

# The Loup River Hydroelectric Project

## Review of Study Plan Determination Letter

January 5, 2010

The logo for the Loup Power District Hydro Project is located in the bottom right corner. It features a stylized graphic of three curved lines in shades of green and blue, resembling a wave or a dam structure. Below this graphic, the text "Loup Power District" is written in a smaller font, and "Hydro Project" is written in a larger, bold font.

Loup Power District  
Hydro Project

# Study 1 - Sedimentation

## Objective 2 – Characterizing Stream Morphology

“....the District shall also synthesize a flow record for and survey at least one cross-section in the lower Platte River between the Loup River and tailrace canal confluences and at least one for the lower Platte River within 5 miles downstream of the tailrace canal. Because this analysis will be used to assess any project-induced sedimentation effects on interior least tern and piping plover nesting and pallid sturgeon habitat, the District shall, to the extent possible, survey the cross-sections in the late spring to early summer period (i.e., mid- May to mid-June) to coincide with the beginning of the interior least tern and piping plover nesting period. This time period would also coincide with the presumed pallid sturgeon spawning period (NGPC 2008a).”

# Study 1 - Sedimentation

Objective 3 – Determining relationship between sediment transport and interior least Tern and piping plover nest counts and fledge success

“We have modified Task 4 under Objective 2 to require that the District survey at least two additional cross-sections on the lower Platte River and include these additional sites as part of a spatial analysis of project effects on channel morphology.”

# Study 1 – Sedimentation Data Gathering Summary

## Objective 2 – Characterizing Stream Morphology

- Synthesize flow record and survey one cross-section at
  - lower Platte River between the Loup River and tailrace canal confluences
  - at least one for the lower Platte River within 5 miles downstream of the tailrace canal
- mid- May to mid-June

## Objective 3 – Determining relationship between sediment transport and interior least Tern and piping plover nest counts and fledge success

- Use above data for spatial analysis

## Study 2 - Hydrocycling

- i. "Therefore, the District shall conduct a modeling study of the effects of hydrocycling on interior least tern and piping plover nesting habitat using the HEC-RAS 1D steady state back-water model and associated methodology for model calibration specified in HDR (2008). The District shall select a representative study site, in consultation with the FWS and Nebraska Game and Parks Commission (Nebraska GPC), in the following reaches: (a) in the Plate River below the Loup River confluence and above the project tailrace, (b) within five miles downstream of the project tailrace, and (c) near the USGS North Bend gage station. The selected study site would preferably include areas where interior least terns and piping plovers have historically nested."

*(continued)*

# Study 2 – Hydrocycling

*(continued)*

“Data collected shall include flow quantity, depth, velocity, sandbar elevation, and bed form (HDR 2008). Cross-sectional measurements to calibrate the model should be done immediately prior to the nesting season (first week in May) and again at the end of the nesting period (first week in August). The length of each cross-sectional measurement should be of sufficient length to capture the full range of flow (based on historical records for the area) expected at the each study site. The District shall photo document the cross sections. After calibration, the model shall be run to model existing operations and run-of-river operations and any other operational alternative identified by the District. Each model run should be conducted for a normal, dry and wet year.”

# Study 2 – Hydrocycling Data Gathering Summary

- Representative study sites for HEC-RAS 1D:
  - Platte River below the Loup River confluence and above the project tailrace
  - within five miles downstream of the project tailrace
  - near the USGS North Bend gage station
- preferably include areas where interior least terns and piping plovers have historically nested
- Prior to (first week in May) and end of (first week in August) nesting season

*(continued)*

# Study 5 – Flow Depletion and Flow Diversion

- i. “Therefore, the District shall supplement its analysis by conducting a modeling study of the effects of diverted flows on interior least tern and piping plover nesting habitat and whooping crane roosting habitat using the HEC-RAS 1D steady state backwater model and associated methodology for model calibration specified in HDR (2008). The District shall select a representative study site, in consultation with the FWS and Nebraska GPC, in the reaches identified above by the FWS [a) the Loup River upstream of the diversion weir; b) the Loup River downstream of the diversion weir; c) the Platte River below the Loup River confluence and above the project tailrace].”

*(continued)*



# Study 5 – Flow Depletion and Flow Diversion

*(continued)*

“Data collected shall include flow quantity, depth, velocity, sandbar elevation, and bed form (HDR 2008). Cross-sectional measurements to calibrate the model shall be done during low flow conditions (50 to 75 cfs) and at a higher flow, selected in consultation with the FWS and Nebraska GPC. The length of each cross-sectional measurement should be of sufficient length to capture the full range of flow (based on historical records for the area) expected at the each study site. The District shall photo document the cross-sections. After calibration, the model shall be run to model existing operations and without the project diverting any flow and any other flow diversion alternative identified by the District. Each model run should be conducted for a normal, dry and wet year.”

# Study 5 – Flow Depletion and Flow Diversion Data Gathering Summary

- Representative study sites for HEC-RAS 1D:
  - the Loup River upstream of the diversion weir
  - the Loup River downstream of the diversion weir
  - the Platte River below the Loup River confluence and above the project tailrace
- Prior to (first week in May) and end of (first week in August) nesting season

*(continued)*

# Field Collection Summary Matrix

Reach	Sedimentation	Hydrocycling	Flow Depletion/Flow Diversion
lower Platte River between the Loup River and tailrace canal confluences	mid-May to mid-June	prior to first week of May and first week of August	low flow and some higher flow
within five miles downstream of the project tailrace	mid-May to mid-June	prior to first week of May and first week of August	
Near the USGS North Bend gage station		prior to first week of May and first week of August	
Loup River upstream of the diversion weir			low flow and some higher flow
Loup River downstream of the diversion weir			low flow and some higher flow

# Sedimentation Study Needs

- Data required at two ungaged sites for comparison with gaged site analysis

# Hydrocycling Study Needs

- Develop 1D HEC-RAS steady state model to study the effects of hydrocycling on interior least tern and piping plover nesting habitat

# Flow Depletion and Flow Diversion

- Develop 1D HEC-RAS steady state model to study the effects of diverted flows on interior least tern and piping plover nesting habitat and whooping crane roosting habitat