FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 1417-196
Kingsley Dam Hydroelectric Project
Central Nebraska Public Power and
Irrigation District

FEB 12 2007

Henry Maddux, Geographical Supervisor
U.S. Fish and Wildlife Service
P. O. Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

Subject: Request for Formal Consultation under the Endangered Species Act

Dear Mr. Maddux:

As required by section 7 of the Endangered Species Act, I'm requesting formal consultation with your office. We are providing for your review a Biological Assessment concerning Central Nebraska Public Power and Irrigation District's (licensee) Kingsley Dam Hydroelectric Project license amendment request.

Background

On June 8, 2004 the licensee requested an amendment of license to change the normal maximum surface elevation for reservoirs; more specifically Lake McConaughy, Lake Ogallala, Diversion Dam, Canyon Lakes, Jeffery Reservoir, and Johnson Lake. By letter dated April 13, 2005, the Commission proposed that the licensee act as our non-federal representative in order to informally consult with the U. S. Fish and Wildlife Service (FWS) regarding any threatened and endangered species in the project area. By letter filed May 16, 2005, the licensee requested to act as our non-federal representative and by letter dated June 10, 2005, the Commission designated the licensee as our non-federal representative.

The licensee filed a letter on March 15, 2006, indicating the schedule for completion of the informal consultation. By letter dated May 26, 2006, the licensee requested an extension of time to complete the consultation. By letter dated June 7, 2006, the Commission issued an extension of time.

On August 3, 2006, the licensee filed a biological evaluation pertaining to listed whooping cranes, interior least terns, and piping plovers. On September 27, 2006 the Commission requested that the licensee continue consultation with your office in order to clarify the relationship between the proposed reservoir elevations (as stated in the amendment request) and hydrocycling operations. The licensee, by their February 2, 2007 filing, supplemented and revised their August 3, 2006 filing.

Discussion and Request

We have reviewed the licensee's biological evaluation and have adopted it as our biological assessment (BA) (attached). Based on the analysis and conclusion in the BA, we find that raising the normal maximum surface elevation at Johnson Lake and the remaining reservoirs does not appear to affect federally-listed species in the immediate vicinity of Johnson Lake and the remaining reservoirs.

However, downstream impact issues related to hydrocycling at the J-2 powerplant on Johnson Lake may adversely affect whooping cranes and its federally designated critical habitat. Additionally, downstream impact issues related to hydrocycling at the J-2 powerplant on Johnson Lake may adversely affect interior least terns and piping plovers.

Protection for these species will be provided by the reasonable and prudent measures to minimize take (contained in the incidental take statement) and the J-2 hydrocycling agreement.[1] It is noted that the 1997 biological opinion[2] determination is unchanged.

Please provide us your biological opinion on our findings no later than 135 days from your receipt of this request. If we do not hear from you within 30 days, we will assume that you have sufficient information to initiate consultation and will provide us with your biological opinion by June 27, 2007.

Please file your response (an original and eight copies) with Magalie R. Salas, Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, DC 20426. Please put the docket number, P-1417-196, on the first page of your response.

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1 See the licensee's February 2, 2007 filing.

2 See FWS's Biological Opinion filed July 30, 1997.

If you have any questions, please call Blake Condo at (202) 502-8914 or contact him by e-mail at blake.condo@ferc.gov.

Sincerely,

George H. Taylor
Chief, Biological Resources Branch
Division of Hydropower Administration
and Compliance

Enclosure: Biological Assessment

BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT REGARDING AN AGREEMENT ON HYDROCYCLING OPERATIONS AT THE CENTRAL NEBRASKA PUBLIC POWER AND IRRIGATION DISTRICT'S JOHNSON NO. 2 POWERPLANT IN THE KINGSLEY DAM PROJECT (FERC NO. 1417)

1.0 Introduction

This incidental take statement and biological opinion addresses hydrocycling operations of the Central Nebraska Public Power and Irrigation District (CNPPID) Johnson No. 2 (J-2) powerplant located in Gosper County, Nebraska, and its potential effects on the whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), and piping plover (*Charadrius melodus*), and federally designated critical habitat for the whooping crane in accordance with section 7 of the Endangered species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.).

The U.S. Fish and Wildlife Service (Service) provided a biological opinion, reasonable and prudent alternative, and incidental take statement regarding the effects of project operations to the Federal Energy Regulatory Commission (FERC) on July 25, 1997, which is unchanged by this consultation (USFWS 1997). All elements of the 1997 biological opinion and the related incidental take statement remain in effect. However, potential impacts of hydrocycling have been highlighted by the current severe drought, and the Service and CNPPID have agreed on operations which serve to limit potential effects that may occur as a result of hydrocycling. This biological opinion is based on CNPPID's agreed-upon hydrocycling limits described in the attached J-2 Hydrocycling Agreement (Agreement) and on field investigations and other sources of information. A complete administrative record of this consultation is on file at the Service's Grand Island, Nebraska Ecological Services Field Office.

2.0 Consultation History

In early 2004, the Service and CNPPID began informal discussions regarding the need to clarify lake level references in CNPPID's license, including discussions of Johnson Lake operations. On June 9, 2004, CNPPID filed an application with FERC to amend its license for the Kingsley Dam Project (FERC Project No. 1417) as necessary to raise the "normal maximum surface elevation" at certain reservoirs in its system, including Johnson Lake. On June 10, 2005, FERC designated CNPPID as its non-federal representative for purposes of conducting informal ESA consultation regarding the proposed amendment. During the informal consultation process, the Service agreed with CNPPID's determination that the lake level corrections for portions of the system other than Johnson Lake, did not adversely affect listed species. This process is documented in the "no effects" letters by CNPPID (May 26, 2006), the Service (June 2, 2006) and the Nebraska Game and Parks Commission (June 9, 2006), to be filed with FERC along with this biological opinion. Pending completion of the license amendment action, FERC granted CNPPID temporary waivers of the reservoirs maximum surface elevations in 2004, 2005, and 2006.

With respect to the portion of the amendment related to Johnson Lake, the Service developed this biological opinion. In addition to reviewing the potential impacts of the amendment on species that might be using Johnson Lake or surrounding habitat, during the informal consultation process, the Service expressed concerns regarding CNPPID's operations at Johnson Lake, specifically its hydrocycling under low flow conditions and its potential effects on federally listed species downstream. CNPPID cycles its Johnson No. 2 turbine when inflows are too low to run the turbine efficiently and without risk of cavitation, and levels in Johnson Lake fluctuate as the turbine is cycled on and off. The question was raised as to the role changes in level limits could play in determining the timing or duration of cycles.

The Service and CNPPID discussed hydrocycling more broadly than simply looking at the role of lake levels in isolation, considering the range of operating options available to CNPPID. We reached Agreement on hydrocycling limits that will serve to reduce potential effects on whooping crane, interior least tern, and piping plover. Typically CNPPID operates with enough margin that lake level limits play a minor role at most in decisions regarding the timing or duration of cycles. However, the proposed Johnson Lake level amendment restores operating flexibility and reduces the potential affect that these limits may have on successfully implementing the hydrocycling Agreement. One requirement of the Agreement is completing the formal consultation process with FERC regarding the potential effects of CNPPID's operations pursuant to the Agreement, which is done here in the context of the Service's evaluation of potential impacts of the lake level amendment.
Relevant actions that may be applicable to this matter include the 1998 relicensing of CNPPID's Kingsley Dam Project (FERC No. 1417) - a complete history of that consultation can be found in section II of the Service's July 25, 1997, biological opinion (USFWS 1997) – and the proposed Platte River Recovery Implementation Program (Program), anticipated to go into effect in late 2006[1]. A complete history of the Program consultation can be found in section II.A of the Service's biological opinion on the Program (USFWS 2006). That section is incorporated herein by reference. The Service is not aware of any additional information relevant to the consultation history.

3.0 Description of the Proposed Action

Under normal and above-normal water supply conditions, CNPPID generally releases sufficient water from Lake McConaughy during the non-irrigation season to divert 1,200 cubic feet per second (cfs) or more into its canal system at the Tri-County Diversion Dam (Central Supply Canal) and produce power through its series of power plants along the canal. Under these conditions, diverted water is passed through the hydroelectric turbines and returns to the Platte River near Lexington out of a canal below the J-2 powerplant with relatively limited fluctuations, and generally in the range of 1,000 to 2,000 cfs.

Hydroelectric turbines have a point of peak operating efficiency such that flows above or below this level result in less efficient power generation. Increasingly lower flows subject the equipment to undesirable stress, cavitation, and vibration. As a result, under

[1] The proposed Platte River Recovery Implementation Program (Program), a combined state/federal action that is anticipated to go into effect in late 2006, is intended to provide ESA compliance for all water-related activities that affect flows above the Loup River confluence. As indicated during the relicensing proceeding, many of the measures undertaken by CNPPID in settling the relicensing proceeding are expected to become components of the Program, if adopted.

low water supply conditions, CNPPID regulates flow in Johnson Lake and its canal system until sufficient volume is available to operate at higher and more efficient rates, typically in an on-and-off manner over repeated cycles of 24 hours or more ("hydrocycling").

Hydrocycling will be inevitable in drier years (Kerkman, February 2003). While hydrocycling has occurred historically (including in the late 1980s and early 1990s), concerns were raised by the Service given the high frequency of hydrocycling in recent years (in each of the years from 2000 through 2004) because of the onset of drought conditions more severe than those experienced in the past. As a result, the Service and CNPPID have agreed on operations tied to the increased flexibility available through lake level modifications (particularly at Johnson Lake) which serve to limit potential impacts. The Agreement is the proposed action upon which the Service is consulting in this document.

3.1 Hydrocycling

CNPPID has a range of hydrocycling options available when flows are low. Balancing factors such as turbine efficiency, rate and timing of Johnson Lake and canal system changes, rate of inflow changes, anticipated weather events, icing conditions, equipment conditions, wear and tear on equipment, transitions into or out of irrigation delivery periods, and power production efficiency. CNPPID's equipment allows it to choose return flow rates of 0 cfs, 450 cfs, or anywhere from 1050 cfs to 2100 cfs. However, hydrocycling is avoided or limited to once per 24 hours to reduce wear and tear on equipment. Timing of a cycle is selected considering demands for flows and for electricity.

The following subsections contrast peak efficiency hydrocycling operations within the range of options available to CNPPID at the J-2 powerplant (i.e., under what conditions hydrocycling may occur and the range of effects on Platte River flows downstream) with use of the operating options described in the Agreement. Peak efficiency operations are represented by a 1700 cfs/0 cfs daily cycle. The description below is based primarily on information provided by CNPPID and on hourly and sub-hourly provisional flow records from U.S. Geological Survey (USGS) stream gages near Overton, Kearney, and Grand Island, Nebraska from October 1998 through the present.

3.1.1 Seasonal Occurrence

Peak efficiency of the J-2 powerplant turbine occurs at approximately 1,700 cfs. Flows below 950 cfs, with the exception of a narrow operating range around 450 cfs, are generally considered stressful to the equipment over time causing problematic cavitation. In drier years, inflows below 950 cfs at the J-2 powerplant are expected unless there are significant flows from the South Platte River basin or the Environmental Account (Kerkman, Feb 2003). Based on operational descriptions of the limits of CNPPID's equipment, hydrocycling has, and will continue to occur at mean daily discharges through the J-2 powerplant of less than 1,050 cfs (CNPPID 2005). The frequencies of J-2 powerplant discharges less than 1,050 cfs (varying priorities for releases from the Environmental Account may affect these results) are estimated in Table 1.

Table 1. **Percent of days that J-2 powerplant return discharges are estimated to be between 200 cfs and 1,050 cfs.**[2]

	JAN	FEB	MAR	APR	MAY	J	J	A	SEP	OCT	NOV	DEC
% of days	69	17	39	61	64	-	-	-	63	45	48	69

During the irrigation season, hydrocycling should rarely occur (i.e., due to the demand for irrigation water on Phelps Canal, there is usually sufficient water to run the J-2 powerplant continuously). Hourly flow records from 2000 to 2004 confirm this. To date, the latest in the year that hydrocycling has terminated was June 18 (in 2001); the earliest it began following the irrigation season was September 10 (in 2002). In addition, in order to reduce risk to infrastructure, hydrocycling is not expected to occur under extremely cold conditions during ice formation.

3.1.2 Range and Duration of Fluctuations

CNPPID prefers to operate the J-2 powerplant at 1,700 cfs to maximize efficiency and reduce stress on its equipment, though other factors influence operational decisions. Considering all the factors described in section 3.1 above, CNPPID typically does not choose to cycle until flows are 1400 cfs or lower. When hydrocycling occurs, Platte River flow fluctuations below the J-2 powerplant have historically been determined by the amount of flow in the Tri-County (Central Supply) Canal and in the Platte River. Assuming that returns through the J-2 powerplant will fluctuate between approximately 1,700 cfs and zero during hydrocycling, the period of time over which water is discharged at the 1,700 cfs rate varies based on water supply. The Tri-County Canal delivery determines the number of hours over which the J-2 powerplant can operate near peak efficiency (1,700 cfs), for example:

Tri-County Canal Delivery to Johnson Lake	Approx # of hours/day that 1,700 cfs can be run through J-2 powerplant turbines (minus the time and water expended during ramp-up and ramp-down)
300 cfs	4
450 cfs	6
600 cfs	8
750 cfs	10
900 cfs	12

3.1.3 Amplitude of Stage Change

The amplitude in river stage of hydrocycling waves moving down the Platte River is affected by many factors, including amount of flow carried by the river, time of year and weather conditions, gaining/losing stream conditions, inflows and diversions, etc. However, under 1,700 cfs/0 cfs hydrocycling, 24-hour differences between high and low flow were measured at the following USGS gages in the Platte River:

[2] DailyFlowAnalysis.xls (Governance Committee Alternative, 1947-1994).

- Platte River near Overton: 1,100 to 1,500 cfs (1.0 to 1.5-foot stage difference[3])
- Platte River near Kearney: 500 to 700 cfs (0.4-foot or more stage difference)
- Platte River near Grand Island: 100 to 300 cfs (0.1 to 0.2-foot stage difference)

3.1.4 Rate of Rise and Fall

Conditions will affect the rate of rise at each of these gage locations. However, under 1,700 cfs/0 cfs hydrocycling, the following maximum rates of rise over a three-hour period have been measured:

- Platte River near Overton: 200 to 350 cfs/hour (i.e., 600 to 1050 cfs in three hours).
- Platte River near Kearney: 100 to 200 cfs/hour.
- Platte River near Grand Island: 20 to 60 cfs/hour.

Rates of hydrograph recession at these locations are typically somewhat less, generally dampened by about 10 to 40 percent compared to the corresponding rate of rise.

3.1.5 Travel Time Between Gages

Again, various conditions will affect the velocity at which a hydrograph "wave" translates downstream in the central Platte River. However, under 1,700 cfs/0 cfs hydrocycling, and assuming relatively low flows in the river, the following travel times appear typical for the hydrocycling peaks and troughs:

- Overton to Kearney gage: 13 to 20 hours
- Overton to Grand Island gage: 40 to 68 hours

3.2 Proposed Agreement to Limit Hydrocycling

3.2.1 Agreement Between CNPPID and the Service

The attached hydrocycling agreement (Agreement), serves as the basis for our analysis of effects on whooping crane, least tern, and piping plover, and/or any reduction in benefits that would otherwise be provided for these species by the Platte River Recovery Implementation Program (Program).[4]

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[3] Stage changes measured at gage locations may not be representative of other areas of the river channel. Gages are typically located at bridges where channels are narrow, so measured stage changes in these locations are expected to be somewhat higher than what might be experienced in wider channel locations.
[4] In cases where there appears to be a discrepancy or inconsistency between this biological opinion and the Agreement, the Agreement language takes precedent.

In general terms, the key elements of the 2006 Agreement include concurrence between the two parties that:

- CNPPID will use its best efforts to operate the J-2 powerplant in accordance with the description of operations in Appendix A of the Agreement.
- CNPPID commits to timely Environmental Account (EA) Manager notification regarding anticipated and current hydrocycling operations during specific periods of the year relevant to potential Platte River habitat use by the least tern, piping plover, and whooping crane. In addition, when hydrocycling, CNPPID commits to maintaining records and making certain data available to the Service's EA Manager.
- The Service and CNPPID commit to supporting, advocating and cooperating with Program efforts to collect baseline data which also can be used to evaluate species and habitat conditions associated with hydrocycling practices.
- The term of the Agreement will coincide with the term of CNPPID's FERC license, unless terminated by either party upon at least 60 days notice.
- Provisions are made to allow for adjustments in the time of day of daily flow increases from the J-2 powerplant under certain circumstances, by mutual consent of the parties.

Additional, more detailed information regarding each of these elements is provided in the Agreement. The limits on hydrocycling operations proposed in Appendix A of that Agreement would, in general terms, commit CNPPID to the following:

- From March 18 to April 30 and from October 17 to November 10 of each year, and on any additional days beginning when whooping cranes are known to be present until they have departed, CNPPID will hydrocycle the J-2 powerplant in a series of stepped-up wicket gate positions (WGP), between certain hours of the day, such that overnight stage increases potentially affecting whooping crane roosting sites downstream are reduced. No modifications in the allowable rate of decline (stage decrease) are proposed under the Agreement.
- During the first seven days of May, J-2 powerplant hydrocycling operations will not be restricted. When hydrocycling during the remainder of May, CNPPID will use best efforts to operate the J-2 powerplant so that peak flows are similar to or less than a benchmark flow[5] at Overton.
- From June 1 to August 15, when hydrocycling occurs, CNPPID will use best efforts to operate the J-2 powerplant to keep flows at Overton at or below the

[5] The Agreement uses the same benchmark flow set forth in the Flow Attenuation Plan (FAP) established pursuant to License Article 412 and approved by FERC on October 16, 2000. The FAP requires that CNPPID and the EA Manager establish a benchmark flow each year at the Overton gage for the June 1 to August 15 time period. The benchmark flow is to be set annually at a level equal to the highest flow during May, or at another flow rate set by the Service based on data regarding nesting locations or desired nesting locations and flows that are believed not to inundate known nests, and with cognizance of CNPPID's limited storage capacity at Johnson Lake. During the nesting season (May 1 to August 15), CNPPID will use its best effort to avoid exceeding the benchmark flow during hydrocycling, as well as in returning flows after a rainfall event occurring between June 1 and August 15 as described in the FAP. At times when CNPPID is not hydrocycling the J-2 powerplant during May, there will be no requirements to operate the J-2 powerplant to achieve or avoid achieving any flow at Overton. Adjustments to the benchmark flow can be made during the time period and can be suspended early with mutual consent.

benchmark flow rate then in effect under the FERC-approved Flow Attenuation Plan (FAP) established pursuant to License Article 412.

- Additional commitments are made to provide the Service with timely data on diversion, storage and discharge practices by CNPPID when hydrocycling is implemented during certain relevant periods of the year.

Details regarding each of the commitments are provided in Appendix A to the 2006 Agreement, which is also included as an attachment to this document.

3.2.2 Quantitative Description of Hydrocycling Under the Agreement

The various effects on flows and stages described below were observed from a single test in November 2005 of the hydrocycling pattern agreed to for the whooping crane migration season and may not correspond to effects in other years, at other times of the year, or under different flow conditions. In addition, the November 2005 river stage and discharge data used to evaluate the operations are also provisional. Nevertheless, this represents the best information available with which to evaluate the effects of hydrocycling, including proposed limits on hydrocycling patterns, on federally listed species, and therefore forms the basis of the Service's analysis regarding the effects of the action.

During November 21-23, 2005, CNPPID discharged water from its J-2 powerplant in a step-wise manner consistent with the mode of operations proposed in Appendix A of the Agreement. Specifically, based on records provided by CNPPID, water was passed through the J-2 powerplant and returned to the Platte River as follows (and as illustrated in Figure 1):

- On Day 1 (November 21), J-2 powerplant was brought on-line between 8:00 a.m. and 9:00 a.m. to the first wicket gate position (approximately 475 cfs), and maintained at that level for about 23-24 hours. Prior to bringing the J-2 powerplant on-line, no flow had been run through this hydropower facility for approximately 62 hours;
- On Day 2 (November 22), between 7:00 a.m. and 9:00 a.m., flow through J-2 powerplant was increased to approximately 1,075 cfs, and maintained at that level for about 24 hours;
- On Day 3 (November 23), between 8:00 a.m. and 9:00 a.m., flow through J-2 powerplant was increased to approximately 1,650 cfs, and maintained at that level for about 16 hours;
- Flows through the J-2 powerplant were halted completely around 1:00 a.m. on November 24, and were not resumed until around 10:00 a.m. on November 26 (about 57 hours later).

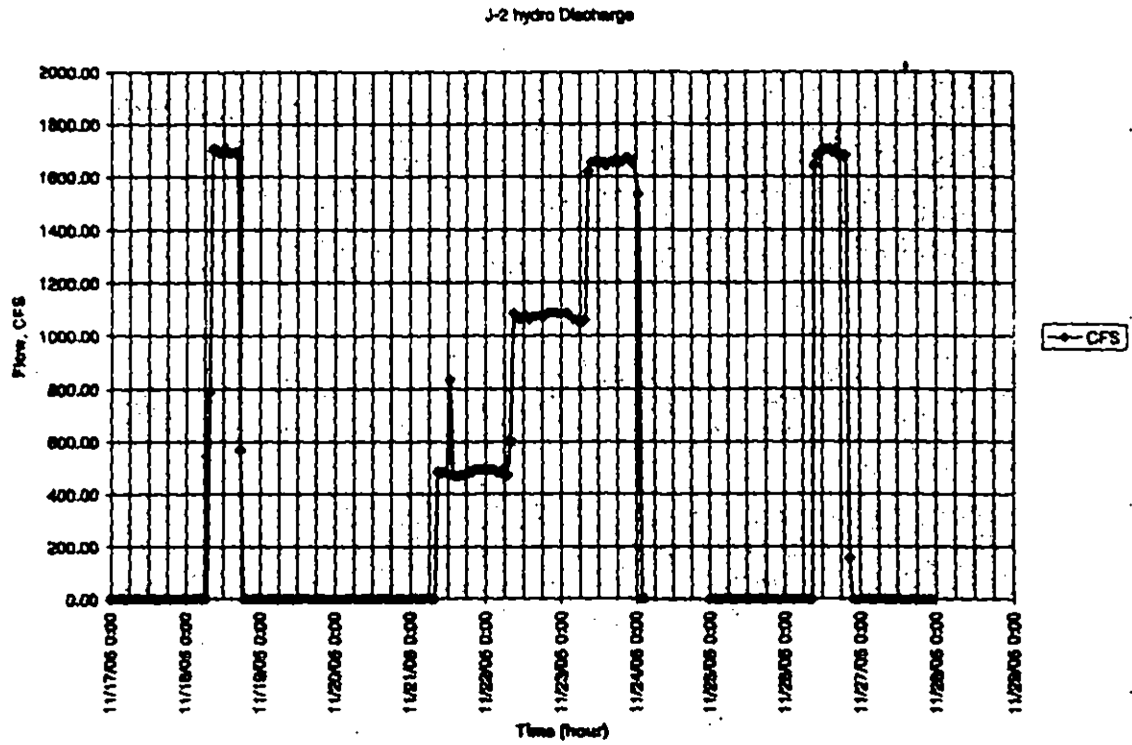

Figure 1. Data provided by CNPPID illustrating hourly flows discharged through the J-2 powerplant, November 17 through November 29, 2005. The discharges on November 18 and November 26, 2005 (left and right sides of figure) represent 1,700 cfs/0 cfs hydrocycling; the stepped-up discharges on November 21, 22, and 23, 2005 (middle of figure), correspond to the hydrocycling pattern identified in the Agreement for the whooping crane migration seasons.

These stepped-up discharges occurred between two hydrocycling events in which discharges from the J-2 powerplant were ramped-up and ramped-down from 0 to about 1,700 cfs within one hour (and maintained at about 1,700 cfs, in both cases, for 10-11 hours).

The Service evaluated this operation using:

- Hourly discharge-rate data for the J-2 powerplant (source: CNPPID);
- Half-hourly stages and estimated flows at the Cottonwood Ranch, Odessa, Overton, Kearney, and Grand Island Platte River gages downstream (sources: Nebraska Department of Natural Resources and the USGS); and
- Stage-discharge relationships for various channel cross-sections along the Platte River near Elm Creek (circa RM 229) and points downstream, as described below.

3.2.3 Travel Times to Downstream Locations

The travel times of CNPPID's J-2 powerplant water discharges to various points downstream on November 21, 22, and 23, based on Service analysis of hourly hydrographs, were approximately as follows:

	Approx time after Johnson-2 discharge ramp-up that the associated pulse:		
	begins to arrive	achieves peak rise rate	begins to plateau
Overton gage	4 to 4-1/2 hours	5 hours	8 hours
Elm Creek*	8 to 12 hours	11 to 14 hours	20 to 25 hours
Odessa gage	11 to 14 hours	14 to 16 hours	24 to 28 hours
Kearney gage	16 to 20 hours	19 to 26 hours	30 to 36 hours

*Interpolated for river mile 229

Note: The travel times observed in November 2005 may not correspond closely to travel times under other hydrologic conditions, but would likely correspond to the results under dry conditions during the fall whooping crane migration season, and have some relationship to anticipated results under dry conditions during the spring migration season.

3.2.4 Magnitude and Timing of Downstream Stage Changes

The Platte River near Elm Creek, Nebraska (RM 228.7) was assessed because this location is upstream of the majority of areas currently managed as potential whooping crane roosting sites in the central Platte River, and it is recognized that the magnitude and rate of stage change will generally attenuate as these pulses continue downstream.

Hourly instantaneous discharge estimates for the Platte River near Elm Creek[6] were converted to estimated hourly river stages by considering two different stage-discharge relationships ("rating curves") for this location: one that the U.S. Bureau of Reclamation (Reclamation) has used for its HEC-RAS unsteady flow model, and another derived from relationships used for Reclamation's SedVeg Model. Net *12-hour changes* in estimated stage at this river location were then calculated and plotted as an indicator of potential overnight stage rise. The present-day stage-discharge relationships assumed for the Elm Creek location, especially for lower flows (e.g., 200 to 700 cfs) have not been verified, and as a result, may not hold consistent with current stage-discharge relationships, but would likely be similar.

The results for the two rating curves are shown in Figure 2. The large peaks at either end of Figure 2 (representing the largest stage increases over 12 hours) are associated with the 1,700 cfs/0 cfs hydrocycling releases by CNPPID on November 18 and 26. The lower peaks between these two events, labeled in Figure 2 with specific times, correspond to the three sequential days of hydrocycling according to the Agreement's pattern for the whooping crane migration season on November 21, 22, and 23.

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[6] Instantaneous discharge in the Platte River at Elm Creek for each hour was estimated as:

$$Q_{ElmCreek} = 0.307 * Q_{Overton}(t-7) + 0.693 * Q_{Odessa}(t+3)$$

where:

$Q_{Overton}(t-7)$ = instantaneous flow at the Overton gage 7 hours earlier, and

$Q_{Odessa}(t+3)$ = instantaneous flow at the Odessa gage 3 hours later.

This corresponds to a linear weighting of the relative locations of the Overton gage (RM 239.3) and the Odessa gage (RM 224).

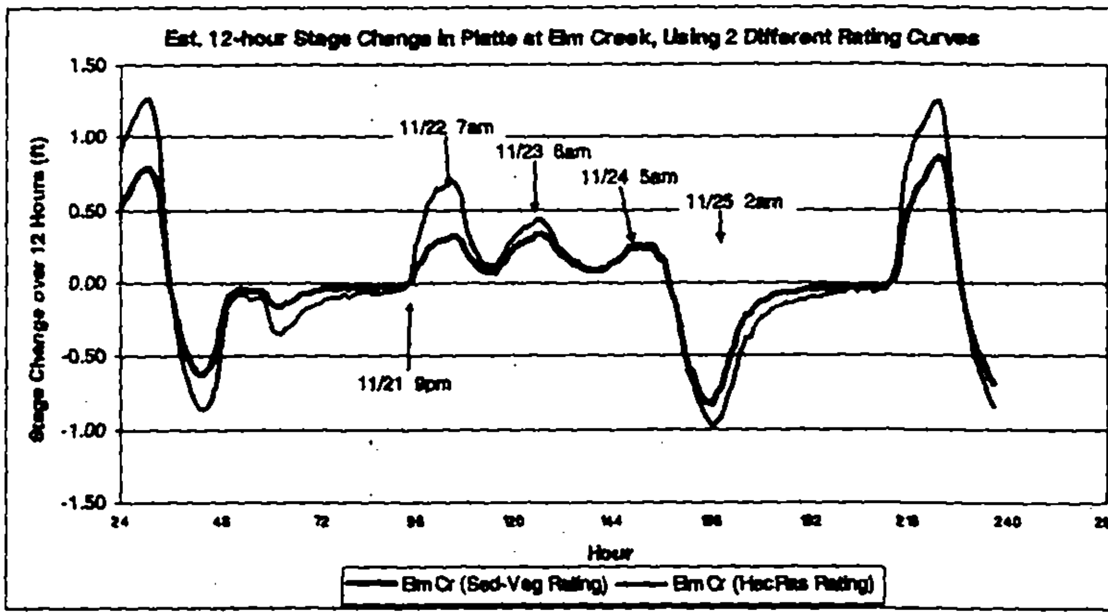

Figure 2. Estimated 12-hour change in stage at the Platte River near Elm Creek location, November 19 through November 27, 2005 using two different stage-discharge relationships.

The above data and analysis confirm that CNPPID's agreed to hydrocycling pattern reduces the rate of rise in Platte River stage at the Elm Creek location relative to the 1,700 cfs/0 cfs hydrocycling pattern. Maximum 12-hour stage changes, which were estimated to be on the order of 0.79 to 1.25 feet (24 to 38 cm) under the 1,700 cfs/0 cfs hydrocycling pattern, were reduced to about 0.33 to 0.69 feet (10 to 21 cm) under the agreed to pattern, or less than half the magnitude.

Figure 2 illustrates estimated stage changes at a particular location and under a particular set of river conditions. It is important to understand that hydrocycling-induced rates of river stage change can be highly variable as a result of several factors:

- River flow conditions: Normally the greatest stage change for a given increase in discharge occurs when river flow is lowest, due to the nature of channel morphology. Thus, stage changes induced by hydrocycling would be less than those indicated by the above analysis as base river flow increased. River flow conditions in November 2005 were exceptionally low (i.e., about 500 cfs mean daily flow at Overton) as compared to the 1970-2004 November average (i.e., about 1,600 cfs at Overton). Under more normal river conditions, hydrocycling-induced stage changes are expected to be substantially less than those described above.
- River channel morphology: River stage is less sensitive to changes in river flow (i.e., it experiences less stage change) where the river channel is shallowest and widest. Thus, where unusually shallow and wide channel areas are of interest because, for example, they are favored by whooping cranes for roosting, and/or are established in the Platte River for purposes of species management, such sites may experience less hydrocycling-induced stage change than suggested above.

- River location: The rate of increase in river discharge and stage rise associated with an advancing hydrocyclic pulse would generally attenuate as the pulse continues downstream, eventually becoming negligible.

3.2.5 Peak Stage Downstream

Discharges ramped-up over a series of days are likely to result in a somewhat higher maximum river stage downstream when compared to hydrocycling in which the same maximum rate of discharge is sustained for only 12 hours or less (at least, under relatively dry river conditions). This is because the longer an elevated stage is maintained and the greater the total volume of flow associated with such a discharge, the less the highest sustained flow will be attenuated downstream by the effects of bank storage (flow to bank storage declines with time as the hydraulic gradient from the river channel to adjacent water tables is reduced).

This theoretical effect appears to be confirmed by the data collected during November 2005 for the Cottonwood Ranch site (Table 2). In this case, hydrocycling in the pattern agreed to for the whooping crane migration was implemented on November 21, 2005, and ultimately produced a somewhat higher stage at Cottonwood Ranch (and a greater net stage increase, from beginning to end of event) than did the shorter 1,700 cfs/0 cfs hydrocycling that occurred immediately before and after.

Table 2. Approximate reported river stage heights at the Cottonwood Ranch site immediately preceding the pulse generated by specific J-2 powerplant discharges, and at peak stage associated with that discharge. The final column illustrates the net stage increase over the course of the event.

Hydrocycling event	Begin stage at Cottonwood (ft)	Peak stage at Cottonwood (ft)	Net stage increase at Cottonwood (ft)
11/18/05 (1,700 cfs/0 cfs hydrocycle)	3.23	4.86	1.63
11/21/05-11/23/05 (agreed to hydrocycle)	3.20	5.08	1.88
11/26/05 (1,700 cfs/0 cfs hydrocycle)	3.31	4.97	1.66

4.0 Status of the Species/Critical Habitat

Ten species were identified as threatened, endangered or candidates for listing pursuant to the ESA in the Service's 1997 biological opinion (USFWS 1997) – the whooping crane, interior least tern, piping plover, pallid sturgeon, American burying beetle (*Nicrophorus americanus*), bald eagle (*Haliaeetus leucocephalus*), Eskimo curlew (*Numenius borealis*), peregrine falcon (*Falco peregrinus*), sturgeon chub (*Macrhybopsis gelida*), and western fringed prairie orchid (*Platanthera praeclara*). This biological opinion addresses potential effects on the whooping crane, interior least tern and piping plover. The Service is not aware of any information related to the proposed action that affects its 1997 findings regarding the other species. A complete description of the status of the whooping crane, interior least tern, piping plover and designated critical habitat for the whooping crane, updating that available in the Service's biological opinion on relicensing, can be found in sections V.A to V.C of the Service's biological opinion (USFWS 2006) on the Program. These sections are incorporated herein by reference. The Service is not aware of any additional information relevant to the status of these listed species or their federally designated critical habitats in the action area.

5.0 Environmental Baseline

When evaluating the effects of the proposed action on federally listed species, the Service is required to consider the environmental baseline (baseline). The baseline includes: a) the past and present impacts of all Federal, State or private actions and other human activities in the action area; b) the anticipated impacts of all proposed federal projects in the area that have already undergone formal or early section 7 consultation; and c) the impact of State or private actions contemporaneous with the consultation process. Thus, the baseline here includes the effects of operating the Kingsley Dam Project (FERC Project No. 1417) under the 1998 license, and the anticipated impacts of the Program, which has undergone formal consultation but has not yet been approved. The baseline also reflects natural factors leading to the current status of federally listed species and their habitats.

The Service's biological opinion regarding the Kingsley Dam Project (FERC Project No. 1417) described a pre-relicensing 1997 baseline in the section "Status of the Platte River System and Listed Species." While additional data and modeling are now available, the fundamental conclusions of that section are unchanged. The 1997 biological opinion also discussed the anticipated effects of relicensing pursuant to the 1997 settlement, which were described in the "Reasonable and Prudent Alternative" (RPA). CNPPID has since implemented these measures. The RPA is based both on CNPPID's actions and the then-anticipated development and implementation of a future, basin-wide Program intended to address endangered species issues. That Program has been developed and its State and Federal signatories are engaged in the final approval process. The biological opinion on the Program was issued in June 2006 and provides updated baseline information and anticipated effects of the Program on the listed species and their habitat.

The evaluations in the relicensing proceeding assumed a continuation of historic lake levels in Johnson Lake, which would be restored by the lake level corrections sought in the amendment. Historic hydrocycling was discussed in some detail in the Program biological opinion and was included in the baseline. The analysis in this biological opinion specifically focuses on the reduction of potential impacts through proposed limits on hydrocycling pursuant to the Agreement and assumes all historical operations are part of the baseline.

6.0 Effects of the Action

Hydrocycling is anticipated to potentially affect the whooping crane and its federally designated critical habitat, the interior least tern, and the piping plover. A great deal of information has been collected on the effects of hydrocycling, hydropower peaking, and other repeated pulse-type flows on river systems around the world. While little of this information has been collected in the Platte River basin or on comparable plains river systems, it is conceptually applicable. Therefore, where quantitative analysis is not available or possible with current levels of information on the Platte River, a qualitative discussion of effects based on such concepts is provided. It should be noted that the qualitative discussions below address hydrocyling generally, not hydrocycling of the magnitude and timing of the proposed action specifically. The proposed action's agreement to certain limits on hydrocycling is expected to substantially reduce in magnitude these potential impacts, except where noted. The change in maximum Johnson Lake level reduces the potential affect that these limits may have on successfully implementing the hydrocycling Agreement. It should be noted that drier conditions are likely to exacerbate other stresses on federally listed species and their habitats for reasons unrelated to CNPPID operations.

6.1 Effects of the Action on Whooping Crane

The spring whooping crane migration season generally extends from March 23 through May 10, and the fall migration season from October 1 through November 15. If hydrologic conditions during the duration of the Agreement are similar to those seen from the late 1940s through the late 1990s, the average frequency of occurrence of hydrocycling would be approximately 58 percent of the time during the spring migration, and approximately 46 percent of the time during the fall migration. Keep in mind, however, that although these frequencies occur on average they may not represent "typical" conditions in any given year, and they may change depending on priorities for releases from the Environmental Account.

Migrating whooping cranes may occupy the Platte River at various times of day and are observed to retreat from fields to Platte River roosts during severe weather conditions. However, whooping cranes primarily use the Platte River for roosting at night. When roosting, whooping cranes stand in shallow (i.e., usually less than about 9 inches deep), slow-moving water and do not normally change locations in the river channel area during the night (pers. comm. Stehn 2006).

Whooping cranes in the Wisconsin-Florida flock of whooping cranes abandoned roosts at the Chassahowitzka National Wildlife Refuge (NWR) wintering area in response to cyclic tidal changes in water depth of approximately one foot (pers. comm. Stehn 2006). Similarly, the cyclic changes in river stage resulting from hydrocycling can adversely affect individual whooping cranes by forcing the cranes to leave the roost at night or to move around within the roost in an effort to find suitable water depths as river stage changes. Additionally, under shallow water conditions at low flows, roosting whooping cranes are exposed to harm or harassment from predators such as coyotes (*Canis latrans*), as observed at Bosque del Apache NWR (pers. comm. Stehn 2006).

6.1.1 Geographic Variation in Magnitude of Effect

Because of flow travel time, the hydrocycle "wave" of river stage change moves downstream and the amplitude of each wave lessens as it proceeds. Therefore, the most pronounced impacts of hydrocycling on whooping cranes occur between the J-2 powerplant return and Kearney (RM 246 to RM 215) where the amplitude of the ascending and descending flow cycle is most pronounced. Within this reach from 1996 to the spring of 2006 inclusive, seven groups of one or more whooping cranes were confirmed using the Platte River (involving 16 cranes, totaling 39 crane use-days). This use of the river by whooping cranes was concentrated in a few segments of wide channels that are being maintained as crane habitat by the combined efforts of the Nebraska Public Power District (NPPD), CNPPID, Service, Nebraska Game and Parks Commission (NGPC), conservation groups, and other entities. The potential adverse biological effects of hydrocycling on whooping cranes will likely increase as riverine habitat restoration efforts are expanded within this reach and the area becomes more attractive to whooping cranes, although the wide channels that are the desired outcome of such restoration efforts are also less susceptible to the stage changes.

Downstream of Kearney, the amplitude of the rise and fall of river stage is much lower, but the river is still subjected to cyclic low flows when river flows are being regulated for power production. Because groundwater returns contribute flows, however, total flows rarely fall below several hundred cfs during the migration season even at the low point of a cycle, so very low flows potentially dewatering portions of the river channel are not generally anticipated. If they do occur, such low flows could potentially disrupt whooping crane roosting behavior, or expose the birds to potential harassment or harm from predators. Between Kearney and Chapman from 1996 to spring of 2006 inclusive, groups of one or more whooping cranes were confirmed using the Platte River during 40 migratory stopovers (involving 73 cranes, totaling at least 517 crane use-days).

Hydrocycling operations as described in the proposed Agreement would likely reduce, but not eliminate, associated adverse impacts on whooping cranes. Due to increases in stage changes associated water depths (upstream of Kearney, in particular) and the magnitude, frequency and rapidity of those changes, there still exists some chance that whooping cranes could be flushed from their roosts or forced to repeatedly move around on the roosts at night when hydrocycling occurs, especially under drier conditions. These effects would appear to be substantially less under agreed upon operations when compared with 1,700 cfs/0 cfs hydrocycling. The agreed to hydrocycling operations reduce the magnitudes of daily stage increases by step-wise ramping over several days. In addition, the Agreement includes limits on the time of day of flow rate changes to assure that stage increases in the most upstream portions of the river occur during the day, when nocturnal roosting is not an issue, so that by nightfall, wave attenuation over distance further reduces stage change. Impacts could occur from either loss of shallow water areas during rising river stage or from dewatering portions of the channel during ebbing flows. Consequently, hydrocycling remains a factor that could impair the normal behavior patterns of whooping cranes using the central Platte River during migration periods.

Like most other bird species—except nocturnal migrants at high altitudes — whooping cranes do not normally fly at night. When whooping cranes are flushed from the roost at night, they are exposed to potential injury and mortality from in-flight collisions with hazards such as tree branches, fences, wires and power lines. Given the severity of the potential adverse effects to individuals in an already small whooping crane population, flight collision and predation pose substantial threats. Cranes forced to take flight from roosts at night would be subjected to risk of injury or mortality from collisions with unseen hazards such as tree branches or power lines (USFWS 1994, Ward and Anderson 1992). Collisions with power lines in general during migration is a substantial threat to whooping cranes and may have caused the deaths of 51 (38 percent – or just under 1.5 per year) of the 133 whooping cranes lost between the months of April and November, 1950 to 1987 (Stehn and Wassenich, 2006). This concern is underscored by the fact that as much as 80 percent of whooping crane mortality occurs during migration periods (Lewis et al. 1992), and that such mortality may be linked to the quality and quantity of stopover habitats (NRC 2005). Because a portion of the whooping crane population stops along the central Platte River during migration, any degradation of that important habitat area adversely affects the likelihood of the species survival and recovery (NRC 2005). Sufficient information has not been collected to indicate whether whooping cranes have dispersed as a result of hydrocycling operations to date.

Even when whooping cranes are not flushed from the roost, hydrocycling may adversely affect roosting cranes through increased exposure to terrestrial predators during periods of low flow when portions of the channel may be dewatered. Rising or falling river stage can require cranes to move within roost sites in search of acceptable shallow water, potentially disrupting their normal behavior patterns. Whooping cranes may also be compelled to expend more energy searching and competing daily for other more suitable roost sites on the river, although we have little information to verify the significance of these movements. It may be that repetitive disruptions in a whooping crane's ability to rest may incrementally reduce its physiological fitness during migration and, for adult birds in the spring, their potential breeding condition – but information to support these concerns is limited. Nightly disturbance due to changes in river stage may also discourage whooping cranes from repeated use of the same roost site on the river on subsequent nights.

While the described effects are qualitative in nature, we anticipate that the likelihood or intensity of potential effects resulting from hydrocycling would be substantially lower under the Agreement. For the reasons discussed at the beginning of the effects of the action, it is not possible to quantify the difference in effects between the two modes of operation at this time.

6.2 Effects of the Action on Whooping Crane Designated Critical Habitat

The designation of critical habitat for the whooping crane predates the Service's current use of "primary constituent elements" (PCEs) in designation of critical habitat. Therefore, physical and biological features of whooping crane critical habitat described in the listing regulation that pertain to the Platte River are addressed here. These include: a) the availability of wide, open, river channel with shallow sand and gravel bars for nightly roosting (roost habitat); b) the availability of bottomland areas, including wet meadows, providing food, water, and other nutritional requirements (food supply); and c) isolation and protection from disturbance. Hydrocycling may adversely affect the ability of one or more of these elements to support the conservation and recovery of the whooping crane, although effects from hydrocycling operations implemented pursuant to the Agreement would likely be reduced when compared with 1,700 cfs/0 cfs hydrocycling operations – and the effects of hydrocycling in general would be more or less pronounced depending on overall water supplies in any given year.

6.2.1 Roost Habitat

Whooping crane use of the central Platte River appears to be primarily associated with suitable roosting habitat. Under certain conditions, hydrocycling would diminish river flows to very low levels in some sections of the river, and increase water levels in others, reducing the ability of the Platte River to provide suitable roost habitat during migration. The Whooping Crane Recovery Team no longer considers Chassahowiska NWR suitable wintering habitat for the Wisconsin-Florida population due to the whooping cranes' reaction to cyclic (tidal) increases in water levels of approximately one foot (pers. comm. Stehn 2006).

Figure 3 shows wetted area of the channel as a function of river flow. When flows ebb during the cycle, low flows of a few hundred cfs would reduce the water surface to about 20 to 40 percent of the channel area (Figure 3). River thalwegs would be shallow and little roost habitat would remain in the discontinuous, narrow, and widely separated subchannels. River reaches dewatered during the day, particularly in the evening, would reduce the suitability and attractiveness of the riverine habitat and the likelihood of whooping crane stopovers during migration periods. Consequently, the ability of the roost habitat to contribute to the recovery and conservation of the whooping crane may be reduced when hydrocycling occurs.

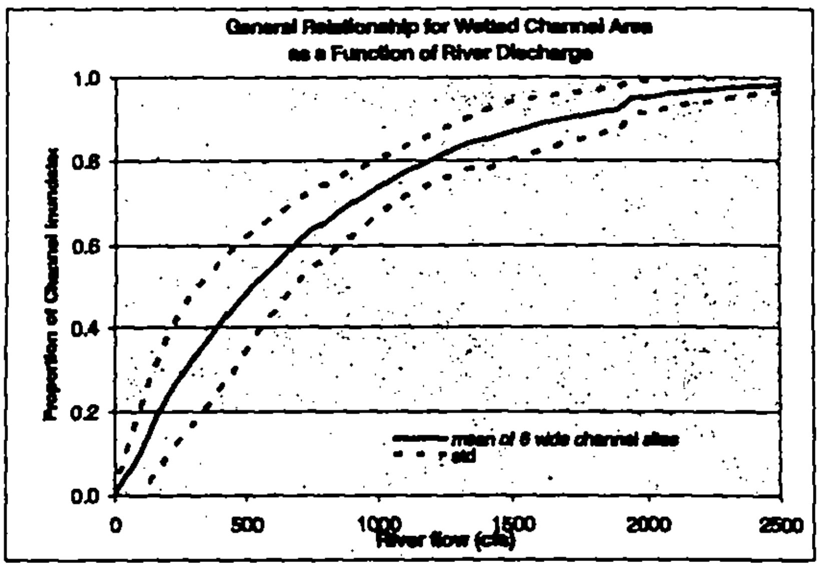

Figure 3. Channel wetted area as a function of river discharge for wide channels (>500 ft) in the Platte River habitat area.

6.2.2 Food Supply

Hydrocycling and its pronounced effect on flows from the J-2 powerplant return to the Kearney reach of the central Platte River may be a contributing factor to increased and more concentrated whooping crane use of the Kearney to Chapman reach for roosting and other needs during migration periods, although such concentration is seen in both cycling and non-cycling years and most enhanced habitat areas are below Kearney. Higher concentrations of sandhill cranes and other migratory birds in the Kearney to Chapman reach prior to or during the whooping crane migration may reduce food resources in agricultural fields near the river. Food resources have already been diminished in that reach as a result of changed agricultural practices that have reduced available waste corn and increased competition with geese (Krapu and Brandt 2001, 2006). During the spring of 2006, two subadult whooping cranes that roosted nightly in the Platte River near Alda for nearly a month regularly traveled with sandhill cranes from 4 to 7 miles (averaging about 5 miles) to find food (Lingle, pers. comm., 2006). It is possible that the cranes would not have flown this far from the river had adequate food resources been available closer to the roost area, though their attachment to a flock of another species makes it difficult to draw conclusions regarding whooping crane behavior.

6.2.3 Isolation from Disturbance

Low flows that expose roosting cranes to potential harassment or harm from predators reduce the ability of the river to provide a secure habitat, free from disturbance. On a larger scale, stretches of river channel experiencing low flows during the day, particularly near evening, would likely reduce the attractiveness of the affected reach of the Platte River to migrating whooping cranes searching for a secure stopover site. Such conditions would likely reduce the value of the Platte River as migrational habitat that contributes to the conservation and recovery of the species when conditions would support hydrocycling.

6.2.4 Summary of Effects to Whooping Cranes

The likelihood and intensity of effects potentially resulting from hydrocycling would be substantially lower under the agreed upon hydrocycling operations than would be expected under 1,700 cfs/0 cfs hydrocycling operations. For the reasons discussed at the beginning of the section on the effects of the action, it is not possible to quantify the effects of the two modes of operation at this time. However, hydrocycling consistent with the Agreement may have the following effects:

- Rising flows may flush whooping cranes from the roost during the night, exposing them to potential injury or mortality from collisions with power lines, tree branches, or other unseen obstacles.
- Reduced flows or partial dewatering of the channel exposes whooping cranes to potential harassment or harm from predators.
- Repeated interruption of whooping cranes roosting by either rising or declining flows may incrementally disrupt normal roosting behavior.
- During cyclic low flow periods, when flows are reduced or channels are partially dewatered, such reaches of the Platte River may not be as attractive as stopover sites to migrating whooping cranes. These conditions may expose migrating cranes to additional risk, especially in the evening when the birds are searching for stopover areas.

6.2.5 Summary of Effects to Whooping Crane Critical Habitat

We anticipate the likelihood or intensity of effects resulting from hydrocycling to be substantially lower pursuant to the hydrocycling Agreement than would be expected under 1,700 cfs/0 cfs hydrocycling operations. For the reasons discussed at the beginning of the section on the effects of the action, it is not possible to quantify the effects of the two modes of operation at this time. However, hydrocycling consistent with the Agreement may:

- Degrade suitable whooping crane roosting habitats;
- Contribute to more concentrated use of downstream portions of the central Platte River, where whooping cranes may be impacted by reduced food resources in those areas;
- Expose whooping cranes to additional instances of predation.

6.3 Effects of the Action on the Interior Least Tern and Piping Plover

6.3.1 Nest Inundation

If suitable, dry sandbars are present, least terns and piping plovers may nest on the central Platte River, although no riverine nesting has been documented since 1996. Suitable sandbars are high enough to provide expanses of dry sand and avoid nest inundation during rain events, but are low enough to be part of the active channel and avoid vegetation encroachment. Probably the greatest impact on tern and plover survival has been the regulation of river flows through the construction of dams and channelization on Great Plains rivers. Untimely releases of water from dams and other structures have resulted in significant egg and chick losses (Schwalbach et al. 1993). The practice of hydrocycling raises water levels in a frequent, cyclic pattern that can potentially inundate areas of sandbars that might otherwise provide tern and plover nesting habitat or, where birds are actively nesting, flood nests, eggs, or chicks. Hydrocycling can also prevent terns and plovers from nesting on sandbars in areas that may not be suitable because of possible inundation.

Based on observations from 1999 to 2005, under some conditions, CNPPID's practice of hydrocycling can overlap the nesting seasons of the piping plover and least tern which begin about May 1 and May 20, respectively, and persist through mid-August. Inundation of sandbar and/or beach areas during nesting season can adversely affect these species by reducing availability of potential nesting habitat and by flooding nests, eggs, and chicks. The greatest changes in river stage as a result of hydrocycling are in upstream locations from Kearney. The amplitude of the peak flow during hydrocycling attenuates as it moves downstream possibly lessening the impact to potential nesting habitat. However, low topographic relief is prevalent in the channel in downstream locations making this area highly susceptible to inundation during weather events. Because, nests and chicks on low sandbars are highly vulnerable to even the slightest increases in flows (Kirsch and Lingle 1993), downstream locations are also susceptible to inundation during hydrocycling, although the threat may be somewhat reduced due to wave attenuation in downstream areas.

To avoid or reduce the likelihood of inundating least tern and piping plover nests, eggs, or chicks due to cycling during nesting season May 1 to August 15, CNPPID has agreed to certain limits on hydrocycling at the start of the tern and plover nesting season. These operations are integrated with CNPPID's FERC-approved FAP (see *Description of the Action* section for a description of the FAP). From May 1 to May 7, cycling operations at the J-2 powerplant will not be restricted. The purpose of this operation is to encourage least terns and piping plovers to nest at higher elevations on sandbars and be less susceptible to rainfall events. Because this operational regime would be initiated at or before the beginning of the nesting season, discouraging nesting on low bars prior to nest initiation may provide incidental benefits to the species.

During the remainder of May, CNPPID would use its best efforts to operate the J-2 powerplant so that peak flows from hydrocycling would be equal to or less than a benchmark flow established at Overton. From May 8 to May 31, this hydrocycling benchmark flow would be determined by the peak flow from the previous 48 hours at the Overton gage. This benchmark flow would not be lower than the initial benchmark set for the previous June 1 to August 15 under the FAP benchmark flow. Limiting the hydrocycling benchmark flow to not less than the FAP benchmark flow is intended to avoid setting an extremely low hydrocyling benchmark if an outage or other circumstances lead to little or no discharge for 48 hours. Similar to the benchmark flow established under the FAP, the hydrocycling benchmark flow during the May 8 to May 31 period is expected to adjust with conditions. For example, a higher flow event during the previous 48 hours would create a higher benchmark for subsequent J-2 powerplant operations. Under similar circumstances, the FAP benchmark flow is adjusted accordingly. The purpose of the limits on hydrocycling during the May 8 to May 31 period is to reduce the likelihood of nest inundation. By providing flows at the hydrocycling benchmark flow during this period, nests should be established above the highest hydrocycling peak flow set earlier in the month and would avoid inundation under most potential summer flow conditions as a result. When CNPPID is not hydrocycling the J-2 powerplant during May, there would be no new requirements to operate the facility to achieve or avoid achieving any flow at Overton.

During June 1 to August 15, if hydrocycling operations continue, CNPPID would use its best efforts to operate the J-2 powerplant to keep river flows at Overton at or below the FAP benchmark flow. As a condition of its 40-year FERC license, CNPPID is responsible for implementing the FAP each year and using its best efforts to attenuate increased flows in that Platte River which might occur because of rejection of irrigation water due to regional or local weather conditions during the June 1 to August 15 nesting season. Following a rainfall event, the FAP calls for reducing return flows by regulating flows in Johnson Lake (to the extent space is available) in an effort to keep flows at Overton below the FAP benchmark and reduce the likelihood of inundating least tern and piping plover nests in the central reach of the Platte River.

Hydrocycling operations pursuant to the proposed Agreement is expected to address the increased probability of nest inundation in the central reach of the river due to hydrocycling; however, sufficiency of this protective measure can only be fully understood through implementation and monitoring. Therefore, monitoring, evaluation, and reporting are essential as Agreement operations are implemented. In light of this, CNPPID has agreed to support, advocate, and cooperate with Program efforts to collect baseline data which can be used to evaluate species and habitat conditions associated with hydrocycling practices. A basin-wide Program is expected to monitor inundation of riverine tern and plover nests and fledglings, and, should the Program fail, the Agreement calls for potentially making such monitoring part of the FERC-approved Monitoring Plan. With mutual consent by CNPPID and the Service, adjustments in the timing of daily flow increases from the J-2 powerplant may be made seasonally according to the Agreement.

Reporting of CNPPID's hydrocycling operations in May and during the period covered by the FAP would be included in the report of FAP activities submitted to the Service's EA Manager after August 15 of each year. Data on average daily diversions into CNPPID's Supply Canal and hourly data on J-2 powerplant discharges, Johnson Lake levels, and Phelps Canal inflows would be provided electronically in conjunction with CNPPID's monthly report to the EA Manager for periods when cycling operations are used.

6.3.2 Sandbar Form and Persistence

As discussed above, both least terns and piping plovers nest on riverine sandbars. Repeated changes in river stage through a varial zone may affect such sandbar habitats not only through submersion or inundation, but also through sandbar erosion.

Several kinds of fluvial processes can destabilize/erode sandbars.[7] Most commonly, studies examine erosion or deposition caused by shear stresses exerted by river flows and corresponding entrainment of sediment (i.e., the sediment transport effect of X cubic feet per second of streamflow). Other studies have examined the erosive effect that wave action can have on sandbars, for example immediately downstream of river rapids (Bauer and Schmidt, 1993). A third sandbar erosion process more relevant to the present discussion is driven by groundwater fluctuations resulting from short-term changes in river stage (e.g., during hydrocycling).

Porewater effluxes associated with the rapid dewatering of sandbars can lead to rill erosion on bar faces and to groundwater sapping that removes basal sandbar support (Carruth et al., 1991; BOR, 1996). Repetitive cycles of saturation and dewatering can also decrease the internal strength of sand bodies and lead to mass failures that become evident under low-flow conditions (Carpenter et al, 1991). Various researchers have noted that large fluctuations in flows, diurnal or otherwise, tend to erode beach/bar sands more rapidly than stable or consistent flows (e.g., NPS, 1980; Beus et al., 1991). In systems where an ample supply of sediment exists, this process may not be a threat to the long-term stability/persistence of sandbars as dynamic features distributed throughout a stream reach because sandbars may simply reform in other locations and/or when high flows return. However, erosion may threaten the security of least tern and piping plover nests on individual sandbars.

Studies of sand beaches/bars along the Colorado River in Arizona below the Glen Canyon Dam suggest that many of these features are prone to erosional episodes that

[7] For this discussion, "sandbar" is a generic term denoting sand bars, beaches, islands, and related features that may subsequently change as a result of river discharge and sediment transport.

occur over a matter of hours and are associated with dam operations, including the diurnal hydropeaking of flows (Werrel et al., 1991; Dexter and Cluer, 1999). Interestingly, Dexter and Cluer (p. 258) found that "well-established riparian vegetation provided little discernible stabilizing influence." However, diurnal stage changes along the banks of the Colorado River can be on the order of 1.5 to 6.5 feet or more (Bauer and Schmidt, 1993), while hydrocycling-associated stage changes in the central Platte River are substantially smaller (rarely more than 1.0-2.0 feet). Thus, a key question is whether the much smaller amplitude of hydrocycling events in the central Platte River, along with the nature of sediments and sediment supplies, has a similar potential to destabilize Platte River sandbars.

During the non-nesting period, some sandbar destabilization would not necessarily have adverse habitat effects. A completely stable flow environment leads to static conditions in river morphology, allowing (for example) more vegetation to become established on sand islands. Fluctuating flows have greater sediment transport capacity than steady flows and thus greater capacity to re-work dynamic channel features. To the extent that hydrocycling reduces the encroachment of vegetation into open channel areas, it may provide some habitat benefits. However, the magnitude of flow variations introduced by hydrocycling operations is considerably smaller than natural seasonal and inter-annual variations in flow that provide such benefits under normal river conditions, and as a result would provide commensurately small geomorphic benefits.

6.3.3 Invertebrate Communities

Piping plovers forage visually for invertebrates near shallow water in the associated moist substrates (Cairns 1982, Cuthbert et al. 1999, Whyte 1985). In the Platte River channel, the birds forage along the waters edge and in moist areas on sandbars and beaches. The diet of piping plovers is not well known. However, Lingle (1988) reported piping plovers eating beetles and small, soft-bodied invertebrates from the waterline in the Platte River.

Corn and Armbruster (1993) sampled invertebrate populations at riverine, sandpit and spoil pile locations, and observed foraging birds. They found that riverine invertebrate distributions (as determined by catch rates) were more or less uniform across the moist riverine habitat and observed birds foraging in the sample areas. They emphasize the importance of river channel foraging habitat during the plover breeding season (approximately May 1 through August 20). It should be noted that Corn and Armbruster (1993) conducted their study in a year when CNPPID hydrocycled throughout the winter and spring due to drought. In addition, Lingle (1988) observed banded piping plovers known to be nesting on sandpits foraging 0.5-mile away in riverine habitat. Therefore, the availability of moist riverine sandbar habitat is important to piping plovers nesting along the central Platte River

Depending on the channel morphology, changing river stage may increase or decrease the quantity of moist sand on sandbars and beaches. For foraging plovers, however, it is not the presence of moist sand that is important, but the abundance and availability of the invertebrates associated with that wet substrate.

The impact of hydrocycling on the availability of piping plover food resources is difficult to determine. Terrestrial invertebrates present on moist sand or along the water's edge may be able to move in response to changing water levels. Most of the invertebrate prey species identified by Corn and Armbruster (1993) were flies, beetles and true bugs drawn to the water's edge that did not live in the water as larva. However, continuous and repeated fluctuations in river stage may disrupt the life cycles of invertebrates living near the surface of moist sand if those invertebrates are incapable of moving through the substrate in response to stage changes. Without better knowledge of the prey species most used by piping plovers, determining impacts of hydrocycling on the distribution or abundance of those species is problematic.

While there have been numerous studies on the impact of hydrocycling on invertebrates (e.g., Gersich and Brusven 1981, Danks 1991, Cereghino and Lavandier 1998), most of these studies focused on benthic or aquatic invertebrates important to fisheries, and/or the studies occurred in river systems much different than those encountered along the central Platte River. Therefore, applicability of those study results in describing potential impacts to piping plover food resources from hydrocycling in the central Platte River is uncertain. Peters et al. (1989) found in studies on the lower Platte River that diel fluctuations in river flow resulting from hydropower peaking operations led to establishment of a zone of substrate with variable habitat suitability that had lower invertebrate productivity than areas consistently submerged. Although the applicability of this information to piping plovers in the central Platte River is somewhat unclear due to the lack of specific information on the species' dietary needs, and the patterns and magnitudes of hydrocycling were much different that the hydrocycling patterns evaluated here, central Platte River invertebrate communities may be affected similarly to those Peters et al. studied in the lower Platte River.

6.3.4 Fish Communities

The diet of least terns consists of small fish. Therefore, the impacts of hydrocycling on the foraging ability of the species are limited primarily to those effects on the abundance and diversity of the fish community in the central Platte River. Beyond impacts to the fish community discussed in this and the following two sections, the physical accessibility of fish to foraging terns is not expected to be significantly affected by hydrocycling due to the abundance of shallow areas in the river channel at various discharges and that hydrocycling due to low flows after May 31 is unusual.

In the Service's 1997 biological opinion (USFWS 1997), there was a thorough description and explanation of the effects of different flow rates on habitat suitability and availability to the fish community (represented by five guilds of representative species and life stages), and on the ability of river flows to moderate summer high water temperature events. For this reason, the mechanisms through which these factors operate will not be discussed here, although they form the foundation for the discussion of effects, and accordingly the basis of the Service's concerns. For a thorough discussion of those mechanisms, please refer to Appendix J of that biological opinion. It should be noted that the fish population studies conducted in support of the relicensing proceeding were conducted in years where CNPPID hydrocycled throughout the winter and spring due to drought.

Periodic fish population monitoring has continued under the FERC-approved monitoring plan developed pursuant to license requirements. Monitoring was conducted on fish diversity and abundance in 2003 and 2005 although the information from these studies are difficult to apply directly to an analysis of cycling alone because they also reflect the impacts of extremely low water conditions lasting through the summer, when CNPPID does not hydrocycle.

6.3.5 Fisheries Habitat Suitability

Three representative hydrocycling scenarios were analyzed at three gages in the central Platte River to determine the shift in total habitat availability in that reach of the river during hydrocycling operations. These scenarios cover the range of flow changes expected under 1,700 cfs/0 cfs hydrocycling and hydrocycling operations implemented pursuant to the Agreement. In general, the habitat shifts discussed below would occur under any type of hydrocycling operation, but those shifts are expected to be more rapid and pronounced under 1,700 cfs/0 cfs hydrocycling than the Agreement hydrocycling operations. Shift in total availability, however, is an incomplete measure.

Under two flow rates, there can be the same amount of a specific class of habitat available, but they are often located considerable distances away in areas that may or may not be accessible to displaced fish. This tends to be more pronounced in shallow water habitats, which tend to become either deep or terrestrial, depending on the direction of change. Deep water habitats simply become more or less deep with changes in flow. This phenomenon can be problematic ecologically, as fish can become isolated into disconnected backwaters, pools, and channels that are susceptible to water quality changes, disease, and increased predation. Those species and life stages that utilize the shallowest habitats (largely guilds A and B) have a lower potential for movement across larger areas, and a greater susceptibility to predation by other fishes in the process. For this reason, additional analyses were performed at river cross sections (measured in 1998 or later) to estimate horizontal shifts in habitat classes, and potential for stranding.

In general, the effects of the three hydrocycling scenarios were significantly more pronounced in the upstream areas than in the downstream areas due to attenuation of hydrocycle peaks as they move downstream. As far downstream as Grand Island, habitat shifts were not pronounced under any of the three scenarios analyzed. There is some concern regarding shifts for guild A, as this guild is comprised of larval and juvenile life stages of fish that exhibit lower mobility than adults. Horizontal shifts in habitat classes were distinctly present, but generally were not extreme, and the primary cause for concern would be for younger life stages. The potential for stranding appears to be relatively low, due to the combination of relatively small changes in stage, and the more protracted time under which they occurred.

In the river reach associated with the Kearney gage, habitat shifts appear to be more pronounced in all three measures analyzed (overall availability, horizontal shift, and stranding potential). Overall habitat availability shifts are most pronounced under wetter conditions. While horizontal shifts are present under all conditions, they are most pronounced under drier conditions. Potential for stranding exists under all conditions, but is most likely to become an issue under drier conditions.

In the reach associated with the Overton gage, habitat shifts appear to be particularly pronounced. Given the range of total flow fluctuation, and habitat availability shifts, it is likely that horizontal shifts would be present, although recent transect information is not immediately available to test this. Potential for stranding would likely follow a similar pattern, although not immediately testable for the same reason. The particularly abrupt pattern of rise and fall of the hydrograph would serve to exacerbate these effects, as habitat shifts and stranding events would be correspondingly abrupt.

6.3.6 Fisheries Recruitment

Reproductive timing and habitat requirements for adult fish were grouped by the guilds used in the habitat availability analysis. Potential effects of CNPPID's hydrocycling operations on each species are briefly discussed below.

Guild A contains no adults. All species are otherwise accounted for in other guilds as adults.

Guild B contains adults of six species. Recruitment of three of these: western silvery minnow (*Hybognathus argyritis*), red shiner (*Cyprinella lutrensis*), and fathead minnow (*Pimephales promelas*) are not anticipated to be significantly impacted by daily hydrocycling. One species, plains minnow (*Hybognathus placitus*), may benefit from hydrocycling, as spawning is stimulated by local flow peaks, and semi-buoyant eggs are not anticipated to be subject to desiccation. Two species: sand shiner (*Notropis stramineus*) and plains killifish (*Fundulus zebrinus*) may be adversely affected. Spawning for these species typically occurs from late spring through summer, largely after cycling in low flow years has ended. However, a summer hydrocycling event could impact eggs due to shallow water spawning habitat requirements and the possibility that the declining limb of the hydrograph would desiccate eggs laid in shallow water. Results of CNPPID fish population monitoring efforts, however, have not identified this impact (Fish Population Studies 2005, 2005 Wildlife Monitoring Report April 24, 2006).

Guild C contains adults of three species. Two of these: river shiner (*Notropis blennius*) and bigmouth shiner (*Notropis dorsalis*) have uncertain spawning habitat requirements, but known habitat requirements of closely related species would suggest potential adverse impacts. The third, emerald shiner (*Notropis atherinoides*), may incur adverse impacts to recruitment as a result of hydrocycling, due to shallow water habitat requirements similar to those discussed above. Spawning for these three species typically occurs from late spring through summer, largely after cycling in low flow years has ended. CNPPID monitoring efforts found too few river and emerald shiners to identify trends and did not identify adverse impacts on the more abundant bigmouth shiners (Fish Monitoring Study Central Platte, Nebraska 1995. Chadwick Ecological Consultants, Inc.).

Guild D contains adults of three species. Common carp (*Cyprinus carpio*) spawn in shallow water, and their eggs may be subject to desiccation, however, given their long spawning season and great quantity of eggs produced, impacts would likely be minimal. Speckled chub (*Macrhybopsis aestivalis*) may not be significantly affected by hydrocycling, as it spawns in deeper, swifter water, and therefore its eggs would not be subject to desiccation. Spawning habitat requirements of silver chub (*Macrhybopsis storeriana*) are not known, but based on requirements of closely related chub species, which spawn in deeper water, it would not likely be significantly affected. Speckled chub and silver chub have been rare in all monitoring and research conducted by CNPPID since 1990. The relative abundance of carp has decreased slightly, but this species is not generally a food source for interior least terns (CNPPID pers. comm.).

Guild E contains adults of two species. Gizzard shad (*Dorosoma cepedianum*) may be adversely affected, because while their depth requirements are not specific relative to those offered in the central Platte River, their eggs are adhesive, and sink after fertilization. This may lead to desiccation of eggs, particularly in the upstream reaches of the central Platte River. Channel catfish (*Ictalurus punctatus*) utilize undercut banks and brush piles, and for this reason may incur infrequent adverse impacts to spawning due to hydrocycling operation, as these habitats typically occur in deeper areas. Spawning for gizzard shad typically occurs in the spring, while channel catfish typically spawn between late spring and mid-summer. Both gizzard shad and channel catfish have shown a slight increase during CNPPID's periodic monitoring efforts from 1990 through 2005 although these results have minimal utility for trending given certain limitations in the monitoringprotocol for these larger species. Channel catfish and mature gizzard shad are not generally a food source for interior least terns (CNPPID pers. comm.).

6.3.7 Summary of Effects to Least Terns and Piping Plovers

The likelihood and intensity of effects resulting from hydrocycling would be substantially lower under the hydrocycling operations implemented pursuant to the Agreement than would be expected under 1,700 cfs/0 cfs hydrocycling operations. For the reasons discussed at the beginning of the section on the effects of the action, it is not possible to quantify the effects of the two modes of operation at this time.

- Hydrocycling may decrease the availability of potential least tern and piping plover nesting habitat in the central Platte River by regularly inundating sandbar areas during the nesting season or may flood nests, eggs, or chicks if cycles are begun after a period of low flow that allowed nesting on low elevation sandbars.
- Hydrocycling may result in destabilization and erosion of sandbars in the central Platte River, including those used by nesting least terns and piping plovers. If such an effect to sandbars is occurring in the central Platte River, it would be expected to be most pronounced in the river reaches upstream of Kearney, due to larger hydrocycling wave amplitudes and a general deficit in sediment supply.
- Cycling or peaking flow releases have been found to have a range of adverse impacts on aquatic invertebrate communities in a wide variety of river systems. However, impacts of hydrocycling on the abundance or availability of prey eaten by piping plovers (likely semi-aquatic or terrestrial invertebrates associated with moist riverine sandbar habitat) is difficult to define due to the lack of specific information available on the prey utilized.
- Hydrocycling may have adverse effects on the diversity of the fisheries community. As with the potential for sandbar destabilization, the effects would

be expected to be most pronounced in the upstream reaches where associated stage changes are most pronounced. Information collected by CNPPID, although limited, has not shown declines in relative abundance of forage fish species during a period with hydrocycling – although specific effects of hydrocycling on fisheries abundance cannot be determined at this time.

- Overall effects of hydrocycling operations on the reproductive success of the fish community are generally negative, and similar to effects on species diversity, would be expected to be more pronounced under drier conditions. These impacts would be most pronounced in mid-spring but may continue through the summer if hydrocycling were extended into those months. As with fisheries diversity and potential sandbar destabilization, the effects would be most pronounced in the upstream reaches.

7.0 Cumulative Effects

The proposed action is anticipated to affect only the central reach of the Platte River. For that reason, only cumulative impacts to that reach are considered here. The Platte River Recovery Implementation Program, a combined state/federal action that began January 1, 2007, is intended to provide ESA compliance for the three species considered in this consultation for all water-related activities that affect flows above the Loup River confluence and addresses the impacts of any non-federal actions, as a result of continued ground and surface water development since July 31, 1997. Thus, no cumulative effects in the central reach of the Platte River are anticipated related to these activities. The Service is not aware of any additional cumulative effects in the action area.

8.0 Conclusions

The Service provided a biological opinion, reasonable and prudent alternative, and incidental take statement regarding the effects of project operations on July 25, 1997, which is unchanged by this consultation. The proposed action for purposes of this consultation (i.e., the revised Johnson Lake level amendment and the Agreement) is not intended to, nor does it offset the effects of the project as a whole. As such, all elements of the Service's 1997 biological opinion (USFWS 1997) and the related incidental take statement remain in effect. By the proposed action, the Service and CNPPID have agreed on operations which serve to limit related potential effects of hydrocycling. Nothing in this biological opinion affects or changes the conclusions drawn in the 1997 biological opinion.

9.0 Incidental Take Statement

This incidental take statement is intended to supplement the Incidental Take Statement included in the Service's 1997 biological opinion (USFWS 1997) by addressing certain potential effects on the least tern, piping plover, and whooping crane that may be associated specifically with hydrocycling actions implemented by CNPPID under the Agreement. As such, the Service has developed the following supplement based on the premise that the reasonable and prudent alternative included in the 1997 biological opinion will be implemented, and that CNPPID's hydrocycling activities will be implemented in conformance with the Agreement.

Section 9 of the ESA and federal regulations pursuant to ESA section 4(d) prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct, and applies to individual members of a listed species. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service acknowledges that there are "Acts of God" or "Acts of Nature" that are beyond the operational control of CNPPID, and that type of take is not incidental take and is not addressed as such.

The Service will not refer the incidental take of any migratory bird covered by this incidental take statement or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. Sec. 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. Sec. 668-668d), if such take is in compliance with the terms and conditions specified herein.

The Service also wishes to make clear that any Terms and Conditions, or Reasonable and Prudent Measures (RPMs) within this Incidental Take Statement, do not supersede or change the Incidental Take Statement within the biological opinion for FERC Project Nos. 1417 and 1835 (USFWS 1997).

The measures described below are non-discretionary, and, through informal consultation as FERC's non-federal representative, have been undertaken by CNPPID under the Agreement, such that the exemption in section 7(o)(2) applies. If CNPPID fails to adhere to the terms and conditions of the incidental take statement through the terms of the Agreement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, CNPPID must report the progress of the action and its impact on the species to the Service as specified in the Agreement and reflected in the incidental take statement [50 CFR §402.14(i)(3)].

9.1 Whooping Crane

Incidental take of whooping cranes may directly or indirectly result from the hydrocycling activities outlined in the proposed action. Such take includes killing, harming, and harassing which could include the loss of habitat and individuals.

In the event of lethal take, the specimen should be collected and stored in a dry, frozen condition, if possible, and delivered to the Service's Field Office in Grand Island, Nebraska, as soon as possible after the incident is reported. Individuals affiliated with CNPPID who discover such take must notify the Service's Field Office in Grand Island within 24 hours of discovering such take.

9.1.1 Amount or Extent of Incidental Take Anticipated

While the Agreement is intended to minimize take of whooping cranes while roosting on the Platte River, it is anticipated that some take due to harassment may occur in association with hydrocycling operations.

It is rare that individual whooping cranes can be observed throughout the night while roosting on the Platte River. This is due to a number of factors, including considerable difficulty in following the birds to a roosting location on the river, and the extreme wariness of the birds, which makes observation, should the birds be successfully followed to their roosts, extremely unlikely. Further, given their extreme wariness while roosting, any attempts at observation on the roost have a substantial likelihood of taking individuals due to harassment. As a result, direct observation of the birds to determine when take is occurring poses unacceptable levels of risk to the birds, and therefore a method of estimating take is needed when whooping cranes are known to be roosting on the Platte River.

Sandhill cranes have served as acceptable physiological surrogates for whooping cranes in previous situations where their ranges overlap. However, given the nature of the effect of the action on cranes roosting in the river (generally changes in river stage), the smaller stature of sandhill cranes combined with the differences between the two species in their tolerance for disturbance, and lack of complete overlap in migration periods, there is too much uncertainty at this time regarding the suitability of sandhill cranes for their use as a surrogate for whooping cranes in determining incidental take.

Use of habitat based surrogates to estimate take is an established practice when direct observation of take of individuals is not feasible. As discussed in the description of the action, a test of the proposed operations was performed and evaluated for its effects on whooping crane roosting habitat in November 2005. Based on this preliminary evaluation, it is likely that the river stage changes associated with hydrocycling operations in accordance with the Agreement will avoid take of whooping cranes due to harassment. However, it must be acknowledged that the Agreement does incorporate a "best effort" qualifier, and that some level of failure to meet the criteria within the Agreement in spite of such best efforts is reasonably foreseeable to occur.

In order to quantify the proportion of time that the criteria of the Agreement may not be achieved, it is necessary to define the conditions under which it would not be expected to be met. The Agreement sets forth circumstances in its section on "Contingencies" where CNPPID will not or cannot make efforts to meet the criteria. Given these contingencies, it could reasonably be anticipated that compliance with the operational criteria in the Agreement would be achieved at least 90 percent of the time.

The take of whooping cranes due to harassment resulting from hydrocycling would only occur during the periods from March 18 to April 30 and from October 17 to November 10 of each year, and on any additional days beginning when whooping cranes are shown to be present until they have departed. As discussed above, operations outside the agreement could occur at any time during the 69 day period (or in additional days when whooping cranes are present). Conditions conducive to hydrocycling have occurred on average 52 percent of the time during the combined whooping crane migration seasons. As such, if the rate of successful implementation of the operational criteria in the Agreement is assumed to be 90 percent, the level of take anticipated under the Agreement would be four instances of operation outside the Agreement criteria per year (i.e., [69 days per year] x [52 percent likelihood of hydrocycling conditions] x [10 percent Agreement preclusion] = 4 days per year when take would be anticipated). This would be applied over a five-year running average to accommodate year to year variation in levels of use, hydrologic conditions, and ability to meet criteria. Therefore, twenty instances of harassment -- operating outside the Agreement criteria under the contingency provision in any five consecutive year period -- are exempted under the ESA. It is important to note that no lethal take associated with hydrocycling is anticipated, therefore none is exempted under the ESA.

In its 1997 biological opinion (USFWS 1997), the Service determined that the level of anticipated take specified is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat when the reasonable and prudent alternative is implemented. The Service's determination is unchanged with the addition of the level of anticipated take detailed in this document.

9.1.2 Reasonable and Prudent Measures to Minimize Take

The Service believes the following RPM with its implementing terms and conditions is necessary and appropriate to minimize take of whooping cranes on the central Platte River.

- CNPPID shall report to the Service hydrocycling activities from March 18 to April 30 and from October 17 to November 10 as set forth in the Agreement including any identified take (harassment as defined above) associated with hydrocycling activity at the J-2 powerplant.

9.1.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of ESA, CNPPID must comply with the following terms and conditions which implement the RPM described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- As set forth in the Agreement, CNPPID shall provide the Service data on average daily diversions into the Central Supply Canal and hourly data on J-2 discharge, Johnson Lake level and Phelps Canal inflows electronically in conjunction with CNPPID's monthly report to the EA Manager from March 18 to April 30 and from October 17 to November 10 (inclusive) when cycling operations are used.
- CNPPID will identify in that report the dates, times, and durations of any cycles that do not conform to the operational criteria in the Agreement.

9.2 Least Terns and Piping Plovers

Incidental take of least terns and piping plovers may result from hydrocycling activities. Such take includes killing, harming, and harassing of adults, eggs and/or chicks.

In the event of lethal take, the specimen should be collected and stored in a dry, frozen condition, if possible, and delivered to the Service's Field Office in Grand Island, Nebraska, as soon as possible after the incident is reported. Individuals affiliated with CNPPID who discover such take must notify the Service's Field Office in Grand Island within 24 hours of discovering such take.

9.2.1 Amount or Extent of Incidental Take Anticipated

Hydrocycling activity may result in take of least tern or piping plover nests, eggs, or chicks by inundation. Any take by inundation of least terns and piping plovers due to hydrocycling is likely to be lethal take in the form of loss of nests, eggs, and/or chicks, as these early life stage birds have not been known to survive inundation. Least tern and piping plover nesting on the river has been considerably less common than whooping crane use of the river, and is anticipated to remain very low until such time as more suitable sandbar habitat and flow conditions are present, due either to natural hydrologic variation or Program actions. Given this rarity of current use, the likelihood that future use will occur when higher elevation (more protected) sandbars are available, and the protections incorporated into the hydrocycling Agreement, the level of take anticipated would be extremely low at this time but may increase if tern and plover use of the river resumes. It should be clarified that take due to inundation as a result of non-hydrocycling operations and rainfall events are addressed in the 1997 biological opinion and incidental take statement and are not modified here.

Any tern or plover nests that are initiated below the waterline of the benchmark flow during the trough of a cycle will be inundated as flows increase. In addition, it must be acknowledged that the Agreement does incorporate a "best effort" qualifier. To avoid ever-decreasing benchmarks, we anticipate that the benchmark established pursuant to the FAP will serve as a target not an absolute ceiling. Given myriad considerations and limitations associated with J-2 powerplant operations, the distance between the plant and the monitoring point at Overton, environmental conditions and monitoring equipment, it is expected that actual flows measured at Overton will fluctuate around the benchmark by a small degree despite best efforts, and could also inundate nests very near the benchmark flow waterline. Because cycling is expected generally to occur on a daily basis, and flow fluctuations about the benchmark by up to 200 cfs are expected to occur regularly, this inundation is considered to do no harm because it causes the tern or plover to relocate to a higher and safer location, likely before eggs are laid. As a result, such inundations will not be considered take.

It is likely that inundation of nests, eggs and chicks by hydrocycling flows more than 200 cfs above the benchmark will be avoided by operating consistent with the Agreement. However, some level of failure to meet the criteria within the Agreement in spite of best efforts is reasonably foreseeable to occur. In order to quantify the proportion of time that the operating criteria of the Agreement may not be achieved, it is necessary to define the conditions under which they would not be expected to be met. The Agreement sets forth circumstances in its section on "Contingencies" where CNPPID will not or cannot make efforts to meet the criteria. In addition, because the benchmark established pursuant to the FAP will serve as a target and because of the considerations identified above, operations will fluctuate around the benchmark and in some cases may be more than 200 cfs above the benchmark despite best efforts. Given the contingencies and the potential for flows more than 200 cfs above the benchmark despite best efforts, it could reasonably be anticipated that compliance with the operational criteria in the Agreement would be achieved at least 90 percent of the time.

CNPPID anticipates that under low flow conditions it may cycle approximately 30 days before irrigation season flows are high enough that cycling is not necessary, and that most of those days will occur before nesting is prevalent. This corresponds to approximately three days per year when the operational criteria in the Agreement might not be achieved and less than one day per year when nests are particularly vulnerable (i.e., inundated too late in the season for successful nesting to reoccur) or when nests with eggs or chicks may be present. Because of the difficulty in estimating the number of tern or plover nests, eggs or chicks that might be taken under the proposed action, the number of inundating flow events (contingencies or best effort flows more than 200 cfs above the benchmark) resulting from hydrocycling will be used as a surrogate. This surrogate measure will be applied over a six-year running average to accommodate year to year variation in levels of use, hydrologic conditions, and ability to meet criteria. Therefore, 18 instances of inundating flows (contingencies or best efforts flows more than 200 cfs above the benchmark) resulting from hydrocycling implemented pursuant to the Agreement in any six consecutive year period are exempted under the ESA. Although there is uncertainty regarding the magnitude of effects of hydrocycling during any particular event counted toward the take surrogate, assuming riverine habitat with higher elevation sandbars is established as described in the first paragraph of this section, we anticipate that many of the flows counted as surrogate take are not likely to inundate substantial portions of that habitat. Because no known riverine nesting of either species has occurred since 1996, quantification of tern and plover take will not begin until terns and/or plovers are known to have begun nesting on the river.

It should be noted that certain rainfall events can increase base flows such that CNPPID cannot make cycling returns sufficiently low to maintain benchmark flows. For a limited time CNPPID can cease returns to avoid exceeding the benchmark, but if Johnson Lake fills, must make discharges of indefinite duration and magnitude, depending on conditions, to reduce lake levels. Such discharges will not be considered hydrocycling and will not count toward the measure of take identified above. Potential take associated with these and other non-cycling flows in excess of the benchmark is covered by the 1997 incidental take statement. Additionally, the Service acknowledges that there are "Acts of Nature" that are beyond the operational control of CNPPID; for example, if during or after a hydrocycling release a rainfall event occurs and together they cause the benchmark flow to be exceeded by more than 200 cfs, this is not incidental take attributed to CNPPID and is not addressed as such. Also, CNPPID operations will be based on river gages calibrated by third parties. As such, flow measurement changes resulting from recalibration are not a basis for take determinations.

In the 1997 biological opinion (USFWS 1997), the Service determined that the level of anticipated take specified is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat when one of the reasonable and prudent alternatives is implemented. This determination is unchanged with the addition of the level of anticipated take detailed in this document.

9.2.2 Reasonable and Prudent Measures to Minimize Take

The Service believes the following RPM with its implementing terms and conditions is necessary and appropriate to minimize take of the least tern and piping plover on the central Platte River.

- CNPPID shall report to the Service hydrocycling activities at the J-2 powerplant between May 1 and August 15 (inclusive) as set forth in the Agreement, including any identified take (inundating flows due to contingencies or best efforts flows more than 200 cfs above the benchmark as defined above)..

9.2.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of ESA, CNPPID must comply with the following terms and conditions which implement the RPM described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- As set forth in the Agreement, CNPPID reporting of the District's cycling operations in May, and during the period covered by the FAP, will be included in the report of FAP activities that is submitted to the EA Manager after August 15 of each year. Data on average daily diversions into the Central Supply Canal and hourly data on J-2 powerplant discharge, Johnson Lake level, and Phelps canal inflows will be provided electronically in conjunction with CNPPID's monthly report to the EA Manager for periods when cycling operations are used.
- CNPPID will identify in that report the dates, times and durations of any cycles that do not conform to the operational criteria in the Agreement and the dates, times, durations and flow estimates used for any cycles that exceeded the benchmark by more than 200 cfs despite best efforts.

9.3 Closing Statement

The Agreement between CNPPID and the Service contains measures designed to avoid and minimize take. Issuance of this incidental take statement is based upon implementation of that Agreement. Should the parties to the Agreement elect to dissolve the Agreement, or should the terms of the Agreement not be upheld, then the protections and provisions provided under this incidental take statement will similarly end.

The Service believes that no more than the amount or extent of whooping cranes, least terns or piping plovers identified in this document will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. CNPPID must immediately provide an explanation of the causes of the taking to the Service and review with the Service the need for possible modification of the reasonable and prudent measures.

10.0 Conservation Recommendations

CNPPID could form a working group with representatives from the Nebraska Game and Parks Commission and the Service to: a) review hydrocycling information as it is developed in the Platte River system and its effects upon the Platte River ecosystem (including federally listed species); and b) recommend potential adjustments in hydrocycling operations pursuant to that new information, as appropriate.

11.0 Conclusion

This concludes formal consultation on the Agreement between the Service and CNPPID regarding limitations on CNPPID's hydrocycling operations. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the Service should be contacted within 24 hours to determine appropriate actions.

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