United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 67, Room 118
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

October 19, 2012

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ER 12/603

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

COMMENTS AND RECOMMENDATIONS--NOTICE OF APPLICATION ACCEPTED FOR FILING, SOLICITING MOTIONS TO INTERVENE AND PROTESTS, READY FOR ENVIRONMENTAL ANALYSIS, AND SOLICITING COMMENTS, RECOMMENDATIONS, PRELIMINARY TERMS AND CONDITIONS, AND PRELIMINARY FISHWAY PRESCRIPTIONS; **LOUP RIVER HYDROELCTRIC PROJECT**, PLATTE AND NANCE COUNTIES, NEBRASKA **(FERC PROJECT NO. 1256-031)**

Dear Ms. Bose,

The Department of the Interior has reviewed the subject application and the Federal Energy Regulatory Commission (FERC or Commission) notice, issued August 23, 2012. The National Park Service (NPS) and U.S. Fish and Wildlife Service (USFWS) provide the following comments.

COMMENTS OF THE NATIONAL PARK SERVICE (NPS)

The NPS, through authority of the Federal Power Act (and other applicable authorities), has been involved with and has provided comments during all stages of the FERC re-licensing process. The interests of the NPS relate mainly to recreation resources and the associated topics of land use and aesthetics. The NPS will continue to provide input when the Commission issues the Draft Environmental Assessment next year.

In addition, the NPS notes that this project may impact sites that were developed with assistance from the Land and Water Conservation Fund (LWCF) program. The Loup River Public Power

District received LWCF assistance under grant 31-00748 and the City of Columbus received LWCF assistance under grants 31-00261 and 31-00732 at Pawnee Park.

Therefore, they recommend you consult directly with the official who administers the LWCF program in Nebraska to determine any potential conflicts with Section 6(f) (3) of the LWCF Act (Public Law 88-578, as amended). This section states in part: "No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation use…." The administrator for the LWCF program in Nebraska is Craig Wacker, Nebraska Game and Parks Commission, 2200 North 33rd Street, P.O. Box 30370, Lincoln, Nebraska 68503.

Please contact the NPS Regional Environmental Coordinator Nick Chevance, Midwest Regional Office, Planning and Compliance at 402-661-1844, if you have any questions about these NPS comments.

COMMENTS OF THE U.S. FISH AND WILDLIFE SERVICE (USFWS)

Pursuant to authorities under section 10(j) of the Federal Power Act, as amended (16 U.S.C. 791a-797 et seq.); the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.); the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703; the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668; and the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 et seq.), the USFWS submits the following recommendations to protect, mitigate damages to, and enhance fish and wildlife resources. We request that these recommendations be included as conditions of any license the Commission may issue for the Loup River Hydroelectric Project (Project).

The rationale for the USFWS' recommendations is provided in Enclosure A. Our recommendations reference, and are consistent with, earlier correspondence the USFWS has submitted to the Commission and applicant as informal interagency consultation under the Endangered Species Act.

In addition, in Enclosure B, the USFWS provides comments on the Loup Power District final license application.

10(j) Recommendations

1. The Loup River Hydroelectric Project shall maintain a continuous minimum flow of 350 cubic feet per second (cfs) from April 1 through September 30 in the Loup River passing the Project diversion;

2. The Project shall maintain a continuous minimum flow of 175 cfs from October 1 through March 31 in the Loup River passing the Project diversion;

3. The maximum diversion of the Project at the Loup River diversion shall not exceed an instantaneous flow of 2,000 cfs, from March 1 through August 31;

4. The Licensee shall mechanically modify four sandbars/point bars within the reach of the Loup River bypass reach to provide suitable nesting habitat for least terns and piping plovers by removing woody and herbaceous vegetation. The sandbars/point bars shall be reshaped to an elevation that would be inundated by the dominant discharge, and with a surface composed of sandy material suitable for piping plover and least tern nesting;

5. The Project shall be operated to maintain a minimum return flow of 1,000 cfs from March 1 to August 31 in the Project tailrace return (i.e., return to the Platte River). Operational deviations from the minimum base flow shall be reported to the Commission within 30 days of the event;

6. Within 1 year of license issuance, the licensee shall file a plan with the Commission to minimize harm to interior least tern (*Sterna antillarum athalassos*) and piping plover (*Charadrius melodus*) adults, eggs, and chicks due to dredging or sand mining activities in the Project's Sand Management Areas. The plan shall be developed in consultation with the U.S. Fish and Wildlife Service and Nebraska Game and Parks Commission, and prior to filing, shall be submitted to those agencies for a 30-day minimum period of review;

7. Adopt environmental measures described in Sections E.6.4.2 and E.6.4.3 of the Final License Application designed to minimize harm to migratory birds and bald eagles.

Please contact Jeff Runge, Fish and Wildlife Biologist in the USFWS Nebraska Field Office (telephone: (308) 382-6468, extension 22), if you have any questions regarding the comments on fish and wildlife resources.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

Enclosures

Enclosure A

Rationale for Section 10(j) Recommendations
FERC Project No. 1256

Technical information provided in USFWS' letters to FERC, dated April 7, 2011 (accession no. 20101022-3031), and February 16, 2012 (accession no. 20120222-0031), is hereby incorporated by reference in the rationale for section 10(j) recommendations.

Recommendations No. 1-3 – Flow bypass in the Loup River

The Final License Application (FLA), Appendix J, provides the results from sediment transport modeling for a 16 year period under current Project operations (Current Ops). The results show sediment transport through the tailrace is "0 tons/day" under current Project operations, and that channel bed degradation (i.e., net large-scale evacuation of channel bed material) occurs near the Project tailrace return for post warm-up operations (i.e., post 1990). The FLA (Figure 5-15) indicates a condition of slight degradation exists at Ungaged Site 4, and that channel degradation of 0.5-feet or more exists at Ungaged Site 3 (Figure 5-17). The results from the Sedimentation Study (FLA, Appendix A) show that the Project erodes 944,632 cubic yards of local sediment near the Project tailrace return on an average annual basis. Schmidt and Wilcock (2008) summarized information showing that interruption of sediment transport in alluvial river systems can result in significant impacts to sandbars and riparian ecosystems, owing in part to the combined effects of sandbar erosion with channel bed incision/degradation.

The modeling results in FLA, Appendix J, Figures 5-15 and 5-17 illustrate that sediment transport deficit and the tendency for degradation of the Platte River channel bed can be offset by adding sediment near the Project tailrace/return at a rate of 550 tons/day and above. Sediment delivery at rates of 2,000 and 7,600 tons/day may contribute to channel aggradation at Ungaged Sites 3 and 4.

FLA Appendix J describes two potential mechanisms for delivering sediment to the Project tailrace region: 1) conveyance through a pipeline slurry; or 2) transport by streamflows through the portion of the Loup and Platte rivers that is currently bypassed by Project diversions. The USFWS supports the second of these options because increased flows in the bypass reach of river channel would help to offset the sediment supply deficit at the Project tailrace return and would also improve channel habitat and aquatic conditions in the Loup River.

10(j) Recommendation number 3 will limit Project diversions from the Loup River flows to 2,000 cfs, and thereby provide higher channel forming flows and sediment to pass the diversion. The recommendation would increase the channel forming flows and sediment transport in the Loup River below the Project diversion. Limitation on diversions is expected to improve habitat suitability for the least tern, piping plover, and whooping crane by improving channel widths and sandbar position in the Project-affected section of the Loup River.

Alternative 3 in Appendix J of the FLA depicts a scenario that limits the maximum diverted flow of the Project to 2,000 cubic feet per second (cfs). The dominant discharges (i.e., channel forming discharges) reported for Alternative 3 are 1,940, 1,170, and 840 cfs, for wet, normal and dry years, respectively. This compares to dominant discharges of 1,730, 1,080, and 790 cfs of the Current Operation for wet, dry, and normal years, respectively. Unobstructed channel widths in the Loup River Bypass Area are expected to adjust (i.e., increase) under Alternative 3 beyond the current widths (range 551 to 821 feet). However, the channel widths would still be less than those observed on the Loup River upstream of the Project diversion (range 797 to 1,567 feet). Increased channel widths are expected to improve habitat conditions in the bypass reach for least tern, piping plover, and whooping crane.[1] With channel widening, the position of sandbars may shift from point bar to a mid-channel bar positions like those observed to be common on the Loup River upstream of the Project diversion, and this would benefit nesting habitat for terns and plovers.

This recommendation would provide capacity for greater sediment transport through the Loup River, and thereby would also contribute sediment delivery and more sustainable river conditions for the Platte River (i.e., complementing recommendations 1 and 2. The analysis indicates average annual sediment transport is increased from 1,569,580 tons/year under Current Operation to 1,818,000 tons/year (Table 1) – an increase of approximately 248,420 tons/year or 681 tons/day. The analysis also indicates that a rate 681 tons/day augmented at the Project tailrace return would be sufficient to offset the aforementioned deficit (550 tons/day) of bed load material in the Platte River under Current Ops. This level of improved sediment transport would thereby provide a more sustainable river system.

Table 1. Average annual sediment transport rates* for alternatives listed in Appendix J of the FLA.

	Current Ops	Alternative 3	Alternative 4	No Diversion
Wet	2,540,000	3,030,000	3,790,000	5,220,000
Normal	1,264,000	1,430,000	1,780,000	3,410,000
Dry	802,000	870,000	1,140,000	2,670,000
Average*	1,569,580	1,818,000	2,283,300	3,822,300

*** Average annual sediment transport rates are based on wet, dry, and normal year types, representing 33-percent, 25-percent, and 42-percent of years in the period of record, respectively.**

Alternative 4 in the FLA, Appendix J, limits the maximum diverted flow at the Project diversion to 2,000 cfs, and also provides a minimum flow in the Loup River bypass reach during the least tern and piping plover nesting season. The 1-year dominant discharges for a wet, normal, and dry hydrologic condition for the Loup River near Genoa under Alternative 4 are 1,730, 1,080, and 790 cfs, respectively. Alternative 4 would increase the average annual sediment transport from 1,568,580 tons/year (Current Ops) to 2,283,300 tons/year (Table 1). This is an increase of 713,720 tons/year or 1,955 tons/day. Thus, Alternative 4 also would accomplish the objective of offsetting channel degradation of the Current Ops scenario.

[1] USFWS comments in Enclosure B of this document provide clarification for defining "channel width."

Recommendations No. 1 and 2 are provided as alternatives to the analysis of minimum flow described in FLA, Appendix J, Alternative 4, to provide sandbar nesting habitat for least terns and piping plover, and to sustain the fish community.

The Low Impact Hydropower Institute (2011) uses a "good" condition rating under the Montana Method (Tennant) as a criterion to certify low impact hydropower facilities. Applying the Montana Method to the Loup River bypass reach, "good" habitat conditions would be provided by flows of 297 to 364 cfs from April 1 through September 30, and flows of 149 to 215 cfs from October 1 through March 31. The USFWS therefore recommends a bypass flow of 350 cfs from April through September and 175 cfs from October through March to sustain the aquatic community and offset impacts of project diversions. In addition, a 350 cfs minimum bypass during summer months would decrease the probability of exceeding the Nebraska Department of Environmental Quality temperature standards: the probability of exceeding temperature standards is decreased from approximately 90 percent to approximately 25 to 30 percent (see FLA, Appendix C, Figure 5-16).

Recommendation No. 4 – Vegetation Removal and Sandbar Shaping in the Loup River Bypass Reach

Vegetation shall be removed from island bars, and point bars on the denuded bars is to be mechanically reshaped, and covered with sandy substrate suitable for sandbar nesting birds, at an elevation that would be inundated by the expected dominant channel forming discharge. This work should be completed as one initial treatment on each of four islands/bars. These proposed mechanical modifications will allow for the channel to more quickly adjust to the modified flow regime. The proposed mechanical modifications are similar to the mechanical actions in the Flow-Sediment-Mechanical approach that have been adopted by the Platte River Recovery Implementation Program (USFWS 2006) to help restore riverine habitats for piping plover, least terns, and cranes. The rationale for the "two to four nesting sites" is based on the USFWS' February 16, 2012, comments on the Project's Draft License Application.

Improvements to the effective/dominant flow regime, as proposed through Term and Condition 3, will be gradual and will probably not translate to immediate changes in channel form due to the presence of riparian vegetation (Eaton et al. 2010; Tal et al. 2003). Because changes in channel form are slower to develop in channels with mature woody vegetation, USFWS recommends mechanical modifications on four sandbar point bars within the Loup River bypass area. The sandbar improvement measures in recommendation number 4 will complement those in recommendation number 3 to benefit of least tern and piping plover nesting habitat, and also provide benefits for alluvial habitats used by the Loup River fish community.

Recommendation No. 5 – Provide base flows to reduce the magnitude of project hydrocycling

Under the current operating conditions, the Loup River Hydroelectric Project diverts water from the Loup River, a tributary to the Platte River. The project temporarily stores this water, and then releases it at a high rate of discharge though hydropower generating plant, at regular intervals–typically at roughly 24 hour cycles during high power demand–to the Platte River. In these

comments, we refer to this aspect of Project discharges as "hydrocycling." The Project discharges fluctuate from 0 to 4,800 cfs.

Fluctuations in the Platte River caused by the Project can be very large compared to Platte River base flows. The effect on Platte River hydrology attenuates downstream. However, at the USGS gaging station near North Bend, Nebraska, roughly 28 miles downstream of the Project tailrace, the Project discharges causes river stage to fluctuate as much as 1.5 feet over a 24-hour cycle (see recemt period Figure 1). Platte River fluctuations are measurable at the USGS' gage near Louisville, Nebraska (about 100 miles downstream), just above the Missouri River confluence. The magnitude of fluctuation varies seasonally and also varies year to year.

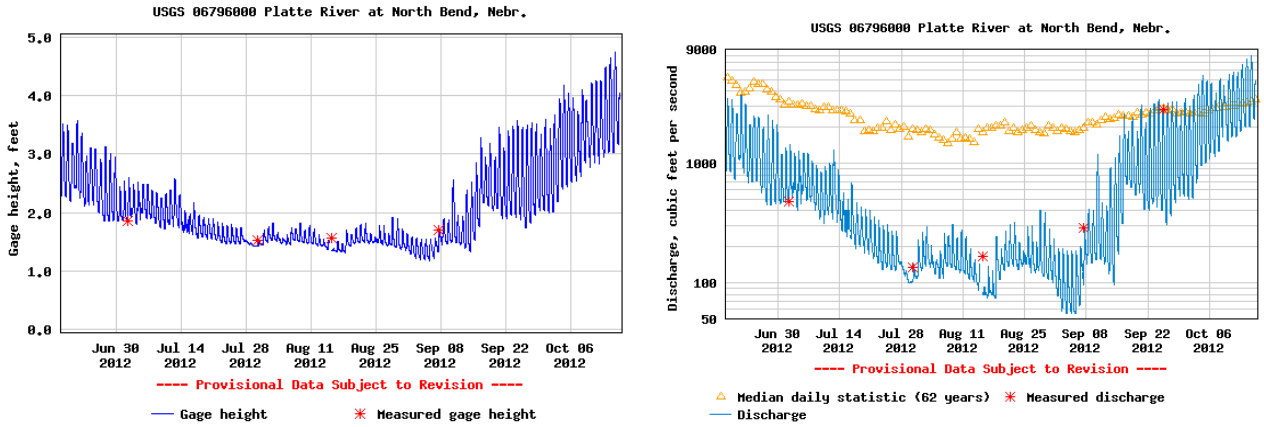

Figure 1. Capture of USGS gaging data (provisional for recent period) for Platte River stage and discharge at North Bend, Nebraska, reflect the influence of the Loup River Hydroelectric Project.

The USFWS recommends that a minimum base flow of 1,000 cfs be maintained from March 1 to August 31 at the Project tailrace return to the Platte River. This base flow would decrease impacts of Project hydrocycling on downstream river ecology. Compared to current operations, this base flow would reduce the magnitude of fluctuations (i.e., amplitude) of Project discharges, and in turn reduce Project impacts on longitudinal fragmentation of habitat for pallid sturgeon (*Scaphirhynchus albus*) and other fish species that use deep water habitats. Reduced amplitude of hydrocycling would also reduce adverse Project impacts to primary productivity that occur under current conditions.

Longitudinal connectivity of habitat is critical for the upstream migration and subsequent downstream sturgeon movement of spawning pallid and shovelnose sturgeon (*Scaphirhynchus platorynchus*) (Wildhaber et al. 2007, DeLonay et al. 2009). Upstream migration of pallid sturgeon occurs in late fall and early-spring with spawning April through July, and downstream drifting of adults often occur immediately after spawning (DeLonay et al. 2009). Peters and Parham (2008) document the movement of pallid sturgeon from the Platte into the Missouri River. The improved longitudinal connectivity from Recommendation 5 would allow for pallid sturgeon, and other deep water fish, to migrate into the Missouri River to avoid adverse conditions on the Platte River such as lethal water temperatures or contaminants describes by Peters and Parham (2008).

Parham (2007) determined that pallid sturgeon habitat in the lower Platte River is generally unconnected at discharge below 4,400 cfs and rapidly becomes connected at discharges of 6,300 cfs, and is fully connected at 8,100 cfs. Using this information, the USFWS (April 7, 2011, letter to FERC) has compared Run-of-River operations to Current Hydrocycling Operations using the standards Peters and Parham set forth. Peters and Parham have since revised their analysis slightly since their 2007 report, however, the changes should not affect the findings reported in the USFWS' April 7, 2011, letter.

The USFWS found 35 instances where run-of-river conditions would have maintained minimum level of habitat connectivity and Current Hydrocycling Operations completely disconnected habitats (i.e., described by USFWS as Category 2). USFWS found 11 instances where moderate connectivity was reduced to minimum connectivity (i.e., Category 4), and found four instances where optimal connectivity under Run-of-River was reduced to moderate connectivity (i.e., Category 6). In three instances, of the most severe impacts, optimum connectivity under Run-of-River operations would be reduced to minimum connectivity under Current Operations (i.e., Category 8).

The USFWS characterized flow magnitudes of the Project's hydrocycling impacts to connectivity by applying information from the USFWS' April 7, 2011, letter. Table 2, below, characterizes flow associated with percent longitudinal connectivity of pallid sturgeon habitats by developing an approximate midpoint for the range of flows under each percentage point. For example, the 4,367 cfs represents the approximate midpoint for the range of flows with a habitat connectivity of 15 percent. Tables 5-19 through 5-30 of the FLA Appendix B list the percent habitat connectivity on a month-by-month basis. The minimum percent habitat connectivity in Tables 5-16 through 5-30 were converted to flow using Table 2 of this document. Minimum percent habitat connectivity is considered to be the limiting factor for pallid sturgeon migration.

For instances where Category 2 was triggered, the magnitude of hydrocycling impact was calculated by subtracting the midpoint for the Current Hydrocycling Operation from the flow where pallid sturgeon habitat is disconnected (i.e., 4,400 cfs). Similar methods were conducted for Categories 4, 6, and 8.

> EXAMPLE: Table 5-22 of the FLA Appendix B, indicates that the minimum longitudinal connectivity at the Study Site 4 under Wet hydrologic year type is 7 percent under Current Operations and 16-percent under Run-of-River. The midpoints for 7 and 16 percent are 3,031 cfs and 4,533 cfs, respectively.
>
> Current Operations flows are 3,031 cfs below the 4,400 cfs minimum connectivity threshold, and therefore it is reasonable to assume that pallid sturgeon habitat is rather disconnected under the Current Operations flow regime. In addition, the difference between Current Operations (i.e., 3,031 cfs) and the 4,400 cfs threshold is 1,369 cfs, which represents the attenuation needed in the trough of the hydrocycle that would restore a minimum level of connectivity.
>
> Operations under Run-of-River have a flow of 4,533 cfs which is greater than 4,400 cfs; thus, Run-of-River provides some level of connectivity that is not provided under Current Operations.

Table 2. Approximate midpoint for the range of flows representing the percent longitudinal connectivity of pallid sturgeon habitats in the lower Platte River. Habitat connectivity and flow data are from the Project Updated Study Report, Appendix J.

Percent Habitat	Midpoint (cfs)
0	476
1	1237
2	1647
3	2009
4	2317
5	2592
6	2836
7	3031
8	3230
9	3402
10	3570
11	3741
12	3897
13	4065
14	4219
15	4367
16	4533
17	4706
18	4859
19	5064
20	5257
21	5492
22	5744
23	6048
24	6370
25	6772
26	7295
27	7981

The analysis for categories 2,4,6 and 8 are listed in Table 3. The average difference between the run of river operations and the current operations at minimum connectivities for all the categories listed above (ΔQ) is 1,372 cfs. This implies that Current Hydrocycling Operations has a lower minimum flow than Run-of-River at an average magnitude of 1,372 cfs. The average difference between the connectivity flow thresholds and the Current Hydrocycling Operations minimum flow for all the caterories ($\Delta Q2$) value is 975 cfs. The USFWS recommendation of a 1,000 cfs minimum base flow is based on both the $\Delta Q2$ value and current hydropower operational constraints. The base flow would reduce the extreme minimums of the hydrocycle trough, thereby decreasing the impacts of hydrocycling operations on the longitudinal connectivity of pallid sturgeon habitats. If hydroelectric turbines are not capable of maintaining a 1,000 cfs base flow, then the Department recommends comparable base flow that can be safely maintained.

Table 3. Summary of longitudinal connectivity of pallid sturgeon habitat; Current Operations compared to Run-of-River Operations. Unless otherwise stated, fields were derived from Tables 5-19 through 5-30, FLA, Appendix B.

Month	Year Type	Location	CO Min%	RoR Min%	Cat	CO-Q	RoR-Q	Connect-Q	ΔQ	ΔQ2
Jan	Dry	Lou	9	16	2	3,402	4,533	4,400	1,131	998
Feb	Dry	Ash	11	15	2	3,741	4,367	4,400	626	659
Feb	Wet	Les	9	16	2	3,402	4,533	4,400	1,131	998
Feb	Nor	Les	14	19	2	4,219	5,064	4,400	845	181
Mar	Dry	Ash	10	18	2	3,570	4,859	4,400	1,289	830
Mar	Wet	Les	9	17	2	3,402	4,706	4,400	1,304	998
Mar	Nor	S4	9	16	2	3,402	4,533	4,400	1,131	998
Mar	Nor	NB	8	16	2	3,229	4,533	4,400	1,304	1,171
Mar	Nor	Les	8	16	2	3,229	4,533	4,400	1,304	1,171
Apr	Wet	S4	7	16	2	3,031	4,533	4,400	1,502	1,369
Apr	Wet	NB	5	15	2	2,592	4,367	4,400	1,775	1,808
Apr	Wet	Les	9	18	2	3,402	4,859	4,400	1,457	998
Apr	Nor	S4	10	18	2	3,570	4,859	4,400	1,289	830
Apr	Nor	NB	8	17	2	3,229	4,706	4,400	1,477	1,171
Apr	Nor	Les	13	20	2	4,065	5,257	4,400	1,192	335
May	Wet	S4	10	16	2	3,570	4,533	4,400	963	830
May	Wet	NB	10	17	2	3,570	4,706	4,400	1,136	830
May	Wet	Les	13	20	2	4,065	5,257	4,400	1,192	335
May	Nor	Les	7	16	2	3,031	4,533	4,400	1,502	1,369
Jun	Nor	S4	12	18	2	3,897	4,859	4,400	962	503
Jun	Nor	NB	10	17	2	3,570	4,706	4,400	1,136	830
Jun	Nor	Les	12	17	2	3,897	4,706	4,400	809	503
Jul	Wet	Ash	14	21	2	4,219	5,492	4,400	1,273	181
Jul	Nor	Lou	14	20	2	4,219	5,257	4,400	1,038	181
Aug	Nor	Ash	7	15	2	3,031	4,367	4,400	1,336	1,369
Aug	Nor	Lou	10	19	2	3,570	5,064	4,400	1,494	830
Sep	Nor	Lou	6	16	2	2,836	4,533	4,400	1,697	1,564
Oct	Nor	NB	7	15	2	3,031	4,367	4,400	1,336	1,369
Oct	Nor	Les	9	16	2	3,402	4,533	4,400	1,131	998
Nov	Wet	Ash	9	19	2	3,402	5,064	4,400	1,662	998
Nov	Wet	Lou	12	21	2	3,897	5,492	4,400	1,595	503
Nov	Nor	S4	9	21	2	3,402	5,492	4,400	2,090	998
Nov	Nor	NB	8	21	2	3,229	5,492	4,400	2,263	1,171
Nov	Nor	Les	8	22	2	3,229	5,744	4,400	2,515	1,171
Dec	Dry	Lou	11	15	2	3,741	4,367	4,400	626	659
Feb	Wet	Ash	23	26	4	6,048	7,295	6,300	1,247	252
Mar	Wet	Ash	22	26	4	5,744	7,295	6,300	1,551	556
Mar	Nor	Ash	23	26	4	6,048	7,295	6,300	1,247	252
Apr	Dry	Lou	20	24	4	5,257	6,370	6,300	1,113	1,043
Apr	Wet	Ash	21	26	4	5,492	7,295	6,300	1,803	808
Apr	Nor	Ash	22	26	4	5,744	7,295	6,300	1,551	556
May	Nor	Lou	23	26	4	6,048	7,295	6,300	1,247	252
Jun	Wet	Les	20	24	4	5,257	6,370	6,300	1,113	1,043
Jun	Nor	Ash	19	24	4	5,064	6,370	6,300	1,306	1,236
Jul	Nor	Lou	20	25	4	5,257	6,772	6,300	1,515	1,043
Oct	Wet	Lou	18	24	4	4,859	6,370	6,300	1,511	1,441
Feb	Nor	Ash	26	27	6	7,295	7,981	8,100	686	805
Mar	Wet	Ash	25	28	6	6,772	8,100	8,100	1,328	1,328
Mar	Nor	Lou	25	28	6	6,772	8,100	8,100	1,328	1,328
May	Wet	Ash	25	28	6	6,772	8,100	8,100	1,328	1,328
Jun	Nor	Lou	23	27	8	6,048	7,981	8,100	1,933	2,052
Nov	Nor	Ash	21	27	8	5,492	7,981	8,100	2,489	2,608
Nov	Nor	Lou	23	27	8	6,048	7,981	8,100	1,933	2,052

Cat: Categorized level of connectivity, defined in USFWS' comment letter dated April 7, 2011
CO-Q: Flow midpoint for CO Min%, Flow midpoint derived from Table 2 of this document
RoR-Q: Flow midpoint for RoR Min%, Flow midpoint derived from Table 2 of this document
Connect-Q: Flow threshold for habitat connectivity
ΔQ: RoR-Q minus CO-Q, or difference in minimum flows between run-of-river operations and current hydrocycling operations
ΔQ2: Connect-Q minus CO-Q, or attenuation needed in the trough of the hydrocycle to restore lost/reduced connectivity
Note: Cat was changed for the following entries due to typographical errors in the comment letter dated April 7, 2011: **A)** March-Louisville-Dry; **B)** March-Ashland-Normal; and **C)** April-Louisville-Normal

The seasonal timeframe to which the recommendation for 1,000 cfs minimum flow applies is based on considering the time frames of pallid sturgeon movements, least tern and piping plover nesting, and maintaining the fish community and primary productivity. Table 3 shows that Categories 4 and 8 generally fall within the months of March through June, which coincides with pallid sturgeon spawning time period. The least tern and piping plover nesting period is bracketed by the months of April through August. When considering the periods of use for each of these primary fish wildlife resources, along with primary production in the river system, the USFWS has determined that the 1,000 cfs minimum base flow should be maintained from March through August. The USFWS makes no recommendations for mimimum flow releases or other restrictions on hydrocycling during the September through February.

Hydrocyling and primary productivity.

Meta-analysis of the effects of anthropogenic dewatering (i.e., effects of water peaking operations or water drawdown) on macroinvertebrates are described by Haxton and Findlay (2008). The Haxton and Findlay (2008) found that scientific research has collectively and consistently demonstrated "dramatic" effects on macroinvertebrate abundance from rapid dewatering. The authors note that the large effect in the meta-analysis raises the possibility that benthiverous fish that inhabit such areas will also be directly affected.

The findings of Haxton and Findlay (2008) are in agreement with directed studies that have evaluated the invertebrate diversity and abundance of a river system under a hydrocycling regime and under a flow regime where hydrocycling was absent. Invertebrate diversity and abundance increased on the Missouri River after hydrocycling was ceased (Troelstrup and Hergenrader 1990). Weisberg et al. (1990) found that invertebrate density on the Susquehanna River, was a 100 times higher during a period of minimum base flows compared to hydrocycling operations for years prior to and after the minimum base flow period.

Conclusion from Haxton and Findlay (2008) meta-analysis suggest that researchers are well supported in citing hydrocycling impacts to Platte River benthivores such as the shovelnose sturgeon (Andresen 2010) and channel catfish (Barada 2009). Barada (2009) noted slower growth rates for channel catfish collected in the Platte River compared to growth rates in published literature, and that channel catfish collected from sites directly below the Loup River Power Canal exhibited the slowest growth rates compared to sites further upstream and downstream. When comparing conclusions in published scientific literature to study results, Barada (2009) concluded that canal hydropeaking reduces availability of channel catfish prey which reduces consumption of prey items. Anderson (2010) documented relatively high mortality rates for sturgeon on the lower Platte River compared to other shovelnose sturgeon populations and hypothesized that environmental stressors such as hydropeaking create an extreme environmental condition that results in direct mortality of individuals or forced emigration from the lower Platte River. A minimum base flow proposed under Term and Condition 5 is likely to substantially reduce Project hydrocycling impacts to benthivorous fish such as the pallid sturgeon, shovelnose sturgeon, and channel catfish.

Recommendation No. 6 – Management Plan to Minimize Potential Harm to Least Tern and Piping Plover

In its letter to FERC, dated February, 16, 2012, USFWS identified the potential for Project sand mining operations to cause harm to least tern and/or piping plover and nests. Unauthorized take of these listed species is a violation of the Migratory Bird Treaty Act and Endangered Species Act.

In response to FERC's request for additional information, LPD filed with FERC on July 30, 2012, a preliminary draft of a memorandum of understanding (MOU) being developed by LPD, USFWS and NGPC. The draft MOU, however, remains incomplete and has not been approved by USFWS or NGPC. A management plan that will include interagency consultation with the USFWS and minimizes potential harm to least terns and piping plovers is therefore needed.

Recommendation No. 7 – Migratory Birds and Bald Eagle

We recommend that FERC adopt the measures described in Sections E.6.4.2 and E.6.4.3 of the FLA. The USFWS had determined that measures described in these sections are appropriate to minimize harassment and harm of migratory birds in general, and bald eagles.

Enclosure B

Comments on the FLA Environmental Report
FERC Project No. 1256

Dominant Discharge and Channel Width

Channel width is a key index in determining habitat values; however, channel width is not consistently defined in the information and indices presented in the Final License Application (FLA). This results in confusing and inconsistent interpretations.

For example, Appendix J of the FLA states that Alternatives 3 and 4 would result in undetectable effects on river morphology; however, channel width and depth indices that are listed in Appendix J, Table 5-5, represent depths and widths of the *wetted* channel. Indices for wetted channel width do not correspond with the definition for channel width used in FLA Appendix D or to the definitions used in the scientific literature for species habitats. Interchanging the definition results in the wetted widths listed in Appendix J, Table 5-5, (from 294 to 402 feet) being much narrower than the channel widths provided in Tables 5-5 and 5-6 of Appendix D (551 to 1,567 foot). A similar error occurs in Loup Public Power's filing July 30, 2012, responsing to FERC's additional information request. Jorgensen et al. (2012b) (accession no. 20120821-0010) state that inconsistent use of the channel width definition is widespread throughout the FLA.

Average channel width in FLA Appendix D (Tables 5-5 and 5-6) is expressed as the tree to tree distance in a channel cross-section. For habitat evaluation purposes, this characterization of channel width is comparable to the "active" channel width of piping plover and least tern habitat (Jorgensen et al 2012a), and whooping crane roost suitability is the unobstructed width (Howlin et al. 2008) used in scientific literature. The USFWS recommends that FERC assess the merits of recommendations for wildlife habitat using channel width definitions that are comparable to those in published in the scientific literature the species (i.e., "active channel width" or "unobstructed channel width").

Loup Power District's Draft Biological Assessment (FLA, Appendix E-2)

The USFWS does not concur with the determination presented in Loup Power District's (LPD) draft Biological Assessment (dBA) (FLA, Document E.2) that the proposed operation of the Project may affect, but is not likely to adversely affect the whooping crane, piping plover, least tern, or pallid sturgeon.

The USFWS agrees with the conclusion in the dBA that habitat in the Loup River bypass (i.e., below the LPD diversion) is *unsuitable* for whooping cranes due to characteristics of narrowed channel. In its comment letter on the Preliminary License Application, dated February, 16, 2012 and filed with FERC as accession number 20120222-0031 on February 22, 2012, USFWS describes the potential impacts of Project operations to whooping crane habitat, and observes that

the Project is located within the whooping crane migratory corridor, that whooping crane use can be estimated, and that project impacts on habitat are measureable.

Section 6.2.1 of the LPD dBA describes that some limited whooping crane use of the Loup River (upstream of the LPD diversion) occurs. This leads us to conclude that reduced habitat suitability in the area of potential use downstream of the LPD diversion may result in adverse affects to whooping cranes.

The USFWS' February, 16, 2012, letter identifies that Project water diversions contribute to reduced suitability of several important habitat indices in the bypassed reach of the Loup River: channel width, wetted width, and/or sandbar position. The USFWS letter also quantitatively characterized reduced use by piping plover and least terns to be a result of reduced habitat suitability in the river reach bypassed by Project diversions. The letter also described potential impacts to small fish that least terns rely on as their food source.

Current Project operations erode channel bed materials near the Project tailrace return, which is likely to contribute to channel narrowing and channel incision near the Project tailrace return. Past effects of narrowing and incision is described in scientific literature and future effects are characterized by FLA studies.

The USFWS' February 16, 2012, letter referenced recent research indicating that pallid sturgeon likely spawns in the Platte River. The operations of the Project cause substantial fluctuations in Platte River river stage and discharge, and this affect of the project on river hydrology may adversely affect pallid sturgeon movements including the migration of spawning individuals of the species. For example, Peter and Parham (2008) state that an average *monthly* discharge below 6,000 cfs does not provide effective connectivity for sturgeon movement. The USFWS' February 16, 2012, letter identifies that, under certain conditions, hydrocycling operations create a *daily* impediment to connectivity that persist for an entire month (i.e., Categories 4 and 8)

Sturgeon monitoring on the Missouri and Platte rivers using telemetry and intensive broodstock collection below the mouth of the Platte indicate that the Platte River is potentially important habitat for pallid sturgeon, and important to pallid sturgeon recovery efforts (Winders and Delonay 2012). As expressed in its February, 16, 2012, letter, USFWS believes the Project may adversely impact pallid sturgeon by adversely affecting the quantity and quality of habitat, and the connectivity of suitable aquatic habitats on the Platte River from the point of Project return on the Platte River to its confluence with the Missouri River. As discussed in subsequent text concerning aquatic community, Project hydrocycling operations may also affect aquatic productivity and may affect small fishes that sturgeon rely on as food sources.

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Loup River Public Power District	)	
Loup River Hydroelectric Project	)	**Project No. 1256-031**

New Major License

Certificate of Service

I hereby certify that I have this day caused the foregoing document to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated on this 19th day of October 2012.

Robert F. Stewart
Regional Environmental Officer
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