reach, ambient air temperature, and water temperature upstream of the Diversion Weir as variables versus water temperature in the Study Reach.

Agreements that the District has entered into in the past have been based on the assumption that the first two variables exert more influence on the temperature of the water in the Loup River bypass reach than any other variable.

Once a predictive relationship is established, that relationship can be used to predict during what conditions the water quality temperature standard may be exceeded.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the study of water temperature in the Loup River bypass reach is a study report. The study report will document the existing relationship between water temperature and flow in the Loup River bypass reach. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the study of water temperature in the Loup River bypass reach will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the study of water temperature in the Loup River bypass reach will cost approximately \$110,000. This work will be completed by qualified water resources engineers. The installation and maintenance of the temperature sensors will be completed by USGS.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The study of water temperature in the Loup River bypass reach is scheduled to begin in the fourth quarter of 2009, and the final study report is to be submitted in the first quarter of 2011.

11. REFERENCES

Beitinger, Thomas L.; Bennett, Wayne A.; McCauley, Robert W.; Temperature tolerances of North American freshwater fishes exposed to dynamic changes in temperature. *Environmental Biology of Fisheries* 58:237-275, 2000.

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NDEQ. 2007. “Loup Fish Kills” Excel spreadsheet. Provided by John Bender, NDEQ, on July 3, 2008.

NGPC. February 6, 2009. Letter from Frank Albrecht, Assistant Division Administrator, to Kimberly D. Bose, Secretary, FERC, regarding comments on the Scoping Document and Pre-Application Document.

STUDY 5.0 FLOW DEPLETION AND FLOW DIVERSION5-1

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STUDY 5.0 FLOW DEPLETION AND FLOW DIVERSION

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach. The Project is able to divert up to 3,500 cfs of water. This is the capacity of the Loup Power Canal as well as the maximum allowed by the District's water right.

Resource management agencies have expressed concern that diminished natural flows in the Loup River bypass reach related to Project operations may affect riverine habitat distribution, including interior least tern (*Sterna antillarum*) and piping plover (*Charadrius melodus*) habitat and fisheries habitat. In addition, depletions attributed to the Loup Power Canal, regulating reservoirs, and irrigation activities may result in flow depletion in the Lower Platte River.

This study will evaluate the effects of Project flow diversion on the Loup River bypass reach and the Lower Platte River. For the purposes of this study, flow depletion is defined as water lost to consumptive use (that is, evaporation and evapotranspiration [ET]). All other water that is diverted or seeped to or from the groundwater is not technically lost as this area is hydraulically connected and any water that is not lost to the atmosphere will eventually return to the Lower Platte River system. That is, the flow may be time lagged, but not lost.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goals of the flow depletion and flow diversion study are to determine if Project operations result in a flow depletion on the Lower Platte River and to what extent the magnitude, frequency, duration, and timing of flows affect the Loup River bypass reach. The results will be used to determine if the Project operations relative to flow depletion and flow diversion adversely affect the habitat used by interior least tern and piping plover populations, the fisheries, and the riverine habitat in the Loup River bypass reach and the Lower Platte River.

The objectives of the flow depletion and flow diversion study are as follows:

1. To quantify flow depletion in the Loup Power Canal, regulating reservoirs, and Loup River bypass reach by calculating consumptive use and making a comparison to alternative conditions.
2. To determine the net consumptive losses associated with Project operations compared to alternative conditions.
3. To use existing gage data to develop flood frequency and flow duration curves in the Loup River bypass reach for current Project operations and for alternative operations.
4. To use current and historic USGS gage rating curves to evaluate change in stage in the Loup River bypass reach during Project operations and compare against alternative hydrographs.
5. To evaluate historic flow trends on the Loup and Platte rivers since Project inception.
6. To determine the extent of interior least tern and piping plover nesting on the Loup River above and below the Diversion Weir.
7. To determine the relative significance of the Loup River bypass reach to the overall fishery habitat for the Loup River.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

The U.S. Fish and Wildlife Service (USFWS) is responsible for the conservation and management of migratory, threatened, and endangered fish and wildlife resources under a number of authorities, including the Endangered Species Act of 1973 (16 USC 1531 et seq.), the Fish and Wildlife Coordination Act (16 USC 661 et seq.), the Bald and Golden Eagle Protection Act (16 USC 703-712, as amended), and the Migratory Bird Treaty Act (16 USC 703-712, as amended). Compliance with all of these statutes and regulations is required to be in compliance with the National Environmental Policy Act (NEPA) (42 USC 4321-4347). The mission of USFWS is “working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” (USFWS, June 15, 1999). Furthermore, USFWS stated that its resource goal related to flow depletion evaluations includes protecting and enhancing river-related habitat for interior least terns, piping plovers, and pallid sturgeon (*Scaphirhynchus albus*) using the Platte River system downstream of Project operations (USFWS, February 9, 2009).

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Relevance to Threatened and Endangered Species

The proposed study area includes the Loup Power Canal and associated regulating reservoirs, the Loup River bypass reach, and the Lower Platte River from the confluence with the Loup River to the USGS gage at North Bend (see Section 5, Study Area and Study Sites).

Flow in the Loup and Platte rivers is seasonally influenced. Flows are relatively high in the spring and early summer due to snow melt and weather events, and flows are low during the late summer and fall due to irrigation and infrequent rainfall. The Lower Platte River retains many of the important flow characteristics of its historic natural hydrograph. The variable timing of water inputs from upstream sources provides baseflow throughout much of the year. The channel of the Lower Platte River still contains a wide range of habitats, from large sandbars to woody islands to shallow sandbars and swift channels (Parham, 2007). The combinations of ample supplies of sediment and flows in the effective discharge range alternatively create transverse bars and then dissect the macroforms, lending support to the development and maintenance of habitats thought to be important to interior least tern and piping plover populations.

Some aspects of the Project may affect wildlife habitat connectivity and suitability in the Loup River bypass reach and Lower Platte River through possible depletion of flow due to net consumptive loss caused by flow diversion. The amount of flow is important to a variety of life stages of fish and wildlife, including the interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and pallid sturgeon (*Scaphirhynchus albus*), three species Federally listed as threatened or endangered.

Sandbar habitat in the Loup and Platte rivers is considered primary habitat for interior least terns and piping plovers and is used by these birds for breeding, nesting, loafing, and foraging. These birds migrate to the Nebraska rivers in mid-April to early June, with breeding, nesting, and egg-laying commencing in mid-May to early July (USFWS, September 1990 and June 28, 1994). After chicks have fledged in mid- to late August, interior least terns and piping plovers abandon the habitat and migrate to their wintering grounds along the Gulf of Mexico.

Riverine nesting areas of interior least terns and piping plovers are sparsely vegetated sand and gravel bars within a wide unobstructed river channel. Nesting locations are usually at higher elevations and away from the water's edge because nesting is typically initiated when river flows are high and small amounts of sand are exposed. Interior least terns and piping plovers have been observed to nest on sandbar habitats with less than 25 percent vegetative cover and an abundance of bare or sparsely

vegetated sand and gravel (Sidle and Kirsch, 1993) with an average area of 1.45 hectares and at an average height of 0.49 meters (Ziewitz et al., 1992). Sandbar habitat is favored for nesting because it is usually surrounded by the channel during sufficient flows, which allows for a degree of protection for young from terrestrial predators, such as mink, raccoons, and bull snakes.

The interior least tern is piscivorous, feeding in shallow waters of rivers, streams, and lakes, along sandbars and sandy shores. Interior least terns usually feed close to their nesting sites but have been known to travel up to 3.2 kilometers to fish. Fish prey is small sized, usually between 2 and 8 centimeters long. Interior least terns are believed to be opportunistic feeders, exploiting any fish within an edible size range (USFWS, September 1990). Interior least terns have been noted to nest near large areas of water for proximity to foraging habitat. Piping plovers feed primarily on exposed beach substrates by pecking for invertebrates at, or less than, 1 centimeter below the surface. Piping plovers are believed to be opportunistic feeders, consuming a variety of invertebrate genus and species. Proximity of feeding areas to nests is important to piping plover chicks. Chicks are mobile within 3 to 5 days of hatching and begin foraging immediately after becoming mobile (USFWS, June 28, 1994).

The pallid sturgeon is considered to be a large turbid river species. The habitat used by different life stages of this species varies widely. Although no recorded spawning grounds have officially been mapped or documented for the pallid sturgeon, there is evidence that the Platte River is used by this species as spawning habitat (Peters and Parham, 2008a). Fertilized eggs of sturgeon sink to the bottom of a river and adhere to the substrate (Simpkins and LaBay, 2007, as cited in Peters and Parham, 2008b). After hatching, embryos drift downstream in water currents. The period of drift may carry them over 300 kilometers downstream (Kynard et al., 2007, as cited in Peters and Parham, 2008b). When sturgeon embryos have developed fin rays, they are considered in a larval stage. During this stage, they begin to actively move to different habitat for feeding. As they lose their fin folds and develop caudal fin rays, they transition to a juvenile stage, where they begin to transition to consuming fish. Pallid sturgeon are considered adults after gonadal development. In the juvenile and adult stage, they mainly use large, fast flowing, turbid rivers, such as the Missouri for feeding.

Pallid sturgeon have been captured in the Platte River up to the confluence with the Elkhorn River. Pallid sturgeon in the Lower Platte River use areas associated with the downstream ends of sandbars and in deeper channels along the edge of sandbars (Peters and Parham, 2008a). It is speculated that accessibility of habitat is related to river discharge and flow. High discharge events produce flow velocities that scour deeper channels, which create and maintain the habitats favored by pallid sturgeon. Pallid sturgeon have been found to use the deepest water available in the Platte River, using depths ranging from 0.33 to 1.27 meters, with average column velocities in the range of 0.52 to 0.82 meters per second (Peters and Parham, 2008a).

3.2 District Operating Procedures

As stated in the PAD, Project operation is heavily dependent on flow conditions in the Loup River. There have been many changes to the flow regime of the river in the 7 decades since the Project was constructed. Storage reservoirs and diversion dams have been constructed in the headwater streams, and hundreds of water appropriations and consumptive use permits have been issued for domestic, agricultural, and industrial depletions of the natural river flow. The quantity of flow diverted for Project power generation is dependent on river flow and sediment conditions at the Headworks. Diverted flow is measured and recorded at the outlet of the Settling Basin (USGS Gage 06792500, Loup River Power Canal near Genoa, NE). The flow rate ranges from 0 cfs to a maximum of 3,500 cfs. The average diversion rate, as measured at the USGS gage, is 1,610 cfs (from 1937 through 2007). The Project operates on a run-of-river basis from the Headworks to the regulating reservoirs.

Seasonal high flow conditions on the Loup River typically occur during the spring runoff months of February and March. At the beginning of these high flow events, the District will typically reduce the intake amount to prevent trash and debris from entering the Settling Basin. During the remainder of these high flows, the District will operate normally, taking in as much as conditions will allow (up to 3,500 cfs).

Seasonal low flow conditions on the Loup River generally occur during the summer months when river flow is often impacted by upstream irrigation withdrawals. During these periods, the Project continues to operate normally, albeit with reduced flow available for diversion and generation. In addition, the District has entered into an agreement to temporarily halt dredging operations in early June until mid- to late August to allow protected interior least terns and piping plovers to nest, forage, and raise young in the sandy habitat created by dredging (that is, the North Sand Management Area). As a result, the amount of flow that the District can divert is reduced due to accumulating sediment in the Settling Basin.

According to USGS gage records and observations, the minimum leakage rate at the Diversion Weir and Sluice Gate Structure is approximately 50 cfs. This value represents the minimum flow in the Loup River bypass reach immediately downstream of the Diversion Weir.

Since 1995, the District's primary Project operating response to hot weather, warm water conditions has been to maintain a flow of 50 to 75 cfs in the Loup River bypass reach when ambient air temperature conditions warrant. In 2008, the District temporarily suspended this practice due to water accounting issues raised by the Nebraska Department of Natural Resources (NDNR). The District is currently working with NDNR to resolve these issues.

3.3 Available Flow Data

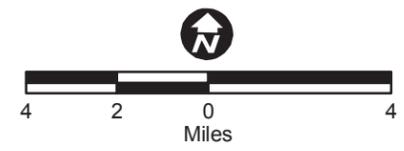
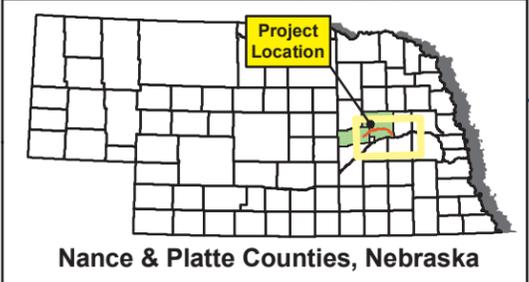
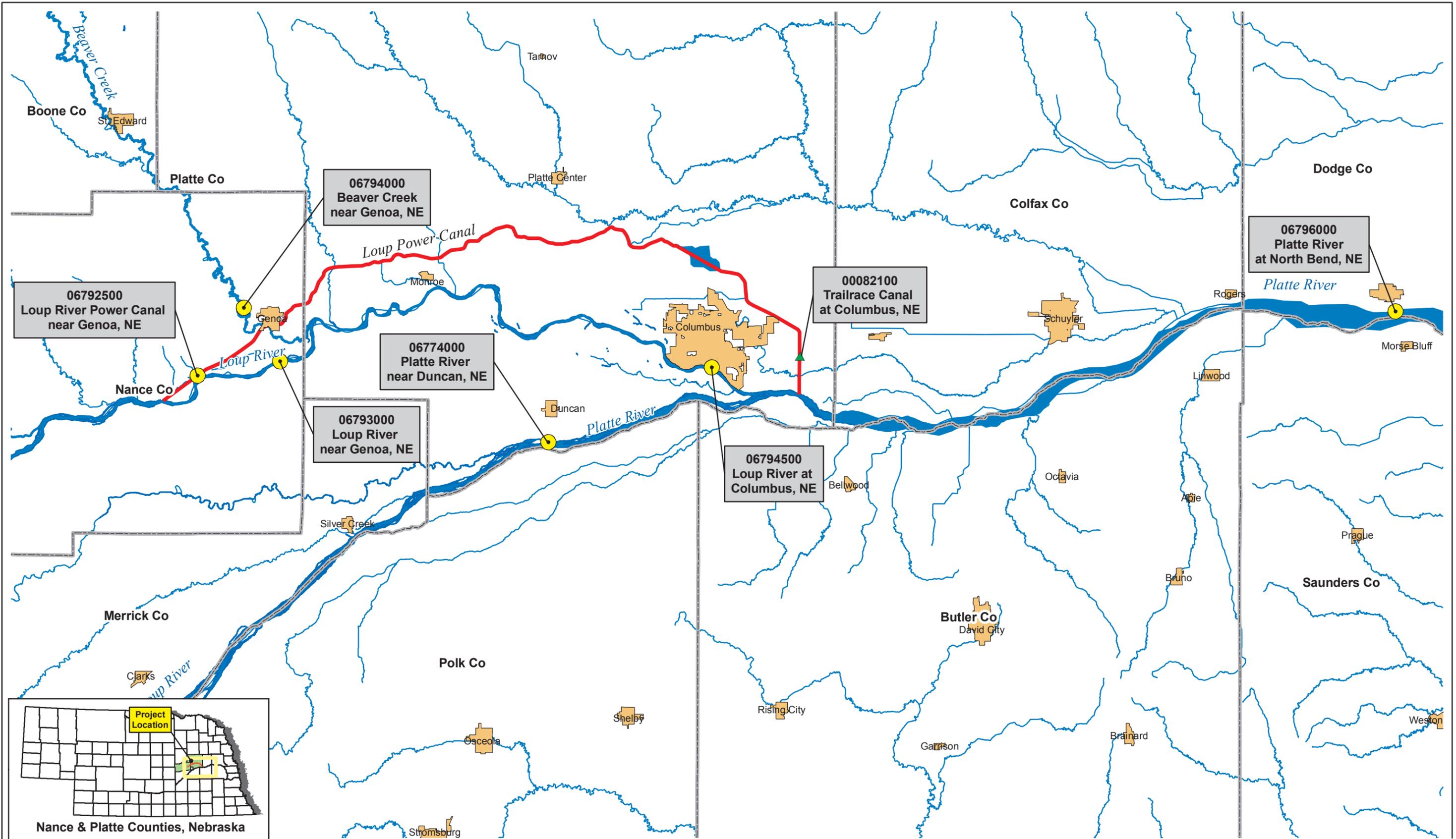
Flow data from USGS and NDNR gage stations shown in Figure 5-1 will be used for this flow depletion and flow diversion study. Each gage station is accompanied by the associated rating curves and velocity and cross-sectional data used to create the rating curves. Flow data that will be used for this study include:

- USGS Gage 06793000, Loup River near Genoa, NE – Available discharge and gage height data from April 1, 1929, to current includes daily and 30-minute interval data.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available discharge and gage height data from January 1, 1937, to current includes daily and 30-minute interval data.
- NDNR Gage 00082100, Loup River Power Canal Return [Tailrace Canal] at Columbus, NE – Available discharge and gage height data from October 1, 2002, to current includes daily and 15-minute interval data.
- USGS Gage 06794500, Loup River at Columbus, NE – Available daily discharge and gage height data from April 1, 1934, to October 10, 1978. This gage was restarted by NDNR on September 23, 2008.
- USGS Gage 06774000, Platte River near Duncan, NE – Available discharge and gage height data from May 3, 1895, to current includes daily and 30-minute interval data.
- USGS Gage 06796000, Platte River at North Bend, NE – Available discharge and gage height data from April 1, 1949, to current includes daily and 30-minute interval data.
- USGS Gage 06794000, Beaver Creek near Genoa, NE – Available discharge and gage height data from October 1, 1940, to current includes daily and 30-minute interval data.

3.4 Available Atmospheric Data

Daily maximum temperature, evaporation, and precipitation data will be obtained from National Weather Service stations at Grand Island, Columbus, and Valley, Nebraska (NOAA NCDC, August 2002).

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- Legend**
- ▲ NDNR Gaging Station
 - USGS Gaging Station
 - Rivers/Streams
 - Loup Power Canal
 - Corporate Limits
 - County Line



Flow Depletion and Flow Diversion Study Area

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

DATE	March 2009
FIGURE	5-1

3.5 Relevant Reports

The following reports are relevant to this flow depletion and flow diversion study:

- Ginting, Zelt, and Linard, 2008, “Temporal Differences in the Hydrologic Regime of the Lower Platte River, Nebraska, 1895-2006,” USGS Scientific Investigations Report 2007-5267.
- Nebraska Department of Natural Resources, October 2007, “2008 Annual Evaluation of Availability of Hydrologically Connected Water Supplies.”
- Parham, 2007, “Hydrologic Analysis of the lower Platte River from 1954-2004, with special emphasis on habitats of the Endangered Least Tern, Piping Plover, and Pallid Sturgeon,” Nebraska Game and Parks Commission.
- Platte River Recovery Implementation Program Cooperative Agreement, October 24, 2006.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The Project diverts water from the Loup River near Genoa into the Loup Power Canal and then releases diverted water into the Platte River through the Tailrace Canal at Columbus, approximately 2 miles downstream of the confluence of the Loup and Platte rivers. Project operations and any net consumptive losses resulting from water diversion from the Loup River to the Loup Power Canal may or may not result in changes to habitat used by interior least terns and piping plovers and habitat connectivity for fish (including the pallid sturgeon in the Lower Platte River) and other riverine species in the Loup River bypass reach and the Lower Platte River.

5. STUDY AREA AND STUDY SITES

The study area is the Loup Power Canal and associated regulating reservoirs; the Loup River bypass reach, which begins at the Diversion Weir, located west of Genoa, and ends at the confluence with the Platte River at Columbus (see Figure 5-1); and the Lower Platte River from the confluence with the Loup River to the USGS gage at North Bend.

There are seven study sites within the study area where data will be collected. These sites are the USGS and NDNR gages listed in Section 3.3, Available Flow Data. An eighth study site is a point upstream of the Diversion Weir.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the flow depletion and flow diversion study includes seven tasks, described below. The period of analysis varies by task.

Task 1 Data Collection

Flow and stage data will be collected at the gages listed in Section 3.3, Available Flow Data, along with the current and historic rating curves. Gage data will be collected for the period of record available at each site.

Atmospheric data, which includes pan evaporation, precipitation, and temperature, from NWS stations will be obtained from 1980 through 2009. This range of data was selected because it includes a moderate flow period (1980 to 1992), a wet period (1993 to 1998), and a dry period (1999-2009). Other data that will be used in Task 2, Net Consumptive Use, will also be collected, including soil data, irrigation metering data, areas of surface irrigated crop by type, and aerial and satellite images of the vegetation along the Loup River bypass reach. This data will also be obtained from 1980 through 2009.

Task 2 Net Consumptive Use

During preparation of the PAD, flow depletions on the Lower Platte River associated with the Loup Power Canal were estimated through development of an annual water budget. Incremental and cumulative water budgets were developed for the Loup Power Canal using USGS Gage 06792500 on the Loup Power Canal near Genoa, power generation records at the Columbus Powerhouse, and NDNR Gage 00082100 on the Tailrace Canal at Columbus. This task will build upon the flow depletion calculations described in the PAD by calculating monthly and seasonal net consumptive use for the time period of 1980 through 2009.

Net consumptive use will be calculated for the Loup Power Canal and Loup River bypass reach for current Project operations and for alternative conditions.

Consumptive use losses are calculated by adding open water evaporative losses and ET losses from native vegetation and agricultural crops. Irrigation water return and groundwater seepage, which will eventually make its way back to the Loup River or Lower Platte River, albeit slightly time lagged, are therefore not a loss to the system and are not considered consumptive losses. This assumption is supported by the

10/50 line analysis performed by NDNR (October 2007) for hydraulically connected areas in the Lower Platte River Basin.

Consumptive Use in the Loup Power Canal and Associated Regulating Reservoirs

Consumptive use in the Loup Power Canal and associated regulating reservoirs will be calculated on a monthly and seasonal basis by adding the ET consumptive use losses and the evaporation consumptive use losses. The total amount of water diverted for irrigation and standard operations will be obtained from the metering records used for billing purposes to assess the upper bounds of consumptive use losses and District operation records. Consumptive losses from irrigation due to crop ET will be estimated by using the total volume obtained from the metering records, the acres by each type of crop, the rate of ET per each acre of each type of crop, the type of soil in the irrigated areas, local precipitation, and the shape of the demand curve used in the Crop Simulation Model (CROPSIM) (Martin, unpublished). The amount of water lost through ET by the crops will be calculated monthly for each growing season. For this analysis, it will be assumed that the water demanded by the crops is fully met. The fraction of the ET demand that is not met through precipitation is assumed to be met through irrigation. Monthly open water evaporative losses for the Loup Power Canal and regulating reservoirs will be estimated by using the total area exposed to the atmosphere and a relationship to pan evaporation data collected from the NWS stations. Surface area will be calculated from channel widths, length, and reservoir areas.

Consumptive Use in the Loup River Bypass Reach

Consumptive use in the Loup River bypass reach will be calculated on a monthly and seasonal basis by adding the ET consumptive use losses and the evaporation consumptive use losses. There are only two surface water rights holders along the Loup River bypass reach. The impact from these is considered negligible and will not be considered further. Consumptive losses due to ET from the trees and other large vegetation that line the Loup River bypass reach will be calculated by replicating the length of riparian vegetation that line the sides of the bypass reach observed from the aerial photographs and satellite images and estimating an ET rate per unit length. Monthly open water evaporative losses for the Loup River bypass reach will be estimated by using the surface area and evaporation data collected from the NWS stations. The surface area will be calculated from channel cross sectional top width and distance between USGS gages. The top width will be based on the 50 percent exceedence discharge, the surveyed USGS cross section, and the USGS rating curve.

Net Consumptive Use

The net consumptive use will be estimated by taking the difference between the consumptive use losses in the Loup Power Canal and the regulating reservoirs and the consumptive use losses in the Loup River bypass reach on a monthly, seasonal, and

annual basis from 1980 through 2009 for the current Project conditions and the alternative conditions. If Project operations result in less flow depletion in the Lower Platte River than the alternative conditions, it can be concluded that the Project operations do not adversely impact and may benefit the species relative to flow depletions. If Project operations results in an increase in flow depletions as compared to alternative conditions, then the District will coordinate with the agencies to determine reasonable and prudent alternatives.

Task 3 Loup River and Platte River Depletions

Historic flow records will be evaluated to determine if there has been a general decline of flows in the Loup and Platte rivers. USGS gages on the Loup River at Genoa and Columbus and USGS gages on the Platte River at Duncan and North Bend will be evaluated. A USGS report (Ginting, Zelt, and Linard, 2008) will be used to assess flow depletions in the Platte River.

Task 4 Flow Duration and Flood Frequency Curves

Flow duration curves will be created for the USGS gage on the Loup River near Genoa, the USGS gage on the Loup River at Columbus, and the synthetic point just upstream of the Diversion Weir for the period of record. As previously stated, the USGS gage on the Loup River at Columbus was discontinued in 1978. A relationship between the Loup River near Genoa and the Loup River at Columbus will be determined based on data from the coincident period of record between the gages. Data from the USGS gage on the Loup River at Columbus will then be extrapolated based on this relationship to match the period of record for data from the USGS gage on the Loup River near Genoa. The median discharge value for each site will be determined graphically as the flow associated with the 50 percent exceedance on the respective flow duration curve. Flood frequency curves will also be generated at each study site for the period of record using the U.S. Army Corps of Engineers HEC-FFA. Alternative flow duration and flood frequency at each gage will be synthesized using gage data. Conservation of mass will be verified using the flow volume of the gages.

Task 5 Stage

The stage in the Loup River bypass reach at Genoa and Columbus will be evaluated using current and historic USGS rating curves and the results from Task 4, Flow Duration and Flood Frequency Curves. The stage for Project operations will be compared with the stage for alternative conditions to obtain change in stage for the 25, 50, and 75 percent chance exceedence discharges for the time period of 1980 through 2009. If the Project operations stage is not materially different from an alternative stage, then it can be concluded that Project operations do not impact stage in the Loup River bypass reach.

Task 6 Interior Least Tern and Piping Plover Nesting on the Loup River Bypass Reach

Existing information from USFWS and the Nebraska Game and Parks Commission (NGPC) on interior least tern and piping plover nesting activities upstream and downstream of the Diversion Weir will be collected. Populations above the Diversion Weir will be compared to populations below the Diversion Weir and in context to populations on the Lower Platte River. If no significant differences in populations exist in context with populations on the Lower Platte River, it will be assumed that the Loup River bypass reach is not an important area for interior least terns and piping plovers.

If differences in populations do exist, then the riparian corridors for 5 miles above and below the Diversion Weir will be examined. The examination will use U.S. Department of Agriculture Natural Resources Conservation Service aerial imagery for 5 years of normal precipitation. The following characteristics will be identified: channel width, un-vegetated sandbars, vegetated sandbars (isolated and non-isolated), and presence and/or type of bank vegetation. The observed conditions for each year for these characteristics will be compared to determine to what extent flow diversion and the presence of the diversion weir may result in different river and riparian vegetation conditions. In addition, the habitat requirements of the interior least tern and piping plover will be examined to determine if any changes in the riparian corridor may have had an effect on these populations.

Task 7 Fishery Populations Above and Below the Diversion Weir

Existing information from NGPC on fishery populations above and below the Diversion Weir will be collected and analyzed to determine to what extent flow diversion results in different species populations upstream and downstream. In addition, the flow information developed in Task 4, Flow Duration and Flood Frequency Curves, will be used to calculate the opportunity for fish species to migrate upstream of the Diversion Weir during high flows when the Diversion Weir is submerged or the sluice gates are raised. If no significant differences in species diversity or richness exist, then it can be concluded that Project operations do not affect fishery populations in the Loup River bypass reach.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the flow depletion and flow diversion study is a study report. The study report will document the magnitude of flow reduction in the Loup River bypass reach. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the flow depletion and flow diversion study will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the flow depletion and flow diversion study will cost approximately \$170,000. This work will be completed by qualified water resources engineers and biologists.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The study will begin in the fourth quarter 2009 and be completed by the second quarter of 2010.

11. REFERENCES

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3. FUTURE FISH SAMPLING ACTIVITIES6-2

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STUDY 6.0 FISH SAMPLING

The Fish Sampling Study Plan does not follow the standard format applied to other study plans proposed by the District. Instead, this study plan generally describes the District's intent to cooperate with the Nebraska Game and Parks Commission (NGPC) in fish sampling efforts independent of Project relicensing and in accordance with a future schedule to be determined by NGPC.

1. BACKGROUND

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. Substantial fisheries have been established at the Project, and angling is a popular recreation activity at multiple locations. The District provides for public access and encourages recreational use of Project lands and waters.

On October 1, 1998, independent of any relicensing proceeding, NGPC and the District worked cooperatively to perform fish sampling in Lake North. NGPC also has approached the District on multiple occasions prior to, and independent of, Project relicensing concerning its desire to perform fish sampling in the Loup Power Canal.

2. STUDY PLAN COORDINATION

2.1 Early Coordination

As part of Project relicensing, a multi-agency Recreation/Land Use/Aesthetics Workgroup was established to discuss issues and identify potential studies related to Project fisheries. On July 17, 2008, the Recreation/Land Use/Aesthetics Workgroup held its initial conference call, and participants included representatives of the District; its consultant, HDR Engineering, Inc. (HDR); NGPC; and the National Park Service (NPS). During the conference call, NGPC stated that it would like to perform fish sampling in the Loup Power Canal to determine species composition, abundance, and length frequency. NGPC went on to state that in order to accomplish the desired fish sampling, special boat access may be required at multiple locations along the canal. The District stated that it would support NGPC's fish sampling effort and would be agreeable to further discussions concerning access accommodations. On July 24, 2008, at the Multi-Agency Study Needs Meeting, NGPC again expressed its desire to perform fish sampling in the Loup Power Canal and its need for associated boat access.

As a result of NGPC's expressed desire to perform fish sampling in conjunction with the Project relicensing process and schedule, the District proposed Study Plan 6.0, Fish Sampling, in the Pre-Application Document (PAD) that was submitted to FERC on October 16, 2008. With regard to the methodologies of Study Plan 6.0, Fish

Sampling, the PAD states that “NGPC will conduct sampling along representative sections of the canal. The District will provide assistance regarding access to the canal” (Loup Power District, 2008).

2.2 Recent Coordination

In late 2008 and early 2009, during several discussions between HDR and NGPC that occurred following PAD submittal, NGPC stated that it has limited staff and is uncertain of its ability to sample Project fisheries in accordance with the Project relicensing schedule.

3. FUTURE FISH SAMPLING ACTIVITIES

As NGPC’s sampling schedule is uncertain, the District proposes to facilitate NGPC-performed fish sampling at NGPC’s convenience and independent of Project relicensing. When NGPC is available to perform fish sampling, the District will accommodate an effort consistent with the *Standard Survey Guidelines for Sampling Lake Fishery Resources* (NGPC, 1985) and/or *Nebraska Fish Community Assessment and Analysis Protocol* (NGPC, 1997). It is anticipated that data collected during fish sampling would be incorporated into the NGPC-administered statewide fish sampling program, the results of which are annually released to the public so that anglers can compare lakes and determine trends at specific sites (NGPC, 2009).

Although NGPC is now uncertain as to its ability to perform the fish sampling study in association with the Project’s relicensing effort, the data collected during the creel survey (see Study Plan 9.0, Creel Survey) would parallel the data collected during a fish sampling study. Both studies would provide data regarding catch rates (including length and weight measurements) and the overall quality of Project fisheries. However, the creel survey would also provide direct views and opinions of anglers that use Project fisheries. As proposed in the Creel Survey Study Plan, the creel survey will be performed with the cooperation of NGPC and in accordance with standard NGPC methodologies. The findings of the creel survey will be fully accessible to NGPC and other interested parties and could be used by the District to better serve the public’s recreation needs.

4. REFERENCES

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STUDY 7.0 FISH PASSAGE

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach.

The Project begins at the Headworks, which is located midway between Fullerton and Genoa, Nebraska, and consists of a Diversion Weir, Intake Gate Structure, and Sluice Gate Structure. The low-head Diversion Weir diverts a portion of the Loup River flow through the Intake Gate Structure into the Loup Power Canal and generation system. The Project is able to divert up to 3,500 cfs of water. This is the capacity of the Loup Power Canal as well as the limit of the District's water right.

The Loup River provides habitat for the channel catfish. The ability of channel catfish to move upstream past the Diversion Weir and Sluice Gate Structure may be restricted by the hydraulic characteristics (that is, flow, velocity, and stage) at the Diversion Weir. A study on fish presence and absence upstream of a low-head dam on the nearby Cedar River presents evidence that high velocities through the dam sluiceways may have been acting as a barrier to fish passage upstream (Admiraal and Schainost, 2004). The analysis proposed in this fish passage study will determine if the Diversion Weir and Sluice Gate Structure impede channel catfish passage in the Loup River.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the fish passage study is to determine if a reasonable pathway exists for fish movement upstream and downstream of the Diversion Weir.

The objectives of the fish passage study are as follows:

1. To evaluate the hydraulic flow, velocity, and stage parameters at the Diversion Weir and Sluice Gate Structure.
2. To review stage and discharge data available at nearby U.S. Geological Survey (USGS) gage stations (USGS Gage 06793000, Loup River near Genoa, NE, and USGS Gage 06792500, Loup River Power Canal near Genoa, NE).
3. To collect hydraulic information, including surveying river cross sections at the upstream and downstream face of the Headworks and recording headwater and tailwater elevations at the Diversion Weir.

4. To review literature to determine velocity and depth criteria for upstream fish passage at the Diversion Weir.
5. To review flow duration curves at the Diversion Weir.
6. To develop a hydraulic model to determine the flow split between the Diversion Weir and sluice gates for a range of flows.
7. To determine whether fish pathways exist over the Diversion Weir, through the Sluice Gate Structure, or by other means.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

The Nebraska Game and Parks Commission (NGPC) manages fisheries statewide for productive sport fishing. NGPC has identified the channel catfish as a sport fish of special interest within the Project Boundary and the Loup River Basin. Furthermore, NGPC is concerned that the Diversion Weir and Sluice Gate Structure may obstruct channel catfish spawning migrations, which in turn may inhibit productive fishing opportunities in state waters (HDR, August 19, 2008).

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Project Structures

The Diversion Weir consists of a 1,320-foot-long, low concrete weir. The fixed crest of the weir is at an elevation of 1,574 feet, and wooden flashboards are maintained along the top of the weir to create an effective crest elevation of 1,576 feet. The right, or south, abutment of the Diversion Weir is flanked by a dike extending approximately 3,000 feet to high ground.

The Intake Gate Structure is located on the north bank of the river. It is constructed of reinforced concrete and supports 11 steel radial gates that admit Loup River water into the Loup Power Canal. The elevation of the concrete gate sills is 1,569.5 feet, and each gate is 24 feet long with a maximum opening of 5 feet.

The Sluice Gate Structure spans the portion of the river flowing between the downstream leg of the Diversion Weir and the Intake Gate Structure. It is in place to promote formation of a scour channel along the front of the Intake Gate Structure as well as to keep the Intake Gate Structure free of debris and ice. The elevation of the sluice gate sills is 1,568 feet, and each steel gate is 20 feet long with a maximum opening of 6 feet.

3.2 Channel Catfish

Channel catfish generally inhabit large rather turbid streams having low or moderate gradients. Adults are found in the larger pools, in deeper water, or around submerged objects. The young often occur in riffles or the shallower parts of pools. During spawning season, channel catfish prefer overhangs, holes in banks, and natural cavities with semi-darkness and seclusion as factors in choice of nest sites (Pflieger, 1997). A characteristic of a healthy fishery during spawning would allow channel catfish to freely move upstream and downstream of the Headworks.

3.3 USGS Flow and Gage Data

Flow velocity is an important factor exerting influence on channel catfish. The data will be used to create a flow duration curve at the Diversion Weir as well as for calibration of the hydraulic model. Each gage station is accompanied by the associated rating curves and velocity and cross-sectional data used to create the rating curves. USGS data at the following two locations, shown in Figure 7-1, will provide flow data that will be used for this study:

- USGS Gage 06793000, Loup River near Genoa, NE – Available discharge data from April 1, 1929, to current for this station includes 15-minute interval data and available 15-minute interval gage height data from June 12, 1997 to current.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available discharge data from January 1, 1937, to current for this station includes 15-minute interval data and available 15-minute interval gage height data from August 30, 2000, to current.

4. PROJECT NEXUS

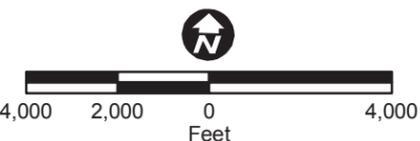
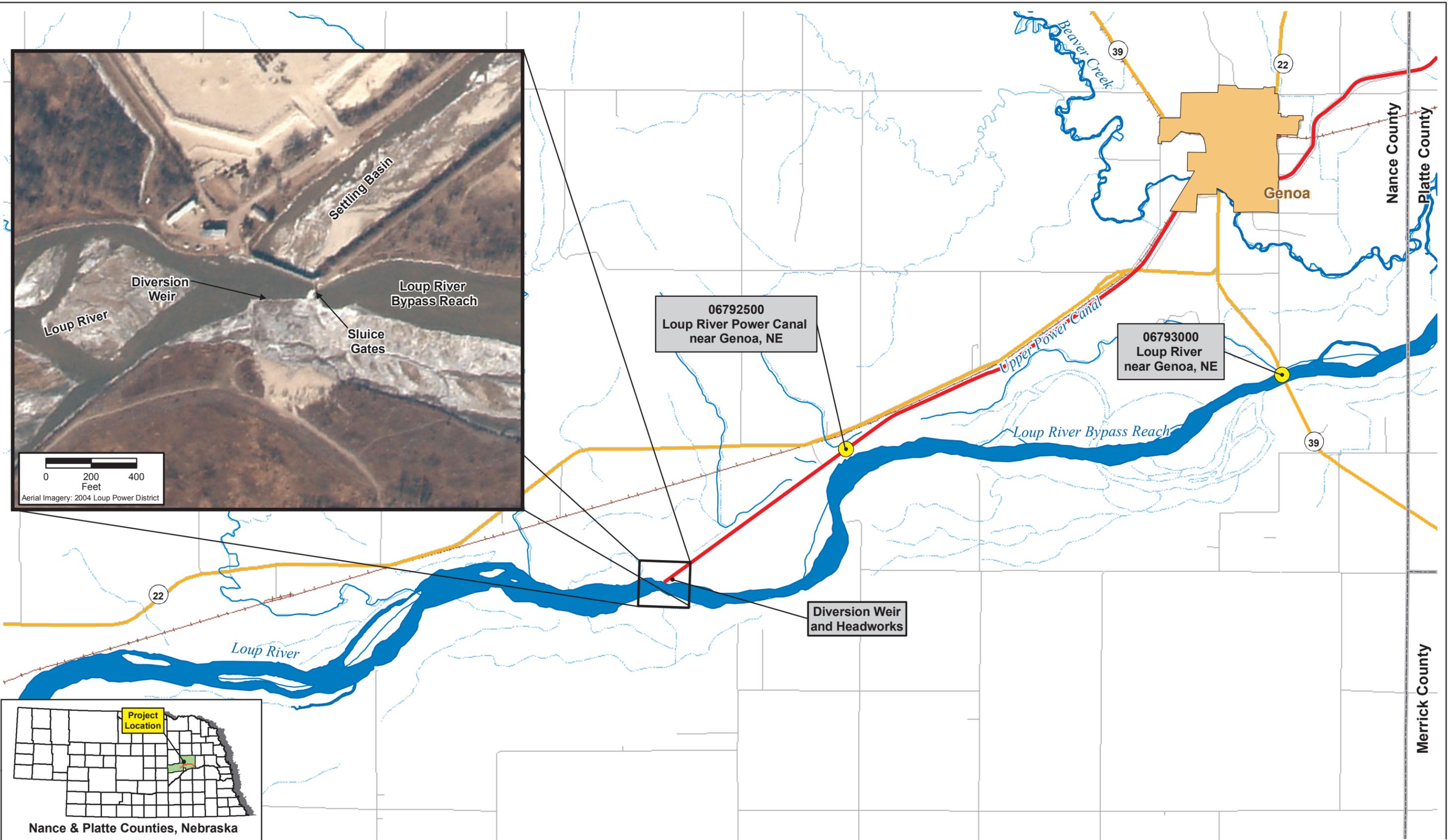
“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The Diversion Weir associated with the Project establishes a water level sufficient to divert Loup River water through the Intake Gate Structure to the Loup Power Canal. The nexus between the Diversion Weir and fish passage is that the Diversion Weir may serve as a physical barrier to upstream and downstream fish movement during the spawning period of April, May, June, and July.

5. STUDY AREA AND STUDY SITES

The study area includes the area around the Headworks. The study area and the locations of the USGS gages from which data will be obtained are shown in Figure 7-1.

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- Legend**
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 - Corporate Limits
 - County Line



Fish Passage Study Area

Loup River Hydroelectric Project
FERC Project No. 1256
Proposed Study Plan

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DATE	March 2009
FIGURE	7-1

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the fish passage study includes three tasks, described below.

Task 1 Data Review

Stage and discharge data available at nearby USGS Gage 06793000, Loup River near Genoa, NE, and USGS Gage 06792500, Loup River Power Canal near Genoa, NE, will be reviewed. This information was used to develop the flow duration curve at the Diversion Weir as described in Section 5 of the PAD. A flow duration curve is a plot of discharge vs. percent of time that a particular discharge was equaled or exceeded. The flow duration links the discharges, the flow depth and velocities (through the hydraulic model in Task 3, below) with a percentage of time equaled or exceeded at the Diversion Weir during the months of April, May, and June (the period of analysis).

In addition to the data described above, literature will be reviewed to determine the hydraulic conditions (flow velocity and vertical distance between upstream and downstream pools) that limit movement of channel catfish.

Task 2 Data Collection

River cross sections will be surveyed at the upstream and downstream face of the Headworks and at two additional locations: one 200 feet upstream and one 200 feet downstream of the Headworks. The cross sections will provide a basis from which to create a hydraulic model. They need to be located far enough away from the Diversion Weir that they are representative of the channel, and it is thought that 200 feet upstream and downstream is an appropriate distance.

In addition, a series of Diversion Weir headwater and tailwater elevations will be collected to develop the hydraulic relationship between the flow in the Loup River bypass reach and the tailwater elevation at the Diversion Weir. This would require that Project personnel record daily elevations at existing staff gages upstream and downstream of the Diversion Weir for the period of analysis. This would ensure that a full range of flow conditions would be recorded.

Task 3 Data Analysis

Hydraulic Modeling

A hydraulic model relating flow in the bypass reach, headwater and tailwater elevations, flow velocity over the Diversion Weir, and flow velocity through the Sluice Gate Structure will be created by developing and analyzing a baseline model, as described as follows.

The geometry for the Diversion Weir and Sluice Gate Structure will be incorporated into a mathematical model that relates flow, headwater and tailwater elevations, and velocity through and over the structures. A set of calibration flows and water surface elevations will be developed based on information at the USGS gage in the Loup River bypass reach and the Diversion Weir tailwater measurements obtained.

A set of flows will be developed, based on the spawning season flow duration curve, to route through the mathematical model. The mathematical model will predict the flow velocity over the Diversion Weir and through the Sluice Gate Structure. The flows should bracket the range of expected flows during the migration and spawning season. Because the flows are part of the flow duration curve, each flow will have a percent of time equaled or exceeded.

Hydraulic Conditions at the Diversion Structure

The difference in upstream and downstream water surface elevations at the Diversion Weir and the average velocity across the Diversion Weir and through the Sluice Gate Structure will be tabulated for all flows in the evaluation flow set (see Hydraulic Modeling under Task 3, above). The tabulated results will be compared to the fish passage criteria. This will allow creation of a table that documents the hydraulic conditions in the Loup River and the percent of time during the spawning period when the conditions in the river (that is, over the Diversion Weir and through the Sluice Gate Structure) are a barrier to catfish movement. The end result of this task is calculation of the time duration that the Diversion Weir serves as a barrier to channel catfish movement upstream in the Loup River.

Alternative Fish Pathways

The hydraulic data will be analyzed to determine whether fish pathways exist over the Diversion Weir, through the Sluice Gate Structure, or by other means.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the fish passage study is a study report. The study report will document the hydraulic conditions at the Diversion Weir and the duration (if any) that the Diversion Weir serves as a barrier to channel catfish passage during the spawning period. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the fish passage study will be included in the study progress reports to be submitted to FERC in March 2010 and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the fish passage study will cost approximately \$70,000. This work will be completed by qualified water resources engineers and biologists.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The fish passage study is scheduled to begin in the first quarter of 2010, and the final study report is to be submitted in the third quarter of 2010.

11. REFERENCES

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STUDY 8.0 RECREATION USER SURVEY

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is referred to as the Loup River bypass reach.

The District has an established policy of providing public access and recreational opportunities at the Project. This includes the Loup Power Canal, the two regulating reservoirs (Lake Babcock and Lake North), five major park and recreation areas, three developed trails, and one 485-acre wildlife management area leased to the Nebraska Game and Parks Commission (NGPC). The only areas within the 5,200-acre Project Boundary that are not accessible to the public are those that present safety or security concerns and those that have had significant vandalism issues.

The District estimates that the Project attracts 150,000 visitors annually. District parks are open to the public between May 1 and November 1 and at other times, weather permitting. The District's formal recreation areas are generally considered adequate for current demands, although some facilities approach or reach their carrying capacity during the peak holiday weekends of Memorial Day, Independence Day, and Labor Day.

The District is proposing a recreation user survey to gather data regarding existing recreational use of Project facilities. The data collected from this survey, in addition to data from Study 9.0, Creel Survey, and Study 10.0, Land Use Inventory, will be used in the development of a recreation management plan for District facilities. This recreation management plan will outline District plans for enhancing existing recreation facilities and meeting future recreation demands as well as identify mitigation measures for identified conflicts.

In a letter dated February 10, 2009, FERC submitted a recreation user study request to the District (a copy of this request is provided in Attachment A). The District has largely incorporated FERC's request into this study plan. Deviations from FERC's request are noted as appropriate in the following sections.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the recreation user survey is to determine the public awareness, usage, and demand of the Project's existing recreation facilities to determine if potential improvements are needed.

The objectives of the recreation user survey are as follows:

1. To measure usage of Project recreation facilities.
2. To document the types of recreation use occurring at Project recreation facilities.
3. To determine whether Project recreation facilities meet current demand.
4. To determine the public’s perception and awareness of Project recreation facilities and identify the impact of Project operations on recreation experiences.
5. To collect data for use in the preparation of a recreation management plan for the District.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

In addition to generating power, which is the primary purpose of the Project, the District has developed and maintains public recreation facilities. The District provides these facilities, free of charge, to comply with requirements of its FERC license and to demonstrate its commitment to the community as a public power district. These recreation facilities must safely meet the recreational demand of the area without impeding safe Project operations, endangering environmental resources, or unnecessarily detracting from the natural aesthetic appeal of the area. The recreation user survey will allow the District to determine whether it is fulfilling the recreation requirements of its license.

In addition, the Nebraska *State Comprehensive Outdoor Recreation Plan (SCORP)* guides the conservation and development of public outdoor recreation resources. The SCORP does not include any specific management goals for Project-related recreation facilities. However, the SCORP does provide the following goals related to recreation needs identified for Region 3, the region in which the Project is located (NGPC, 2006):

- “New facilities, including lodging, should be in regions where population is growing.”
- “Region 3 should focus on new acquisition and development because of growing populations.”

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Existing Usage

In the PAD, the District estimates that 150,000 user visits are made to their recreation facilities annually. This estimate is based on informal observations by District personnel rather than formal user surveys or detailed record keeping. The survey outlined in this plan will provide more accurate and detailed user information to guide future decision-making for recreation facilities.

3.2 Nebraska State Comprehensive Outdoor Recreation Plan

NGPC’s SCORP, which is updated every 5 years, provides an inventory of recreation facilities available in Nebraska (NGPC, 2006). As stated in Section 2, Relevant Resource Management Goals, above, the District’s recreation facilities are located in Region 3, Northeast (NGPC, 2006). Region 3 includes 16 counties and has approximately 190,000 residents. In addition to the Project recreation facilities, other recreation areas available to the residents in the region include Outlaw Scenic Byway; Lewis and Clark Scenic Byway; portions of the Missouri River; wildlife viewing and hunting opportunities; canoe trails on the Upper and Lower Missouri River, Elkhorn River, and Cedar River; recreation facilities on the Missouri River and Niobrara River; and the 321-mile Cowboy Trail. State parks and recreation areas in the region include Ashfall State Historic Park, Niobrara State Park, Ponca State Park, Neligh Mills State Historic Site, Willow Creek Recreation Area, and Lewis and Clark State Recreation Area.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The following Federal regulations require that recreational resources be evaluated in relation to operation of the Project:

- Federal Power Act (FPA) Section 4(e) states that “In deciding whether to issue any license..., the [Federal Energy Regulatory] Commission...shall give equal consideration to...the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality” (16 USC 797(e)).
- FPA Section 10(a)(1) states that “All licenses issued under this subchapter shall be on the following conditions: (a)(1) That the project adopted, including the maps, plans, and specifications, shall be such as in the

judgment of the [Federal Energy Regulatory] Commission will be best adapted to a comprehensive plan... for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including... recreational...” (16 USC 803(a)(1)).

5. STUDY AREA AND STUDY SITES

Almost all of the 5,200 acres within the Project Boundary are open and accessible for public recreation. Due to the size of the Project Boundary, key study sites have been identified for completing in-person surveys and spot counts (see Section 6, Proposed Methodology). These sites are as follows:

- Headworks Park – parking areas, camp sites, picnic areas, identified fishing sites, and Headworks OHV Park
- Lake Babcock Park (aka Loup Park) – parking areas, camp sites, picnic areas, shoreline, and in Lake Babcock
- Lake North Park – parking areas, camp sites, picnic shelters, shoreline, and in Lake North
- Columbus Powerhouse Park – parking area, picnic area, and identified fishing sites
- Tailrace Park – parking area, identified fishing sites, and playground

In its February 10, 2009, study request, FERC asked that the recreation user survey also include the Monroe Powerhouse, areas along the Loup Power Canal and access roads, the Loup Lands Wildlife Management Area, and areas along the Loup River bypass reach (see Attachment A). The District has not included these sites in the survey for the following reasons:

- Monroe Powerhouse – Fishing is the primary recreation use at the Monroe Powerhouse, and any other recreation uses are incidental to fishing. Fishing usage information will be gathered as part of Study 9.0, Creel Survey, that will also be conducted as part of the relicensing process.
- Loup Power Canal – Fishing is the primary recreation use along and in the canal. As mentioned above, fishing usage will be surveyed as part of Study 9.0, Creel Survey.
- Loup Lands Wildlife Management Area – The District leases the Loup Lands Wildlife Management Area to NGPC. Under the lease terms, NGPC is responsible for preparing a management plan for the area, controlling access, performing maintenance, and carrying out other management activities in a manner similar to that of other Wildlife Management Areas (see Attachment B). The District is not responsible for recreation facilities or activities in the Loup Lands Wildlife Management Area.

- Loup River bypass reach – There are no public access points along the Loup River bypass reach between the Diversion Weir and the Tailrace Canal; thus, recreation use is limited to individuals with private access. Because there are no public access points and land along the bypass reach is privately owned, there are no locations from which to conduct a recreation user survey.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The collection of recreation usage data that will be used to develop a recreation management plan for the District includes a multi-pronged effort. Data will be collected through in-person surveys at Project recreation facilities, field observations of recreational activities at Project recreation facilities, infrared usage counts of Project recreation trails, a telephone survey of residents, and a survey of Off-Highway Vehicle (OHV) users. The tasks associated with data collection and recreation management plan development are described below.

Task 1 Pre-Survey Activities

District representatives or District staff will act as survey proctors. All potential survey proctors will be trained on established protocols and standard practices for surveying. Prior to the survey period, District staff will establish a survey schedule for the season to ensure that all locations are visited and surveyed consistently.

Task 2 Data Collection

Data will be collected through in-person surveys, field observations, trail counts, a telephone survey, and a survey distributed in the Nebraska Off-Highway Vehicle Association (NOHVA) newsletter.

In-person Surveys

Surveys will be conducted at improved recreation areas (see Section 5, Study Area and Study Sites, above) on two weekdays and two weekend days per month as well as one summer holiday (Memorial Day, Independence Day, or Labor Day) from May 1 to November 1, 2010.

Survey proctors will visit sites at District-identified peak activity times, usually in the morning as recreation users are arriving or in the afternoon/evening as the users are leaving. Based on current annual use estimates of 150,000 visitors, approximately 300 completed surveys would be needed to achieve statistically valid responses.

To encourage participation in the survey, signs will be placed at the entry points to recreation facilities notifying users of the survey. Survey proctors will wear shirts indicating their affiliation with the District and will have identification prominently displayed. Respondents will be offered a small incentive for participation, such as a water bottle or snack item. In addition, the survey length was kept to a minimum to reduce the perceived inconvenience of completing the survey. Based on trials of the survey, it is estimated that each survey will take approximately 5 minutes to complete. The District's recreation user survey is provided in Attachment C. The National Park Service (NPS) was consulted during development of the survey questions.

Field Observations

Field observations will be performed at Headworks Park, Lake Babcock Park (aka Loup Park) and Lake Babcock, Lake North Park and Lake North, Columbus Powerhouse Park, and Tailrace Park on the same days as the in-person surveys. Field observations will be recorded during morning and afternoon peak times as well as throughout the day. Observations will include spot counts for various recreation activities as well as other relevant information. A sample field observation form is provided in Attachment D.

Field observations at Lake Babcock and Lake North will be completed from shore. As a result, the number and types of users may be an estimate rather than an exact count. Survey proctors, who will also conduct the field observations, will note whether the numbers recorded are exact counts or estimates.

Trail Counts

Infrared trail counters will be used along Two Lakes Trail, Bob Lake Trail, and Robert White Trail between May and October 2010. These counters will allow for counting both pedestrians and bicyclists.

Telephone Survey

A telephone survey of residents in Nance and Platte counties will be conducted using professional phone surveyors to determine the general awareness and perception of Project recreational opportunities in the area. Based on county populations, the desired sample size is approximately 400. A sample telephone survey is provided in Attachment E.

Survey in the Nebraska Off-Highway Vehicle Association (NOHVA) Newsletter

During the FERC scoping process, members of NOHVA expressed a great deal of interest in the Headworks OHV Park. To address this interest and reach a large recreation user group, this group will be surveyed via a short survey distributed in the NOHVA newsletter. A sample OHV user survey is provided in Attachment F.

FERC Study Request

In its February 10, 2009, study request, FERC outlined a recreation user survey that included year-round surveying and field observations, mechanical counters at established recreation sites, and a mail survey of area households (see Attachment A). Explanation of why study methodology differs from this request follows:

- Year Round Surveying – The Project recreation facilities are open to the public from May 1 to November 1 and at other times, weather permitting. To determine if significant recreation usage occurs between November 2 and April 30, the in-person survey includes a question about year-round usage. If survey findings indicate significant recreation facility usage outside of the initial survey period, expansion of the survey period will be considered.
- Mechanical counters – The District has not included mechanical vehicle counts at recreation areas because similar information is being collected via field observation and parking lot counts. Further, the information collected via mechanical counters would not necessarily be reflective of actual recreation counts due to District operations activities that use a common entrance at Headworks Park.
- Mail Survey – The District proposes a telephone survey of residents in Nance and Platte counties to determine general awareness and perception of its recreation facilities rather than a mailed survey. Due to the cost of printing and postage and relatively low response rates of mailed surveys, a telephone survey was determined to be the most efficient survey method to reach area residents.

Task 3 Data Analysis

Field data, with the exception of telephone surveys, will be collected from May through October 2010. Survey responses and field observations will be recorded and analyzed. Based on the data collected, annual usage, average weekday usage, average weekend usage, and peak weekend usage for each recreation facility will be determined. From these numbers, the percent of capacity at which all Project recreation facilities are operating will be estimated. Descriptions of the user experiences with recreation facilities included in survey responses will be used to

determine whether Project recreation facilities meet user needs and to what degree. Narrative explanations of findings will accompany quantitative analyses.

Task 4 Recreation Management Plan

The data and analysis from this recreation user survey, Study 9.0, Creel Survey, and Study 10.0, Land Use Inventory, will provide information that will be used in the development of a recreation management plan for the District. The recreation management plan will compile findings from the surveys and inventory to provide a framework for future provision of recreation facilities. The plan will provide recommendations for enhancement of existing recreation facilities to meet existing and future recreation demands as well as mitigation measures for identified conflicts.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

During preparation of the PAD, the District formed a Recreation/Land Use/Aesthetics Workgroup to discuss issues related to these topics. Numerous agencies with a potential interest in recreational activities were invited to participate in the workgroup. During preparation of this Recreation User Survey Study Plan, on December 19, 2008, a conference call meeting of this workgroup was held to discuss the recreation user survey and to help determine study needs. In addition, the National Park Service was consulted during development of the in-person survey questions. The District will continue to work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

There are two intended work products of the recreation user survey. The first is a study report that documents the level of use of Project recreation facilities and user experiences with the facilities as well as general awareness of the District’s recreation facilities. The second is a recreation management plan that, together with data from Study 9.0, Creel Survey, and Study 10.0, Land Use Inventory, will outline District plans for enhancing existing recreation facilities and meeting future recreation demands as well as identify mitigation measures for identified conflicts.

Updates regarding the recreation user survey will be included in the study progress reports to be submitted to FERC in March 2010 and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the recreation user survey and recreation management plan will cost approximately \$320,000. This work will be completed by qualified planners, District interns, and clerical staff.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The pre-survey activities are scheduled to begin in the first quarter of 2010, and the final Recreation User Survey Report is to be submitted in fourth quarter of 2010. Survey work will occur between May and October 2010.

Preparation of the recreation management plan will begin upon completion of this recreation user survey, Study 9.0, Creel Survey, and Study 10.0, Land Use Inventory. It is anticipated that a final recreation management plan will be completed in the second quarter of 2011.

11. REFERENCES

- 16 USC 797(e). Federal Power Act, Section 4(e). Issue of licenses for construction, etc., of dams, conduits, reservoirs, etc.
- 16 USC 803(a)(1). Federal Power Act, Section 10(a)(1). Modification of plans; factors considered to secure adaptability of project; recommendations for proposed terms and conditions.
- FERC. April 2004. “Handbook for Hydroelectric Project Licensing and 5 MW Exemptions from Licensing.” Available online at http://www.ferc.gov/industries/hydropower/gen-info/handbooks/licensing_handbook.pdf.
- NGPC. 2006. *State Comprehensive Outdoor Recreation Plan (SCORP): Assessment and Policy Plan, 2006-2010*. Lincoln, NE. Available online at <http://www.ngpc.state.ne.us/parks/programs/scorp/scorp.pdf>.
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Attachment A – FERC Recreation User Survey Study Request

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
February 10, 2009

OFFICE OF ENERGY PROJECTS

Project No. 1256-029 – Nebraska
Loup River Hydroelectric Project
Loup River Public Power District

Neal Suess, President/CEO
Loup Power District
P.O. Box 988
2404 15th Street
Columbus, Nebraska 68602

Reference: Staff comments on Loup River Hydroelectric Project Pre-application Document and Study Request

Dear Mr. Suess:

Federal Energy Regulatory Commission (Commission) staff, after reviewing the Loup River Public Power District's (Loup Power District) Pre-Application Document (PAD) for the Loup River Hydroelectric Project (project) and the transcripts of our January 12 and 13, 2009, scoping meetings, have no comments on the PAD. We do have one study request at this time (attached in schedule A). Please note that staff may determine a need for additional studies or information upon receipt and review of scoping comments, study requests, and the applicant's proposed study plan.

If you have any questions, please contact Kim Nguyen at (202) 502-6105, or via e-mail at kim.nguyen@ferc.gov.

Sincerely,

Jennifer Hill, Chief
Hydro West Branch 1

cc: Mailing List
Public Files

Schedule A

Study Request #1

Recreation Use Within Project Boundary & Along Bypassed Reach

After reviewing the information provided in the PAD as well as the comments provided during the scoping meetings held on January 12 & 13, 2009, two information gaps have been identified. Current recreational use along the Loup River bypassed reach as well as use within the project boundary along the Loup Canal is not well documented. The extent of the information gap and relative scope of the study can be established during the study plan meetings after reviewing all available information.

The following study request addresses each of the seven study criteria as required in 18 C.F.R. §5.9(b):

§5.9(b)(1) — *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to determine the demand for and existing use of the recreational facilities provided at the following areas:

- 1) Headworks Park
- 2) Headworks Off Highway Vehicle (OHV) Park
- 3) Monroe Powerhouse
- 4) Lake North
- 5) Lake Babcock (Loup Park)
- 6) Powerhouse Park at the Columbus Powerhouse
- 7) Tailrace Park
- 8) Loup Lands Wildlife Management Areas
- 9) Along the bypassed reach of the Loup River
- 10) Within the Loup Canal
- 11) On the Loup Canal access roads

The objectives of the study are to:

- 1) Quantify existing recreation use levels at all locations identified above.
- 2) Document the types of recreational use occurring by season at each location.
- 3) Identify user perceptions regarding the operation and management of outdoor recreation facilities at each location.
- 4) Assess the impact of project operations on recreation experiences.
- 5) Document public awareness of existing recreation facilities.
- 6) Identify potential measures to alleviate any negative impacts as well as

- to enhance existing recreational opportunities.
- 7) Develop a recreation plan for the project.

§5.9(b)(2) — *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not Applicable

§5.9(b)(3) — *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Comments provided during the scoping process by representatives of the Nebraska OHV Associate indicate a strong interest in the continued provision of recreation facilities in general and specifically for off-road vehicle and camping opportunities in and around Headworks Park. In order to document existing use of the Headworks Park and other recreation amenities as well as to provide insight regarding the needs of recreationists at project facilities, a study of recreation use is relevant to the Commission's public interest determination.

It was also noted during the scoping process that no assessment of recreational use in the bypassed reach has been undertaken to date. To fully evaluate the project's impact on boating and fishing in the bypassed reach and to balance potential recreation enhancement opportunities with their costs, a study of recreation use is needed.

§5.9(b)(4) — *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

When comparing historic visitation as reported via Recreation Reports (Form 80) filed with the Commission to the more recent estimates made in the PAD, it appears that recreational use is increasing. The Form 80 also indicated that camping facilities were at 90% capacity without consideration of peak use and trails were at 85%. Since the submission of this document, trail mileage has been added to address capacity needs, but no additional campsites have been documented. Other facilities receiving high levels of use (70% capacity during non-peak weekends) included parks, playgrounds, picnic areas, tent/trailer/RV sites, and group camping areas. With the large increase in recreational visitors,

some of these facilities may be experiencing use levels that exceed their design capacity. To better understand the types of recreational use that occurs on Loup Power District's facilities, as well as to quantify that use, a visitor use study should be conducted.

Regarding the bypassed reach, no information was provided in the PAD regarding recreational use. During the public scoping meetings, it was noted that "people canoe and kayak on the bypass reach on a regular basis between Monroe and Columbus." The existing level of recreation use should be documented so that the information may be used to inform future management recommendations. Initially, existing hydrology data should be reviewed to identify daily flow levels in the bypassed reach. This information should be augmented with an assessment of local knowledge regarding existing recreational activity within the bypassed reach to ascertain a range of flow levels that facilitates recreational use. Depending upon the level of existing use as well as latent demand identified for recreation in the bypassed reach, a controlled flow study may be warranted.

§5.9(b)(5) — Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Recreation has been identified as a legitimate project purpose by the Commission. Applicants are encouraged to develop recreation resources in such a matter that is "consistent with the needs of the area to the extent that such development is not inconsistent with the primary purpose of the project" (18 C.F.R. §2.7). The Loup Power District has established a precedent over the previous 80 years of providing a wide array of outdoor recreation opportunities. An assessment of the current level of recreational use should be conducted to provide Loup Power District personnel with the knowledge to manage the recreational components of the project efficiently and effectively over the life of the next license.

Project operation affects available instream flows for boating and fishing in the bypassed reach of the Loup River by diverting flows from the 31 mile reach between the headworks for the canal and the confluence of the Loup and Platte Rivers. No minimum instream flow has been established that meets the needs of all interested parties. An analysis of existing recreational use of the bypassed reach (canoes and kayaks) would help form the basis for determining the project's ability to enhance boating opportunities.

§5.9(b)(6) — Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the

duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

As stated in the PAD, the recreation user survey shall “determine the public awareness, usage, and demand of the project’s existing recreational facilities to determine if potential improvements are needed.” The most efficient way to count visitors to a recreation site is to install mechanical counters at an entrance to the parking lots at each facility. An infra-red beam counter will track hourly counts for each 24 hour time period up to one month. Data can be easily downloaded from the counter to a personal computer. Mechanical counters should be installed for 12 months in order to capture seasonal use variations.

In addition to the mechanical counts, a visitor intercept study should be conducted in order to determine use patterns at each recreational facility. Conducting an on-site study also would provide a method to validate the mechanical count numbers by tracking the number of vehicles that enter the park during the time period when onsite interviews are conducted. The group size encountered will also provide an estimate of the number of individuals entering the facility per car. Sampling visitors to each site should be stratified by day of the week and time of day to ensure that the spectrum of visitors to each site are included in the survey. Similar to the mechanical counters, interviews should be conducted over a 12 month period in order to capture seasonality.

The most appropriate method to assess public awareness would be to conduct a telephone or mail survey of potential users within the Loup Power District’s service area. A one page questionnaire would inform the Loup Power District regarding public awareness of existing facilities and provide the opportunity to gather information from former users and potential users. This study would also allow an assessment of latent demand for additional recreation opportunities.

§5.9(b)(7) — Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost for preparing the study plan, conducting the studies and preparing the report is estimated to be between \$90,000 and \$125,000. Three sub-studies would be conducted in order to gather all of the needed information: a visitor count study; a visitor intercept study; and a potential user study.

The first study would include the installation of mechanical counters (for a period of 12 months) at all established recreational sites within the project boundary [Headworks Park, Headworks OHV Park, Monroe Powerhouse, Lake

North, Lake Babcock (aka Loup Park), Powerhouse Park, Tailrace Park, and Loup Lands Wildlife Management Areas]. The count data would provide information on the distribution of use throughout the project boundary as well as document seasonal fluctuations in use. In addition to purchasing the counting devices, staff would need to learn how to operate and install them. On a monthly basis staff would need to download data from the counters and save it in a master data file. This portion of the study should cost between \$10,000 and \$15,000 depending upon the number of counters purchased and installed in the field.

Individuals pursuing recreational activities would be interviewed in the second study. A stratified sample of visitors (across days of the week and time of day) would be contacted over a 12 month period. While on site, the interview staff would also be responsible for counting the number of vehicles and people using the location during the sampling time frame. These numbers would be used to validate the mechanical counters. Visitors at the established recreation sites [Headworks Park, Headworks OHV Park, Monroe Powerhouse, Lake North, Lake Babcock (aka Loup Park), Powerhouse Park, Tailrace Park, and Loup Lands Wildlife Management Areas] would be sampled on two week days and two weekend days per month as well as on one summer holiday (Memorial Day, July 4th, or Labor Day). Disbursed recreationists using the canal or the canal banks would be sampled on a similar schedule by having interview staff drive the canal bank on scheduled days to contact visitors and count users and vehicles. Paddlers using the bypassed reach of the Loup River would be sampled during high water events at put-in or take-out locations. This study would provide information on visitor use patterns as well as user perceptions of facilities, operations strategies, and management regulations. This portion of the study should cost between \$60,000 and \$80,000 assuming that interviewing is done in pairs for safety reasons.

The final component of the study is a mail survey of households within the service area of the Loup Power District. Following the methods recommended by Dillman (2000), each household selected to participate in the mail study should be contacted multiple times to increase the chances of an individual completing and returning the survey. This portion of the study should cost between \$20,000 and \$30,000 assuming a desired sample size of 400 and a 20% response rate.

References Cited

Dillman, D. (2000). *Mail and Internet Surveys: The tailored design method*, 2nd Ed. John Wiley & Sons, New York, NY.

Form 80 (2003). *Licensed Hydropower Development Recreation Report* submitted by Loup Power District for the year 2002.

PAD (2008). Pre-application document submitted by the Loup Power District on October 16, 2008 for project number 1256.

Loup Power District (2009). <http://www.loup.com/RECREATE.asp>, accessed on January 26, 2009.

Attachment B – Nebraska Game and Parks Commission Lease Agreement

AGREEMENT
ON
LOUP RIVER PUBLIC POWER DISTRICT LANDS

COPY

This agreement is made and entered into by and between the Loup River Public Power District (hereinafter called District) and the Nebraska Game and Parks Commission (hereinafter called Lessee) and becomes effective upon the date of the final signature. The agreement shall be in effect until April 15, 2014. After April 15, 2014, the agreement shall be null and void. The agreement can be terminated prior to April 15, 2014, by either party giving the other party thirty (30) days advance notice.

Purpose: The District has a number of plots of land under their ownership having high wildlife values. The purpose of this agreement shall be to provide for the establishment and administration of a program of assistance and cooperation in the development, management and enhancement of these wildlife lands in the Loup River Public Power District.

Land Tracts Involved and Management Needed: (Appendix I)

TRACT d

Size: Approximately 10 acres (only that portion not in cropland & excluding existing duck blind)

Legal Description: The Northwest corner of a tract in the N1/2 of Section 6, T16N, R4W, lying south of the Loup River. Said 10 acres measuring approximately 650' south from the Loup River along the west line of said Section 6, thence approximately 200' east, thence north approximately 200', then east approximately 675', thence north to the road along the south side of the Loup River, thence west along said road to the place of beginning. The intent being to include only the area planted to trees.

Description: Planted timber area along south side of Loup River next to cropland.

Wildlife Potential: Excellent area for deer and game including pheasant and quail and furbearers including raccoon and coyote.

TRACT g

Size 330 acres

Legal Description: All land south and east of Loup River, Section 32, T17N, R4W. Part of the W1/2, Section 33, T17N, R4W. Part of NW1/4, NE1/4 and part of NE1/4 NE1/4, Section 33, T17N, R4W. Also N1/2NW1/4, Section 34, T17N, R4W. The area in Section 33, T17N, R4W lies west and north of the fence as now located on the east and south sides of the Loup River Public Power District dike.

Description: Timberland subject to frequent flooding. Loup River Public Power District cuts temporary piling and trees for riprap from this land.

Wildlife Potential: Excellent area for big game (particularly deer), upland game (particularly quail), small game and non-game.

Public access is available both to the land and to the river.

TRACT h

Size: Approximately 145 acres

Legal Description: All that part of W1/2 Section 27, T17N, R4W, south of the south right-of-way line of the Loup River Public Power District canal and north of the Loup River, except approximately 35 acres lying west of the state dike, "which runs northwest by southeast," and north of the timber line. This area being in the northwest corner of the above described tract.

Description: Two-thirds timberland and one-third pastureland. Contains old oxbows holding water year round. This land is north of the Loup River and subject to frequent flooding.

Wildlife Potential: Good waterfowl production potential as well as an excellent area for big game, upland game, small game, and non-game. Public access is available to land and to the Loup River.

Lessee Responsibilities That the Lessee will:

- a. Prepare a general management plan for all tracts and coordinate this with Loup.
- b. Fence all lands when necessary to exclude livestock.
- c. Accomplish wildlife enhancement practices on the areas, including planting of trees, shrubs, and grasses, control burning, etc.
- d. Perform minor maintenance, including cleanup, fence repair, etc.
- e. Perform law enforcement activities, particularly those dealing with outdoor activities such as hunting, fishing and trapping.
- f. Post all lands with appropriate signs concerning public access.
- g. Review wildlife habitat management activities with LPD periodically.
- h. Pay for the costs of the above duties except when otherwise decided upon jointly by the Loup River Public Power District and the Game and Parks Commission
- i. Open all areas to public access (foot traffic only) year around for the purpose of hunting, fishing, trapping and hiking unless otherwise specified by both the District and the Lessee. All rifles, including .22 calibre, are prohibited in the leased areas.

District Responsibilities That the District will:

- a. Pay taxes and/or other assessments on the land.
- b. Review management activities with Game and Parks Commission periodically.
- c. Assist Game and Parks Commission in routine inspections for trespassing livestock, vandalism, etc., and advise Game and Parks Commission of any irregularities.
- d. Continue to handle major maintenance activities such as dike repair and renovation. The District is not committed to maintaining dikes and other existing land improvements which are not required now or in the future for proper operation of the hydraulic facilities.

It is agreed that the Lessee cannot assign or sublet the premises without authority from the District; that the premises will be used for fish and wildlife management purposes, including hunting and fishing; that the District reserves the right to enter upon the property, without liability to the Lessee, and make such use thereof as is necessary for proper maintenance, supervision and construction of its system; that the Lessee will maintain all fences thereon; that the Lessee will be responsible for control of noxious weeds in leased area. The District presently cuts trees from the leased areas for use in the District's maintenance programs. The District retains the right to cut trees in the leased areas, but will work with the Lessee in selecting the trees to be cut.

It is further agreed that the District is under no obligation to the Lessee to protect the leased premises from any hazards arising from flood or other casualty.

The Lessee agrees to indemnify and hold the District harmless from any and all claims by any person, including employees of the Lessee and employees of the District for damage to persons or property caused by and arising out of the use of this property by the Lessee.

This agreement is executed by the Loup River Public Power District and the Game and Parks Commission after due consideration at official meetings of each respective organization on the dates affixed beside their authorization and adoption thereof. Either party may withdraw from this agreement, by action of their respective Boards, for stated causes.

ATTEST:

Vicki Boden

LOUP RIVER PUBLIC POWER DISTRICT

By *[Signature]*

DATE: *9/29/03*

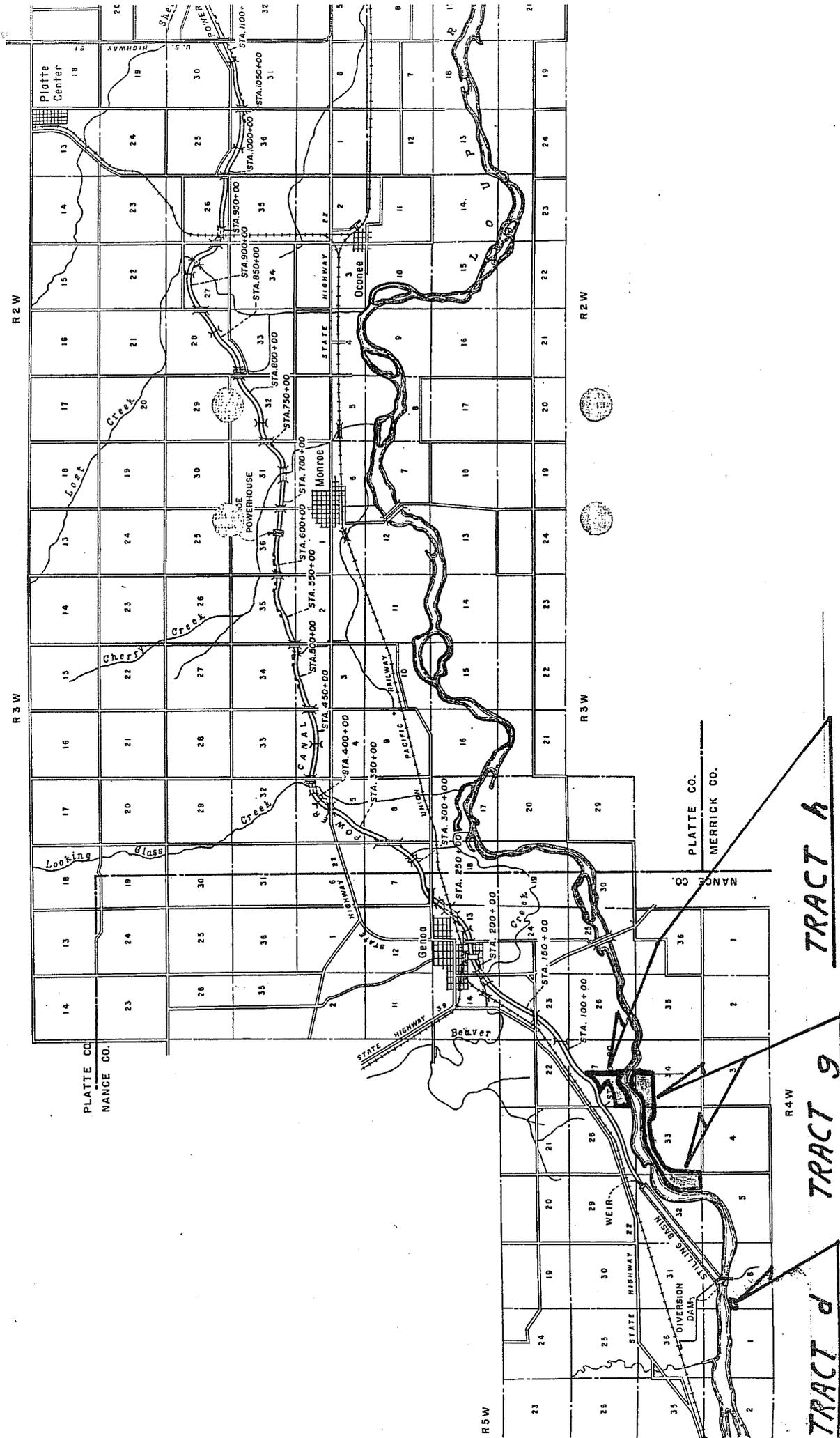
ATTEST:

Sally A. Hebert

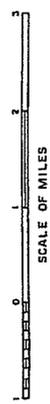
NEBRASKA GAME AND PARKS COMMISSION

By *[Signature]*

DATE: *10/1/03*



LOCATION MAP



R-4-W

T-17-N

25

30

29

28

27

HWY 22

Disposal Area

RAILROAD

36

Dike R.O.W.

31

SETTLING BASIN

32

Loup River

33

Game & Parks

34

T-16-N

Loup River

Wasteland

Leased Pasture

6

Farmland

Dike R.O.W.

5

4

Park

Entrance Roads

Wasteland

Owned By Jack Wright (Wasteland)

LOUP CANAL (Pasture)

HWY 22

LOUP CANAL

River

KEY

-  Disposal Area
-  Game & Parks
-  Leased Pasture
-  Wasteland
-  Farmland

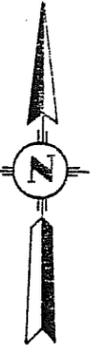
-  Light Duty Road
-  Unimproved Dirt Road
-  Section Line

APR 27 1988

LOUP POWER DISTRICT

Loup Owned Property at Headworks

DRAWN BY	DATE	CHECKED BY	APPROVED BY
JKH	4-26-88		<i>[Signature]</i> 5-10-88
SCALE 1" = 200 ft.		DRAWING NO. T&D '8132	



Attachment C – In-Person Recreation User Survey

In-person Recreation User Survey

Survey Location:

Date:

Time:

Zip Code of Residence:

1. How many people are in your party, including yourself?

18 years or older _____

Under 18 years _____

2. If you plan to or have stayed overnight, how many nights will/did you stay?
How will/did you camp?

Tent at developed campground # of nights _____

Tent at undeveloped campground # of nights _____

RV/Trailer # of nights _____

3. Please estimate how many times per year you visit this location for recreation purposes?

_____ Weekly

_____ Several times a month

_____ Once a month

_____ 2 to 3 times per year

4. What months do you typically use this location?

January

May

September

February

June

October

March

July

November

April

August

December

5. Do you visit other locations in Nance or Platte counties for recreation purposes? If so, which one(s)?

6. Please indicate the activities that you have been or will be participating in on this visit. [Mark all that apply.]

- | | |
|---|--|
| <input type="checkbox"/> Camping | <input type="checkbox"/> Water Skiing |
| <input type="checkbox"/> Hiking/Biking | <input type="checkbox"/> Non-Motorized Boating |
| Which trail? _____ | <input type="checkbox"/> Wildlife/Scenic Viewing |
| <input type="checkbox"/> Fishing from Shore | <input type="checkbox"/> Organized Event |
| <input type="checkbox"/> Fishing from Boat | <input type="checkbox"/> Picnicking, Informal Recreation |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Children’s Playground |
| <input type="checkbox"/> Motorized Boating | <input type="checkbox"/> Off-Highway Vehicles |
| <input type="checkbox"/> Jet Skiing | <input type="checkbox"/> Other _____ |

7. What recreation activities have you participated in during the past 12 months at this location? [Mark all that apply.]

- | | |
|---|--|
| <input type="checkbox"/> Camping | <input type="checkbox"/> Water Skiing |
| <input type="checkbox"/> Hiking/Biking | <input type="checkbox"/> Non-Motorized Boating |
| Which trail? _____ | <input type="checkbox"/> Wildlife/Scenic Viewing |
| <input type="checkbox"/> Fishing from Shore | <input type="checkbox"/> Organized Event |
| <input type="checkbox"/> Fishing from Boat | <input type="checkbox"/> Picnicking, Informal Recreation |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Children’s Playground |
| <input type="checkbox"/> Motorized Boating | <input type="checkbox"/> Off-Highway Vehicles |
| <input type="checkbox"/> Jet Skiing | <input type="checkbox"/> Other _____ |

8. Please rate the facilities you have used at this location.

	Excellent	Good	Average	Below Average	Poor	Not Applicable
Boat ramps	<input type="checkbox"/>					
Swimming beach	<input type="checkbox"/>					
Parking lot	<input type="checkbox"/>					
Campgrounds	<input type="checkbox"/>					
Restroom facilities	<input type="checkbox"/>					
Picnic area	<input type="checkbox"/>					
Children’s playground	<input type="checkbox"/>					
Shoreline fishing area	<input type="checkbox"/>					
Trails	<input type="checkbox"/>					
Off-highway vehicle park	<input type="checkbox"/>					

If you indicated any facility as “Poor,” please explain.

9. Were there any activities that conflicted with your recreation activities? If so, please indicate the activity.

- Yes, other recreation activities
- Yes, other non-recreation activities
- No

10. Please indicate how important the following recreational opportunities are to you.

	Very Important	Important	Neutral	Somewhat Important	Not Important
Motor boating	<input type="checkbox"/>				
Jet skiing	<input type="checkbox"/>				
Water skiing	<input type="checkbox"/>				
Non-motorized boating	<input type="checkbox"/>				
Fishing	<input type="checkbox"/>				
Hiking/biking	<input type="checkbox"/>				
Wildlife/scenic viewing	<input type="checkbox"/>				
Swimming	<input type="checkbox"/>				
Trails	<input type="checkbox"/>				
Camping	<input type="checkbox"/>				
Picnic shelters/facilities	<input type="checkbox"/>				
Informal recreation	<input type="checkbox"/>				
Children’s playground	<input type="checkbox"/>				
Off-highway vehicles	<input type="checkbox"/>				

11. Please identify any other activities or facilities that are currently not available that you feel would enhance your recreational experience.

Thank you for your participation!

Attachment D – Field Observation Form

Field Observation Form

(Specific activities/observation categories will vary by location. A table will be created for each key study site identified in Section 5 of this Recreation User Survey Study Plan.)

Date:

Location:

	Parking Area	Campground	Picnic Area	Playground	
Time and Weather					
Vehicles					
RV Campers					
Tent Campers					
Fishing from Shore					
Fishing from Boat					
Swimmers					
Picnickers					
Jet Skiers					
Water Skiers					
Canoeists					
Power Boaters					
Walkers/Hikers					
Wildlife Viewers					
Bicyclists					
Children’s Playground					
Informal Recreation					
Other					
Comments/Observations					

Survey proctors should indicate whether the observations are estimates or actual counts.

Attachment E – Telephone Recreation User Survey

Telephone Recreation User Survey

Loup Power District (District) is applying to the Federal Energy Regulatory Commission to relicense its hydroelectric project near Genoa and Columbus, Nebraska, and is conducting a recreation user survey to determine use of the District’s facilities. The survey will take approximately __ minutes.

1. Are you familiar with any of the following recreation facilities provided by Loup Power District?

- Headworks Park
- Headworks OHV Park
- Lake Babcock Park (sometimes called Loup Park)
- Lake North Park
- Columbus Powerhouse Park
- Tailrace Park
- Two Lakes Trail
- Bob Lake Trail
- Robert White Trail

IF YES:

2A. Have you or any members of your household visited one or more of the facilities in the last year? The facilities are:

[Mark YES answers]

- | | |
|--|----------------------|
| • Headworks Park | How many times? ____ |
| • Headworks OHV Park | How many times? ____ |
| • Lake Babcock Park (sometimes called Loup Park) | How many times? ____ |
| • Lake North Park | How many times? ____ |
| • Columbus Powerhouse Park | How many times? ____ |
| • Tailrace Park | How many times? ____ |
| • Two Lakes Trail | How many times? ____ |
| • Bob Lake Trail | How many times? ____ |
| • Robert White Trail | How many times? ____ |

IF YES:

3A. Why do you choose to use Loup Power District recreation facilities instead of other recreation facilities in the area? Choose all that apply.

- Location – close to home
- Provide the facilities we need
- Don't know where other facilities are located
- Facilities are safer
- Facilities are better maintained
- Facilities are free
- Other

4A. I am going to list the District's recreation facilities, and I'd like you to rate the ones you use as excellent, good, average, below average, poor, or not applicable.

	Excellent	Good	Average	Below Average	Poor	Not Applicable
Boat ramps	<input type="checkbox"/>					
Swimming beach	<input type="checkbox"/>					
Parking lot	<input type="checkbox"/>					
Campgrounds	<input type="checkbox"/>					
Restroom facilities	<input type="checkbox"/>					
Picnic area	<input type="checkbox"/>					
Children's playground	<input type="checkbox"/>					
Shoreline fishing area	<input type="checkbox"/>					
Trails	<input type="checkbox"/>					
Off-highway vehicle park	<input type="checkbox"/>					

[If "Poor" for any above, specifically ask, for example, you indicated that boat ramps were poor – can you explain?]

5A. I'm going to list recreational opportunities for you, and I'd like you to rate how important they are to you as very important, important, neutral, somewhat important, or not important.

	Very Important	Important	Neutral	Somewhat Important	Not Important
Motor boating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jet skiing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water skiing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-motorized boating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hiking/biking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildlife/scenic viewing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Swimming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Camping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picnic shelters/facilities	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Children's playground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Informal recreation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Off-highway vehicles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6A. Please identify any other activities or facilities that are currently not available that you feel would enhance your recreational experience.

<END>

IF NO:

3B. Why have you or members of your household not used Loup Power District recreation facilities in the last year? Choose all that apply.

- Location – too far from home
- Do not provide the facilities we need
- Too busy/not interested in recreation
- Don't know where the facilities are located
- Facilities do not have the right equipment
- Facilities are not safe
- Facilities are not well maintained
- Other (please explain _____)

4B. I'm going to list recreational opportunities for you, and I'd like you to rate how important they are to you as very important, important, neutral, somewhat important, or not important.

	Very Important	Important	Neutral	Somewhat Important	Not Important
Motor boating	<input type="checkbox"/>				
Jet skiing	<input type="checkbox"/>				
Water skiing	<input type="checkbox"/>				
Non-motorized boating	<input type="checkbox"/>				
Fishing	<input type="checkbox"/>				
Hiking/biking	<input type="checkbox"/>				
Wildlife/scenic viewing	<input type="checkbox"/>				
Swimming	<input type="checkbox"/>				
Trails	<input type="checkbox"/>				
Camping	<input type="checkbox"/>				
Picnic shelters/facilities	<input type="checkbox"/>				
Children's playground	<input type="checkbox"/>				
Informal recreation	<input type="checkbox"/>				
Off-highway vehicles	<input type="checkbox"/>				

<END>

IF NO:

2C. In which outdoor recreational activities do you or members of your household regularly participate?

- A. Camping
- B. Hiking/Biking
- C. Trails
- D. Fishing
- E. Motorized Boating
- F. Jet Skiing
- G. Water Skiing
- H. Non-motorized Boating
- I. Swimming
- J. Off-Highway Vehicles (OHV)
- K. Wildlife/Scenic viewing
- L. Picnicking
- M. Children's Playground
- N. Informal Recreation
- O. Do not participate in outdoor recreation activities

If response is O, conclude survey.

3C. Where do you currently participate in outdoor recreation activities?

4C. Why do you choose this/these locations for your recreation activities?

5C. I'm going to list recreational opportunities for you, and I'd like you to rate how important they are to you as very important, important, neutral, somewhat important, or not important.

	Very Important	Important	Neutral	Somewhat Important	Not Important
Motor boating	<input type="checkbox"/>				
Jet skiing	<input type="checkbox"/>				
Water skiing	<input type="checkbox"/>				
Non-motorized boating	<input type="checkbox"/>				
Fishing	<input type="checkbox"/>				
Hiking/biking	<input type="checkbox"/>				
Wildlife/scenic viewing	<input type="checkbox"/>				
Swimming	<input type="checkbox"/>				
Trails	<input type="checkbox"/>				
Camping	<input type="checkbox"/>				
Picnic shelters/facilities	<input type="checkbox"/>				
Children's playground	<input type="checkbox"/>				
Informal recreation	<input type="checkbox"/>				
Off-highway vehicles	<input type="checkbox"/>				

<END>

Attachment F – NOHVA Recreation User Survey

NOHVA Recreation User Survey

Loup Power District (District) is applying to the Federal Energy Regulatory Commission to relicense its hydroelectric project near Genoa and Columbus, Nebraska, and is conducting a recreation user survey to determine use of the District’s facilities. NOHVA members are asked to complete the following survey about Headworks Park. Please take a few minutes to complete the following survey and return it to _____.

Thank you.

1. In the past 12 months, how many days have you or anyone in your household used an Off-Highway Vehicle (OHV) (such as ATVs or 4-wheelers, dirt bikes, or snow mobiles) for recreational purposes?

2. How many of those days were at the District’s Headworks OHV Park?

2a. What months of the year do you use Headworks Park and other recreation facilities?

January	May	September
February	June	October
March	July	November
April	August	December

3. In what other places have you used an OHV for recreational purposes in the last 12 months?

4. Where do you use OHVs most frequently for recreational purposes?

4a. Why do you prefer the place you use most often? Select all that apply.

- It is easy to get to.
- It has the best OHV facilities.
- There is no other place to ride.
- It is free to ride there.
- Other _____

5. When you use Headworks Park, do you stay overnight? If yes, where do you stay?

- Nearby hotel/motel
- RV/Trailer at District's campground
- Tent at District's developed campground
- Tent at District's undeveloped campground
- Camping at another location
- Other _____

6. Please select other activities that you participate in when visiting Headworks Park. Mark all that apply.

- | | |
|---|--|
| <input type="checkbox"/> Camping | <input type="checkbox"/> Water Skiing |
| <input type="checkbox"/> Hiking/Biking | <input type="checkbox"/> Non-Motorized Boating |
| Which trail? _____ | <input type="checkbox"/> Wildlife/Scenic Viewing |
| <input type="checkbox"/> Fishing from Shore | <input type="checkbox"/> Picnicking |
| <input type="checkbox"/> Fishing from Boat | <input type="checkbox"/> Children's Playground |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Informal Recreation |
| <input type="checkbox"/> Motorized Boating | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Jet Skiing | |

7. Please rate the District’s recreation facilities that you have used.

	Excellent	Good	Average	Below Average	Poor	Not Applicable
Boat ramps	<input type="checkbox"/>					
Swimming beach	<input type="checkbox"/>					
Parking lot	<input type="checkbox"/>					
Campgrounds	<input type="checkbox"/>					
Restroom facilities	<input type="checkbox"/>					
Picnic area	<input type="checkbox"/>					
Children’s playground	<input type="checkbox"/>					
Shoreline fishing area	<input type="checkbox"/>					
Trails	<input type="checkbox"/>					
Informal recreation	<input type="checkbox"/>					
Off-highway vehicle park	<input type="checkbox"/>					

If you indicated any facility as “Poor,” please explain.

8. Are there any activities at the District’s facilities that conflict with your recreation activities? If so, please indicate the activity.

- Yes, other recreation activities: _____
- Yes, other non-recreation activities: _____
- No

9. Please indicate how important the following recreational opportunities are to you.

	Very Important	Important	Neutral	Somewhat Important	Not Important
Motor boating	<input type="checkbox"/>				
Jet skiing	<input type="checkbox"/>				
Water skiing	<input type="checkbox"/>				
Non-motorized boating	<input type="checkbox"/>				
Fishing	<input type="checkbox"/>				
Hiking/biking	<input type="checkbox"/>				
Wildlife/scenic viewing	<input type="checkbox"/>				
Swimming	<input type="checkbox"/>				
Trails	<input type="checkbox"/>				
Camping	<input type="checkbox"/>				
Picnic shelters/facilities	<input type="checkbox"/>				
Informal recreation	<input type="checkbox"/>				
Children’s playground	<input type="checkbox"/>				
Off-highway vehicles	<input type="checkbox"/>				

10. Please identify activities or facilities that are currently not available that you feel would enhance your recreational experience.

STUDY 9.0 CREEL SURVEY 9-1

- 1. GOALS AND OBJECTIVES OF SURVEY 9-1
- 2. RELEVANT RESOURCE MANAGEMENT GOALS 9-2
- 3. BACKGROUND AND EXISTING INFORMATION 9-2
- 4. PROJECT NEXUS 9-3
- 5. STUDY AREA AND STUDY SITES 9-5
- 6. PROPOSED METHODOLOGY 9-5
- 7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS 9-7
- 8. WORK PRODUCTS 9-7
- 9. LEVEL OF EFFORT AND COST 9-8
- 10. SCHEDULE 9-8
- 11. REFERENCES 9-9

STUDY 9.0 CREEL SURVEY

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. Substantial fisheries have been established at the Project, and angling is a popular recreation activity at multiple locations. The District provides for public access and encourages recreational use of Project lands and waters.

No recent data is available to evaluate the composition, distribution, and utilization of the Project fisheries. Therefore, in response to a request by the Nebraska Game and Parks Commission (NGPC), the District will perform a creel survey of the Project fisheries spanning one open-water fishing season. A creel survey is a survey of anglers to determine the species and number of fish caught in a specific fishery over a specific time period. A creel survey is not a biological study; instead, it is a data-gathering tool for use in making recreational fishery management decisions. To be compatible with other Nebraska creel survey data, the survey of Project fisheries will employ methodologies used by NGPC. The creel survey data will be used in the development of a recreation management plan (see Study 8.0, Recreation User Survey) and will be available to assist the District and NGPC in managing fishery resources and public recreation at the Project.

1. GOALS AND OBJECTIVES OF SURVEY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the creel survey is to determine the status of Project fisheries and how the fisheries are used by anglers. The District desires to gain a better understanding of how Project fisheries are perceived and used by anglers.

The objectives of the creel survey are as follows:

1. To determine what species anglers are targeting and catching.
2. To determine anglers' catch rates.
3. To determine anglers' expectations and the degree to which they are satisfied.
4. To identify anglers' wants or needs.
5. To determine anglers' overall perception of Project fisheries.
6. To document survey results.

7. To provide information on Project fisheries to be used in conjunction with the results of Study 8.0, Recreation User Survey, and Study 10.0, Land Use Inventory, to develop a recreation management plan.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

NGPC manages Project fisheries for productive sport fishing via its state fishing regulations. The NGPC 2009 *Nebraska Fishing Guide* lists the following fish species as being accessible to anglers in Project fisheries:

- Loup Power Canal and Loup River – carp, channel and flathead catfish, freshwater drum
- Lake Babcock – bullhead, carp, channel and flathead catfish
- Lake North – carp, channel catfish, crappie, freshwater drum, walleye

Historically, NGPC actively stocked Project fisheries, including walleye in Lake North. Currently, NGPC has no ongoing stocking programs in Project waters.

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

3.1 Nebraska Creel Survey Guidance and Methodologies

NGPC produced the *User’s Guide for Nebraska Creel Surveys* to provide guidance and methodologies to both NGPC staff and outside interests on how to design and perform creel surveys in Nebraska (NGPC, April 30, 1992). The User’s Guide includes an introduction to creel surveys, information on survey design and planning, instructions for conducting on-site creel surveys, and information on data analysis. The guidance and methodologies from this User’s Guide provide the basis for the proposed methodology discussed in Section 6 of this Study Plan.

3.2 General Information on Project Fisheries

Although no formal creel surveys have been performed for Project fisheries, the following general information concerning Project fisheries is known:

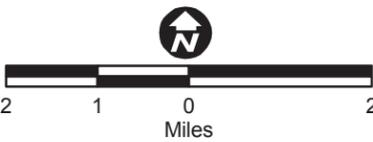
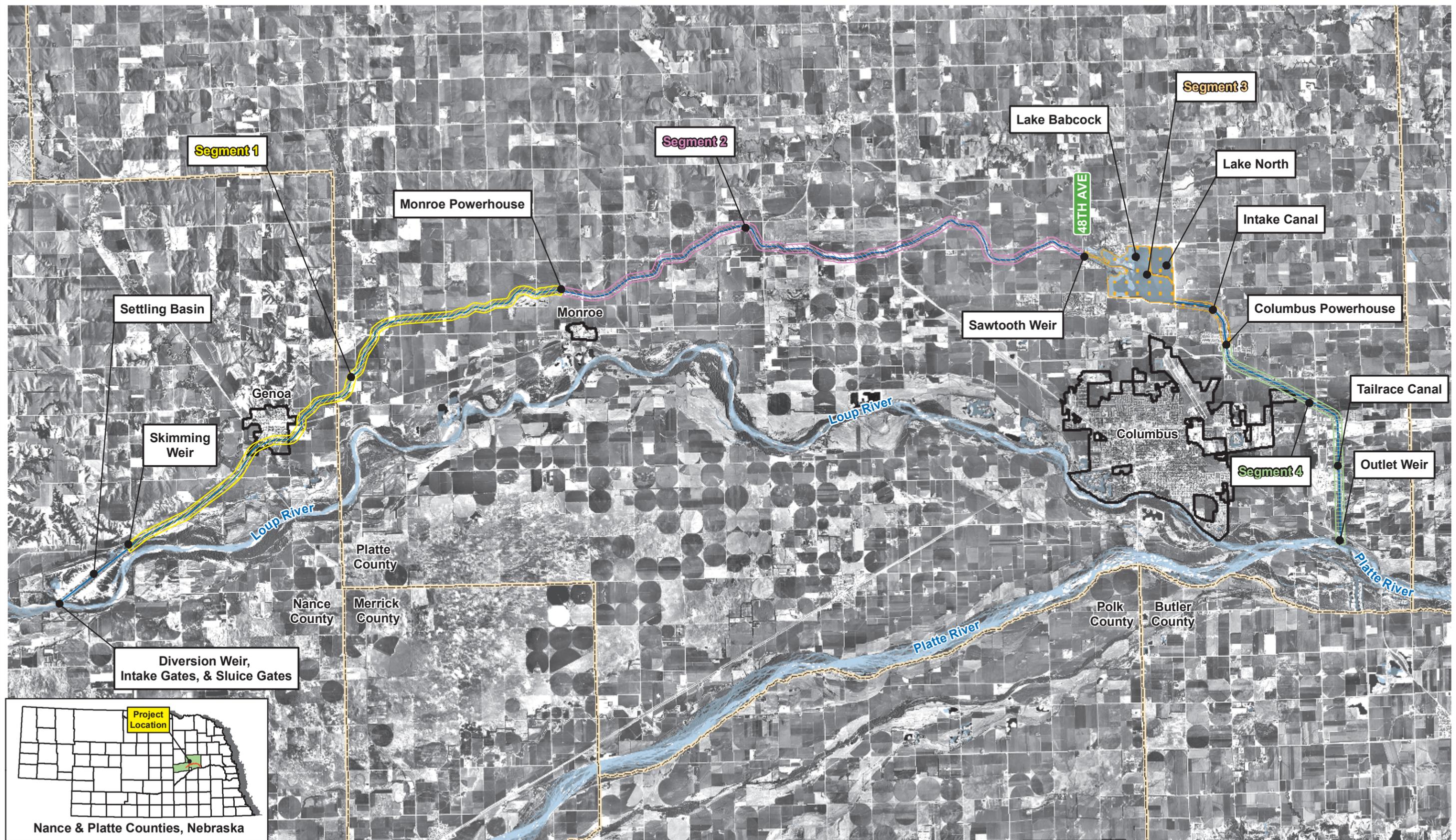
- Central to the District’s fishing opportunities is the Loup Power Canal (shown in Figure 9-1). The canal is approximately 35 miles long, has approximately 70 miles of shoreline (not including the 10 miles of shoreline surrounding Lake Babcock and Lake North), and is fully accessible to the public via access roads on both sides. The public access roads allow for fishing opportunities, specifically for carp, channel and flathead catfish, and freshwater drum, along the canal’s length. The canal’s most productive fishing opportunities occur at the Outlet Weir, siphons, Settling Basin, and in the tailwaters below the Monroe and Columbus powerhouses (NGPC, 2009).
- Lake North Park is the District’s most popular recreation area and provides unrestricted boat access to the 200-acre Lake North, another important Project fishery that contains carp, channel catfish, crappie, freshwater drum, and walleye (shown in Figure 9-1). Lake North Park features 2 miles of beaches and two boat ramps.
- Lake Babcock Park (aka Loup Park) provides fishing access to the 600-acre Lake Babcock, which contains bullhead, carp, and channel and flathead catfish (shown in Figure 9-1). At Lake Babcock, boats are restricted to 5 miles per hour with no wake, and no boating is allowed during waterfowl hunting season (NGPC, 2009).
- Project-related fishing opportunities also exist at Tailrace Park, which provides fishing opportunities for river species downstream of the Columbus Powerhouse and along the Tailrace Canal. Headworks Park also provides fishing access to small lakes and the Loup Power Canal, as well as access to downstream of the diversion wall on the Loup River on District owned property.

4. PROJECT NEXUS

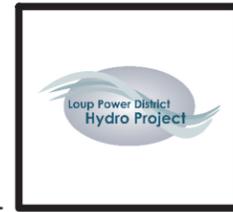
“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

The following Federal regulations require that recreational resources, including fishing opportunities, be evaluated in relation to operation of the Project:

- Federal Power Act (FPA) Section 4(e) states that “In deciding whether to issue any license..., the [Federal Energy Regulatory] Commission...shall give equal consideration to...the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality” (16 USC 797(e)).



- | | | | |
|------------------|-----------|------------------------|--|
| Legend | | Survey Segments | |
| Loup Power Canal | Segment 1 | Segment 3 | |
| Corporate Limits | Segment 2 | Segment 4 | |
| County Line | | | |



Creel Survey Study Area

Loup River Hydroelectric Project
 FERC Project No. 1256
 Proposed Study Plan

DATE	March 2009
FIGURE	9-1

Aerial Imagery: 2006 National Agricultural Inventory Project, Nance and Platte Counties Mosaic.
 Streams/Lakes: 2000 Tiger Line Files, Platte and Nance Counties.

- FPA Section 10(a)(1) states that “All licenses issued under this subchapter shall be on the following conditions: (a)(1) That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the [Federal Energy Regulatory] Commission will be best adapted to a comprehensive plan...for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including... recreational...” (16 USC 803(a)(1)).
- With regard to FERC relicensing, the Code of Federal Regulations (CFR) states that “recreation studies should be designed to identify current and future recreational needs and how those needs can be best met” (FERC, April 2004).

5. STUDY AREA AND STUDY SITES

The creel survey will be limited to fisheries in Project waters (that is, within the Project Boundary), as shown in Figure 9-1. Specifically, the survey will focus on the Loup Power Canal, Lake Babcock, and Lake North and will be divided into four segments as described in Section 6, Proposed Methodology, and shown in Figure 9-1. Although the survey generally will not include data collection associated with anglers on the Loup River or the Lower Platte River, the survey will capture angler counts and interviews of those anglers fishing immediately adjacent to either the Diversion Weir on the Loup River or the Outlet Weir on the Platte River.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the creel survey includes three tasks, described below. This methodology is consistent with the NGPC *User’s Guide for Nebraska Creel Surveys*, which represents current NGPC guidance and methodologies for NGPC-performed creel surveys (NGPC, April 30, 1992).

Task 1 Pre-Survey Activities

A survey schedule was determined using an unnamed NGPC software package specifically designed for the preparation of survey schedules using random, statistical formulas. Based on a number of user-supplied inputs, the NGPC software package provides a survey schedule allowing for an accurate, random sampling of anglers.

Surveys will be performed on 4 weekend days and 6 week days per month from May through September 2010. The District’s formal creel survey schedule is provided in Attachment A.

NGPC’s standard field count form and field interview form were modified to accommodate the collection of Project-specific details. Blank copies of the Project-specific field count form and field interview form are provided in Attachments B and C, respectively.

District representatives who are qualified scientists or District staff consisting of seasonal interns will act as survey clerks. NGPC will instruct potential survey clerks on established protocols and standard practices commonly used by NGPC during creel surveys prior to anyone acting as a survey clerk on behalf of the District. NGPC staff may also accompany survey clerks during the initial survey to demonstrate appropriate survey practices (NGPC, December 12, 2008).

Task 2 Field Survey Activities

The survey will consist of a stratified, random, roving design in which all survey activities (counts and interviews) will be performed from shore. For purposes of the survey, the Project will be divided into the following four segments (see Figure 9-1):

- Segment 1 – Skimming Weir to the Monroe Powerhouse
- Segment 2 – Monroe Powerhouse to 48th Avenue
- Segment 3 – 48th Avenue to the Columbus Powerhouse (includes Lake Babcock and Lake North)
- Segment 4 – Columbus Powerhouse to the Outlet Weir

To obtain an “instantaneous count,” anglers will be counted in a 2-hour time period. Angler counts will be coded by Project segment so that angler pressure on specific areas of the Project can be better documented. Further, the direction in which angler counts are performed should alternate between surveys (for example, Survey 1 should be performed east to west, Survey 2 should be performed west to east, and so forth). Details related to angler counts are shown in the field count form, provided in Attachment B.

Angler interviews could occur during or following the 2-hour instantaneous count period and would also be coded according to Project segment, as noted above. The District’s proposed survey will include interview questions aimed at determining angler species preference, angler expectations and needs, and the overall perception of Project fisheries. To obtain comprehensive survey data, the District will attempt to interview an amount of anglers equivalent to 50 percent of the total number of anglers identified during the 2-hour instantaneous count period. Further, an amount of anglers equivalent to 25 percent of the total number of anglers identified during the 2-hour instantaneous count period will be interviewed for “completed trip

information.” Completed trip information is obtained by interviewing anglers who have completed angling activities for the associated trip. Details related to angler interviews are shown in the field interview form, provided in Attachment C.

Task 3 Data Analysis

Data collected during Field Survey Activities will be evaluated for completeness and accuracy. Data will also be analyzed to determine angler effort, catch, and angler success, as described in Section 8.1).

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

During preparation of this Creel Survey Study Plan, the District worked cooperatively with NGPC staff to use existing NGPC guidance and methodologies for creel surveys. Specifically, the NGPC Fisheries Division in Norfolk, Nebraska, provided detailed information that has been incorporated and referenced in this study plan.

Furthermore, NGPC produced the survey schedule, field count form, and field interview form as shown in Attachments A, B, and C, respectively. The District will continue to work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

8.1 Creel Survey Report and Supporting Documentation

The primary work product of the creel survey will be a Creel Survey Report that details creel survey findings using both text and graphics. Anticipated contents of this report include:

- Approach and methods
- Angler effort
 - Total angler trips and angler trips per month
 - Total angler counts and angler counts broken out by specific location and differentiated between boat and bank anglers
 - Fishing hours expended by angler
- Catch
 - Number of fish harvested and released by species
 - Length and frequency of caught individuals by species
- Angler success – Catch per Unit Effort (CPUE)

- Fish caught per hour and per month (derived from angler effort and catch data)

Secondary work products of the creel survey will consist of completed field count forms and field interview forms that will be collected throughout the duration of the survey.

Updates regarding the creel survey will be included in the study progress reports to be submitted to FERC in March 2010 and June 2010.

8.2 Adoption of Work Products by Other Studies or Parties

NGPC actively manages Project fisheries through the implementation and enforcement of fishing regulations. It is anticipated that NGPC will incorporate survey findings into its data library and may use these findings to modify existing fishing regulations specific to Project fisheries.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the creel survey will cost approximately \$80,000. This work will be completed by qualified scientists and District interns trained as survey clerks by NGPC.

The survey will consist of a stratified roaming survey in which all survey activities will be performed from shore; therefore, no watercraft or specialized equipment will be required.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The pre-survey activities are scheduled to begin in the first quarter of 2010, and the final Creel Survey Report is to be submitted in the fourth quarter of 2010. The majority of the work will occur in the spring and summer of 2010.

This schedule may be delayed if coordination with and review by NGPC is not timely or sufficient. As the survey is intended to satisfy standard NGPC guidance and methodologies, input from NGPC is crucial in survey design, field survey activities, data analysis, and documentation.

11. REFERENCES

16 USC 797(e). Federal Power Act, Section 4(e). Issue of licenses for construction, etc., of dams, conduits, reservoirs, etc.

16 USC 803(a)(1). Federal Power Act, Section 10(a)(1). Modification of plans; factors considered to secure adaptability of project; recommendations for proposed terms and conditions.

FERC. April 2004. “Handbook for Hydroelectric Project Licensing and 5 MW Exemptions from Licensing.” Available online at http://www.ferc.gov/industries/hydropower/gen-info/handbooks/licensing_handbook.pdf.

NGPC. April 30, 1992. *User’s Guide for Nebraska Creel Surveys*. NGPC Fisheries Division.

NGPC. December 12, 2008. Personal communication between Jeff Schuckman, NGPC, and Quinn Damgaard, HDR.

NGPC. 2009. *2009 Nebraska Fishing Guide: Regulations and Public Waters*. Lincoln, NE. Available online at www.ngpc.state.ne.us/fishing/guides/fishguide/FishGuide.pdf.

Attachment A – Creel Survey Schedule

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

CREEL SURVEY DESIGN PARAMETERS

```

]
]
] SURVEY MONTHS: 05/2010 TO 09/2010
]
] #WEEKDAYS/MONTH: 6 PERIOD LAKE SECTION
] #WEEKENDS/MONTH: 4 PROBABILITIES PROBABILITIES
] 1: .50 1: 1.0
] 2: .50 2: .
] TIME PERIODS/DAY: 2 3: . 3: .
] 4: . 4: .
] COUNTS/DAY: 1 5: . 5: .
] 6: . 6: .
] COUNT LENGTH(MIN): 90 120
]
] DAYLIGHT DESIGN - PROGRAM DEFINES DAILY START/STOP TIMES
]
] DAYS SELECTED AS HOLIDAYS:
] 05/24/10 07/04/10 09/06/10 . . . . .
]
] * ASTERICK INDICATES COUNTS/DAY WERE CHANGED BY PROGRAM. (RANDOM SEED: 8296715 )
]

```

** MONTHLY TIME PERIOD LIMITS **

```

MONTH=MAY YEAR=2010 DAILY START/STOP TIMES = 0630/2030
PERIOD 1 START/STOP TIMES = 0630/1330
PERIOD 2 START/STOP TIMES = 1330/2030

MONTH=JUN YEAR=2010 DAILY START/STOP TIMES = 0600/2100
PERIOD 1 START/STOP TIMES = 0600/1330
PERIOD 2 START/STOP TIMES = 1330/2100

MONTH=JUL YEAR=2010 DAILY START/STOP TIMES = 0600/2100
PERIOD 1 START/STOP TIMES = 0600/1330
PERIOD 2 START/STOP TIMES = 1330/2100

MONTH=AUG YEAR=2010 DAILY START/STOP TIMES = 0630/2030
PERIOD 1 START/STOP TIMES = 0630/1330
PERIOD 2 START/STOP TIMES = 1330/2030

MONTH=SEP YEAR=2010 DAILY START/STOP TIMES = 0700/2000
PERIOD 1 START/STOP TIMES = 0700/1330
PERIOD 2 START/STOP TIMES = 1330/2000

```

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

LISTING OF SELECTED DATES AND TIMES

DATE	TIME1	TIME2	TIME3	TIME4	PERIOD	DATE	TIME1	TIME2	TIME3	TIME4	PER
Sat, May 1, 2010	2000	.	.	.	2						
Thu, May 6, 2010	0730	.	.	.	1						
Sat, May 8, 2010	1600	.	.	.	2						
Mon, May 10, 2010	1530	.	.	.	2						
Fri, May 14, 2010	1900	.	.	.	2						
Sun, May 16, 2010	1630	.	.	.	2						
Thu, May 20, 2010	0800	.	.	.	1						
Sat, May 22, 2010	1030	.	.	.	1						
Wed, May 26, 2010	1130	.	.	.	1						
Mon, May 31, 2010	1800	.	.	.	2						
Tue, Jun 1, 2010	1800	.	.	.	2						
Thu, Jun 3, 2010	1600	.	.	.	2						
Sat, Jun 5, 2010	1500	.	.	.	2						
Thu, Jun 10, 2010	0730	.	.	.	1						
Sat, Jun 12, 2010	1730	.	.	.	2						
Mon, Jun 14, 2010	1830	.	.	.	2						
Wed, Jun 16, 2010	0630	.	.	.	1						
Sun, Jun 20, 2010	1200	.	.	.	1						
Tue, Jun 22, 2010	0700	.	.	.	1						
Sun, Jun 27, 2010	0800	.	.	.	1						
Thu, Jul 1, 2010	1230	.	.	.	1						
Sun, Jul 4, 2010	1400	.	.	.	2						
Thu, Jul 8, 2010	2000	.	.	.	2						
Sat, Jul 10, 2010	1030	.	.	.	1						
Fri, Jul 16, 2010	0700	.	.	.	1						
Sun, Jul 18, 2010	1700	.	.	.	2						
Wed, Jul 21, 2010	1600	.	.	.	2						
Sat, Jul 24, 2010	0830	.	.	.	1						
Mon, Jul 26, 2010	1630	.	.	.	2						
Wed, Jul 28, 2010	1400	.	.	.	2						
Sun, Aug 1, 2010	1300	.	.	.	1						
Mon, Aug 2, 2010	1200	.	.	.	1						
Sat, Aug 7, 2010	1530	.	.	.	2						
Mon, Aug 9, 2010	1000	.	.	.	1						
Sun, Aug 15, 2010	0730	.	.	.	1						
Wed, Aug 18, 2010	1930	.	.	.	2						
Fri, Aug 20, 2010	1030	.	.	.	1						
Tue, Aug 24, 2010	1030	.	.	.	1						
Fri, Aug 27, 2010	1930	.	.	.	2						
Sun, Aug 29, 2010	0700	.	.	.	1						
Wed, Sep 1, 2010	1600	.	.	.	2						
Mon, Sep 6, 2010	0830	.	.	.	1						
Wed, Sep 8, 2010	1500	.	.	.	2						
Sat, Sep 11, 2010	0830	.	.	.	1						
Tue, Sep 14, 2010	0930	.	.	.	1						
Fri, Sep 17, 2010	1200	.	.	.	1						
Sun, Sep 19, 2010	1430	.	.	.	2						
Mon, Sep 20, 2010	1330	.	.	.	2						
Sun, Sep 26, 2010	1530	.	.	.	2						
Tue, Sep 28, 2010	1700	.	.	.	2						

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 2 PERIODS/ 60 MINUTES COUNT LENGTH

May 2010						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 2000 . . . PERIOD#2
2	3	4	5	6 0730 . . . PERIOD#1	7	8 1600 . . . PERIOD#2
9	10 1530 . . . PERIOD#2	11	12	13	14 1900 . . . PERIOD#2	15
16 1630 . . . PERIOD#2	17	18	19	20 0800 . . . PERIOD#1	21	22 1030 . . . PERIOD#1
23	24	25	26 1130 . . . PERIOD#1	27	28	29
30	31 1800 . . . PERIOD#2					

Legend
JAN=830/1730 FEB=800/1800 MAR=700/1900 APR=700/2000 MAY=630/2030 JUN=600/2100

JUL=600/2100 AUG=630/2030 SEP=700/2000
OCT=800/1900 NOV=730/1730 DEC=800/1700
DAY START/STOP

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 2 PERIODS/ 60 MINUTES COUNT LENGTH

June 2010						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 1800 . . PERIOD#2	2	3 1600 . . PERIOD#2	4	5 1500 . . PERIOD#2
6	7	8	9	10 0730 . . PERIOD#1	11	12 1730 . . PERIOD#2
13	14 1830 . . PERIOD#2	15	16 0630 . . PERIOD#1	17	18	19
20 1200 . . PERIOD#1	21	22 0700 . . PERIOD#1	23	24	25	26
27 0800 . . PERIOD#1	28	29	30			

Legend	
JAN=830/1730	FEB=800/1800
MAR=700/1900	APR=700/2000
MAY=630/2030	JUN=600/2100
JUL=600/2100	AUG=630/2030
SEP=700/2000	OCT=800/1900
NOV=730/1730	DEC=800/1700
DAY START/STOP	

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

6 WKDAYS/ 4 WKENDS/ 2 PERIODS/ 60 MINUTES COUNT LENGTH

July 2010						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 1230 . . PERIOD#1	2	3
4 1400 . . PERIOD#2	5	6	7	8 2000 . . PERIOD#2	9	10 1030 . . PERIOD#1
11	12	13	14	15	16 0700 . . PERIOD#1	17
18 1700 . . PERIOD#2	19	20	21 1600 . . PERIOD#2	22	23	24 0830 . . PERIOD#1
25	26 1630 . . PERIOD#2	27	28 1400 . . PERIOD#2	29	30	31

Legend

JAN=830/1730 FEB=800/1800 MAR=700/1900
 APR=700/2000 MAY=630/2030 JUN=600/2100
 JUL=600/2100 AUG=630/2030 SEP=700/2000
 OCT=800/1900 NOV=730/1730 DEC=800/1700
 DAY START/STOP

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

6 WKDAYS/ 4 WKENDS/ 2 PERIODS/ 60 MINUTES COUNT LENGTH

August 2010						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 1300 . . PERIOD#1	2 1200 . . PERIOD#1	3	4	5	6	7 1530 . . PERIOD#2
8	9 1000 . . PERIOD#1	10	11	12	13	14
15 0730 . . PERIOD#1	16	17	18 1930 . . PERIOD#2	19	20 1030 . . PERIOD#1	21
22	23	24 1030 . . PERIOD#1	25	26	27 1930 . . PERIOD#2	28
29 0700 . . PERIOD#1	30	31				

Legend	
JAN=830/1730	FEB=800/1800
MAR=700/1900	APR=700/2000
MAY=630/2030	JUN=600/2100
JUL=600/2100	AUG=630/2030
SEP=700/2000	OCT=800/1900
NOV=730/1730	DEC=800/1700
DAY START/STOP	

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 2 PERIODS/ 60 MINUTES COUNT LENGTH

September 2010						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 1600 . . PERIOD#2	2	3	4
5	6 0830 . . PERIOD#1	7	8 1500 . . PERIOD#2	9	10	11 0830 . . PERIOD#1
12	13	14 0930 . . PERIOD#1	15	16	17 1200 . . PERIOD#1	18
19 1430 . . PERIOD#2	20 1330 . . PERIOD#2	21	22	23	24	25
26 1530 . . PERIOD#2	27	28 1700 . . PERIOD#2	29	30		

Legend	
JAN=830/1730	FEB=800/1800
MAR=700/1900	APR=700/2000
MAY=630/2030	JUN=600/2100
JUL=600/2100	AUG=630/2030
SEP=700/2000	OCT=800/1900
NOV=730/1730	DEC=800/1700
DAY START/STOP	

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

MONTH MAY 630/2030

	PERIOD		TOTAL	WEEK_DAY						TOTAL
	1	2		SUN	M	W	R	F	SAT	
	N	N		N	N	N	N	N	N	
TIME										
0730	1	.	1	.	.	.	1	.	.	1
0800	1	.	1	.	.	.	1	.	.	1
1030	1	.	1	.	.	.	.	.	1	1
1130	1	.	1	.	.	1	.	.	.	1
1530	.	1	1	.	1	.	.	.	.	1
1600	.	1	1	.	.	.	.	.	1	1
1630	.	1	1	1	.	.	.	.	.	1
1800	.	1	1	.	1	.	.	.	.	1
1900	.	1	1	.	.	.	.	1	.	1
2000	.	1	1	.	.	.	.	.	1	1
TOTAL	4	6	10	1	2	1	2	1	3	10

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

MONTH JUN 600/2100

	PERIOD		TOTAL	WEEK_DAY						TOTAL
	1	2		SUN	M	T	W	R	SAT	
	N	N		N	N	N	N	N	N		N
TIME										
0630	1	.	1	.	.	.	1	.	.	1
0700	1	.	1	.	.	1	.	.	.	1
0730	1	.	1	.	.	.	.	1	.	1
0800	1	.	1	1	.	.	.	.	.	1
1200	1	.	1	1	.	.	.	.	.	1
1500	.	1	1	.	.	.	.	.	1	1
1600	.	1	1	.	.	.	.	1	.	1
1730	.	1	1	.	.	.	.	.	1	1
1800	.	1	1	.	.	1	.	.	.	1
1830	.	1	1	.	1	.	.	.	.	1
TOTAL	5	5	10	2	1	2	1	2	2	10

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

MONTH JUL 600/2100

	PERIOD			WEEK_DAY						TOTAL
	1	2	TOTAL	SUN	M	W	R	F	SAT	
	N	N	N	N	N	N	N	N	N	
TIME										
0700	1	.	1	.	.	.	.	1	.	1
0830	1	.	1	.	.	.	.	.	1	1
1030	1	.	1	.	.	.	.	.	1	1
1230	1	.	1	.	.	.	1	.	.	1
1400	.	2	2	1	.	1	.	.	.	2
1600	.	1	1	.	.	1	.	.	.	1
1630	.	1	1	.	1	.	.	.	.	1
1700	.	1	1	1	.	.	.	.	.	1
2000	.	1	1	.	.	.	1	.	.	1
TOTAL	4	6	10	2	1	2	2	1	2	10

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

MONTH AUG 630/2030

	PERIOD			WEEK_DAY						TOTAL
	1	2	TOTAL	SUN	M	T	W	F	SAT	
	N	N	N	N	N	N	N	N	N	
TIME										
0700	1	.	1	1	.	.	.	.	.	1
0730	1	.	1	1	.	.	.	.	.	1
1000	1	.	1	.	1	.	.	.	.	1
1030	2	.	2	.	.	1	.	1	.	2
1200	1	.	1	.	1	.	.	.	.	1
1300	1	.	1	1	.	.	.	.	.	1
1530	.	1	1	.	.	.	.	.	1	1
1930	.	2	2	.	.	.	1	1	.	2
TOTAL	7	3	10	3	2	1	1	2	1	10

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

MONTH SEP 700/2000

	PERIOD			WEEK_DAY						TOTAL	
	1	2	TOTAL	SUN	M	T	W	F	SAT		
	N	N	N	N	N	N	N	N	N		N
TIME											
0830	2	.	2	1	.	.	.	.	.	1	2
0930	1	.	1	.	.	1	.	.	.	.	1
1200	1	.	1	.	.	.	.	1	.	.	1
1330	.	1	1	.	1	.	.	.	.	.	1
1430	.	1	1	1	.	.	.	.	.	.	1
1500	.	1	1	.	.	.	1	.	.	.	1
1530	.	1	1	1	.	.	.	.	.	.	1
1600	.	1	1	.	.	.	1	.	.	.	1
1700	.	1	1	.	.	1	.	.	.	.	1
TOTAL	4	6	10	3	1	2	2	1	1	10	

COUNT TIME DISTRIBUTION FOR: LOUP CANAL

 6 WKDAYS/ 4 WKENDS/ 1 COUNTS/ 60 MINUTES COUNT LENGTH

TOTAL

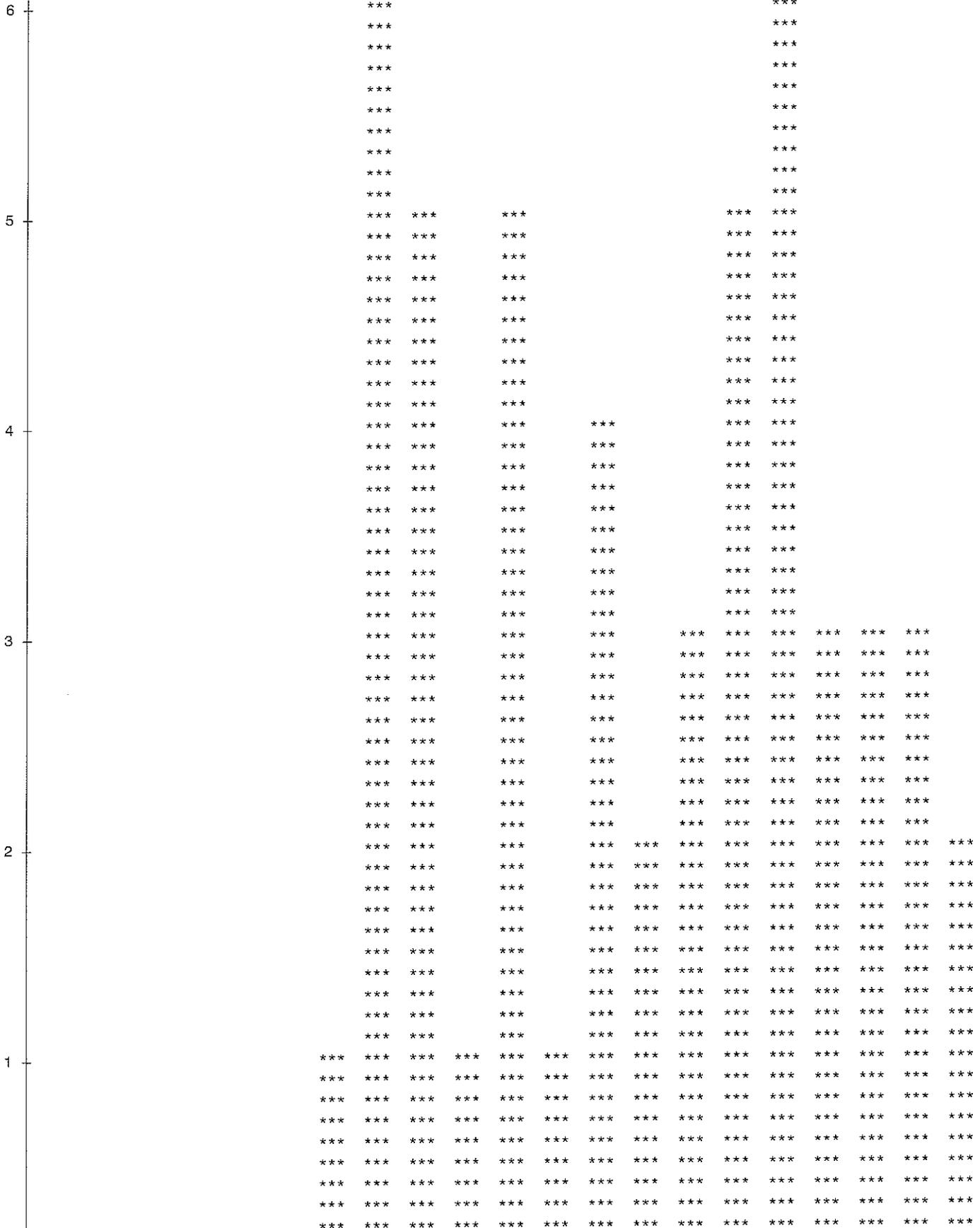
TIME	PERIOD		TOTAL	WEEK_DAY							TOTAL
	1	2		SUN	M	T	W	R	F	SAT	
	N	N		N	N	N	N	N	N	N		N
0630	1	.	1	.	.	.	1	.	.	.	1
0700	3	.	3	1	.	1	.	.	1	.	3
0730	3	.	3	1	.	.	.	2	.	.	3
0800	2	.	2	1	.	.	.	1	.	.	2
0830	3	.	3	1	.	.	.	.	.	2	3
0930	1	.	1	.	.	1	.	.	.	.	1
1000	1	.	1	.	1	.	.	.	.	.	1
1030	4	.	4	.	.	1	.	.	1	2	4
1130	1	.	1	.	.	.	1	.	.	.	1
1200	3	.	3	1	1	.	.	.	1	.	3
1230	1	.	1	.	.	.	.	1	.	.	1
1300	1	.	1	1	.	.	.	.	.	.	1
1330	.	1	1	.	1	.	.	.	.	.	1
1400	.	2	2	1	.	.	1	.	.	.	2
1430	.	1	1	1	.	.	.	.	.	.	1
1500	.	2	2	.	.	.	1	.	.	1	2
1530	.	3	3	1	1	.	.	.	.	1	3
1600	.	4	4	.	.	.	2	1	.	1	4
1630	.	2	2	1	1	.	.	.	.	.	2
1700	.	2	2	1	.	1	.	.	.	.	2
1730	.	1	1	.	.	.	.	.	.	1	1
1800	.	2	2	.	1	1	.	.	.	.	2
1830	.	1	1	.	1	.	.	.	.	.	1
1900	.	1	1	.	.	.	.	.	1	.	1
1930	.	2	2	.	.	.	1	.	1	.	2

2000	.	2	2	.	.	.	.	1	.	1	2
TOTAL	24	26	50	11	7	5	7	6	5	9	50

CREEL SURVEY SCHEDULE FOR: LOUP CANAL

DISTRIBUTION OF SELECTED COUNT TIMES

Frequency



*** **

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2

TIME

Attachment B – Field Count Form

Attachment C – Field Interview Form

NEBRASKA GAME AND PARKS COMMISSION
FISHERIES DIVISION

CREEEL SURVEY — INTERVIEW FORM

CATEGORY 1 — LAKE INFORMATION

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Lake	Lake	Mo.	Day	Yr.	Code	Section	Date				

CATEGORY 2 — ANGLER INFORMATION

14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
No. of Anglers	Fishing Start Time	1 = Bank 2 = Boat 3 = Ice	Interview Time	Hrs.	Min.	Time Fished								

CATEGORY 3 — SUPPLEMENTAL / USER DEFINED

30	31	32	33	34	35	36	37
Most Sought Species	Trip	1 = Complete 2 = Incomplete	Fishing Success Rating	State	County		

1 = Excell. 4 = OK
2 = VG 5 = Poor
3 = Good

CATEGORY 4 — CAUGHT AND KEPT (HARVEST) INFORMATION

1	2-6	7-11	12-16	17-21	22-26	27-31	32-36	37-41	42-46	49-52	53-56	57-61	62-66
ID	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7	Block 8	Block 9	Block 10	Block 11	Block 12	Block 13

Comments

CATEGORY 5 — CAUGHT AND KEPT (HARVEST) INFORMATION

1	2-4	5-7	8-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	45-48	49-52	53-56	57-60	61-64	65-68	69-72
ID	Species Code	Harvest Count	Harvest Tot. Weight (G)	Harvest Lengths (mm)														

CATEGORY 6 — TAG INFORMATION

1	2-4	5-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63					
ID	Species Code	Release Count	Length Frequency of Released Fish	Inches: <5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63

CATEGORY 7 — TAG INFORMATION

1	2	3	4	5
ID	Species Code	# of Tags	Tag Numbers	

STUDY 10.0 LAND USE INVENTORY..... 10-1

- 1. GOALS AND OBJECTIVES OF STUDY..... 10-1
- 2. RELEVANT RESOURCE MANAGEMENT GOALS..... 10-2
- 3. BACKGROUND AND EXISTING INFORMATION 10-2
- 4. PROJECT NEXUS..... 10-3
- 5. STUDY AREA AND STUDY SITES 10-4
- 6. PROPOSED METHODOLOGY 10-4
- 7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS.... 10-6
- 8. WORK PRODUCTS..... 10-6
- 9. LEVEL OF EFFORT AND COST 10-7
- 10. SCHEDULE 10-7
- 11. REFERENCES 10-7

STUDY 10.0 LAND USE INVENTORY

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The Project passes through agricultural, commercial, and industrial land in Nance and Platte counties, through the community of Genoa, and near the communities of Monroe and Columbus; therefore, there are a variety of land uses adjacent to the Project. Based on length of the Project and the variety of adjacent land uses, there is the potential for incompatible land uses between Project lands (within the Project Boundary) and adjacent properties (outside of the Project Boundary).

The District does not have a detailed inventory of land uses adjacent to the Project Boundary. Such a record could be used to assist the District in evaluating land use conflicts. Therefore, the District will conduct a general land use inventory of all Project lands and of all adjacent properties. Land use information will be plotted on maps and analyzed to identify potential conflicts and opportunities relating to Project operations, public access, recreation, and environmental resource protection. This information will be used in the development of a recreation management plan (see Study 8.0, Recreation User Survey).

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the land use inventory is to determine specific land uses of Project lands and adjacent properties to identify potential conflicts and/or opportunities relating to Project operations, public access, recreation, and environmental resource protection.

The objectives of the land use inventory are as follows:

1. To identify and record current and proposed future land uses of Project lands.
2. To identify and record current and authorized future land uses of adjacent properties.
3. To identify and map all existing public access points to the Loup Power Canal, regulating reservoirs, and defined recreation areas on Project lands.
4. To identify and map any areas on Project lands or adjacent properties having potentially incompatible or conflicting land uses.
5. To identify, and map potential opportunities for improving public access to Project lands and recreation areas.

6. To identify potential opportunities to enhance public safety on Project lands.
7. To identify potential solutions for any land use conflicts that may be identified.
8. To provide information on land use, land use conflicts, and access to be used in conjunction with the results of Study 8.0, Recreation User Survey, and Study 9.0, Creel Survey, to develop a recreation management plan.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

A principal goal of FERC relicensing is to balance the power and non-power aspects of the Project. A land use inventory is a beneficial tool for licensees, agencies, and adjacent property owners when managing Project resources and planning for the future. An accurate land use inventory facilitates appropriate management of Project lands and waters by limiting instances of incompatible adjacent land uses. In turn, the reduction of incompatible land uses prevents adverse impacts on Project operations, public access, recreation, and environmental resources.

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

The District has extensive knowledge about the land uses within the Project Boundary as well as those properties and land uses adjacent to the Project Boundary. However, a detailed land use inventory has not been conducted and recorded for adjacent properties.

Within the Project Boundary, hydropower generation constitutes the authorized and predominant land use. Various types of public recreation and natural resource conservation are also established land uses of Project lands. It should be noted that all land adjacent to the Project Boundary is private property owned by others, and the District has no control over its use.

Properties that are adjacent to the Project Boundary and that are within the City of Columbus’s jurisdiction and future growth areas are shown in the *Columbus Comprehensive Plan Update*, which includes current (2005) land use, zoning, and future land use maps (City of Columbus, October 2005). Existing land uses adjacent to the Project Boundary include open space, agriculture, single-family residential, and industrial. The land adjacent to the Project Boundary is currently zoned Rural Residential (RR), Single-Family Residential (R-1), High-Density Residential (R-3), Commercial (C-1), and General Industry (MH). A portion of the Loup Power Canal is adjacent to the City’s Northeast Growth Center, which is described in the *Columbus*

Comprehensive Plan Update and has future land use designations of single-family residential, major commercial, office and limited commercial, and high-density residential. In addition, the Lost Creek Parkway runs parallel to the Tailrace Canal. As the City of Columbus grows to the north and east, it is anticipated that agricultural land uses adjacent to the Loup Power Canal will gradually change to more urban/suburban land uses.

Properties that are adjacent to the Project Boundary that are within the jurisdiction of Nance County are shown in the *Nance County Comprehensive Development Plan*. Existing land uses adjacent to the Project Boundary include land zoned Primary Agriculture District A and B (A1A and A1B) and Transitional Agriculture District (TA). Additionally, the canal runs along the south side of the City of Genoa, which does not have a comprehensive plan.

Columbus and Nance County are the only jurisdictions adjacent to the Project Boundary that have adopted comprehensive plans and have land use maps approved within the last 10 years. Genoa, Monroe, and Platte County do not have similar documentation.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

Hydropower operation and maintenance procedures for the Project have evolved over a period of 70 years, and to date, no major conflicts have arisen between Project operations and recreation and conservation uses on Project lands. Licensed Project facilities are completely within the Project Boundary. Surface water management and drainage ditch maintenance constitute the District’s primary interfaces with adjacent property owners. To date, the District has not identified any Project operations that significantly affect adjacent properties. Similarly, the District has not identified any adjacent land uses that have significant effects on the Project and its operation.

Incompatible land uses, or poor management of otherwise compatible land uses, could adversely impact Project operations, public access, recreation, and environmental resources. An accurate land use inventory will be a beneficial tool for the licensee, agencies, and property owners when managing Project resources and planning for the future because such an inventory can be used to help reduce or avoid incompatible adjacent land uses. The data gathered as part of the land use inventory will also be used in the completion of future studies and plans that may be required as part of the relicensing process.

5. STUDY AREA AND STUDY SITES

The Project extends approximately 35 miles from the Headworks to the Outlet Weir, and the Project Boundary encompasses approximately 5,200 acres of land. A large portion of the Project consists of a power canal with a nominal width of 300 feet. The majority of adjacent land is agricultural and is considered compatible with the Project. Areas that may present conflicts or opportunities relating to Project operations, public access, recreation, and environmental resource protection include urban areas, public access points, the five developed recreation areas, and important environmental features or habitat. Specific land uses of Project lands and adjacent properties at the following sites will be carefully evaluated:

- Headworks Park, including Headworks OHV Park
- Lake Babcock Park (aka Loup Park)
- Lake North Park
- Columbus Powerhouse Park
- Tailrace Park
- Loup Lands Wildlife Management Area (leased to the Nebraska Game and Parks Commission)
- Lake Babcock Waterfowl Refuge
- North Sand Management Area
- South Sand Management Area
- Siphons
- Areas with evidence of heavy informal usage
- Urban areas of Genoa, Monroe, and Columbus

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the land use inventory includes three tasks, described below. Standard land use inventory methods will be employed, with modifications to account for the size of the Project Boundary.

Task 1 Data Collection

For Project lands, existing Project maps will be used and District staff will be consulted to classify land uses. The specific land use classifications that will be used are as follows:

- Developed Recreation Area (campsites, picnic areas, playground equipment, swimming beaches, etc.)
- Bicycle and Pedestrian Trail
- Wildlife Management Area
- Intensive Recreation Area (motorized boating, hunting, OHV park)
- Restricted Operations Area

For adjacent properties, a preliminary land use inventory will be completed using the existing *Columbus Comprehensive Plan Update* and Nance County Comprehensive Plan (City of Columbus, October 2005; Nance County, 1999). For areas not included in current comprehensive plans, USDA 2006 (or most recent available) aerial photographs will be used to identify land use. These aerial photographs will also be used to verify the accuracy of land use information from the existing comprehensive plans. Adjacent properties will be classified according to the following conventional land use designations:

- Agricultural
- Park/Open Space
- Single-Family Residential
- Multi-Family Residential
- Commercial
- Institutional
- Industrial

Field observations will be completed to gather detailed land use information for developed areas and for any other areas for which review of aerial photographs provides insufficient information. Field observations will include “windshield” or walking surveys and may include interviews with property owners if additional information is needed.

Task 2 Map Generation

Land use maps will be developed based on the findings from the data collection and field observations. The maps will be at a 1" = 1,000' scale and will be on aerial photographs to allow for land use identification and interpretation. Available electronic data will be used, including USDA 2006 (or most recent available) aerial

photographs. Land use and other relevant information will be digitized and color coded.

Task 3 Analysis

Based on the data collection, including field observations, areas of current land use conflicts and potential future land use conflicts will be identified. Any conflicts, including the specific land uses in conflict, the type of conflict (operational, environmental, nuisance, etc.), and possible mitigation measures to resolve the conflict, will be described.

If, through the land use inventory, opportunities for improving Project operations, public access, recreation, or environmental resource protection become apparent, explanations of these opportunities will also be prepared and measures for taking advantage of these opportunities outlined.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

During preparation of the PAD, the District formed a Recreation/Land Use/Aesthetics Workgroup to discuss issues related to these topics. The workgroup discussed questions raised by agencies during early coordination regarding land use and its relationship to relicensing and held a conference call meeting on July 7, 2008 to discuss potential land use conflicts. During preparation of this Land Use Inventory Study Plan, on December 19, 2008, an additional conference call meeting of this workgroup was held to discuss potential land use conflicts (a coordination call with the workgroup chair was also held on December 1, 2008). During these conference call meetings, the National Park Service identified a land use inventory as a means to address concerns about potentially incompatible land uses. Other workgroup representatives supported conducting a land use inventory during the relicensing process to identify potential opportunities for enhancing recreational facilities. The District will continue to work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product of the land use inventory is a study report that documents the land use inventory process and analysis, includes a series of maps of the entire Project Boundary outlining land use findings, and provides recommendations for resolving conflicts and taking advantage of opportunities relating to Project operations, public access, recreation, and environmental resource protection.

Updates regarding the land use inventory will be included in the study progress reports to be submitted to FERC in December 2009 and March 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the land use inventory will cost approximately \$50,000. This work will be completed by qualified land planners, engineers, and GIS technicians.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

All tasks for the land use inventory are scheduled to occur in the fourth quarter of 2009, and the final study report is to be submitted in the first quarter of 2010.

11. REFERENCES

City of Columbus. October 2005. *Columbus Comprehensive Plan Update*.

Available online at

<http://www.columbusne.us/commdev/Columbus%20Plan.pdf>.

Nance County. 1999. Nance County Comprehensive Development Plan.

STUDY 11.0 SECTION 106 COMPLIANCE..... 11-1

- 1. GOALS AND OBJECTIVES OF STUDY..... 11-1
- 2. RELEVANT RESOURCE MANAGEMENT GOALS..... 11-2
- 3. BACKGROUND AND EXISTING INFORMATION 11-2
- 4. PROJECT NEXUS..... 11-3
- 5. STUDY AREA AND STUDY SITES 11-4
- 6. PROPOSED METHODOLOGY 11-4
- 7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS.... 11-6
- 8. WORK PRODUCTS..... 11-7
- 9. LEVEL OF EFFORT AND COST 11-7
- 10. SCHEDULE 11-7
- 11. REFERENCES 11-8

STUDY 11.0 SECTION 106 COMPLIANCE

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs.

Relicensing the Project is a Federal undertaking by FERC, and Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), requires Federal agencies to determine whether their undertakings have adverse effects on historic properties (any site, structure, or other property listed on or eligible for listing on the National Register of Historic Places [NRHP]). Historic properties include historic structures and archaeological sites.

Although archaeological surveys and excavations have occurred in the past, no formal cultural resources surveys have been conducted within the Project Boundary for this relicensing proceeding. This study will identify and evaluate any historic properties in the Area of Potential Effects, defined in Section 3, Background and Existing Information, and will support FERC's Section 106 consultation process. The consultation process will provide FERC with information from Nebraska SHPO, Native American tribes, and the Advisory Council on Historic Preservation (ACHP), enabling informed management decisions.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the Section 106 compliance study is to achieve NHPA Section 106 compliance through a programmatic, ongoing consultation relationship between the District and the Nebraska SHPO.

The objectives of the Section 106 compliance study are as follows:

1. To review existing information with Project stakeholders to identify consultation needs and additional archival and field data collection requirements.
2. To gather sufficient information to identify any historic properties that may be affected by the Project.
3. To conduct field studies to identify and evaluate historic properties, including archaeological properties and elements of the standing structure/built environment as well as properties of traditional religious and cultural value important to Native American tribes.

4. To document the historic properties in the Area of Potential Effects and, as applicable, present management recommendations in technical reports, an ethnographic memorandum, and a historic district documentation package.
5. To develop, in consultation with Nebraska SHPO, Native American tribes, and ACHP, a Historic Properties Management Plan (HPMP) in accordance with FERC guidelines (see Attachment A).
6. To develop a Programmatic Agreement (PA) to complete the Section 106 compliance process and to incorporate in the Project license (this is a standard procedure carried out by FERC).

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

Compliance with Section 106 requires Federal agencies to consider adverse effects on historic properties through their undertakings, with opportunities for other agencies to comment. The FERC license constitutes such an undertaking, and during its consideration of adverse effects, FERC will consult with the District, Nebraska SHPO, Native American tribes, other federal agencies, and other parties as identified through the relicensing process.

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

Since the 1930s, numerous archaeological surveys and excavations have occurred in the vicinity of the Project during infrastructure (such as road and civic) improvement projects, including the construction of the Loup Power Canal, and research projects. The Project facilities are located among cultural resources that were identified during these surveys; however, no formal cultural resources surveys have been conducted within the Project Boundary for this relicensing proceeding.

During preparation of the PAD, the District obtained archival information from the Nebraska State Historical Society regarding known (that is, previously identified or reported) cultural resources in the vicinity of the Project, including, but not limited to, historic standing structures locations and descriptions, archaeological resources locations and descriptions, and inventory survey locations. The District also met with Nebraska SHPO to discuss relicensing of the Project and to obtain additional information related to cultural resources.

During early coordination meetings and correspondence, Nebraska SHPO noted that the entire Project is likely considered to be a historic district eligible for listing on the National Register of Historic Places (NRHP). Nebraska SHPO representatives toured the Project with District personnel in June 2007. While the entire extent of the

historic district has not yet been evaluated, the historic district appears to be significant and to meet integrity standards according to definitions under the National Park Service (NPS) guidelines. The District understands the historic district eligible for listing on the NRHP to be particularly directed at the physical plant constructed since the 1930s.

The facility components include the Diversion Weir, Settling Basin, Skimming Weir, siphons, Monroe and Columbus powerhouses (designed during the Art Deco period), Lake Babcock, Sawtooth Weir, and recreation areas. In addition, the dustpan dredge, called Pawnee, has been used continuously since 1937.

Thirteen archaeological sites have been recorded adjacent to the Project between the point of diversion on the Loup River and the confluence of the Loup and Platte rivers. Of particular interest are a group of sites associated with the pre-contact and historic period villages near present-day Genoa. These sites (25NC4, 25NC6, and 25NC20) comprise a large occupation area that is bisected by the Loup Power Canal. While no specific observations point to intact archaeological resources or human remains within the Project Boundary, archival documentation suggests that fill material used during construction in the 1930s was taken from these site locations.

Site 25PT1 and nearby Site 25PT8, along with a cluster of sites downstream along the Loup Power Canal (25PT54, 25PT55, 25PT63, 25PT64, and 25PT65), are also noteworthy. Based on the limited information available, they may retain integrity and have diverse artifact assemblages, though none were formally evaluated. In addition, no cultural materials associated with these sites have been documented within the Project Boundary.

In January 2009, FERC and the District proposed to establish the Area of Potential Effects (APE) for the Project as the Project Boundary, defined in the PAD in Figure 4-1, Sheets 1 through 14. The area within that boundary encompasses the entirety of the District's holdings that are subject to the relicensing effort described in the PAD. On January 23, 2009, Nebraska SHPO concurred that the Project Boundary, as defined in the PAD, is the APE.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

Granting of a new license by FERC constitutes an undertaking subject to Section 106 compliance. Specifically, Section 106 states that an agency with the “authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register” (16 USC 470f). Through this Section 106 compliance study, the District will identify and evaluate any historic properties in the APE and will establish a consultation process to

ensure that the Project remains in compliance with Section 106 throughout the life of the license.

5. STUDY AREA AND STUDY SITES

The study area is the APE, or Project Boundary, which encompasses the entirety of the District's holdings that are subject to the relicensing effort described in the PAD. On January 23, 2009, Nebraska SHPO concurred that the Project Boundary, as defined in the PAD, is the APE.

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the Section 106 compliance study includes six tasks, described below. Field studies carried out during the Section 106 compliance study will be conducted in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation Activities (48 FR 44716-44740) as well as any additional guidelines recommended by Nebraska SHPO. Archaeologists and architectural historians contracted to complete these field studies will meet the Professional Qualifications Standards used by the Secretary of the Interior and codified in 36 CFR 61.

Task 1 Phase IA Archaeological Overview

Prior to the field studies, the District will produce an archaeological resources overview, also referred to as a Phase IA investigation, of the APE for the Project. The Phase IA investigation will document the known resources in the vicinity of the Project, provide background for pre-contact and historic-period Native American use of the area, illustrate the land-use history within the APE to provide a better understanding of where intact archaeological resources may likely exist, and provide recommendations for additional fieldwork in specific areas of the APE.

Information will be gathered from consulting parties and during review of existing records and literature on archaeological resources and previous cultural resource studies in the vicinity of the Project (generally within 1 mile of the APE) that are on file with the District and Nebraska SHPO as well as at libraries, museums, historical societies, and other local and regional repositories. Specifically, information will be obtained from the District's extensive library of engineering drawings, maps, and aerial photographs as well as from maps and plats on file at Nebraska SHPO. The

District will identify resource locations on maps and design a field research strategy to survey areas where intact archaeological resources might exist.

The Phase IA archaeological overview will be a written report that will contain sensitive information and will be made available to Project stakeholders as necessary to secure a common understanding of the scope of any future proposed field studies and evaluations as appropriate.

Task 2 Phase I Archaeological Inventory and Evaluation

The District will conduct archaeological field studies in areas indicated in the Phase IA investigation as having the potential for intact archaeological resources. The field studies will be conducted to identify and evaluate historic properties, including archaeological properties and elements of the standing structure/built environment as well as properties of traditional religious and cultural value important to Native American tribes. Accompanying each field study will be an analysis of potential adverse effects on any historic properties during the term of the license.

The field studies, known as Phase I investigations, will employ methods that will adhere to Federal standards and state guidelines and will likely involve both surface pedestrian reconnaissance and subsurface shovel testing. Ultimately, the field methods used in specific areas will be determined by the Principal Investigator. The intent of the Phase I investigations is to gather sufficient information on historic properties within the APE to evaluate any resources identified as potentially eligible for listing on the NRHP.

If the data obtained during the Phase I investigations are insufficient to evaluate the resource, it may be subject to additional field investigations, commonly referred to as Phase II evaluations, to gather additional information sufficient for determining NRHP eligibility. The District intends to avoid any potential adverse effects on archaeological properties, so no Phase II investigations are anticipated at this time. Should a potential adverse effect on a non-evaluated archaeological property be identified in the future, the District would then sponsor a Phase II evaluation of that property.

Task 3 Ethnographic Documentation

The District, in consultation with Native American tribes, will document any known places within the APE that are of traditional religious and cultural importance to the tribes. This report will document meetings with and written correspondence supplied by the tribes and will be provided to FERC in the form of a summary memorandum. If locations of traditional religious and cultural importance are identified within the APE by the tribes, the District will consult with FERC, Nebraska SHPO, and the tribes to ascertain the eligibility of these locations for listing on the NRHP and the nature of any adverse effects. If necessary, the District will address these findings in its Historic Properties Management Plan (HPMP), discussed under Task 5.

Task 4 Historic District Inventory and Evaluation

The District will inventory and evaluate the potential historic district, including standing structures and other engineering features within the APE, identified during early coordination with Nebraska SHPO. This will be done in accordance with Federal standards and state guidelines for documentation and will result in a documentation package for the property. The District does not intend to nominate the property, but understands that Nebraska SHPO wants to document the physical plant, which it believes is eligible for listing on the NRHP. The draft documentation package will be made available to Project stakeholders for review and comment, and a final documentation package will be filed with Nebraska SHPO and will provide the basis for managing eligible standing structures in the HPMP throughout the licensing period.

Task 5 Historic Properties Management Plan

Based on the results of the studies and documentation efforts discussed in Tasks 1 through 4, the District will prepare an HPMP to summarize the existing conditions of historic properties within the APE, assess reasonably foreseeable adverse effects of operations or maintenance on the historic properties, and establish notification, consultation, and reporting procedures that take into account these effects throughout the licensing period.

The HPMP will be developed according to the “Guidelines for the Development of Historic Properties Management Plans For FERC Hydroelectric Projects” and will capture FERC requirements for ongoing management of historic properties throughout the term of the Project license (FERC, May 20, 2002). The HPMP represents the conclusion of Section 106 consultation and establishes a framework for historic property management while accommodating the business goals of the licensee.

Task 6 Executed Programmatic Agreement

The executed Programmatic Agreement (PA) will include signatures from FERC, Nebraska SHPO, Native American tribes, and possibly ACHP to complete Section 106 requirements. The PA is the legal mechanism that implements the HPMP and provides documentary evidence of compliance with Section 106.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will consult with FERC, Nebraska SHPO, the Pawnee Tribe, the Iowa Tribe of Kansas and Nebraska, the Omaha Tribe, the Sante Sioux Tribe, the Winnebago Tribe, and the Ponca Tribe of Nebraska during the studies and documentation efforts discussed in Section 6, Proposed Methodology. The District will monitor the administrative record as consultation proceeds and will provide

regular progress reports to keep the consulting parties informed of developments and aware of issues relevant to their interests.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The work products for the Section 106 compliance study include the following five technical reports: Phase IA Archaeological Overview Report, Phase I Archaeological Inventory and Evaluation Report, Ethnographic Report, Historic District Inventory and Evaluation (documentation package), and Historic Properties Management Plan. The communication between the District and Project stakeholders will be included in the administrative record.

Updates regarding the study of Section 106 compliance will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the Section 106 compliance study will cost of approximately \$220,000 to \$250,000. This work would be completed by qualified archaeologists, architectural historians, engineers, and planners. A range of costs is provided because the costs associated with the fieldwork to support the Phase I Archaeological Inventory and Evaluation Report are dependent on the results of the Phase IA Archaeological Overview Report and the extent of the locations identified as having the potential for intact archaeological resources. FERC uses standardized programmatic agreement formats to implement HPMPs that require little negotiation or alteration prior to execution.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The archaeological field studies and associated consultation are scheduled to be completed by October 2009. The Phase I Archaeological Inventory and Evaluation Report will be available by December 2009, and the Ethnographic Report is expected by December 2009. The final Historic District documentation package is to be

completed by August 2010. The schedule for preparation of the HPMP will be dictated by the PA and the conditions of the NEPA record of decision.

11. REFERENCES

48 FR 44716-44740. Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation Activities.

16 USC 470f. Section 106 of the National Historic Preservation Act of 1966, as amended.

FERC. May 20, 2002. "Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects." Available online at <http://www.ferc.gov/industries/hydropower/gen-info/guidelines/hpmp.pdf>.

**Attachment A – FERC Guidelines for the Development of Historic Properties
Management Plans**

Guidelines for the Development of Historic Properties Management Plans For FERC Hydroelectric Projects

May 20, 2002

I. INTRODUCTION AND PURPOSE OF THIS GUIDANCE

Section 106 of the National Historic Preservation Act (NHPA) requires the Federal Energy Regulatory Commission (FERC or Commission) to take into account the effect of its undertakings on historic properties and to afford the Advisory Council on Historic Preservation (Council) a reasonable opportunity to comment. An undertaking includes any project, activity, or program requiring a federal permit, license, or approval. Therefore, many FERC actions, such as issuance of new and original licenses, license amendments, surrenders, and terminations, are undertakings that are subject to Section 106. Section 106 is implemented through the Council's regulations, "Protection of Historic Properties" (36 CFR Part 800).¹ For hydropower licensing actions, FERC typically completes Section 106 by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the license applicant, the Council, and the State and/or Tribal Historic Preservation Officer (SHPO/THPO).² This agreement is then incorporated by reference into the project license when it is issued.

Because it is not always possible for FERC to determine all of the effects of various activities that may occur over the course of a license, the PA or MOA typically provides, and FERC typically requires as a license condition, that the licensee develop and implement a Historic Properties Management Plan (HPMP).³ Through an approved HPMP, FERC can require consideration and appropriate management of effects on historic properties throughout the term of the license. In so doing, FERC meets the requirements of Section 106 for its undertakings.

¹ These regulations became effective on January 11, 2001.

² The 1992 amendments to the NHPA include provisions for Indian tribes to assume the responsibility of the SHPO on tribal lands. The Council's regulations use the term Tribal Historic Preservation Officer (THPO) to mean the THPO under Section 101(d)(2) of the NHPA for undertakings occurring on or affecting tribal lands.

³ In past hydropower relicensing PAs, FERC has required licensees to develop "Cultural Resources Management Plans" (CRMPs). In this guidance, however, the term HPMP is used, because it more accurately reflects the requirements of Section 106 of the NHPA.

The purpose of this document is to provide guidance for the development of HPMPs.

What is a HPMP?

A HPMP is a plan, implemented pursuant to a FERC license, for considering and managing effects on historic properties of activities associated with constructing, operating, and maintaining hydropower projects.⁴ It establishes a decision-making process for considering potential effects on historic properties, preferably early in project planning. The HPMP should consider and manage the effects on historic properties of actions taken to implement the license over its entire term. For example, the HPMP should take into account other plans that are required (or will be required), such as recreation plans, timber management plans, or fisheries plans.

A good HPMP should identify the nature and significance of historic properties that may be affected by project maintenance and operation, any proposed improvements to project facilities, and public access. It should identify goals for the preservation of historic properties; establish guidelines for routine maintenance and operation; and establish procedures for consulting with SHPOs, THPOs, Indian tribes, historic preservation experts, and the interested public concerning effects to historic properties or contributing elements of a historic district.

The HPMP should be responsive to the purposes of the Project and should be realistic in terms of those purposes. It is not the intent of Section 106 or the HPMP to transform a hydroelectric powerhouse into a “museum” or to jeopardize the ability of the licensee to produce hydroelectricity. Accordingly, the HPMP should recognize the need to fulfill all of the terms and conditions of the Project license, and should not impede the safe and efficient production of energy.

⁴“Project” means any licensed or unlicensed, existing or proposed water power project that is subject to FERC jurisdiction, including minor projects, major projects, exemptions, and major modified projects as defined in the Commission's regulations at 36 C.F.R. § 4.30 (2001).

The HPMP should be:

- Integrated into the licensee's Project decision-making process so that historic preservation needs are considered during Project planning and operation;
- Written in plain English with historic property management terms clearly defined;
- A stand-alone document (not dependent on access to previous studies, although incorporation by reference may be desirable in some cases); and
- Consistent with any other Project management plans, settlement agreements and/or long-range planning documents.

What does the HPMP propose to manage?

The HPMP should provide for the management of properties listed in or eligible for listing in the National Register of Historic Places, the National Park Service's official list of properties recognized for their significance in American history, architecture, archeology, engineering, and culture. Such places, are referred to as **historic properties** and may include the project facilities, such as the dam, powerhouse and substations; other kinds of buildings and structures; prehistoric and historic archeological sites; and properties of traditional religious and cultural significance to Indian tribes.⁵

The management of historic properties involves both the long term preservation of historic values of historic properties and consideration of the effects of a licensee's actions on historic properties. Hydroelectric projects may affect historic properties in a number of ways.⁶ Modes of Project operation that cause erosion can result in the loss of archeological sites located along shorelines. Likewise, constructing recreational developments and providing greater public access can damage archeological sites. Even actions which initially seem fairly routine can undermine the integrity of a historic

⁵ An applicant may develop a management plan dealing with all cultural resources (a CRMP, for example) as part of a settlement agreement, or based on the needs of Indian tribes, federal land managers, and other agencies. This approach is not required for Section 106 review, but can improve understanding between parties, and facilitate better coordination of all the applicable laws and regulations relating to cultural resources.

⁶ "Effect" as defined in the Council's regulations means "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" [36 CFR § 800.16(j)]

property. For example, since windows are often a character-defining feature of historic buildings, their replacement in a historic powerhouse can significantly alter that property.⁷

Who's responsible for carrying out the plan?

The Project licensee implements the HPMP, pursuant to the license conditions. Therefore, the plan should identify the project staff position (such as Cultural Resource Liaison, project operator, plant operator, etc) responsible for implementing the plan over the course of the license. However, FERC is responsible for enforcing the licensee's compliance with the license and implementation of the HPMP.

Successful implementation of the HPMP is more likely when Project staff is educated about the specific requirements of the plan within the general context of historic preservation law and practice.⁸ Even with this staff training, however, consultants with specialized training may be needed to complete certain aspects of the plan, such as archeological studies, for example.

When is a HPMP prepared and filed?

We encourage applicants to draft their HPMP in consultation with the other stakeholders and submit it at the time they file a license application with the Commission. One advantage to having a draft HPMP completed when a license application is filed is that it provides a convenient means to involve the SHPO/THPO, Indian tribes and other stakeholders in consultation early on, so that they might reach agreement regarding the scope and results of studies, as well as establishing the APE (area of potential effect). Another advantage to early preparation of the HPMP is that it allows the licensee to consider historic preservation in conjunction with other aspects of the project. Completion of a final HPMP is more easily accomplished prior to issuance of a new license, thereby alleviating many delays and compliance problems after issuance.⁹ This can result in a savings of both time and money for the licensee.

⁷ An "adverse effect" is found when a proposed action may alter the characteristics that qualify a historic property for inclusion in the National Register "in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association." [36 CFR § 800.5(a)(1)].

⁸ Project staff means the licensee's staff and consultant who implement or are responsible for the project operation.

⁹ When a final HPMP has been completed prior to issuance of a license, Commission staff typically develops a PA that requires the licensee to implement the HPMP upon license issuance.

A three year time frame during the prefiling stage--from the notice of intent to filing an application--allows for plenty of time to coordinate, consult, and draft a HPMP. Prefiling consultation involving the licensee and the various stakeholders and Indian tribes is already required through the Federal Power Act, and provides a good opportunity for completing a draft HPMP at this time. In addition, the revised implementing regulations for Section 106 allow FERC to authorize the licensee to initiate Section 106 consultation on its behalf, pursuant to 36 CFR §800.2(C)(4). This means that the licensee can begin early formal Section 106 consultation with the SHPO/THPO, Indian tribes, and other stakeholders at the time it files notice of intent to file a license application with the Commission. Another factor to consider is that, during the prefiling stage, FERC staff can freely consult with the licensee and other stakeholders without violating the Commission's rules concerning off-the-record communications--which take effect after a license application has been filed with the Commission and becomes contested due to interveners.

A HPMP should not be concluded without the involvement of FERC, as the responsible Federal agency for purposes of Section 106. It is, therefore, advisable to involve FERC in resolving questions or issues that arise in drafting a HPMP, even when the document is drafted prior to filing a license application.

If it is not possible to complete a HPMP before license issuance, the PA will typically require that a HPMP be developed within one year of the issuance of the FERC license.

II. HOW TO DEVELOP A HPMP

Who should prepare a HPMP?

The preparer of the HPMP should be knowledgeable about:

- Hydropower project operations and maintenance;
- Historic preservation law, policy and practice; and
- Management and treatment issues pertaining to all the types of historic properties that may be affected by Project operations.

Standards for Professional Qualification in the areas of archeology, history, architecture and architectural history have been established.¹⁰

Applicants and licensees are encouraged to consult these standards and to seek technical guidance from FERC, the Council, and the appropriate SHPO and/or THPO. The degree of expertise needed to develop a HPMP will depend on the complexity of the Project and its historic preservation issues.

Who should be consulted?

The licensee should develop the HPMP in consultation with various entities. Pursuant to Section 800.2 of the Council's regulations, the Commission may authorize the licensee to initiate consultation with the SHPO/THPO and others, but remains responsible for all findings and determinations.¹¹ The consulting parties include:

- ❑ The SHPO-- The SHPO reflects the interests of the state and its citizens in the preservation of their cultural heritage, and advises Federal agencies in carrying out their Section 106 responsibilities. Because the SHPO usually plays an important role in the implementation of a HPMP throughout the term of the license, preparers of HPMPs are strongly encouraged to involve the SHPOs in the development of the plan;
- ❑ The THPO or tribal representative--If the Project is either on tribal lands or affects historic properties on tribal lands, and the tribe has assumed the responsibilities of the SHPO for Section 106 in accordance with Section 101(d)(2) of the NHPA, the THPO must be consulted. If a tribe does not have a THPO, the applicant and FERC should consult with the tribe's officially designated tribal representative. Because Indian tribes exercise sovereign authority over tribal lands, the participation of the THPO or other designated representative is important to the development and implementation of the HPMP;
- ❑ Indian Tribes--Consultation must also involve Indian tribes or Native Hawaiian organizations that attach traditional religious or cultural significance to historic properties that may be affected by the operation of

¹⁰ See the Secretary of the Interior's Professional Qualification Standards [48 FR 44738-9]. Although the Secretary of the Interior published draft revised standards on June 1, 2000, these standards are not yet final.

¹¹ See 36 C.F.R. § 800.2 (c)(4).

the Project.¹² Such resources may be located on tribal lands, ceded lands, or other lands within the traditional territory of a tribe;

¹² See 36 C.F.R. § 800.16 (n).

- ❑ State and local governments, other federal and state agencies, non-governmental organizations, property owners, and other individuals-- These parties may wish to participate in the development of a HPMP based on the nature of their legal or economic interest in the undertaking or affected historic properties, or their concern with the undertaking's affects on historic properties. For example, the Project may be constructed on lands owned by or under the jurisdiction of the Forest Service or the Bureau of Land Management; and
- ❑ The Council--The Council oversees the Section 106 process, and may be asked to help resolve disagreements and provide guidance, advice, or technical assistance to FERC, license applicants, licensees, and other consulting parties in completing Section 106 consultation in developing a HPMP.

III. CONTENTS OF A HPMP

A Project's HPMP should be organized in a logical manner, so that information is easy to find and appropriate procedures can be quickly identified. It is only a guide, and is not meant to be rigidly applied to every Project. The following is an example of how the HPMP might be organized.

1. Overview and Executive Summary

The HPMP should begin with a statement of purpose describing the scope of the plan, how it will be used, and the authority under which it is developed (the statutory and regulatory context). This section should also identify who participated in the plan's development, as well as any ongoing commitment and procedures or protocols to continue consultation with Indian tribes, the SHPO/THPO, and other organizations in implementation of the plan. In addition, this section should summarize the contents of the HPMP.

2. Background Information

The HPMP should include:

- ❑ A description of the Project facilities and operation, its location, and the APE;
- ❑ The historic context (time, place, and theme);

- A description of surveys and/or inventories that have been completed, with maps and other graphics, as needed (including analysis of the scope and quality of existing surveys), and those that will be required to identify historic properties that may be affected by planned actions (include survey standards here, such as SHPO standards, that will be followed);
- A description of known and potential historic properties with an explanation of their significance and public values;
- Appendices which include maps, relevant correspondence, and technical studies or summaries of these studies.

3. **Project Management and Preservation Goals and Priorities**

The HPMP should include a description of the goals for operating the project and the goals for historic preservation at the project. A presentation of those preservation goals and standards in conjunction with the plan for project operation will guide implementation of the HPMP and should identify any historic resources that will be accorded special consideration. The goals and standards should take into account the type of historic properties present, such as Traditional Cultural Properties, historical buildings or equipment, or archeological resources. The HPMP should also describe the philosophy guiding management of historic properties within the Project's APE. For example, the licensee could manage a project under the continuity of use philosophy). It should also relate the plan to the specific management structure of the Project; for example, to the processes by which planning and budgetary decisions are made.

4. **Project Effects and Mitigation/Management Measures**

The HPMP should:

- Include a schedule for completing all actions required in the HPMP, and require FERC, as well as the SHPO/THPO, approval of revisions to this schedule, if any are needed;
- Identify, in consultation with the SHPO/THPO and other consulting parties, activities that will be considered exempt from further review under the HPMP because they possess little or no chance of affecting historic properties;
- Develop and implement rehabilitation standards and an oversight protocol;

- Include procedures to evaluate the effects of actions such as project-induced shoreline erosion, construction of fish passage facilities, construction of recreation facilities, and other Project activities on historic properties, and provide for consideration and treatment of adverse effects, as appropriate, in consultation with others;
- Consider relevant future, ongoing, and past effects, as appropriate;
- Include a monitoring protocol and provisions for enforcement, as appropriate;
- Provide for the treatment of human remains (distinguishing between Native American Grave Protection and Repatriation Act (NAGPRA)), if applicable, and State law requirements);
- Describe provisions for public interpretation; and
- Describe procedures to address effects when unanticipated historic properties are discovered and during project emergencies.

5. **Implementation Procedures**

The HPMP should include provisions for:

- Designating a HPMP coordinator;
- Training project personnel;
- An internal decision-making process (Refer to Principle #6 in Section IV);
- Consultation with the SHPO/THPO and others, including the Council if National Historic Landmarks are affected;
- Periodic reporting and meetings;
- Periodic review and revision of the HPMP;
- Actions requiring consultation with the SHPO/THPO, Indian tribes, Federal land managers, and others; and
- Dispute resolution, if not already provided in the PA or MOA.

IV. PRINCIPLES OF HPMP DEVELOPMENT AND IMPLEMENTATION

License applicants and licensees are encouraged to apply the following principles in developing and implementing a HPMP for a hydroelectric project.

Principle 1: The HPMP should be responsive to the purposes of the Project, including the safe and efficient production of hydroelectric power, and realistic in terms of those purposes.

The HPMP should be responsive to the purposes of the Project and should be realistic in terms of those purposes. It is not the intent of Section 106 or the HPMP to transform a hydroelectric powerhouse into a “museum” or jeopardize the ability of the licensee to produce electricity. Accordingly, the HPMP should acknowledge the need to fulfill all of the terms and conditions of the Project license, and should not impede the safe and efficient production of energy.

Principle 2: The scope of the HPMP should be clearly defined, and should establish an approach to address effects on private lands.

The HPMP is limited to the consideration of actions that fall under the jurisdiction of FERC and the licensee. The HPMP should recognize that the Project area is not necessarily the same as the area that is affected by project operations and management.¹³ Because Project effects can extend beyond the Project boundary, the geographic scope of the HPMP should not necessarily be limited to Project lands. However, in order to comport with the Council’s regulations, the HPMP cannot compel actions on private lands where the licensee has been denied access. In defining the scope, the plan should:

- Describe and include a map showing the APE, as defined in the Council’s regulations at 36 CFR § 800.16(d);
- Where applicable, identify how to access private lands; and
- Describe outreach efforts that can encourage the treatment of effects on private lands.

Principle 3: The HPMP should be based on sufficient studies to predict the likely effects of Project activities on historic properties, and should provide for the conduct of additional studies that may be needed.

The HPMP should include a description of previous inventories and historic properties that have been identified. It is not good practice to defer all identification and evaluation of historic properties until after the license is issued,

¹³ For major projects and some minor projects, the project area is also called the project boundary.

especially with large and/or complex Projects. However, it is not necessary to complete identification of each and every historic property within the APE before licensing. The HPMP should also specify whether additional identification and evaluation of historic properties are needed, and when they should be done. The HPMP should:

- Identify what additional surveys and evaluation are needed and provide a schedule for their completion;
- Establish procedures to ensure that the pertinent information will be obtained (for example, consultation with Indian tribes regarding properties of traditional religious and cultural significance), and considered prior to the implementation of any action that might affect historic properties; and
- Provide for re-evaluation of historic properties during the term of the license due to changing circumstances, such as the passage of time or changes in the property's integrity.

Principle 4: The HPMP should establish achievable and realistic goals and targets for completing specified tasks that can serve as the basis for budget decisions, staff assignments, and performance measures.

It is important to establish management goals and objectives, and to identify who will carry out the HPMP and how they will do so. In order to facilitate implementation of the HPMP, the licensee might find it useful to develop a field operations manual to provide procedures for staff. This should include a description of how staff will be trained to ensure that the HPMP is properly implemented.

Principle 5: The HPMP should establish management priorities and steps to be taken to ensure long-term preservation of historic properties.

Where historic properties of particular importance to stakeholders have been identified in the APE, the plan should provide for their consideration, avoidance of adverse effects, and, if necessary, treatment. The HPMP should also provide for and establish a schedule for implementing the protective measures, such as monitoring or stabilization; and for public education and interpretation of the historic and archeological values of the project.

Principle 6: The HPMP should establish a decision-making process that provides for the consideration of effects on historic properties early in project planning and include mechanisms for reaching resolution.

The plan should include procedures to consider ways to avoid, minimize, or mitigate adverse effects to historic properties, to promote their proper use, and to encourage beneficial effects. It should also provide for the review of proposed actions by the SHPO and/or THPO and other stakeholders, and should include specific standards for operation and maintenance activities. Procedures in the HPMP should:

- Address possible effects to historic properties resulting from the continued operation and maintenance of the Project;
- Provide for the preservation of historic properties that may be affected by shoreline erosion, other project-related ground disturbing activities, and vandalism--depending on the nature of the effects, could include implementing a program of shoreline monitoring on a regular basis within the APE and follow-up procedures;
- Determine ways to avoid or mitigate adverse effects on historic properties, including consultation as appropriate with the SHPO/THPO, Indian tribes and other stakeholders;
- Determine the process to be followed if previously unidentified properties or effects are discovered;
- Determine how effects on historic resources will be considered in the event of a Project emergency; and
- Establish what, if any, actions have little or no potential for affecting historic properties and can be implemented without any review (exempt activities)
- Establish procedures for dispute resolution.

Principle 7: The HPMP should be developed and implemented in coordination with other plans required by the license.

In addition to project operating plans, recreation plans, and wildlife mitigation plans, the HPMP should be coordinated with other plans and any approved settlement agreement developed either through the traditional or alternative licensing process.

Principle 8: The HPMP should provide for an appropriate level of consultation with others before decisions are made.

The HPMP should establish procedures to identify when and how others, such as the SHPO, the THPO, and Indian tribes, will be consulted in review and decision-making about the management of historic properties. The communication protocol developed for the Alternative Licensing Process might be a useful place to start developing such procedures. It is most useful to consult with others early, before decisions are made, to allow consideration of a range of available options. The HPMP should establish procedures for reaching decisions through consultation, including resolving disputes when they occur.

Principle 9: The HPMP should consider other applicable federal, state, and local laws and regulations that provide authority for its implementation and may affect its scope.

Although the focus of a HPMP is the preservation of “historic properties” and compliance with the NHPA, the treatment of historic properties and review procedures included in the HPMP should be consistent with other applicable laws and regulations. For example, if the Project is located on Federal or tribal lands, the HPMP should take into account the requirements of NAGPRA and its implementing regulations, which provide procedures for determining the treatment of Native American human remains intentionally excavated or discovered during ground disturbing activities. The HPMP should therefore:

- Identify applicable Federal, state and local laws and regulations; and
- Establish how the HPMP will be implemented in conjunction with other legal responsibilities.

This is especially important when dealing with the treatment and disposition of any human remains that may be discovered, so that the HPMP is consistent with applicable Federal, state, and local laws, and the Council’s policy on the treatment of human remains.

Principle 10: The HPMP should provide Project staff with ready access to pertinent information, but should also include mechanisms to protect sensitive data and to establish an appropriate level of security to discourage abuses.

Access to relevant information--such as survey data, standards and guidelines, and points of contact for consultation--is important for the effective implementation of the HPMP. However, confidentiality, especially regarding the location of archeological sites and historic properties of traditional religious and cultural significance to Indian tribes, may be needed to provide for long term protection, particularly to protect against such activities as vandalism and looting.¹⁴

Principle 11: The HPMP should avoid the use of jargon, and should use terms consistently and correctly.

Staff at the licensed hydropower projects who will use the HPMP and supervise its implementation may not be familiar with terminology commonly used in historic preservation. If specialized terms are used, they should be defined. For example, terms such as *Phase I archeological survey*, *certified archaeologist*, *state approved contracting archeologist*, *Phase II survey*, and *Phase IA survey*, should be clearly defined so that whoever implements the HPMP is not confused about terminology and meaning.

Principle 12: The HPMP should not be a static document.

The HPMP should provide mechanisms for its periodic review and revision. Any steps to revise, amend, or otherwise alter the plan should be approached in the same manner as the development and approval of the initial HPMP.

Principle 13: Periodic reporting should be a part of the HPMP activities.

The HPMP should establish the scope, contents, and timing of a periodic report and the deadline for submission to the SHPO/THPO, other consulting parties, and FERC. Through this reporting, the licensee and others, most notably the SHPO/THPO, will be able to periodically assess the effectiveness of the plan.

¹⁴Section 304 of NHPA provides that the head of a Federal agency or other public official receiving grant assistance pursuant to NHPA, after consultation with the Secretary of the Interior, shall withhold from disclosure to the public information about the location, character, or ownership of a historic resources when disclosure may (1) cause a significant invasion of privacy; (2) risk harm to the historic resource; or (3) impede the use of a traditional religious site by practitioners (see also 36 CFR § 800.11[c]).

References

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- 1998 Tom King, Cultural Resource Laws & Practice: An Introductory Guide, Alta Mira Press
- n.d. Advisory Council on Historic Preservation, “Proposed Council Guidelines: Historic Resource Management Plans” (draft).

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STUDY 12.0 ICE JAM FLOODING ON THE LOUP RIVER

The Project is located in Nance and Platte counties, where water is diverted from the Loup River and routed through the 35-mile-long Loup Power Canal, which empties into the Platte River near Columbus. The Project includes various hydraulic structures, two powerhouses, and two regulating reservoirs. The portion of the Loup River from the Diversion Weir to the confluence with the Platte River is called the Loup River bypass reach.

District procedures require that Project operators stop admitting water to the Loup Power Canal when frazil ice is observed upstream of the Diversion Weir. According to the U.S. Army Corps of Engineers (USACE), frazil ice, also known as slush ice because of its appearance, is formed only in turbulent supercooled water. Frazil ice is most often seen in early to mid-winter and can accumulate to form an ice cover or an ice jam (USACE, July 1994). When frazil ice is no longer observed near the Intake Gates, the District resumes flow diversion to the Loup Power Canal.

An ice jam formation that caused severe flooding at Columbus in the winter of 1993 prompted a USACE study of ice jam formation in the Lower Platte River. The report states that “a recommended future study would be to evaluate the effect, if any, that Project operations have on ice conditions downstream” (USACE, July 1994). In a letter dated February 9, 2009, the Nebraska Department of Natural Resources (NDNR) submitted a study request to investigate the possible effect of Project operations on ice jam flooding in the Platte River basin (a copy of this request is provided in Attachment A). The requested scope also included predictive modeling of ice events and identification of methods for prevention and mitigation of ice jam flooding.

The proposed study is to evaluate the data gathered since the report was completed and to compare it to the flow records to determine qualitatively if a correlation exists between Project operations and ice jam formation in the Loup River bypass reach. Further explanation of deviations from the NDNR’s request are noted as appropriate in the following sections.

1. GOALS AND OBJECTIVES OF STUDY

“Describe the goals and objectives of each study proposal and the information to be obtained;” 18 CFR §5.11(d)(1)

The goal of the study of ice jam flooding on the Loup River is to qualitatively determine if the operation of the Loup Power Canal has a material effect on the formation of ice jams or a material effect on the severity of flooding caused by ice jams in the Loup River bypass reach.

The objectives of the study of ice jam flooding on the Loup River are as follows:

1. To collect and organize ice observation reports, associated atmospheric temperature data, and associated gage flow data.
2. To characterize the available information and its relevance to performing a qualitative analysis.
3. To perform a qualitative analysis to determine if a relationship can be found between Project operations and ice jam flooding or the severity of flooding caused by ice jams in the Loup River bypass reach.

2. RELEVANT RESOURCE MANAGEMENT GOALS

“Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;” 18 CFR §5.11(d)(2)

NDNR is the official state agency for all matters pertaining to floodplain management, maintains the statewide Nebraska Ice Reporting database through its website (<http://dnrdata.dnr.ne.gov/Icejam/index.asp>), and has jurisdiction over all matters pertaining to surface water rights. A goal of NDNR is to prevent recurring destruction to roads, structures, residences, and businesses from ice jam flooding (NDNR, February 9, 2009).

3. BACKGROUND AND EXISTING INFORMATION

“Describe existing information concerning the subject of the study proposal, and the need for additional information;” 18 CFR §5.11(d)(3)

In early winter, frazil ice begins to form in the Loup River and the Settling Basin, generally in the early morning hours. A small amount of frazil ice can normally be diverted into the Settling Basin without causing problems. As winter progresses and temperatures drop, the frazil ice forms earlier in the evening and in heavier concentrations. At this point, the frazil ice must be bypassed down the Loup River. If too much heavy frazil ice is diverted from the Loup River into the much slower-flowing Settling Basin, an ice plug can form in the basin. If this should happen, there can be no further flow diversion until the ice plug melts or dissipates. The ice plug could remain in place for the remainder of the winter.

As air temperature gets colder, an ice cap forms both on the Loup River and in the Loup Power Canal. Once a solid ice cap exists, a steady winter diversion rate of about 2,000 cfs can be established. This rate can be maintained fairly well through the winter provided that the ice cap remains intact. Abrupt flow increases must be avoided when there is an ice cap in the canal. The entire 35-mile length of the Project must be monitored for heavy slush ice, frazil ice formation, ice floes, and ice jams. Any of these conditions may create an emergency situation where flow diversion must be quickly adjusted or curtailed completely.

Two USACE reports that are relevant to this study of ice jam flooding on the Loup River have been published. The first report is titled “Lower Platte River Ice Jam

Flooding” (USACE, July 1994), and the second report is titled “Ice Jam Flooding and Mitigation: Lower Platte River Basin, Nebraska” (USACE, January 1996).

The 1994 report states that local residents have expressed the opinion that Project operations cause or exacerbate ice jams in the Loup River bypass reach. In addition, the report states that it would be very difficult to perform a quantitative analysis given the lack of data. However, a qualitative analysis could address such issues as the potential effects of rising and lowering water levels in the Loup River bypass reach on border ice formation, frazil ice production, frazil ice transport, and ice movement. For the purposes of this study, border ice, also known as sheet ice, is defined as the smooth ice that grows along slow-moving water, lakes, reservoirs, and the edges of rivers.

A Lower Platte River predictive model was developed at the USGS gage station at North Bend as part of the study reported in 1994. The North Bend gage station is located approximately 31 miles downstream of the confluence of the Loup and Platte rivers. The North Bend site was chosen because it contained “the best combination of ice data, and long term stage, discharge, and meteorological records” (USACE, July 1994). The predictive model created for the report used flow and a variable calculated from atmospheric temperature to predict possible ice jam formation. The resultant predictive model consisted of a graph relating discharge to Julian day. In the 1994 report, October 1 is Julian day 1, and September 30 is Julian day 365 (or day 366 in a leap year). If the atmospheric temperature variable is exceeded and the forecast discharge is greater than the discharge on the plot, there is “a high probability that an ice jam will occur in at least one location in the study area” (USACE, July 1994). The study area included the Loup River from Genoa to its confluence with the Platte River and the Platte River from its confluence with the Loup River to its confluence with the Elkhorn River. In addition to atmospheric temperature and flow, channel slope and channel restrictions at bridges and sharp bends were also identified as important factors in ice jam formation (USACE, July 1994).

As a result of the 1994 report, NDNR has been collecting ice observation data from approximately 1995 to present. This data is collected on a standard reporting form. The 1994 report speculates that based on additional ice data collected as part of the ice data collection program, the predictive model at North Bend can be refined and can lead to the development of predictive models at other locations within the study area.

3.1 Flow and Gage Data

Flow data from USGS and NDNR gage stations will be used for this study of ice jam flooding on the Loup River. Each gage station is accompanied by the associated rating curves and velocity and cross-sectional data used to create the rating curves. Flow data that will be used for this study include:

- USGS Gage 06793000, Loup River near Genoa, NE – Available discharge and gage height data from April 1, 1929, to current includes daily and 30-minute interval data.
- USGS Gage 06792500, Loup River Power Canal near Genoa, NE – Available discharge and gage height data from January 1, 1937, to current includes daily and 30-minute interval data.

3.2 Atmospheric Data

Atmospheric data is an important factor exerting influence on ice formation. Atmospheric data will be collected from the National Weather Service (NWS) station at Genoa during the proposed period of analysis. Daily mean, maximum, and minimum ambient atmospheric temperature data is available at this station and can be found at <http://www.ncdc.noaa.gov/oa/climate/stationlocator.html>.

3.3 Nebraska Ice Reports

NDNR maintains the Nebraska Ice Reporting database which includes reports on statewide ice observations, as discussed in Section 2, Relevant Resource Management Goals. There are seven Nebraska Ice Report observation sites in the study area, as listed in Table 12-1.

Table 12-1. Nebraska Ice Report Observation Sites

Site Name	Description
L1	Hwy 14 at Fullerton
L2	Hwy 39 at Genoa
L3	Headgate of Loup Power Canal
L4	Loup Bridge at Palmer, 4 Mile North
NR2	Fullerton to Genoa
PC1	Monroe Bridge
WR1	Hwy 81 Columbus Bridge

Source: NDNR, *Listing of Nebraska Ice Report Sites*,
retrieved on March 17, 2009,
<http://dnrdata.dnr.ne.gov/Icejam/listing.asp>.

4. PROJECT NEXUS

“Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied;” 18 CFR §5.11(d)(4)

USACE, NDNR, and local residents have suggested that Project operations may affect ice jam formations or may increase the severity of ice-jam-related flooding in the Loup River bypass reach.

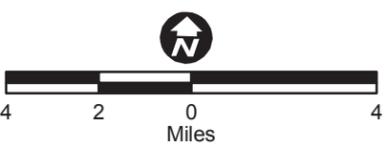
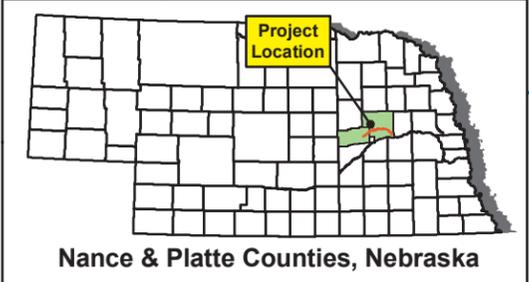
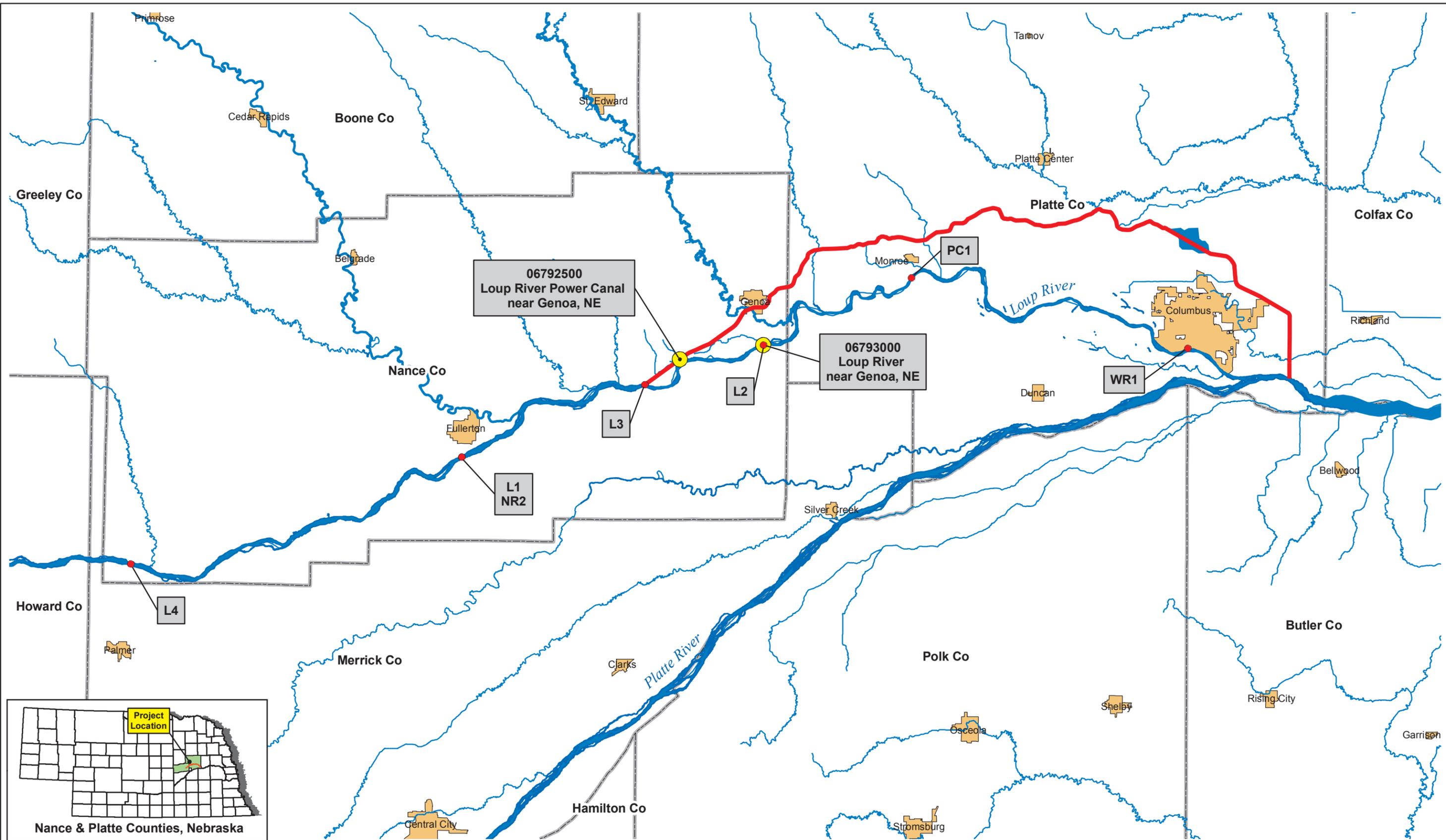
5. STUDY AREA AND STUDY SITES

The proposed study area includes the Loup River bypass reach and the Loup Power Canal. The study sites are the locations of the two USGS gages listed in Section 3.1, Flow and Gage Data, and the seven Nebraska Ice Report observation sites listed in Table 12-1, above. Figure 12-1 shows the extent of the study area and the study sites.

In its February 9, 2009, study request, NDNR requested that the study area include the Platte River Basin from the Project diversion to the confluence of the Platte and Missouri rivers (see Attachment A). The District's proposed study area is limited to the Loup River bypass reach and the Loup Power Canal for the following reason:

- This area can be readily analyzed because it experiences maximum Project operational changes, and only a limited number of “external” influences (tributaries, confluences, and bridges). If a definitive relationship is discovered between Project operations and ice jam flooding in this area, then an expanded study area may be appropriate.

Z:\Projects\Loup_Power_District\37104_LPD_FERC_Relicensing\map_docs\mxd\Ice_Study_Plan.mxd\march09\jcm



- Legend**
- Ice Observation Report Location
 - USGS Gaging Station
 - Rivers/Streams
 - Loup Power Canal
 - Corporate Limits
 - County Line



Ice Jam Study Area

Loup River Hydroelectric Project
FERC Project No. 1256
Proposed Study Plan

© 2009 Loup River Public Power District

DATE	March 2009
FIGURE	12-1

6. PROPOSED METHODOLOGY

“A detailed description of the study and the methodology to be used;” 18 CFR §5.11(b)(1)

“Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests;” 18 CFR §5.11(d)(5)

The methodology for the study of ice jam flooding on the Loup River includes three tasks, described below.

Task 1 Data Collection and Evaluation

The Nebraska ice reports for the Loup River that are available in the NDNR database will be collected. The spatial and temporal extent of the data will be characterized by cataloging and describing the dates, times, and locations of ice observations in the collected reports.

Flow data from the USGS and NDNR gages and atmospheric temperature data will also be collected.

Task 2 USACE Report Update

Tabulated data from the July 1994 USACE report will be extended to include current information. The tables of winter high stage events will be updated. Flow graphs that correlated temperature and flow in the Loup Power Canal and flow in the Loup River bypass reach will also be updated.

Task 3 Qualitative Analysis

The NDNR ice observation records and data from Task 2, USACE Report Update, will be evaluated qualitatively to determine if a correlation can be made between Project operations and ice jam flooding. Flow in the Loup Power Canal and Loup River bypass reach will be compared to the collected ice observation records as well as to information in the updated 1994 USACE report. The period of record for the qualitative analysis will be from 1995 to present. Flows in the Loup Power Canal and Loup River bypass reach will be plotted from November to April of each year. Instances of observed flooding and ice-jam-related observations will be flagged on the plots. If no definitive correlation exists based on the accumulated ice observation records, it can be concluded that Project operations do not materially contribute to ice jam formation or subsequent flooding. If a definitive correlation exists, the District will work with NDNR to evaluate the extent of Project contribution to ice jam formation and related flooding.

In its February 9, 2009, study request, NDNR outlined a scope that included predictive modeling of ice events and identification of methods for prevention and mitigation of ice jam flooding. In addition, the request specified that the study should be funded by the District, but performed by the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL). Explanation of why the District’s study methodology differs from this request follows:

- The District is proposing to review and update portions of the CRREL report using the most recent available information, including the ice data and observation reports collected by the NDNR since 1994 as detailed in Tasks 2 and 3. The District would complete the proposed study and the results would be available for review by others as appropriate.
- The proposed study does not include refinement of the existing predictive model nor does it include development of a new predictive model for ice events in the Platte River basin. The District believes that development of such a model is the responsibility of the NDNR as the state agency responsible for all matters pertaining to floodplain management.
- The proposed study does not include identification of methods for prevention or possible mitigation of ice jam flooding through operational changes or responses to ice formation. The District believes that identification of mitigation is premature prior to establishing that a definitive relationship exists between Project operation and ice jam flooding in the study area.

7. CONSULTATION WITH AGENCIES, TRIBES, AND OTHER STAKEHOLDERS

This study plan was developed based on discussions with agencies prior to submittal of the PAD. The District will work with agencies to resolve any issues or concerns during the course of the study plan meetings prior to preparation of the revised study plan.

8. WORK PRODUCTS

“Provisions for periodic progress reports, including the manner and extent to which information will be shared; and sufficient time for technical review of the analysis and results;” 18 CFR §5.11(b)(3)

The intended work product for the study of ice jam flooding on the Loup River is a study report. The study report will document the ice conditions in the Loup River bypass reach. Along with the study report, a database of the data gathered and used in the analysis will be available.

Updates regarding the study of ice jam flooding on the Loup River will be included in the study progress reports to be submitted to FERC in December 2009, March 2010, and June 2010.

9. LEVEL OF EFFORT AND COST

“Describe considerations of level of effort and cost, as applicable.” 18 CFR §5.11(d)(6)

It is estimated that the study of ice jam flooding on the Loup River will require approximately 360 person-hours of effort at a cost of approximately \$90,000. This work will be completed by qualified water resources engineers.

10. SCHEDULE

“A schedule for conducting the study;” 18 CFR §5.11(b)(2)

“The potential applicant's proposed study plan must also include provisions for the initial and updated study reports and meetings provided for in §5.15.” 18 CFR §5.11(c)

The study of ice jam flooding on the Loup River is scheduled to begin in the fourth quarter of 2009, and the final study report is to be submitted in the third quarter of 2010.

11. REFERENCES

NDNR. *Listing of Nebraska Ice Report Sites*. Retrieved on March 17, 2009.
<http://dnrdata.dnr.ne.gov/Icejam/listing.asp>.

NDNR. February 9, 2009. Letter from Brian P. Dunnigan, Director, to Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, regarding a study request.

USACE. July 1994. “Lower Platte River Ice Jam Flooding.” U.S. Army Corps of Engineers, Omaha District.

USACE. January 1996. “Ice Jam Flooding and Mitigation: Lower Platte River Basin, Nebraska.” U.S. Army Corps of Engineers, Omaha District.

Attachment A – NDNR Ice Jam Flooding Study Request



Dave Heineman
Governor

STATE OF NEBRASKA

DEPARTMENT OF NATURAL RESOURCES
Brian P. Dunnigan, P.E.
Director

February 9, 2009

IN REPLY TO

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Relicensing of Loup River Hydroelectric Project (P1256-029)

Dear Secretary Bose:

The Nebraska Department of Natural Resources (NDNR) is requesting a study: (1) of the effects the Loup River Hydroelectric Project has on ice jam flooding, (2) a predictive model of the Project's effects on ice jam flooding, and (3) prevention, alleviation and mitigation of ice jam flooding caused by the Project. The NDNR is the official state agency for all matters pertaining to floodplain management.

In March of 1993, severe flooding due to the combination of ice jams and rapid snowmelt occurred within the Lower Platte River basin in Nebraska. One of the areas most affected was along the Loup River at Columbus, NE, between the diversion by the Loup Public Power District (LPPD) and its tail race into the Platte River. The event caused many millions of dollars worth of damage, including road closures; destruction of a major highway, weigh station, motel and farm implement dealership; flooding of residential, agricultural, industrial, and commercial areas; and damage to bridge abutments, levees, dikes, and other river training structures.

In response to the 1993 flooding event, the Federal Emergency Management Agency formed an Interagency Hazard Mitigation Team to review the event and suggest measures which might be implemented to mitigate similar future events. The United States Army Corps of Engineers (USACE) completed a comprehensive Section 22 Study of ice jam flooding in the Lower Platte River Basin. (A copy of the July 1994 Section 22 report is attached.)

The USACE gathered and analyzed historical data relating to ice jams, intending to develop guidance in mitigating or alleviating ice jam flooding in the area. Information was obtained through searches of state and federal agency records, a literature search, weather and river discharge records, and public meetings. The USACE Cold Regions Research and Engineering Laboratory developed a model to predict the occurrence of ice events. It was noted that little specific data was available for jams occurring in the area where the LPPD diverts and discharges into the river and that the model cannot be applied with confidence without obtaining this additional data. A data collection program for future field observations was recommended and developed. NDNR has the data that has been collected.

admin-directors/Dunnigan/2009

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Kimberly D. Bose
February 9, 2009
Page 2 of 3

The USACE report detailed the LPPD's hydropower operation, including: diversion of the Loup River and outflow into the Platte River; the fluctuation of diversions, and response to the formation of frazil ice. Local residents opined that the fluctuations in water level cause or exacerbate ice jams in the Loup River downstream from the canal diversion. The report suggested that a future "qualitative study could address such issues as the potential effects of raising and lowering water levels on the formation of border ice, frazil production, frazil ice transport, and the effects of sudden decreases in river flow on ice movement (e.g., stranding ice blocks, increased frazil deposition). In addition, it was noted that "[c]hanges in the sediment regime of the river resulting from canal operations may also have impacted ice formation and transport processes." The USACE recommended that after collection of data, a study be done to evaluate the impact of the operation of the Loup Power Canal on downstream ice conditions.

It is this USACE-recommended study that the NDNR is requesting be done prior to LPPD being allowed to relicense its project. Such study of the effects of the LPPD operation on ice jam flooding was requested by the NDNR at a meeting with LPPD on August 19, 2008. Copies of the USACE report containing their recommendation for a study were distributed. Aerial photographs showing a three mile ice jam were displayed. It was noted that the levee holding back the Platte River from the City of Columbus was nearly overtopped and that a levee surrounding a housing development had nearly failed.

In a letter to LPPD on August 29, 2008, the NDNR again requested that a study on the effect the LPPD operation has on ice jam flooding be studied. Our request is attached.

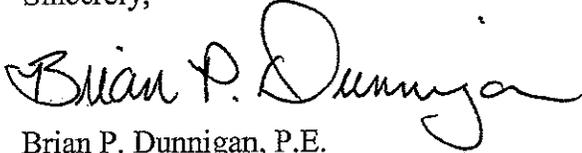
The October 16, 2008, Pre-Application document (PAD) included the NDNR's statement that the LPPD operation may cause ice jam flooding, NDNR's request for a study, several paragraphs regarding the USACE study, and the statement, "The Nebraska Department of Natural resources asks that studies be conducted on what contributions the operation of the LPPD canal have on ice jam flooding as well as what measures could be taken to mitigate ice jam flooding and resulting damages." (See PAD Volume 2 – Appendices.) LPPD responded to the NDNR concern by stating on page 6-22 of the PAD, "The NDNR request for a study does not provide enough information to define the goal, reasons for study, and methodology for the District to conduct a study; therefore, no formal studies are proposed at this time. The District will continue to discuss this issue with NDNR to determine study needs." This issue has not been discussed further other than LPPD's reference to a conversation with the Nebraska Emergency Management Agency in which the Agency didn't remember the USACE report.

The NDNR is confounded by LPPD's response to our request for a study. NDNR has provided to LPPD: a history of ice jam flooding in the project area; the USACE report suggesting a connection between LPPD operations and ice jam flooding and that a study be conducted; and our concern for the residents, business people and travelers in the area, and the economic effects of the flooding on the State Treasury.

Kimberly D. Bose
February 9, 2009
Page 3 of 3

Again, the NDNR requests that a study be conducted on the effect of the LPPD project on ice jam flooding, additional modeling to predict future flooding events, and any possible mitigation and or ways to alleviate damage.

Sincerely,

A handwritten signature in black ink that reads "Brian P. Dunnigan". The signature is written in a cursive style with a large, looped initial "B".

Brian P. Dunnigan, P.E.
Director

Enclosures

cc: Loup Public Power District

Re: Loup River Nebraska Project No. 1256-029

TITLE OF PROPOSED STUDY

Study by the U.S. Army Cold Regions Research and Engineering Laboratory of the possible effect of the operation of the Loup Public Power District hydroelectric operation on ice jam flooding in the Platte River Basin; additional predictive modeling of ice events; and methods for prevention and mitigation of ice jam flooding.

REQUESTER OF PROPOSED STUDY

Nebraska Department of Natural Resources
300 Centennial Mall South
P.O. Box 94677
Lincoln, NE 68509-4676

STUDY GOALS, OBJECTIVES, AND RESULTING INFORMATION

The goal of the requested study is to discover the effect the operation of the Loup Public Power District hydroelectric operation has on ice jam flooding in the Platte River Basin, refinement of predictive modeling of ice events in the Platte River Basin, and possible prevention and mitigations of ice jam flooding through operation changes or responses to ice formation.

STUDY AREA

The geographic scope of the proposed study is the Platte River Basin between the diversion of the Loup River at a point 34 miles upstream of the confluence of the Loup and Platte Rivers into the Loup Public Power Canal, downstream to the confluence of the Platte and Missouri Rivers.

RELEVANT RESOURCE MANAGEMENT GOALS OR PUBLIC INTEREST CONSIDERATIONS

The requester Nebraska Department of Natural Resources (NDNR) is the official state agency for all matters pertaining to floodplain management, is the home of the Nebraska Ice Report data base, and has jurisdiction over all matters pertaining to surface water rights. The Department wishes to prevent recurring destruction to roads, structures, residences and businesses from ice jam flooding.

Nebraska Revised Statute 61-206

Department of Natural Resources; jurisdiction; rules; hearings; orders; powers and duties. Department of Natural Resources; jurisdiction; rules; hearings; orders; powers and duties. (1) The Department of Natural Resources is given jurisdiction over all matters pertaining to water rights for irrigation, power, or other useful purposes except as such jurisdiction is specifically limited by statute. Such department shall adopt and promulgate rules and regulations governing matters coming before it. It may refuse to allow any water to be used by claimants until their rights have been determined and made of record. It may request information relative to irrigation

and water power works from any county, irrigation, or power officers and from any other persons. It may have hearings on complaints, petitions, or applications in connection with any of such matters. Such hearings shall be had at the time and place designated by the department. The department shall have power to certify official acts, compel attendance of witnesses, take testimony by deposition as in suits at law, and examine books, papers, documents, and records of any county, party, or parties interested in any of the matters mentioned in this section or have such examinations made by its qualified representative and shall make and preserve a true and complete transcript of its proceedings and hearings. If a final decision is made without a hearing, a hearing shall be held at the request of any party to the proceeding if the request is made within thirty days after the decision is rendered. If a hearing is held at the request of one or more parties, the department may require each such requesting party and each person who requests to be made a party to such hearing to pay the proportional share of the cost of such transcript. Upon any hearing, the department shall receive any evidence relevant to the matter under investigation and the burden of proof shall be upon the person making the complaint, petition, and application. After such hearing and investigation, the department shall render a decision in the premises in writing and shall issue such order or orders duly certified as it may deem necessary.

(2) The department shall serve as the official agency of the state in connection with water resources development, soil and water conservation, flood prevention, watershed protection, and flood control.

(3) The department shall:

(a) Offer assistance as appropriate to the supervisors or directors of any subdivision of government with responsibilities in the area of natural resources conservation, development, and use in the carrying out of any of their powers and programs;

(b) Keep the supervisors or directors of each such subdivision informed of the activities and experience of all other such subdivisions and facilitate cooperation and an interchange of advice and experience between such subdivisions;

(c) Coordinate the programs of such subdivisions so far as this may be done by advice and consultation;

(d) Secure the cooperation and assistance of the United States, any of its agencies, and agencies of this state in the work of such subdivisions;

(e) Disseminate information throughout the state concerning the activities and programs of such subdivisions;

(f) Plan, develop, and promote the implementation of a comprehensive program of resource development, conservation, and utilization for the soil and water resources of this state in cooperation with other local, state, and federal agencies and organizations;

(g) When necessary for the proper administration of the functions of the department, rent or lease space outside the State Capitol; and

(h) Assist such local governmental organizations as villages, cities, counties, and natural resources districts in securing, planning, and developing information on flood plains to be used in developing regulations and ordinances on proper use of these flood plains.

Nebraska Revised Statute 31-1017

Department; flood plain management; powers and duties.

31-1017 Department; flood plain management; powers and duties. The department shall be the official state agency for all matters pertaining to flood plain management. In carrying out that function, the department shall have the power and authority to:

- (1) Coordinate flood plain management activities of local, state, and federal agencies;
- (2) Receive federal funds intended to accomplish flood plain management objectives;
- (3) Prepare and distribute information and conduct educational activities which will aid the public and local units of government in complying with the purposes of sections 31-1001 to 31-1023;
- (4) Provide local governments having jurisdiction over flood-prone lands with technical data and maps adequate to develop or support reasonable flood plain management regulation;
- (5) Adopt and promulgate rules and regulations establishing minimum standards for local flood plain management regulation. In addition to the public notice requirement in the Administrative Procedure Act, the department shall, at least twenty days in advance, notify by mail the clerks of all cities, villages, and counties which might be affected of any hearing to consider the adoption, amendment, or repeal of such minimum standards. Such minimum standards shall be designed to protect human life, health, and property and to preserve the capacity of the flood plain to discharge the waters of the base flood and shall take into consideration (a) the danger to life and property by water which may be backed up or diverted by proposed obstructions and land uses, (b) the danger that proposed obstructions or land uses will be swept downstream to the injury of others, (c) the availability of alternate locations for proposed obstructions and land uses, (d) the opportunities for construction or alteration of proposed obstructions in such a manner as to lessen the danger, (e) the permanence of proposed obstructions or land uses, (f) the anticipated development in the foreseeable future of areas which may be affected by proposed obstructions or land uses, (g) hardship factors which may result from approval or denial of proposed obstructions or land uses, and (h) such other factors as are in harmony with the purposes of sections 31-1001 to 31-1023. Such minimum standards may, when required by law, distinguish between farm and nonfarm activities and shall provide for anticipated developments and gradations in flood hazards. If deemed necessary by the department to adequately accomplish the purposes of such sections, such standards may be more restrictive than those contained in the national flood insurance program standards, except that the department shall not adopt standards which conflict with those of the national flood insurance program in such a way that compliance with both sets of standards is not possible;

(6) Provide local governments and other state and local agencies with technical assistance, engineering assistance, model ordinances, assistance in evaluating permit applications and possible violations of flood plain management regulations, assistance in personnel training, and assistance in monitoring administration and enforcement activities;

(7) Serve as a repository for all known flood data within the state;

(8) Assist federal, state, or local agencies in the planning and implementation of flood plain management activities, such as flood warning systems, land acquisition programs, and relocation programs;

(9) Enter upon any lands and waters in the state for the purpose of making any investigation or survey or as otherwise necessary to carry out the purposes of such sections. Such right of entry shall extend to all employees, surveyors, or other agents of the department in the official performance of their duties, and such persons shall not be liable to prosecution for trespass when performing their official duties;

(10) Enter into contracts or other arrangements with any state or federal agency or person as defined in section 49-801 as necessary to carry out the purposes of sections 31-1001 to 31-1023; and

(11) Adopt and enforce such rules and regulations as are necessary to carry out the duties and responsibilities of such sections.

NEED FOR PROPOSED STUDY

In 1994 the U.S. Army Corps of Engineers created a simple model of ice jam events in the Platte River valley, noted the lack of specific data needed to refine the model, created an ice data collection system, and suggested that a study be done upon the collection of such ice data. Without such study it can only be surmised by the USACE, NDNR, other agencies and citizens that the operation of the Loup Public Power District project contributes to ice jam flooding. Without an accurate model the State has no tools to predict, prevent or mitigate ice jam flooding. Many ice jam events have occurred in the project area, causing millions of dollars worth of damage. The NDNR is not capable of conducting a study but recognizes that the Army Cold Regions Research and Engineering Laboratory is capable of such study and cooperated with the USACE Section 22 study on Lower Platte River Ice Jam Flooding. NDNR has the data CRREL requested. LPPD should pay CRREL to perform the study to find out how its operations can be changed to prevent future flooding.

NEXUS TO PROJECT

Direct effects:

The operation of the Loup Public Power District project may directly affect ice jam flooding through the winter time changes in diversion of the Loup River at the time of frazil ice formation.

Indirect and cumulative effects:

The operation of the Loup Public Power District project may change the river contours, cause channel degradation, allow vegetative encroachment and otherwise impact the river's ability to carry the entire flow during those infrequent times when diversion is interrupted.

STUDY METHODOLOGY

The U.S. Army Cold Regions Research and Engineering Laboratory will gather ice data, including that data collected since the March 1993 ice jam flood, refine the predictive model for ice events, and study possible preventions and mitigations of ice jam flooding.

LEVEL OF EFFORT AND COST

The NDNR does not know the level of effort and cost the study would require. The NDNR believes only the U.S. Army Cold Regions Research and Engineering Laboratory is capable of conducting the study.

LITERATURE CITED

Loup River Hydroelectric Project
FERC Project N. 1256
Pre-Application Document
Volumes 1 and 2

Lower Platte River Ice Jam Flooding (attached)

Section 22

July 1994

Prepared by the Ice Engineering Research Branch, U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, NH, and Hydrologic Engineering Branch, Engineering Division, U.S. Army Engineer District in Omaha, NE.

RESPONSES TO STUDY REQUESTS

WHOOPING CRANE POWER LINE IMPACT EVALUATION

RESPONSE 1.0 WHOOPING CRANE POWER LINE IMPACT EVALUATION

Based on the following factors, the District proposes that the transmission and distribution line impact evaluation, as recommended by the U.S. Fish and Wildlife Service (USFWS), is not necessary to facilitate Project relicensing:

1. The District does not own any overhead transmission voltage lines (lines with a voltage above 115 kilovolts [kV]). The sub-transmission and distribution lines that the District owns are independent of the Project (are not interrelated or interdependent). These power lines would remain in use regardless of Project relicensing. The District's only overhead sub-transmission and distribution lines interrelated to Project operations are those located within the Project Boundary¹ that are used to provide power to the Project Headworks and developed recreation areas.
2. No whooping crane sightings have been documented within the Project Boundary. The nearest point of the Project Boundary is located approximately 35 miles east of the whooping crane's primary migration corridor,² as defined by the U.S. Geological Survey (USGS) (USGS, August 3, 2006), the Nebraska Game and Parks Commission (NGPC) (NGPC, November 2002), and USFWS (Stehn, June 1, 2007). This primary migration corridor is also referred to as the 100-mile-wide migration corridor by USFWS (Stehn, June 1, 2007). Maps showing these corridors are included at the end of this response.
3. Throughout the entire 100-mile-wide migration corridor, which spans from northern Alberta Canada to southern Texas, the USFWS report has not documented any whooping crane collisions with power lines east of the USFWS-delineated 100-mile-wide migration corridor (Stehn, June 1, 2007). The Project Boundary is located east of the migration corridor.

1.1 USFWS STUDY REQUEST

In response to the District's Pre-Application Document (PAD) (Loup Power District, October 16, 2008) and FERC's Scoping Document 1 (FERC, December 12, 2008), USFWS issued comments on these documents on February 9, 2009. On page 2 of its comment letter, USFWS recommended that the District evaluate all transmission and distribution lines owned and maintained by the District and/or power lines that are

¹ The Project Boundary is defined and shown in Figure 4-1, Sheets 1-14, in the PAD.

² All references in this document to whooping cranes and the whooping crane migration corridor are specific to the Aransas-Wood Buffalo National Park population, which migrates between Wood Buffalo National Park in northern Alberta Canada and the Aransas Wildlife Refuge in southeast Texas (Canadian Wildlife Service and USFWS, March 2007).

located within the Project Boundary for their potential to impact migrating whooping cranes.

1.2 DISTRICT RESPONSE TO STUDY REQUEST

The following sections detail the District's justification for proposing that the transmission and distribution line impact evaluation as proposed by USFWS is not necessary to facilitate Project relicensing.

1.2.1 Project-Associated Transmission Lines

Consistent with the following excerpt from Section 4.2.21 of the PAD, no overhead transmission voltage lines are included in the Project or contingent upon relicensing:

All power produced at the Monroe and Columbus powerhouses is sold at the on-site substations to NPPD. For this reason, no overhead transmission voltage lines are associated with the Project license. The District does own and maintain extensive overhead distribution voltage lines to serve customers throughout its four-county service area.

However, none of these lines are directly associated with the Project.

FERC defines transmission lines as being 115 kV and above. According to this definition, the District does not own any transmission lines. All transmission lines previously owned by the District were sold to the Nebraska Public Power District (NPPD) in November 1981. All lines currently owned by the District are sub-transmission or distribution lines.

The overhead sub-transmission and distribution lines associated with the District's four-county service area are independent of Project relicensing. These lines distribute power purchased from NPPD to the four-county area regardless of whether the power is generated at the Project or another power generating facility.

The only overhead power lines directly related to Project relicensing are the sub-transmission and distribution lines that provide power to the Project Headworks and developed recreation areas that are located inside the Project Boundary.

1.2.2 Whooping Crane Occurrences in the Project Boundary

There are no documented whooping crane sightings in the Project Boundary (NGPC, October 2, 2008).

The nearest point of the Project Boundary lays approximately 35 miles east of the USGS-delineated whooping crane primary migration corridor, an area in which 82 percent of all confirmed post-1949 sightings in Nebraska occur (USGS, August 3,

2006)³. USGS determined the primary migration corridor through Nebraska to be between 100 and 120 miles wide by plotting all of the confirmed sightings in the state during the last 30 years and drawing straight lines to enclose 70 to 100 percent of the sightings at each latitude (USGS, August 3, 2006). USGS goes on to state that “the remaining sightings [outside of the primary migration corridor] are primarily to the west [of the primary migration corridor].” As stated previously, the Project Boundary is 35 miles east of the primary migration corridor.

In its February 9, 2009, comment letter, USFWS states that the Project Diversion Weir lies within the migration corridor of the whooping crane. USFWS then provides the three whooping crane sightings nearest, but not within, the Project Boundary. The District provides the following clarifications to these statements:

- Concerning the USFWS definition of whooping crane migration corridor, USFWS is consistent with USGS and NGPC in assigning a 100-mile-wide migration corridor in which USFWS states that 82 percent of all known sightings have occurred (Stehn, June 1, 2007). The Project Boundary is approximately 35 miles east of this 100-mile-wide migration corridor, as defined by USFWS. Beyond the 100-mile-wide migration corridor agreed upon by multiple agencies, USFWS also defines a more liberal 200-mile-wide corridor in which an additional 12 percent of all known sightings have occurred (total of 94 percent of all known sightings) (Stehn, June 1, 2007). The Project is located within this expanded, 200-mile-wide corridor.
- The three documented sightings noted by USFWS represent isolated occurrences that span a 12-year time frame. The closest sighting was 3 miles west of the Project Boundary.

1.2.3 Whooping Crane Power Line Collisions

In a draft document by Mr. Tom Stehn, USFWS Whooping Crane Coordinator, titled “Whooping Cranes and Wind Farms – Guidance for Assessment of Impacts,” dated June 1, 2007, Mr. Stehn not only discusses the potential for whooping crane collisions with wind turbines, but also the potential for collisions with associated power lines (Stehn, June 1, 2007). Mr. Stehn states that along the entire 200-mile-wide migration corridor (Alberta to Texas), there are nine documented whooping crane collisions with power lines. Based on the location of the documented collisions in relation to the 100- and 200-mile-wide corridors, Mr. Stehn states that “The chance for a whooping crane colliding with a [wind] turbine or associated power line is much greater within the main 100-mile whooping crane migration corridor, less in the

³ NGPC has delineated a primary migration corridor which is very consistent with that delineated by USGS. NGPC also states that 80 percent of confirmed sightings occur within this corridor (NGPC, February 2002).

100 to 200 mile-wide corridor, and negligible outside the 200-mile corridor” (Stehn, June 1, 2007). More specifically, the document provides the following collision data:

- Seven of the nine collisions (77 percent) occurred within the 100-mile-wide corridor.
- One of the nine collisions (11 percent) occurred within the 200-mile-wide corridor, west of the 100-mile-wide corridor.
- One of the nine collisions (11 percent) occurred west of the 200-mile-wide corridor.

In summary, over the entire length of the primary migration corridor, there are no documented whooping crane collisions with power lines east of that corridor. The Project is located 35 miles east of the primary migration corridor.

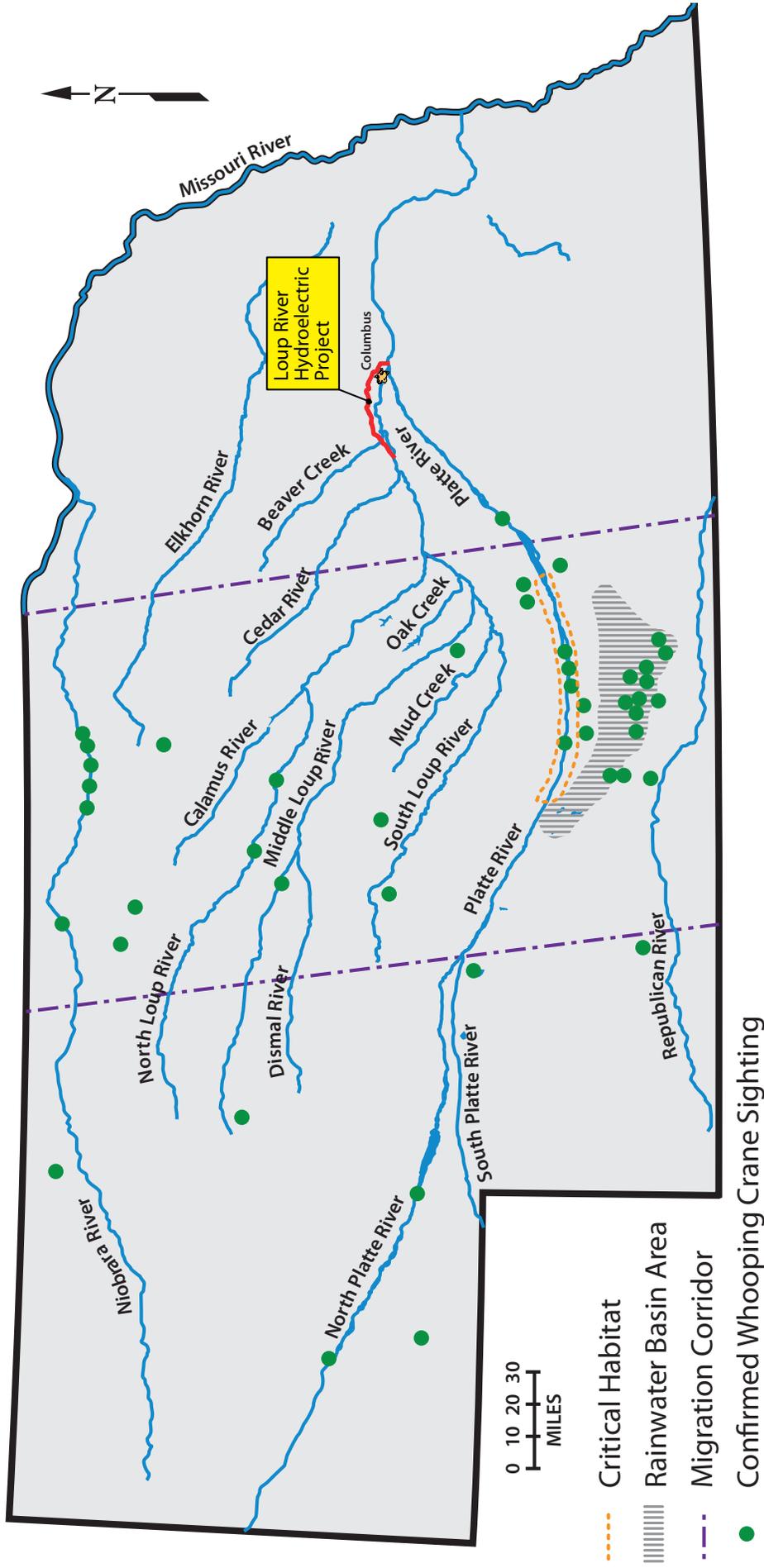
1.3 REFERENCES

- Canadian Wildlife Service and USFWS. March 2007. International Recovery Plan for the Whooping Crane (*Grus americana*). Ottawa: Recovery of Nationally Endangered Wildlife (RENEW) and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. Available online at http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf.
- FERC. December 12, 2008. Scoping of Environmental Issues for Relicensing the Loup River Hydroelectric Project. Office of Energy Projects. Washington D.C.
- Loup Power District. October 16, 2008. Pre-Application Document. Volume 1. Loup River Hydroelectric Project. FERC Project No. 1256.
- NGPC. November 2002. Whooping crane (*Grus americana*): Migration Distribution in Nebraska – February 2002. NE T.G. Notice 522, Section II, NRCS.
- NGPC. October 2, 2008. Personal communication (email) from Krystal Stoner, Environmental Analyst Supervisor, Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, to Melissa Marinovich, Environmental Scientist, HDR.
- Stehn, Tom. June 1, 2007. “Whooping Cranes and Wind Farms – Guidance for Assessment of Impacts.” U.S. Fish and Wildlife Service, Whooping Crane Coordinator. Available online at <http://www.neo.ne.gov/renew/wind-working-group/wind-whoopingcranes.pdf>.
- USFWS. February 9, 2009. Letter from June M. DeWeese, Nebraska Field Supervisor, to Ms. Kimberly Bose, Federal Energy Regulatory Commission, regarding comments on the Pre-Application and Scoping Documents for the Loup River Hydroelectric Project.

USGS. August 3, 2006. “Platte River Ecology Study: Whooping Cranes.” *Northern Prairie Wildlife Research Center*.

<http://www.npwrc.usgs.gov/resource/habitat/plriveco/wcranes.htm>.

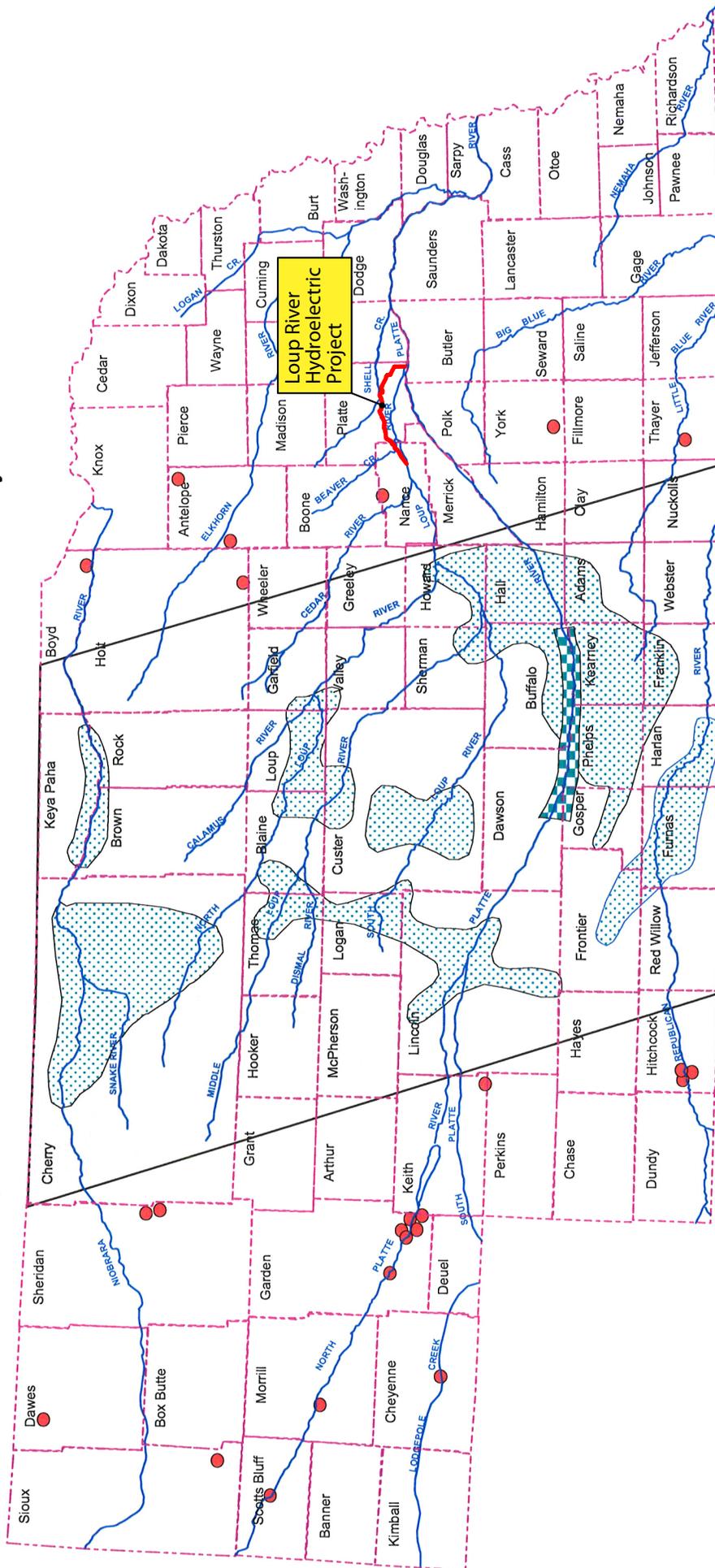
Loup River Hydroelectric Project location relative to whooping crane migration corridor and confirmed sightings (1950-spring 1980) in Nebraska.



Source: Basemap - USGS Platte River Ecology Study, Figure 13, accessed from <http://www.npwrc.usgs.gov/resource/habitat/plriveco/figures/fig13.htm>

Whooping Crane (*Grus americana*)

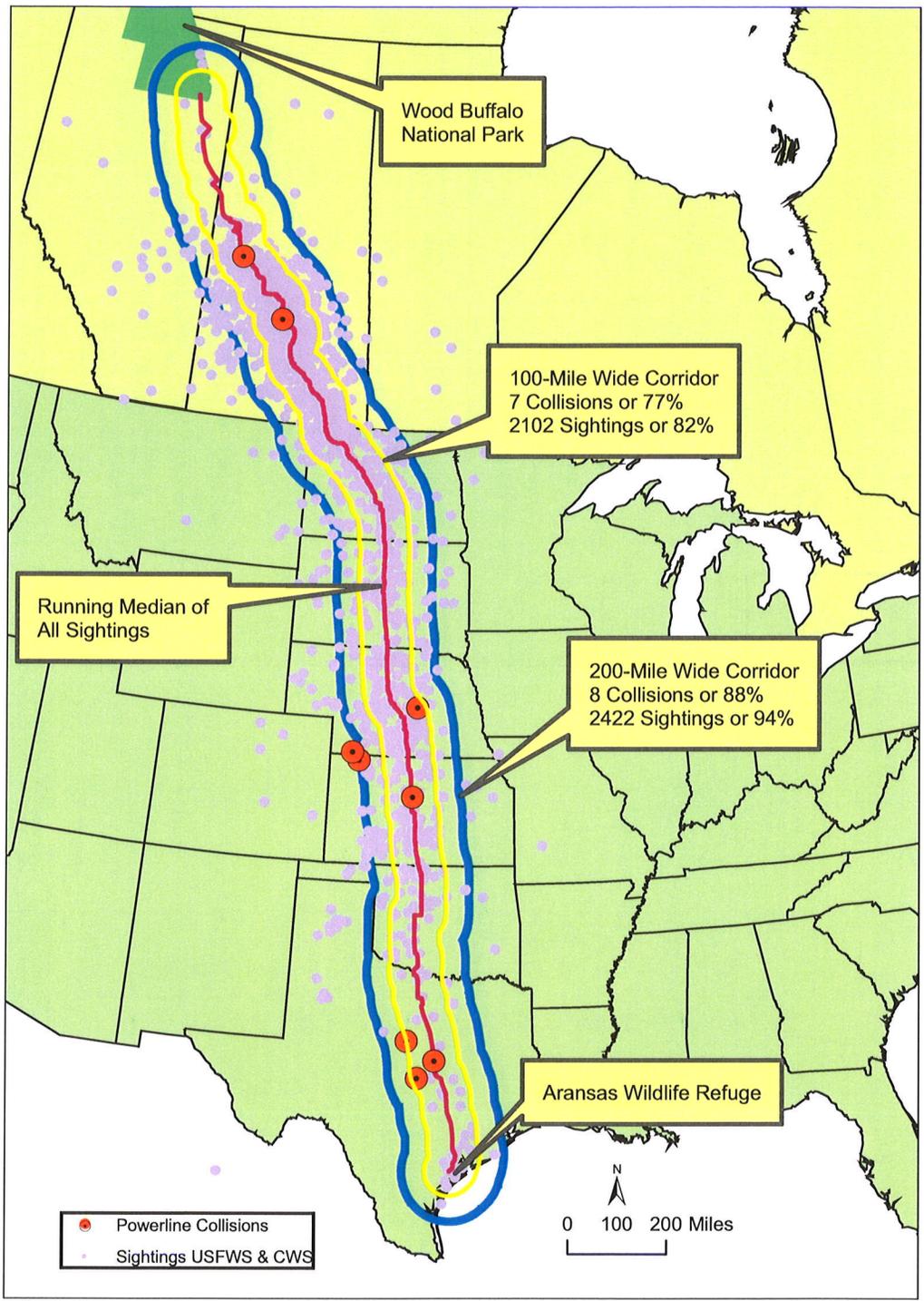
Migration Distribution in Nebraska - February 2002



-  CRITICAL HABITAT
-  ISOLATED SIGHTINGS
-  PRIMARY USE AREAS DURING MIGRATION
-  80% OF CONFIRMED SIGHTINGS AND PRIMARY MIGRATION CORRIDOR

NE T.G. Notice 522
Section II
NRCS-NOVEMBER 2002

NOTE: Loup River Hydroelectric Project has been superimposed on whooping crane migration corridor base map from Nebraska Game and Parks Commission.



Created by Tom Wassenich – Revised 2005

FLOW DEPLETIONS IN THE LOUP RIVER EVALUATION

RESPONSE 2.0 FLOW DEPLETIONS IN THE LOUP RIVER EVALUATION

Based on the discussion to follow, the District proposes that no study or further issue discussion is warranted during Project relicensing related to flow depletions in the Loup River upstream of the Project.

2.1 USFWS STUDY REQUEST

In response to the District's Pre-Application Document (PAD) (Loup Power District, October 16, 2008) and FERC's Scoping Document 1 (FERC, December 12, 2008), USFWS issued comments on these documents on February 9, 2009. On pages 10 and 11 of its comment letter, USFWS recommended that the District study the possible cumulative impacts of future water depletions on the Loup River above the Diversion Weir at Genoa on Federally listed species.

2.2 DISTRICT RESPONSE TO STUDY REQUEST

With regard to the study requested by USFWS and how this issue relates to Federal project review under the Endangered Species Act of 1973 (16 USC 1531 et seq.) and the National Environmental Policy Act (42 USC 4321-4347), the District provides the following information.

As noted in the PAD, Nebraska water law uses a priority and preference system to determine order of use for water. Priority is typically based on date of application, and preference is based on type of use. Under Nebraska's water preference system, domestic and agricultural water use outranks water used for industrial and power generation purposes. Therefore, although the District has the senior water right in most cases, it cannot prevent consumptive uses upstream of the point of diversion for water uses with a higher preference, nor can it speculate as to the amount and location of future uses.

Furthermore, in December 2008, the Nebraska Department of Natural Resources (NDNR) preliminarily declared the Lower Platte River Basin, which includes the Loup River, fully appropriated (NDNR, December 16, 2008). This preliminary determination imposed an immediate stay on construction of new water wells within the hydrologically connected areas within the Lower Platte River Basin, including the Loup River Basin. Existing wells and surface water appropriations will continue to operate and function as administered in the past; however, expansion of new water uses will require offsets¹ of equal amounts of water use, or in limited cases, exceptions and variances may apply. Additionally, municipalities and industries must track and establish baseline water uses for their existing levels of water development, and offsets will be required if water use increases above the baseline amounts.

¹ Offsets refers to retirement or reduction of existing water uses.

In accordance with NDNR’s preliminary determination described above, new or additional water uses within the Lower Platte River Basin, including the Loup River, will require providing offsets of equal amounts of existing water use. Therefore, future water use on the Loup River above the point of diversion at Genoa should not impact flow depletions on the Loup River or Project operations.

As a result of NDNR’s preliminary determination, and the discussion provided above, the District proposes that no study or further issue discussion is warranted during Project relicensing related to flow depletion in the Loup River upstream of the Project.

2.3 REFERENCES

FERC. December 12, 2008. Scoping of Environmental Issues for Relicensing the Loup River Hydroelectric Project. Office of Energy Projects. Washington D.C.

Loup Power District. October 16, 2008. Pre-Application Document. Volume 1. Loup River Hydroelectric Project. FERC Project No. 1256.

NDNR. December 16, 2008. 2009 Annual Evaluation of Availability of Hydrologically Connected Water Supplies: Determination of Fully Appropriated. Nebraska Department of Natural Resources. Lincoln, NE. Available online at <http://www.nlc.state.ne.us/epubs/N1500/A005-2009.pdf>.

USFWS. February 9, 2009. Letter from June M. DeWeese, Nebraska Field Supervisor, to Ms. Kimberly Bose, Federal Energy Regulatory Commission, regarding comments on the Pre-Application and Scoping Documents for the Loup River Hydroelectric Project.

RESPONSE 3.0

WATER QUALITY EVALUATION

RESPONSE 3.0 WATER QUALITY EVALUATION

Based on the following factors, the District proposes that the detailed water quality study of District waters, as proposed by the U.S. Fish and Wildlife Service (USFWS), is neither related to Project operations/relicensing, nor is it in the best interest of downstream water users:

1. PCB contamination is prevalent statewide and not analogous to the Project or associated with its operations. Although the Nebraska Department of Environmental Quality (NDEQ) has historically detected PCBs in fish tissue samples collected from the Loup Power Canal, NDEQ has identified neither a source, nor a responsible party for these detections.
2. Existing NDEQ sampling data shows a generally decreasing trend in PCB concentrations in fish tissue samples collected in the Loup Power Canal. The Loup Power Canal is scheduled for NDEQ fish tissue sampling during the summer of 2009, and it is very possible that this sampling effort could result in the removal of the fish consumption advisory currently associated with the Loup Power Canal.
3. The professional opinion of the NDEQ representative tasked to coordinate water quality standards in the State of Nebraska, Mr. John Bender, is that PCB sampling as proposed by USFWS could result in the resuspension of sediment-bonded PCBs (if PCBs are indeed present in benthic sediment) to the water column and ultimately result in conditions more environmentally damaging than those that currently exist.

In addition, because the Project is not a source of water quality pollutants and because the District has no authority to regulate off-site pollutant sources that drain to Project waters, the District maintains that it is not responsible for studying pollutant exposure pathways to the Platte River or developing non-point source pollutant prevention strategies for areas outside of the Project Boundary.

In summary, the District proposes that no water quality studies be required of the District during Project relicensing. The following details are provided to support this position.

3.1 USFWS STUDY REQUESTS

In response to the District's Pre-Application Document (PAD) (Loup Power District, October 16, 2008) and FERC's Scoping Document 1 (FERC, December 12, 2008), USFWS issued comments on these documents on February 9, 2009. On pages 14 through 16 of its comment letter, USFWS requests that the District perform the following studies in association with the relicensing process:

1. A “robust sampling survey” to evaluate total PCBs within the Project area and immediately downstream. The survey should be designed to evaluate PCB exposure and effects on fish and aquatic or aquatic-dependent wildlife by sampling to evaluate exposure pathways including water, sediment, and food items.
2. A study on non-source pollutant exposure pathways into the Project area. The study should be aimed at identifying strategies to reduce non-point source pollution (nutrients, pH, *Escherichia coli* bacteria, and atrazine) before it enters the Project area or is discharged from the Project area into the Platte River.

In addition to these two specific study requests (noted above), USFWS also provides in its February 9, 2009, comment letter four comments on the water quality sections of the PAD and associated Appendix E. As these comments all consist of minor issues that USFWS has identified with the content of the PAD and are not related to any formal study requests, comment responses are not provided in this study request response document.

3.2 DISTRICT RESPONSE TO STUDY REQUESTS

3.2.1 PCB Survey

Based on the following discussion, the District proposes that no PCB survey, beyond the standard fish tissue sampling already being performed by NDEQ, be required during Project relicensing.

Shared Position of NDEQ and the District

NDEQ is tasked with administering the water quality program in the State of Nebraska. As stated below, NDEQ is opposed to PCB sampling as proposed by USFWS and beyond what is already being performed in accordance with standard state water quality assessment methodologies. The District supports NDEQ’s position.

During the agency scoping meeting for the Project on January 12, 2009, and in the context of PCB-related issues and status at a state level, Mr. John Bender, NDEQ Water Quality Standards Coordinator, stated:

PCBs, mercury, and dieldrin are the three contaminants that we find statewide as giving us a problem with fish tissue. Not necessarily in this locale [Loup Power Canal], but throughout the state. PCBs are in any part of the state. It’s not just restricted to the Columbus area. We’ve got it in the lower Platte region. We’ve got it in the Elkhorn. We’ve got it in the Missouri River. We’ve even got it out near North Platte.

NDEQ has not identified a source or a responsible party for the PCBs detected in the Loup Power Canal.

During the same agency scoping meeting and in the context of concentration trends of PCB sampling performed in the Loup Power Canal to date, Mr. Bender stated:

In my mind the [PCB] levels that we're finding [in the Loup Power Canal] are decreasing. If we had a null hypothesis, it would be that we wouldn't find PCBs this summer,¹ and then we could remove that impairment from our 303(d) list.

Also during the agency scoping meeting and concerning the risks associated with performing extensive PCB sampling beyond the fish tissue sampling already being performed, Mr. Bender went on to state:

I guess even if we did find low levels of PCBs that triggered continued listing [on the state's 303(d) list], what we know about this compound is that it's probably better leave it in place rather than digging up the countryside and remobilizing it. So the end result in my mind, at least from the environmental agency, would be to leave it in place and accept the low level of leaching because we are not using it. It's been banned [the manufacture of PCBs was stopped in the U.S. in 1977]. We don't have it in use anymore, and the only projection is that in the future, it will degrade. It's better to accept the low level of it rather than mobilize it and get an extreme amount over a short period of time.

Analysis of Existing NDEQ Fish Tissue Sampling Data

USFWS, on page 15 of its February 9, 2009, comment letter, makes several references to NDEQ's existing PCB fish tissue sampling data, provided in Table 1.

¹ NDEQ is scheduled to perform its standard fish tissue sampling of the Loup Power Canal during the summer of 2009. Data collected during this sampling event will determine if a fish consumption advisory will remain in effect for the Loup Power Canal.

Table 1. NDEQ Fish Tissue PCB Sample Results

Waterbody	Date	PCB-1248 ^a (mg/kg)	PCB-1254 ^a (mg/kg)	PCB-1260 ^a (mg/kg)	Total PCBs (mg/kg)
Loup Power Canal	10-18-93	0.087	0.059	0.027	0.173
	08-07-94	0.084	U	U	0.084
	08-07-94	0.240	U	U	0.240
	08-07-94	0.260	0.035	U	0.295
	09-16-98	U	U	U	0.000
	08-04-99	0.058	U	0.031	0.089
	08-04-99	0.059	U	0.029	0.088
	08-04-99	0.053	U	U	0.053
	09-29-04	U	U	U	0.000
	08-12-05	U	0.061	U	0.061
	08-12-05	U	U	U	0.000
	08-12-05	U	0.042	U	0.042

Source: NDEQ, November 24, 2008, Sample Data, PCB Concentrations of Fish Tissue in the Loup Power Canal, provided via email from John Bender, NDEQ, to Matt Pillard, HDR.

Notes:

^a U = non-detect = 0.00 for mean calculations as defined in the section titled Analysis of Existing NDEQ Fish Tissue Sampling Data, below.

The District provides the following clarifications with regards to the analysis of this data, as provided by USFWS:

1. USFWS mistakenly states that the highest PCB concentrations collected in the Loup Power Canal (295 µg/kg) were sampled in 1998. This concentration was actually sampled in 1994. This clarification that the highest PCB concentration was sampled 4 years earlier than the date cited by USFWS, and during only the second year of PCB sampling in the Loup Power Canal (11 years prior to the most recent sampling event of 2005), provides further support to the statement made by Mr. Bender during the agency scoping meeting on January 12, 2009, that PCB concentrations in fish tissue samples collected in the Loup Power Canal are decreasing (as quoted in the section titled Shared Position of NDEQ and the District and shown in Table 1, above).

2. USFWS provides mean total PCB concentrations for samples collected between 1993 to 1999 and 2004 to 2005 without including non-detect samples in their mean calculations. As stated in the following excerpt from “Methodologies for Waterbody Assessments and Development of the 2008 Integrated Report for Nebraska” (NDEQ, November 2007), non-detect samples should be included in data analysis:

Section 2.5.7 Values Below Detection Limits:

“...measurements below detection limits may provide valuable information on situations where pollutants and pollutant loads are not a concern. Finally, elimination of the low-end values may skew a data set.”

To accurately depict the mean value of PCB concentrations in the collected fish tissue samples, a value of 0.00 should be used for any sample listed as non-detect. The assignment of this value is based on NDEQ’s “Findings of the 2005 Regional Ambient Fish Tissue and Follow-Up Programs in Nebraska” (NDEQ, December 2006), which states that “the concentration of a contaminant in the fish tissue was used as the exposure concentration. Contaminants present below the target reporting limit were considered not to occur in the sample.”

When non-detect readings are included as 0.00 values in NDEQ fish tissue sample mean total-PCB calculations, the 1993 to 1999 value is 128 (± 99 – standard deviation), instead of the 146 (± 91) as calculated by USFWS. Furthermore, when non-detects are accounted for, the mean value of the 2004 to 2005 samples is 26 (± 30), instead of the 52 (± 13) as calculated by USFWS. USFWS states that due to small sample size and high variability between samples, the difference in the USFWS-calculated mean values was not significant. By the definition of statistical significance for comparing two means, this is true. The difference between the mean values calculated using the non-detect samples is also not significant; however, the following discussion describes how a sample of this (small) size cannot be significantly different, regardless of mean values:

Comparing the mean values at a 95 percent confidence interval yields results indicating that mean concentrations of PCBs in the two sample groups are not significantly different. However, comparison of the standard deviations using a power test indicates that due to the small sample size $n=12$ (eight samples from 1993 to 1999 and four samples from 2004 to 2005), there is insufficient data to avoid Type II errors in a test comparing the two sample means. Under the null hypothesis, the mean concentrations of PCBs are equal; however, the sample lacks the power in this statistical test to reject the false null hypothesis (that is, even if all of the 2004 to 2005 samples were non-detect, the mean would not be significantly different

from the mean of the 1993 to 1999 samples). Furthermore, the power test indicates that an approximate total sample size of $n=26$ would be required to compare the difference between the two sample means (0.128 mg/kg and 0.026 mg/kg) and minimize the probability of type II errors.

Summary

The mean values of total-PCB concentrations of fish tissue samples in both the 1993 to 1999 and 2004 to 2005 sample groups are smaller than those depicted by USFWS. Furthermore, the sample size (as administered by NDEQ in association with standard water quality sampling protocols in the State of Nebraska) is not adequate to establish a statistically significant difference between the two sample groups, regardless of calculated mean values. The small sample size also nullifies attempts to apply a statistical trend analysis to samples collected in both the Loup Power Canal and the Platte River (segment LP1-20000).

As existing data is not sufficient to apply statistical calculations, the data must be looked at in a more basic manner. When both the individual sample concentrations and the group sample mean concentrations are compared (without statistical analysis), the concentrations of total-PCBs are decreasing in fish tissue samples collected in the Loup Power Canal. This is consistent with and supports Mr. Bender's statements during the agency scoping meeting on January 12, 2009.

With regards to the potential argument that the lack of statistically sufficient sample data only lends itself to additional, more extensive sampling, the District supports Mr. Bender's statement made during the agency scoping meeting on January 12, 2009, concerning his preference not to pursue sediment samples that could result in PCB resuspension and more detrimental water quality effects.

3.2.2 Non-Source Pollutants

The USFWS recommendation for a study on non-source pollutant exposure pathways into the Project area is not related to the Project or the relicensing process; therefore, the District opposes a study related to this issue.

USFWS states that "the Loup Power Canal Project Area is not likely a source for atrazine, nutrients, and/or *E. coli*" (USFWS, February 9, 2009). The District concurs with this statement and notes that it effectively discounts the Project as a pollutant source; therefore, the District should not be responsible for funding a study of pollutants that do not originate in the Project Boundary and none of which would be influenced by the relicensing decision. Furthermore, it is the U.S. Environmental Protection Agency that is tasked with enforcing the Clean Water Act and its associated nonpoint source pollution regulations, not the District. As the District has no regulatory jurisdiction regarding pollutant minimization strategy enforcement on properties not owned by the District that drain to Project waters, the District cannot be held accountable for, or expected to study, pollutants that originate off-site.

3.3 REFERENCES

FERC. December 12, 2008. Scoping of Environmental Issues for Relicensing the Loup River Hydroelectric Project. Office of Energy Projects. Washington D.C.

Loup Power District. October 16, 2008. Pre-Application Document. Volume 1. Loup River Hydroelectric Project. FERC Project No. 1256.

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NDEQ. November 2007. “Methodologies for Waterbody Assessments and Development of the 2008 Integrated Report for Nebraska.” Nebraska Department of Environmental Quality, Water Quality Division.

NDEQ. November 24, 2008. Sample Data, PCB Concentrations of Fish Tissue in the Loup Power Canal. Provided via email from John Bender, NDEQ, to Matt Pillard, HDR.

USFWS. February 9, 2009. Letter from June M. DeWeese, Nebraska Field Supervisor, to Ms. Kimberly Bose, Federal Energy Regulatory Commission, regarding comments on the Pre-Application and Scoping Documents for the Loup River Hydroelectric Project.