



Meeting Notes

Project: Loup River Hydroelectric Project FERC Project No. 1256	
Subject: Agency Follow-up Meeting – Study Needs	
Meeting Date: July 24, 2008, 9:00 am – 1:30 pm	Meeting Location: Holiday Inn Express, Columbus, NE
Notes by: HDR	

Attendees: See Attached

Meeting Agenda:

1. Welcome/Introductions
2. Summary of June 25th Meeting
 - Overview of Key Issues
 - Workgroups
3. Discussion of Potential Studies
4. Next Steps

Discussion:

1. Welcome/Introductions

The purpose of the meeting was to discuss the potential studies to be performed to address Project related issues. Introductions were made and the two NGO's present at the meeting provided a description of their group's mission and activities:

- The Tern and Plover Partnership provided that they are advocates for the species and look for ways for industry and bird populations to co-exist.
- The Nebraska Off-Highway Vehicle Association (NOHVA) is a 3500 member organization that manages 5 facilities. The Headworks Park property that they manage in association with the District is an important destination and their organization values this facility.

2. Summary of June 25th Meeting

The issues identified at the meeting on June 25th were presented in summarized form (see attached). This was used to frame the discussion of the days meeting. The question was asked if there were any new issues to add or issues to table/eliminate.

- The NGPC asked that the river otter be added to the list, noting that there is little information available about the river otter in this reach of the Loup River.
- The DNR added that an expansion of the Just Compensation issue is that compensation to the district from irrigators for lost power generation should depend on where the withdrawal point is located within the system.
- It was noted that threatened and endangered species issues are threaded through many of the issue groupings.

- NPPD added that another key issue is the economic value of the established load following aspect of project operation (hydrocycling). They are also interested in any future limitations on project operations as might result from the relicensing process.

Recreation Work Group Report

Dave Tunink (NGPC) provided a summary of the Recreation Workgroup discussions:

- The workgroup discussed issues and possible studies related to recreation, land use, and aesthetics. Recreational components included outdoor recreation, trails, fishing, boating/canoeing, and access. Land use issues involved conflicting land uses and access conflicts. The group noted that aesthetics can be a difficult item to address.
- The workgroup identified the following potential studies/data needs:
 - Recreation: review of existing resources, recreational user survey, evaluation of hunting opportunities, coordination with CART, angler and creel survey, and development of an overall recreation plan.
 - Fisheries: develop a fisheries plan and provide for improved fisheries at Lake North via jetties or brush piles. Fish passage at the diversion may also be an issue.
 - Land use: evaluate location of access points and identify any conflicting land uses.
 - Aesthetics: there are multiple ways to study aesthetics, but there may not need to be a study for this project.

NGPC asked if coordination with agencies would be beneficial through the FERC licensing process. HDR responded that yes, coordination is absolutely beneficial.

NGPC would like access to the canal to do fish surveys. The purpose is to sample species distribution, densities, and other details. The District is working with them to find locations.

NGPC also noted that the economic impacts associated with recreation could also be evaluated. This information could be gathered from the recreation use survey. NOHVA added that they did an economic survey in 2003 and could do another one. They can also get input from their national organization regarding economic impacts.

From a land use perspective, one potential conflict is that the Headworks OHV Park may provide access to exposed sand areas in the Loup River. Beyond the District property line, this constitutes trespass on private property. NOHVA noted that there is a sign at east end of the park noting that riding on private property is trespassing to discourage this practice. As organization policy, NOHVA does not encourage trespass and tries to inform/educate others. The Tern & Plover Conservation Partnership noted that off-road vehicles, in general, are believed to account for the largest loss of tern and plover nests.

Water Rights Report

Jean Angell (NDNR) provided a summary of the Water Rights Workgroup discussions:

- DNR and the District have been providing information to the group relative to the issues identified, including: a map of local irrigators, list of appropriators, irrigation agreements, relevant state statutes, information from the current license. The group discussed this information and will be sharing more information in the future.
- Issues still under discussion and research include:
 - How much water can be used for irrigation and still have the Project be economically viable. The group discussed this and it was noted that irrigation would only affect operations for part of the year, the cost of replacement power will continue to increase, and it would require irrigation of approximately 300,000 acres of land to utilize all the District's water (based on 1 cfs/70 acres).

- Does the lake need to be full to provide head for operating only one turbine? The district will provide this information.
- Overall the Water Rights Workgroup feels that these issues can be addressed through information exchange over the next couple of months.

A question was asked about how the cost of replacement power is figured to establish just compensation. NPPD position is that the cost of replacement is the value of the cost to purchase replacement power, which may or may not cover actual operational costs. The District's determination of the cost of replacement may be different.

3. Discussion of Potential Studies

HDR provided clarification on how the study request process works. The District is not requesting Formal Study Requests at this time. That request will be made by FERC as part of scoping. Process for developing final study plan:

- District will identify a preliminary list of requested and proposed studies in the PAD (based on input from 2008 agency discussions)
- FERC will issue Scoping Document which asks agencies to submit formal study requests.
- FERC will conduct scoping meetings (and receive comments).
- *Agencies provide comments on scoping document and PAD and submit formal study requests.*
- FERC may issue second Scoping Document if needed based on comments
- District prepares Proposed Study Plan
- District conducts Study Plan meeting (and receives comments)
- *Agencies provide comments on Proposed Study Plan*
- District may develop Revised Study Plan if needed
- FERC issues a Study Plan Determination, noting final list of studies District will be required to perform for relicensing.
- *Agencies may submit formal study disputes if there are concerns about proposed studies*
- Study Plan will be approved if there are no disputes.

It was noted that the Endangered Species Act (ESA) process is a separate process in which Loup will be working with the USFWS and that the information needs and studies related to various issues will apply to the ESA process as well as the ILP process.

The group discussed possible studies for the following issues. These discussions focused on identifying elements to be considered relative to the issue, resources that are affected by the issue, what question about that resource would a study answer, how could it be studied, what data is available, and what data is needed? For each issue, it was discussed that identifying the Project's effect to the issue will be important to determine.

Water Temperature

Elements of consideration for Project-effects to temperature:

- Flow
- Ambient air temperature
- Water temperature
- Season of interest is June to September
- Critical reach is bypass reach from headgates to Beaver Creek confluence

Resources potentially affected:

- Fisheries

- Tern and plover food sources
- Pallid sturgeon spawning

Possible ways to study:

- Monitor water temperature, air temperature and flow rate. Develop thermographs and temperature modeling for the Loup River bypass reach and the Platte River below the tailrace outlet weir.

Questions to be answered:

- When (combination of air & water temperature and flow) will Loup River temperatures downstream of the headworks diversion point reach critical thermal max thresholds for species?
- Do water pulses associated with hydrocycling change downstream water temperatures enough to affect pallid sturgeon spawning?

Data Needed:

- Temperature & flow data
- Species critical thermal max & pallid sturgeon spawning temperature range

Discussion:

- Dewatering of the Loup River system downstream of the headgates to the mouth and the Platte River system from the Loup River confluence to the District tailrace increases water temperatures which affects the fish community and macroinvertebrates.
- Hydropower cycling will affect temperatures in the Platte River from the District tailrace to the mouth which affects the fish community (including pallid sturgeon) and macroinvertebrates.
- Macroinvertebrates are likely to be more affected by flow than temperature.
- NGPC would prefer to see Lake North full of water for fisheries resources.
- NHHS noted that public water wells could be affected by increased temperature of surface water in areas where there is a direct interconnection.
- There has been at least one documented fish kill in the power canal. This resulted from reduced DO levels that occurred during a reduced flow period for turbine refurbishment at Monroe Powerhouse. The District has made operational modifications to avoid future issues.
- NGPC discussed fisheries in the canal as a good fisheries area. The need to understand the temperature change compared with species critical thermal max thresholds is needed.
- What will temperature affects be in the future considering *NDNR estimates (1,536 cfs decline in 25 years at the North Bend streamgage and a 2,768 cfs decline in 25 years at the Louisville streamgage)*?
- How much of the temperature impacts are related to hydro project operation?

Sediment Budget, Sandbars, Sediment deprived flow into Platte River system

Elements of consideration for Project-effects to sediment:

- Flow
- Duration
- Sediment supply
- Sediment composition (grain distribution)
- Sandbar formation
- Sandbar erosion
- Bank erosion
- Sediment carrying capacity

Resources potentially affected:

- Tern and plover food source
- Tern and plover nesting habitat
- Fisheries
- Invertebrates
- Macro invertebrates

Possible ways to study:

- Sediment budget
- Review rating curves
- Establish relationship between stage/discharge and elevation of sandbars
- Timing of potential re-suspension of sediment
- Aggregation/degradation analysis

Question to be answered:

- How do Project operations affect sediment budget (current sediment load from the tailrace)?
- To what degree does current and future sediment supplies affect habitat for terns and plovers?
- Will the possible studies answer these questions?

Data Needed:

- Aerial photographs
- Flow information
- Sediment sampling (grain size distribution)
- Bed elevation changes
- Water quality information

Discussion:

- Need to isolate cause and effect related to hydro project operation.
- Affects of bank stabilization on sediment load.
- Review of aerial photos may not be helpful for review of historical sandbar formation and channel erosion because high flows have a major affect on channel formation.
- Channel entrenchment
- Less moist soil interface
- Prevalence of invasive plant species (includes exotics and expansion of native plants) – stabilizes soil and diminishes native vegetation diversity
- Natural vegetation can be affected
- Can sediment removed at the settling basin be put back into the river during high flows?

Hydrocycling

Elements of consideration for Project-effects to hydrocycling:

- Temperature
- Flow and timing of flow
- Change of stage
- Sediment carrying capacity
- Ramp up and ramp down rates

Resources potentially affected:

- Tern and plover food source

- Tern and plover habitat
- Fisheries
- Invertebrates
- Macro invertebrates
- Pallid sturgeon
- River otter
- Power generation operations and economics

Possible ways to study:

- Hydraulic model
- Difference of flooding nests relative to natural flows in comparison to flows with hydrocycling

Question to be answered:

- How does flow affect physical habitat (bar formation, foundation, erosion)
- Effects of operation on hydrocycle stage
- Effects of hydrocycling on erosion of sandbars
- Evaluation of peak flows compared to hydrocycling – effect on sandbars
- Effects on stage to pallid issue – how it effects physical habitat

Data Needed:

- Additional flow information (more gauges)
- Sandbar elevations
- Cross sections
- Determination of bed degradation (hydraulic modeling or physical studies) would help determine physical habitat needed for pallid

Discussion:

- Hydrocycling has less proportional effect with higher flows.
- Wetness of sand and how it affects macro invertebrate drift densities
- Flow magnitude affects sandbar formation – by itself apart from sediment flows
- The proportion of tern & plover nests are lowest in the upstream portions of the lower Platte River, and numbers generally increase towards Plattsmouth (thus more habitat exists further down stream on the Platte River).
- Does hydrocycling actually benefit terns & plovers by prompting them to build their nests on higher sandbars?
- There is always some flow in the tailrace due to leakage and inflow from Lost Creek storm control project
- Can information from other studies provide information relevant to the Project (ex. Platte River stage change study)
- How does hydrocycling affect vegetation on sandbars and shoreline?
- Historic high flows in late May/ early June aid in regenerating barren sandbars through erosion and sediment mobilization.
- Hydrocycling may facilitate sandbar erosion later in the nesting period (late June through August).

4. Next Steps

Work Groups will continue to meet to discuss studies and resolve issues. The Tern and Plover Partnership and NOHVA would like to be added to the Recreation/Land Use/Aesthetics Workgroup. Gene Zuerline (NGPC) would like to be added to the Water Rights Workgroup.

The need for another group meeting was discussed. It was decided that another group meeting would be needed to discuss the remaining issues to identify potential study needs. Those issues are:

- Flow depletions on the Loup River bypass reach (below the diversion)
- Flow depletions on the Loup river above the diversion
- Flow depletions on the Platte River system
- Dredging and discharge at the settling basin
- Hydraulic habitat connectivity and distribution
- Vegetation species composition and distribution

The meeting will be held on August 19. Time and place to be determined.

The following are USGS Questions related to FERC relicensing and operations of LPD. The questions are not intended to imply known effects of LPD operations on the Loup-Platte river systems, but rather to suggest some questions that may be relevant to LPD and agencies interested in understanding the LPD operations for the purposes of FERC relicensing. The core subject of each series of questions is in bold, italics, and underlined.

1. LPD operations have the potential to affect **water temperature** in several ways, some of which are listed below:
 - a) Diversion of Loup River water has potential to affect temperature by:
 - i. increasing temperatures in the Loup River below LPD headworks by decreasing flow depths and, potentially turbidity; the LPD effects on the lower Loup may have an effect on water temperature in the Platte River below the confluence.
 - ii. water in the LPD canal, holding basins, and reservoirs undergoes temperature alterations that are subject to water depth and time/surface area in contact with atmosphere; thus temperature of tailrace water may have an effect on water temperature on the lower Platte River.
 - b) Hydrocycling has the potential to affect water temperatures in the lower Platte. The lower Platte is a wide and shallow river (very high width to depth ratio), and as such is more sensitive to air temperature fluctuations than a river with equivalent hydrology, but lower width to depth ratios. As a result, hydropower operations have the potential to affect especially the daily maximum water temperature by changing water depths in the channel over a power cycle. This is of special concern during the mid to late-summer season when large percentages of the discharge of the lower Platte River are from the Loup River and LPD tailrace, and when daily maximum temperatures are most likely to reach levels causing maximum stress to aquatic biota. The biological stress may be direct effects of high water temperatures or by indirect effects as water temperature affects dissolved oxygen concentrations and stream metabolism processes.
2. Diversion of the Loup River at LPD headworks diverts sediment and water. The sediment must be removed for maintenance of the power canal, and protection of the turbines. This has the potential to affect the **sediment budget** of the Loup-Platte river system in several ways, some of which are:
 - a) Reduction of sediment supply in Loup River below LPD headworks. The reduction in supply may be less important when both water and sediment supply are reduced, but possibly more important during larger magnitude annual channel maintenance floods, when sediment would be more likely to be mobilized from bar and bank storage, which consequently may become depleted over longer time scales.

- b) Reduction of sediment supply in Platte River below Loup River confluence. Water from the LPD tailrace canal enters the lower Platte River essentially as 'clear' water, and as such contributes energy for transporting sediment, but virtually no sediment. The clearwater contribution from the LPD tailrace may create a sediment deficit similar to the J2 return from NPPD on the Central Platte. A sediment deficit may be expected to result in channel bed, bar, and bank degradation.
 - c) Alteration of sediment particle-size distributions by:
 - i. Alteration of sediment supply from headworks diversion and sediment trapping of coarse fraction, ultimately affecting bed sediment particle sizes in lower Platte River below Loup River confluence and LPD tailrace.
 - ii. Potentially reduced sediment supply, may have effects on sediment transport rates during seasonal floods. For example, increased daily transport rates from hydrocycling may cause the sediment supply on the bed of the river to coarsen downstream, which may decrease overall transport rates.
3. LPD hydropeaking (hydrocycling) from the Loup tailrace canal may affect sandbars in the lower Platte by:
- a) Wave action on bars may increase bar degradation by scalloping banks, increasing bank slopes, and subsequent increased sloughing of sediment from bars into deeper portions of the channel; this ultimately may reduce elevation differential between bar and bed elevation (implications for bird and fish habitat respectively).
 - b) Rapidly changing sediment transport rates from hydropeaking (sometimes in conjunction with seasonal floods) may affect the type, size, and distribution of bar and bedforms (implications for distribution and abundance of types of hydraulic habitat).
4. LPD operations may affect hydraulic habitat connectivity and distribution in several ways, including:
- a) At times of the year when LPD headworks are diverting large proportions of the Loup River discharge, reduction of flows in the LPD headworks may cause disconnection of channel habitats between and within channels of the lower Platte and Loup Rivers.
 - b) LPD hydrocycling may change hydraulic habitat (combinations of water depth and velocity) connectivity and distribution by:
 - i. Reduced flows in the Loup and Lower Platte during times of water storage in LPD canals and reservoirs may cause deep thalwegs to become discontinuous habitats or patch habitats to disconnect from the main flow. Some organisms may become

stranded and unable to reach refugia where they can survive the low-flow condition.

- ii. Altering the bed configuration (types and distributions of bedforms) of the Lower Platte during ramping operations, may have an effect on the spatial and temporal distribution and abundance of some specific hydraulic habitats preferred by or critical for aquatic species.

- 5. LPD operations may affect *vegetation species composition and distribution* in the Loup-Platte River system in several ways, some of which are:
 - a) Alteration of bar substrate moisture content through hydrocycling (alteration of the hydroperiod).
 - b) Alteration of vegetation establishment success through alteration of growth substrate resulting from potential alteration of the sediment supply and particle size distribution.
 - c) Disturbance of vegetation hydrochory due to hydrocycling.
 - d) Alteration of plant seedling and sapling population survival due to potential alteration of bank and bar erosion patterns and scalloping and sloughing of banks.



Attendance by Meeting

Hydroelectric Relicensing FERC Project No. 1256

Meeting Type: Agency
Meeting Name: Agency Meeting
Date: 7 /24/2008
Time: 09:00 AM
Location: Holiday Inn Express

Name	Organization	Contact Type
Jean Angell	Nebraska Department of Natural Resources	Agency - Local
Brian Barels	Nebraska Public Power District	Agency - Local
Mary Bomberger Brown	Tern and Plover Conservation Partnership	NGOs & Stakeholders
Ben Dietsch	U.S. Geologic Survey	Agency - Federal
Pat Engelbert	HDR Engineering, Inc.	HDR
Jim Frear	Loup Power District	LPD Project Team
Dennis Grennan	HDR Engineering, Inc.	HDR
Robert Harms	U.S. Fish and Wildlife Service	Agency - Federal
David Jundt	Nebraska Department of Health and Human Services;	Agency - Local
Robert Mohler	Lower Loup Natural Resources District	Agency - Local
Dan Nitzel	NOHVA	NGOs & Stakeholders

Name	Organization	Contact Type
Matt Pillard	HDR Engineering, Inc.	HDR
Lisa Richardson	HDR Engineering, Inc.	HDR
Jeff Runge	U.S. Fish and Wildlife Service	Agency - Federal
Henry Santin Jr.	Nance County	Agency - Local
Jeff Schuckman	Nebraska Game and Parks Commission	Agency - Local
John Shadle	Nebraska Public Power District	Agency - Local
Bill Sigler	HDR Engineering, Inc.	HDR
Phil Soenksen	U.S. Geologic Survey	Agency - Federal
Kristal Stoner	Nebraska Game and Parks Commission	Agency - Local
Neal Suess	Loup Power District	LPD Project Team
Martha Tacha	U.S. Fish and Wildlife Service	Agency - Federal
Dave Tunink	Nebraska Game and Parks Commission	Agency - Local
George Waldow	HDR Engineering, Inc.	HDR
Stephanie White	HDR Engineering, Inc.	HDR

Name	Organization	Contact Type
Gene Zuerlein	Nebraska Game and Parks Commission	Agency - Local