

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

ATTACHMENT 5

WATER PLAN

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Attachment 5

Water Plan

October 24, 2006

The Program Water Plan consists of the following Sections:

1. Program Water Management Process
2. Channel Capacity of the North Platte River Upstream of Highway 83
3. Colorado's Initial Water Project (Tamarack I)
4. Wyoming's Pathfinder Modification Project
5. An Environmental Account for Storage Reservoirs on the Platte River System in Nebraska
6. Reconnaissance-Level Water Action Plan
7. Depletions Plan, Platte River Basin, Wyoming
8. Nebraska New Depletion Plan
9. Colorado's Plan for Future Depletions
10. Federal Depletions Plan for the Platte River Recovery Implementation Program
11. Water Plan Reference Materials

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 1

Program Water Management Process

August 8, 2006

Described below is the Program's water management process and the relationship of the FWS's Environmental Account (EA) Manager and the Program to that process. The relationship is also shown in Figure 1 of the Organizational Structure Document (Attachment 6).

1. Background

- a. Water projects throughout the Platte River basin are operated by various entities in accordance with each state's water laws. The responsibility for accounting, tracking, regulating, and protecting water rests with each state's water administration.
- b. Pursuant to FERC relicensing requirements, an Environmental Account (EA) was established in Lake McConaughy. A contract between Central Nebraska Public Power and Irrigation District (CNPPID) and the FWS authorized the FWS's representative, the EA Manager, to request releases of EA water pursuant to the terms of the contract. The EA Manager is an employee of the FWS and has the responsibility to manage, request releases from, and coordinate operations of the EA. The EA Manager also develops the EA Annual Operating Plan (AOP), including the demands for the EA water.
- c. Pursuant to FERC relicensing requirements, the document entitled, *An Environmental Account for Storage Reservoirs on the Platte River System in Nebraska* (Attachment 5, Section 5) establishes an Environmental Account Committee (EAC) and Reservoir Coordinating Committee (RCC). The EAC is chaired by the EA Manager and provides guidance/input to the EA Manager for the development of the EA AOP. The RCC provides a forum to coordinate the annual operating plans of other projects and to discuss projected water supply conditions in the basin. The RCC is for coordination purposes only.
- d. The EA Manager, EAC, and RCC, created to meet FERC relicensing requirements, will continue to exist with or without the Program.
- e. Relative to Program water management, Project Sponsors include the states in their tracking, accounting, regulating, and protecting Program water; the federal government and the states in the management of their respective depletions plans; CNPPID for the EA in Lake McConaughy; the State of Colorado for Tamarack I; and the State of Wyoming for the Pathfinder Modification Project. In addition, the Program Water Plan provides opportunity for parties outside the Program to enter into cooperative arrangements with the Signatories for meeting Program water goals.

2. Program Water Operation Process. The following proposed Program water operation process builds on the existing structure that is in place for the Lake McConaughy EA and integrates that structure into the Program.

- a. The role of the FWS's EA Manager as the Lake McConaughy EA operator will be expanded. The EA Manager will prepare an annual AOP for the Program water (Program AOP) in the manner described below. The right to request water from individual projects may be accomplished through contracts, letter agreements, or whatever means is acceptable to the Project Sponsor, EA Manager, and Governance Committee. Project Sponsors retain the authority, unless delegated to the Governance Committee or EA Manager, to develop and implement individual operating plans for Program water, provided such operations are consistent with applicable state laws, compacts, decrees, and the Program first increment water objectives.
- b. The responsibility for accounting, tracking, regulating, and protecting Program water rests with each state's water administration. Any changes in state laws or procedures relating to the accounting, tracking, regulating, and protecting water will be reported to the Governance Committee.
- c. In October, the Project Sponsors will report to the EA Manager on the status of the water supply conditions projected in their respective written AOP's. The projected water supply conditions will initially be based on average inflow conditions.
- d. The EA Manager, in consultation with the Executive Director, will use the information provided by the Project Sponsors, EAC, and RCC to develop a draft Program AOP. The Program AOP will match the projected water supply conditions to the EA Manager's stated goals and priorities.
- e. In November, the EA Manager and the Executive Director will meet with the Project Sponsors, EAC, and RCC to discuss and receive input on the draft Program AOP. After consideration of the information received, the EA Manager will make any appropriate revisions in the Program AOP and distribute it to the Executive Director and the Project Sponsors. The Program AOP will include a description of the goals and purposes for which releases of Program water will be requested by the EA Manager.
- f. The Executive Director will report to the Governance Committee on the status of the Program AOP. If needed, the Governance Committee will seek additional review/guidance on the Program AOP from the Water and Technical Advisory Committees. The Governance Committee or its individual members may recommend changes to the Program AOP.
- g. At least once a month, the Project Sponsors may update their projected water supplies conditions and include the estimated snowmelt run off and actual inflow/demand data.
- h. The EA Manager may use the updated water supply information provided by the Project Sponsors to update the Program AOP at least once a month.
- i. The Executive Director will report monthly to the Governance Committee on the status of the Program AOP. If needed, the Governance Committee will seek additional

review/guidance on the updated Program AOP from the Water and Technical Advisory Committees. The Governance Committee or its individual members may recommend changes to the Program AOP at any time.

j. The EA Manager will request the release of Program water in accordance with the Program AOP and the contracts and agreements with the Program Sponsors. However, it is understood that the EA Manager will need to react and adapt to the actual hydrologic events that may impact the planned deliveries to the habitat. To the extent possible, the EA Manager will keep the Executive Director informed of the day-to-day operations for the Program water.

k. At the end of each water year, the EA Manager will prepare a report comparing the actual Program water operations during the water year with the operations outlined in the Program AOP, identifying and explaining any differences in actual operations from the operations proposed in the previous year's Program AOP, and providing other information requested by the Governance Committee. The year-end report will also describe whether the EA releases met the goals and purposes for which the water was used. This year-end report and any Governance Committee comments on that report will be used by the EA Manager as input to the subsequent year's Program AOP.

3. Program Water Operations for Enhancing Peak, or Pulse, or Other Flows by Reregulating Water in the CNPPID and/or NPPD Systems and Intentionally Bypassing Program EA Water

a. Consistent with Program section II.E.1.b, the EA Manager may request CNPPID and/or the Nebraska Public Power District (NPPD) to reregulate flows in their respective systems, downstream of Lake McConaughy, and in conjunction with such reregulation may also request the Districts intentionally to bypass EA water. EA Bypass Flows are created when CNPPID or NPPD (Districts), at the request of the EA Manager, waives the discretion provided by their licenses and the Environmental Account Document (Attachment 5, Section 5) to divert Environmental Account (EA) water that could have been routed through their systems, and instead routes the EA water via the North Platte and/or Platte River. The reregulation of water in District facilities with or without intentional EA bypass will only be requested to enhance peak, pulse or other short-duration high flows.

The EA Manager will consider the following factors when determining whether reregulation with or without intentional EA bypass is necessary, and in developing the annual plan for such operations:

- (1) Feasibility/likelihood of generating satisfactory flows without reregulation and intentional EA bypass.

To the extent that a short-duration high flow or other flows of the desired magnitude and duration can be achieved without reregulation and intentional bypass, or with reregulation but without making an intentional EA bypass, reregulation and bypass may not be needed or requested. This is most likely to occur under wetter-than-normal basin conditions when CNPPID is already making full or nearly-full diversions at the CNPPID Supply Canal headgate.

(2) Anticipated benefits

In cases where reregulation with intentional bypass of EA water would not be expected to provide improvements in the magnitude and duration of the high flows or other flows, nor contribute to the effectiveness of achieving other habitat objectives such as channel sediment mobilization, the FWS is unlikely to call for an intentional bypass or reregulation.

(3) Magnitude, duration, and effectiveness of peak flow events occurring over the previous 12 months.

If a pulse flow of unusually high magnitude (*e.g.*, approaching or exceeding 8,000 cfs) occurred across the habitat reach over the previous year, and these flows were effective at scouring in-channel vegetation, reworking sediment, improving habitat for the target species, or achieving similar Program management objectives, the FWS may determine that it is a low priority to use EA water to generate a short-duration high flow in the current year, and thus may not request a bypass or reregulation for pulse flow purposes.

(4) Other circumstances

Additional considerations may be important. For example, a reregulation and EA bypass request may be needed to test the effectiveness of alternative flow routing strategies, particularly during earlier, experimental EA releases.

b. In the event that the EA Manager calls for reregulation with or without intentional EA bypasses to enhance peak, pulse or other short-duration high flows, the Districts will not unreasonably decline to provide the requested reregulation and intentional EA bypass flows. Reasonable causes for declining to provide requested reregulation with or without intentional bypass include prior nonpayment by the Program under paragraphs c.(1) and (2) below, the Program not providing EA water for system refill per subparagraph c.(3) below, and disagreement by the State of Nebraska's Department of Natural Resources with water accounting to implement subparagraph c.(3) below to avoid impacts on either Districts' water supply. Regulation and intentional bypass will be available as follows:

- (1) To assist in creating or enhancing peak, pulse or short duration high flows below the J-2 Return, at the Environmental Account (EA) Manager's request CNPPID will regulate up to 12,000 acre-feet annually of water diverted at CNPPID's diversion dam under CNPPID's power use appropriations, and retime the return of that water to coincide with releases made from the EA in Lake McConaughy. The amount of regulation available may be limited by CNPPID to less than 12,000 acre-feet in some years or some times of the year depending on anticipated impacts on project facilities, anticipated impacts on others (*e.g.*, downstream flooding, damage to other river facilities), conflicting operational or licensing requirements such as implementation of the Flow Attenuation Plan, and compliance with other agreements. (The initial test will be 4,000 acre-feet in February, March, or April after which, and prior to planning for the subsequent

water year, CNPPID will determine based on physical and operational impacts if regulation beyond 4,000 acre-feet will be available to the Program).

- (2) In planning for flow enhancement and requesting regulation and bypass, the EA Manager will seek to limit the EA water intentionally bypassed at CNPPID's diversion dam to the minimum amount necessary to achieve the intended flow magnitude and duration downstream of the J-2 return and will rely to the extent feasible on the regulation of flow in CNPPID's system to enhance flows. Planning and requests for regulation and bypass will also include reasonable ramping rates to attempt to avoid damage to CNPPID's system. Throughout the peak, pulse or other short duration high flow event being enhanced, CNPPID will continue to release water as necessary to meet or exceed the minimum flow requirements at its diversion dam called for in section III of the EA document, in accordance with the compliance measures in section III.G which measure flows for compliance purposes excluding EA releases. .
- (3) To assist in creating or enhancing peak, pulse or short duration high flows, NPPD will coordinate the operations of the Sutherland Project with the EA Manager and CNPPID, and, if requested, will intentionally bypass EA water and/or reregulate EA water or other water in its system to the extent feasible without impacting NPPD's ability to meet other downstream demands and to operate the system in a manner that is consistent with safe business operations.

c. When reregulation is provided with or without intentional EA bypass, the Program will provide payment to the Districts in an amount equivalent to resultant lost power production, increased power acquisition costs and other associated costs, and will provide water from the EA as needed to refill the Districts' systems ("borrow and payback"). The EA Manager will not call for reregulation with or without intentional EA bypass resulting in total payments that exceed \$ 3,081,000 for the following activities during the first increment of the Program, unless approved by the GC.

- (1) Lost power production and increased power acquisition costs include:
 - a. Power generation forgone by CNPPID, valued at rates consistent with CNPPID's then-applicable power sales agreement(s);
 - b. For so long as CNPPID sells the power it produces at its canal hydropower facilities to NPPD, the net additional cost, if any, to NPPD of obtaining replacement power for the generation foregone by CNPPID. The cost of the increase in power, if any, would be based on the delivered market price of power at the time of by-pass as compared to the contract price from CNPPID;
 - c. If CNPPID sells the power it produces at its canal hydros to another party, the net additional cost, if any, to the other party of obtaining replacement power for the generation foregone by CNPPID; and
 - d. The net increase in cost to NPPD, if any, from replacing power foregone by NPPD facilities during times of EA by-pass. The cost of the replacement power, if any, would be based on the delivered market price of power.
- (2) Other associated costs to be paid for by the Program beyond direct lost power production and increased power acquisition costs may occur if equipment or facilities are operated outside the normal range to accommodate reregulation and/or EA bypass. They may include bank sloughing in canals and reservoirs,

wind and wave erosion in Johnson Lake, additional lost hydro generation due to lower head, costs of avoiding recreational impacts, and, with discharges above the normal full canal flow, turbine cavitation damage, tailrace damage, and damage to other components.

- (3) Upon completion of activities to aid the creation or enhancement of peak, pulse or short-duration high flows, sufficient water will be released from the EA to refill the supply canal/reservoir systems to levels existing prior to the initiation of reregulation and/or bypass activities, and to avoid refilling using the Districts' storage water. Replacement water, including any EA water which is part of the replacement water, will be available for use by the affected District or Districts for power and/or irrigation. Timely replacement of water (as determined by the affected District or Districts) will be arranged between the affected District or Districts and the EA Manager.
 - (4) Similar to the Program's good neighbor policy regarding addressing adverse impacts of the land component of the Program, the Program will address damages to third parties impacted by regulation in the Districts' systems and/or intentional EA bypass, such as fisheries, concessionaires, cabin owner's docks, boats, and shore stations, sand dams, private river facilities and equipment, without regard to any liability limitations that the Districts may otherwise have in place under other agreements. The Program shall, prior to implementing operations under this agreement in any water year, take appropriate measures to have in place a liability insurance policy naming the Districts as co-insured to cover at least \$1 million in documented claims resulting from reregulation and/or EA bypass activities or shall provide other means of addressing third party impacts that hold the Districts harmless and are acceptable to the Districts. Payments of damages to third parties and cost of the insurance policy or alternatives will be counted toward the \$3.081 million budgeted for reregulation and intentional EA bypass.
- d. The GC will be kept informed of plans for reregulation with or without intentional EA bypass and estimated costs, and will be provided the opportunity for comment through the annual Program AOP process described in section 2 above as follows:
- (1) As part of the development of the Program AOP described in Attachment 5, Section 1, Subsection 2, the Districts will work cooperatively with the FWS to explore potential water routing and delivery strategies. The EA Manager will annually document the intent to implement reregulation with or without intentional EA bypasses in the draft Program AOP, including the estimated amount of EA water to be intentionally bypassed, the Districts facilities/diversion to be used for reregulation or to be bypassed, and flow conditions anticipated when bypasses would be requested.
 - (2) The Districts will independently provide estimates of their respective lost power production and increased power acquisition costs and any other anticipated costs associated with the proposed reregulation with or without EA bypass within 30 days of receipt of the draft Program AOP for use by the EA Manager in preparation of any revision to the Program AOP.
 - (3) When reporting to the GC on the status of the revised Program AOP per Attachment 5, Section 1, Subsection 2.f, the Executive Director will particularly note any costs associated with reregulation and/or bypass flows. The GC may

seek additional review/guidance or recommend changes relating to reregulation and bypass flows.

- (4) Based on updated water supply estimates provided per Attachment 5, Section 1, Subsection 2.g, the reregulation and bypass cost estimates from the Districts and/or other information, the EA Manager may amend the draft Program AOP proposed reregulation or EA bypasses. The EA Manager and Executive Director will include any such amendment in the monthly status report on implementation of the Program AOP required in Attachment 5, Section 1, Subsection 2.i..
- (5) Prior to December 31 each year, each District will separately invoice the Program's Executive Director with a copy to the EA Manager based on the cost factors in paragraph 3.c above together with suitable documentation of the basis for the amount billed. The amount of EA water by-passing the District's diversion dams will be determined based on the Nebraska Department of Natural Resources water accounting program.
- (6) Prior to 60 days following receipt of the invoices from the Districts, the Executive Director, in consultation with the EA Manager, will review and provide payment through the financial management entity for the bills from the Program budget item specifically established for this purpose.
- (7) In the event that the Program disagrees with the amount of any invoice, it shall nonetheless pay the full amount of the disputed invoice and shall advise the District in question, within 30 days of the receipt of the invoice, of the amount in dispute together with its reasons in writing for disputing that portion of the bill. Such payment shall be placed in escrow pending resolution of the dispute. In the event the parties are unable to agree upon a resolution of the dispute within 60 days of the date of the invoice (or such later date as the parties may mutually agree), the dispute shall be submitted to an arbitration under the rules and procedures of the American Arbitration Association.

e. After the start of Program implementation, a formal agreement will be entered into between the Program and CNPPID and NPPD that will implement the provisions outlined in this Attachment 5, Section 1, Subsection 3. There will be no reregulation or EA bypass under the Program until such agreement is in effect.

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 2

Channel Capacity of the North Platte River
Upstream of Highway 83

December 7, 2005

I. Purpose

The purpose of this section of the Water Plan is to describe the capital investment and maintenance measures addressed in Section III.E.2.d.iii of the Program Document.

II. Description

The descriptions of the capital investment and maintenance measures are provided in Exhibit A to this attachment. Exhibit A consists of the report entitled “North Platte Channel Capacity Study,” prepared by J.F. Sato and Associates, Inc, absent the appendices. This report was prepared for the Water Management Committee during the term of the Cooperative Agreement. The Governance Committee, based on input from the Water Management Committee, concluded the Base Case, Alternative 1 and Alternative 2, outlined in the report should be implemented to increase the capacity of the channel of the North Platte River upstream of Highway 83 to 3,000 cubic feet per second (cfs). The report refers to the Base Case, Alternative 1 and Alternative 2 as short-term solutions as J.F. Sato and Associates, Inc. proposed additional studies to identify long-term solutions. The Governance Committee did not approve the proposal for additional studies.

III. Schedule

It is the intent of the Governance Committee to complete the Base Case, Alternative 1 and Alternative 2, described in Exhibit A, as one project in accordance with the following preliminary schedule:

<u>Tasks</u>	<u>Completion Date</u>
1. Permitting (federal, state, local)	October 1, 2007
2. Final design; acquisition of easements; preparation of bid packages, as needed.	July 1, 2008
3. Solicit and review bids. Prepare contracts. Issue the construction notice to proceed.	October 1, 2008
4. Completion of the project.	October 1, 2009

It is understood that the proposed project must undergo a review under the National Environmental Policy Act (NEPA) in order to secure the necessary federal permits. The NEPA review could alter the configuration of some of the components of the project and impact the above preliminary schedule. However, it is the intent of the Governance Committee to complete as much of the project as possible by October 1, 2009. It may be necessary to phase the work to ensure as much work as possible can be completed by this date.

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 2
Exhibit A

Final Report
North Platte Channel Capacity Study
For the
Water Management Committee
North Platte Cooperative Agreement



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**Final Report
North Platte Channel Capacity Study
For the
Water Management Committee
North Platte Cooperative Agreement**

December 1, 2005

Prepared by

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**North Platte Channel Study
Final Report**

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1. Timeline of Events

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- A. Drawings, Sheets 1 through 7 -
- B. Technical Memorandum No. 1 dtd Aug 1 2005 -
- C. Technical Memorandum No. 2 dtd Aug 31 2005 -
- D. List of resource materials and contacts
- E. Meeting minutes, field memoranda, correspondence
- F. Presentations: July 13 and September 12 (Powerpoint) -
- G. Scope of Services from Contract -
- H. JFSA Technical Proposal -
- I. Survey data from JFSA (AutoCAD format)
- J. Photographs -
- K. Aerial Mapping (on ~20 CDs available from WEST, Inc)
- L. HEC-RAS runs -
- M. Data from Gary Lewis (3 CD's available from WEST, Inc)

North Platte Channel Capacity Study –Final Report

Purpose: This Final Report is submitted in accordance with Section 3.6 of the Scope of Services in the contract between J.F. Sato and Associates (JFSA) and the Nebraska Community Foundation. Based on the Preliminary Review Technical Memo dated August 31 that was first presented to the Water Management Committee (WMC) on September 7, 2005, and then to the Governance Committee (GC) on September 12, 2005, JFSA was directed to consider the following three alternatives for conceptual design:

- Base Case: construction of channels to intercept and drain the area near Washboard Road
- Alternative 1: Includes the Base Case, plus two additional channels for additional drainage
- Alternative 2: Includes Alternative 1, plus removes a sand bar in one of the critical upper channels

Background: The objective of this study is to investigate methods to increase and maintain a channel capacity in the North Platte River at North Platte, Nebraska of 3,000 cubic feet per second (cfs). In July 2001 flows of this magnitude caused nuisance flooding of properties approximately 1,500 feet upstream of Highway 83 (Hwy 83). In July 2002 more serious flooding occurred in several homes, hay meadows, and parts of both Washboard Road and North River Road. The National Weather Service (NWS) visited the site in response to concerns from local residents. Based on daily stream gauge and water level measurements and the corresponding degree of flooding, the NWS issued a letter on September 9, 2002, that lowered the flood stage from El 6.0 to El 5.7. The stream gauge is located just downstream of Hwy 83. This stage equated to a flow of about 1,980 cfs, less than the desired amount. This water level impacts the Platte River Recovery Implementation Program's (Program) ability to pass Environmental Account (EA) water and the Central Nebraska Public Power and Irrigation District's (Central) ability to pass flows needed for irrigation demands without exceeding the flood stage.

The activities leading up to this final report are listed on the timeline in Table 1.

Table 1. Timeline of Activities.

Date	Activity
May 23 2005	RFP Issued
June 15 2005	Proposals Received
July 5 2005	Contract Award
July 6-7 2005	Field Visit
July 13 2005	Scoping Session, Cheyenne
July 25-27	Additional data collection
August 1 2005	Initial Technical Memorandum
August 31 2005	Preliminary Results Technical Memorandum
September 7 2005	Teleconference with the Water Management Committee
September 12 2005	Presentation to the Governance Committee in Denver
November 1 2005	Draft Final Report
December 1 2005	Final Report

Further background information can be found in the Technical Memoranda included as appendices.

Problem Identification and Solutions: In our earlier reports we described the flooding problem as having two parts - the "local" and the "big-picture" parts. The local problem is the flooding upstream of Hwy 83 in the area south of North River Road. The big-picture problem is the change over time in the conveyance in the reach extending from Central's Main Supply Canal diversion to several miles upstream of Hwy 83. The alternatives selected for conceptual design provide a solution to the local problem. The solution will be effective as long as the main channel capacity in the reach near the Hwy 83 bridge continues to maintain the ability to convey 3000 cfs without causing direct flooding of the impacted area. Many factors impact the longevity of the solution. These include continued invasive vegetation growth in the main channels, continued deposition of sediments, and floods that may temporarily restore part of the channel capacity.

As part of our initial investigation, we had looked at a Base Case and seven alternatives as described below:

Base Case. The following elements are included:

1. Open State Channel
2. Extend State Channel north to existing ponds/North River Road
3. Construct road ditch along west side of Washboard Road
4. Open southern channel from road ditch to abandoned detour road
5. Remove abandoned detour road and construct ditch to main channel of the North Platte
6. Remove phragmites along opened drainages

Alternative 1. The following additional elements are **added** to the Base Case:

1. Improve and open the channel to connect existing culverts in Washboard Road to the existing concrete box culvert under Hwy 83.

2. Improve conveyance through the ponds to the main channel and provide overflow structure.

Alternative 2. The following additional element is **added** to Alternative 1:

1. Remove sand bar that is blocking the northern channel about 1,500 feet above Hwy 83 and improve the channel downstream of this point.

Alternative 3. Construct dikes to protect properties.

Alternative 4. Purchase or remove properties.

Alternative 5. Dredge channel through the reach and place berms.

Alternative 6. Revise diversion operation.

Alternative 7. Interconnect NPPD's Sutherland Canal and Central's Main Supply Canal (aka Tri-County Canal).

Section 3.3 of the contract scope requested JFSA to look at several factors in evaluating alternatives. These are:

- An opinion of capital cost
- An estimate of annual O&M costs
- A description of logistics, including permitting
- Comments on the potential for channel aggradation
- Channel capacity expected
- Probability of success

This information was summarized in a decision matrix to decide on the scenarios to be carried into conceptual design. The three highest ranking scenarios, in order, were Alternative 2, Alternative 1, and the Base Case.

Cost Estimates: The cost estimates have been reviewed and updated as part of this phase. The updated cost estimates are included in Appendix A. Quantities were developed from the drawings. Unit prices were estimated from construction cost guides, such as R.S. Means, as well as input from local contractors. Standard unit prices were increased to allow for small work areas and access. Land values were estimated from records of the County Assessor's office and increased about 20 percent. Phragmite's removal costs were estimated from literature sources. At this level of study a contingency of 25 percent is standard practice. Engineering costs at 15 percent include surveying, final design, plans and specifications, and limited construction administration. Legal and administrative costs are included to cover city, county, and project sponsor costs. Permitting costs and costs for an Environmental Assessment (EA) are our estimates after we discussed the scope with the United States Army Corps of Engineers (USACE) in Kearney, NE. Wetlands may be present in all locations. The costs for wetland delineation include field time, preparation of exhibits and coordination with regulators. The costs noted for the EA for each alternative are inclusive, for example the EA cost for Alternative 2 includes the costs of the EA for Alternative 1 and the Base Case.

Easements: The proposed work is on both public and private property. Where work extends outside of the public right-of-way, additional easements would be needed. We have indicated on the drawings the proposed easements. Temporary easements would be needed during construction. Permanent easements would be needed where maintenance is required. Temporary easements were taken as 3 percent of the land value; permanent easements were taken as 10 percent of the land value. Because the work generally occurs in the undeveloped portion of private parcels, the land value was reduced 50 percent when calculating easement costs.

Permitting: An overview of permit requirements follows.

Federal. The US Army Corps of Engineers (USACE) will require Section 404 permitting for all work accomplished in wetlands and other waters of the United States, such as the North Platte River. The permitting process will begin with accurate delineation of jurisdictional wetlands within the project area. The USACE office in Kearney, Nebraska, will verify these delineations and provide guidance on permit application. Initial discussion with the USACE concerning this project has resulted in their opinion that an Individual Section 404 Permit will be required. This permit type would require a diversity of data collection, including threatened and endangered species (T&E) clearances, wetland delineation, and cultural resource clearances. Other federal agencies, such as the US Fish and Wildlife Services, would be involved. A public comment period is involved. The timeframe for preparing and processing this type of permit is no less than three months.

Mr. Dwight Tillotson of the Kearney office of the USACE has indicated that an Environmental Assessment will be needed as part of the decision making process for the 404 permit. The applicant normally assists in the preparation and analysis of alternatives for a project of this complexity.

Any alternative that would permanently impact the jurisdictional floodplain would also require the submittal of a Conditional Letter of Map Revision (CLOMR) to Federal Emergency Management Agency (FEMA) in accordance with the National Flood Insurance Program. Currently, there is an update (Flood Hazard Mitigation Study (FHMS)) to the floodplain boundaries being prepared by the City of North Platte. The scenario studies in the Conceptual Design are not expected to require a CLOMR because they have not significantly changed the cross section of the main channels.

State. At this point, no state permits have been identified. The North Platte Game Refuge is located in the project area. The Refuge area is off limits to hunting. The boundaries are based on the delineated riverbank, but none of the proposed work is expected to impact the riverbank delineation. The limits of the Refuge are shown on the drawings.

Local. Because Washboard Road is a county road, a county road permit is anticipated. Haul permits may be needed if large amounts of material are moved on public roads. The City regulates the floodplain in this area. Any construction in the floodplain would require a Floodplain Development Permit. Obtaining a permit requires performing studies similar to the studies needed for a CLOMR, as noted above.

Description of Alternatives. A description of each scenario follows. Drawings are provided in Appendix A.

Scenario: Base Case

Description: The Base Case is a short-term solution that represents the minimum work required to reduce the flooding of properties and allow passage of 3,000 cfs through the Hwy 83 Bridge. The following features are included and shown on the drawings in Appendix A:

Open the State Channel. The State Channel is approximately 2,360 feet long and was built in the late 1960s as part of the Hwy 83 bridge reconstruction project. The purpose of the channel was to drain water from the upper floodplain, or , to keep the bridge construction area dry. After the bridge construction, this channel was allowed to fill in with vegetation and sediment. Vegetation consists of trees, grasses, and phragmites. Opening this channel would intercept flows in the overbank and convey them to the main channel. The proposed work would clear and grub the channel and excavate about 1.5 feet from the channel bottom. The channel width would be restored to 20 feet. To ensure that flows reach this channel, the natural channel (North Channel) to which it connects would also be cleared of vegetation and regraded at a width of 80 feet for a distance of about 800 feet.

Extend the State Channel. To intercept water that flows near the North River Road, a new channel with a 20-foot base width would be extended to the North River Road. To minimize excavation and disruption, the existing ponds would be incorporated.

Construct Road Ditch along Washboard Road. Any flow that passes around or under the State Channel will continue to Washboard Road. A road ditch approximately 1,150 feet long with a bottom width of 8 feet would be constructed along the west side of Washboard Road to convey flows south to the South Channel, a natural channel. Culverts with headwalls would be installed under the existing drives. The ditch would be re-vegetated and the landscaping restored. The bottom of the ditch would be lined with 2-inch rock to reduce erosion and facilitate maintenance.

Open South Channel. At the end of the proposed road ditch along Washboard Road, the flows would enter an existing channel (South Channel) that used to convey significant flows before being blocked with vegetation and sediment. The Base Case would open about 800 feet of channel by removing vegetation and regrading the invert. The end of this channel would connect to the next ditch that is proposed.

Remove Abandoned Road, Construct Ditch. The 24-foot wide asphalt road constructed as part of the detour for the Hwy 83 bridge construction was never totally removed. A section about 800 feet long remains in place. The road embankment interferes with flow in the floodplain. The Base Case would remove the road and construct a ditch that connects the South Channel to the main channel of the river. Where the South Channel meets the proposed ditch, an existing temporary culvert would be removed and the earthwork reshaped to provide smooth flow. A private duck blind has been constructed next to the road and would have to be relocated.

Removal of *Phragmites australis* (common reed). Besides the clearing and grubbing work in the channels that would mechanically remove *Phragmites australis*, the Base Case proposes to use chemical methods to kill *Phragmites* for at least 50 feet on each side of the reopened channels. Part of this treatment is proposed to be done with aerial

methods using the glyphosate compound Rodeo[®]. In areas where adjacent vegetation may be damaged by drift, the use of backpack sprayers is proposed. One application of chemical at the correct time of year has been reported to be effective in killing the standing growth. Subsequent annual applications are needed to keep the plant from returning.

Capital Cost: Estimated quantities and unit prices were developed for the work as described above. The opinion of cost is attached. The estimated cost is \$398,610. The estimated cost for the EA has been shown separately.

O&M Cost: Annual costs will be incurred to keep the channels free of vegetation and sediment. An allowance has also been provided for maintenance of the road ditch and culverts.

Logistics, including permitting: This scenario will impact the waters of the US and therefore require an Individual 404 Permit. The USACE has indicated that an EA will need to be prepared as part of the review process for the Permit.

Potential for additional channel aggradation: This alternative will not have any significant impact on the mechanisms causing aggradation in the main channel.

Probability of success: Based on our understanding of the causes for the flooding during 2002, this proposed action has a high probability of success to eliminate flooding at a flow of 3,000 cfs as long as the channels that are noted are kept open.

Channel capacity expected: For the short term, the main channel should be able to convey 3,000 cfs through the reach without resulting in flooding. If aggradation and encroachment of vegetation in the main river channel continues, the effectiveness of this scenario may diminish over time.

**JFSA
NORTH PLATTE CHANNEL CAPACITY STUDY
CONCEPTUAL DESIGN
ENGINEER'S OPINION OF PROBABLE COST**

EXHIBIT BC-1

ALTERNATIVE: BASE CASE

CAPITAL COST:

No.	Item	Quantity	Unit	Unit Price	Total
1	Mobilization	1	LS	\$12,500.00	\$12,500.00
Open & Extend State Channel, North Channel					
2	Clear and grub	5.6	Ac	\$1,250.00	\$7,000.00
3	Excavate and haul	4,600	CY	\$7.00	\$32,200.00
				subtotal:	\$39,200.00
Construct Road Ditch along Washboard Rd					
4	Clear and grub	0.6	Ac	\$1,250.00	\$750.00
5	Excavate and haul	1,550	CY	\$7.00	\$10,850.00
6	Culverts, 36-inch CMP, 50 ft long	6	EA	\$5,000.00	\$30,000.00
7	Headwalls	6	EA	\$2,500.00	\$15,000.00
8	Restore drives, landscaping	3	EA	\$7,500.00	\$22,500.00
9	Channel lining, 2-inch rock	260	CY	\$25.00	\$6,500.00
10	Geotextile fabric	2,550	SY	\$3.00	\$7,650.00
				subtotal:	\$93,250.00
Remove Detour Road, Open South Channel, Build Ditch					
11	Clear and grub South Channel	1	Ac	\$1,250.00	\$1,250.00
12	Remove 3-inch asphalt road	2,150	SY	\$5.00	\$10,750.00
13	Remove embankment, haul	8,900	CY	\$7.00	\$62,300.00
14	Excavate ditch	2,075	CY	\$5.00	\$10,375.00
				subtotal:	\$84,675.00
Phragmites					
15	Treat phragmites, aerial spray	5	Ac	\$225.00	\$1,125.00
16	Treat phragmites, backpack sprayer	2	Ac	\$1,100.00	\$2,200.00
				subtotal:	\$3,325.00
Investigations, Permits					
17	Wetland Delineation/Verification	96	Hr	\$85.00	\$8,160.00
18	USACE Section 404 Individual Permit	120	Hr	\$85.00	\$10,200.00
19	Easements, Permanent	9	Ac	\$200.00	\$1,800.00
20	Geotechnical Report	1	LS	\$2,000.00	\$2,000.00
				subtotal:	\$22,160.00

Sub-total: \$255,110.00

Contingency: 25% \$63,780.00

Sub-total: \$318,890.00

Engineering: 15% \$47,830.00

Legal and Admin: 10% \$31,889.00

Total: \$398,610.00

Environmental Assessment (if required): \$80,000.00

**JFSA
 NORTH PLATTE CHANNEL CAPACITY STUDY
 CONCEPTUAL DESIGN
 ENGINEER'S OPINION OF PROBABLE COST**

EXHIBIT BC-1

ALTERNATIVE: BASE CASE

ANNUAL O&M COST:

No.	Item	Quantity	Unit	Unit Price	Total
1	Clear vegetation	5	Ac	\$500.00	\$2,500.00
2	Treat Phragmites	6.6	Ac	\$750.00	\$4,950.00
3	Clear culverts	1	LS	\$500.00	\$500.00
4	Road ditch maintenance	1	LS	\$1,000.00	\$1,000.00
5	Remove sediment from opened channels	1	LS	\$3,500.00	\$3,500.00
6	Mitigation monitoring for 404 Permit	24	HR	\$85.00	\$2,040.00

Sub-total: \$14,490.00

Contingency: 25% \$3,620.00

Sub-total: \$18,110.00

Legal and Admin: 10% \$1,811.00

Total: \$19,921.00

Scenario: Alternative 1 – Base Case and Drainage Improvements

Description: Alternative 1 is a short-term solution that **includes** the elements of the Base Case and **adds** two elements to improve drainage. The first element is restoring the drainage way from the culverts that cross under the north end of Washboard Road to the concrete box culvert (CBC) under Hwy 83. The second element is improving the flow from the eastern lake to the southern lake and on to the main channel of the North Platte River (NPR). The features are shown on the drawings in Appendix A.

The improvements to the drainage way begin at two 24-inch-diameter corrugated metal pipe (CMP) culverts under Washboard Road. The upstream ends of these culverts have been damaged, restricting flow. The culverts will be repaired and headwalls provided to protect the upstream ends. The downstream channel will be cleared of vegetation and brush for a length of approximately 800 linear feet and a width of about 50 feet and reshaped to improve its ability to convey flows. This reach of the channel discharges into the northern lake (former sand pit).

Water that enters the northern lake now exits either through two 12-inch-diameter CMPs to the east or through one 18-inch diameter culverts and a swale to the south. The lake discharges over a low spot in the south berm where it overflows to the main channel of the NPR.

The improvements to the east would include replacing the two 12-inch-diameter culverts with two 36-inch-diameter culverts with upstream and downstream headwalls. These will discharge into a natural channel that needs to be cleared of vegetation and widened for a distance of about 400 feet to reach the CBC. The CBC consists of two cells, each 4 feet wide and 2.5 feet high. Downstream of the CBC, an additional 600 feet of channel needs to be cleared and regraded to allow flow to continue into the lake on the east side of Hwy 83. A controlled overflow section will be constructed to reduce damage should the lake level rise to the point of overtopping.

The improvements to the south include replacing the culvert between the lakes with two 30-inch-diameter CMPs with headwalls and constructing an overflow section in the berm of the south lake at an elevation to provide for adequate drainage. The overflow section would consist of a concrete cutoff wall with a 10-foot-long overflow section. A riprap blanket would be placed downstream to minimize erosion of the embankment.

There are few, if any, phragmites in this area. Treatment of vegetation would be limited to mechanical removal of trees and brush.

Capital Cost: Estimated quantities were developed for the work as described above. The Opinion of Probable Construction Cost for Alternative 1 has been estimated at \$530,145. The estimate is attached.

The estimated cost for the EA, \$90,000, includes the work for the Base Case, and has been shown separately.

O&M Cost: Annual costs will be incurred to keep the channels free of vegetation and sediment and to maintain the culverts.

Logistics, including permitting: There will be minimal impact to the channels. No additional permitting other than needed for the Base Case is expected to cover this work.

Potential for additional channel aggradation: The additional channels that would be improved as part of this alternative are not subject to significant aggradation. See the Base Case for comments on the river channels.

Probability of success: Because these drainage improvements are not impacted by either uncontrolled vegetation or aggradation, they are expected to function well and result in a high probability of success.

Channel capacity expected: The same as for the Base Case, that is, for the short term, the channel should be able to convey 3,000 cfs through the reach without resulting in flooding. If aggradation and encroachment of vegetation in the main river channel continues, the effectiveness of this scenario may diminish over time.

**JFSA
NORTH PLATTE CHANNEL CAPACITY STUDY
CONCEPTUAL DESIGN
ENGINEER'S OPINION OF PROBABLE COST**

EXHIBIT ALT1-1

ALTERNATIVE: ALTERNATIVE 1 (Base plus connection to the CBC)

CAPITAL COST:

No.	ITEM	Quantity	Unit	Unit Price	Total
1	Base Case (includes mobilization)	1	LS	\$255,110.00	\$255,110.00
2	Clear and grub	2.5	Ac	\$1,250.00	\$3,125.00
3	CMP 30-inch repair upstream ends (2)	1	LS	\$1,000.00	\$1,000.00
4	Culverts, 30-inch CMP, 150 ft long	2	EA	\$10,000.00	\$20,000.00
5	Headwalls, 30-inch CMP	8	EA	\$2,500.00	\$20,000.00
6	Culverts, 36-inch CMP, 100 ft long	2	EA	\$9,000.00	\$18,000.00
7	Headwall, 36-inch CMP	4	EA	\$2,500.00	\$10,000.00
8	Concrete cutoff wall, including excavation	3.3	CY	\$600.00	\$1,980.00
9	Revegetate	2	Ac	\$500.00	\$1,000.00
10	Bank protection	42	CY	\$40.00	\$1,680.00
11	Additional geotechnical	1	LS	\$1,500.00	\$1,500.00
12	Additional permitting	24	Hr	\$85.00	\$2,040.00
13	Additional Easements, permanent	2.3	Ac	\$200.00	\$460.00
14	Additional Wetland Delineation	40	Hr	\$85.00	\$3,400.00

Sub-total: \$339,295.00

Contingency: 25% \$84,820.00

Sub-total: \$424,115.00

Engineering: 15% \$63,620.00

Legal and Admin: 10% \$42,410.00

Total: \$530,145.00

Environmental Assessment (if required): \$90,000.00

ANNUAL O&M COST:

No.	Item	Quantity	Unit	Unit Price	Total
1	Base Case	1	LS	\$14,490.00	\$14,490.00
2	Clear vegetation, additional	2	Ac	\$500.00	\$1,000.00
3	Treat Phragmites, additional	0	Ac	\$750.00	\$0.00
4	Clear culverts, additonal	1	LS	\$500.00	\$500.00
5	Road ditch maintenance	0	LS	\$1,000.00	\$0.00
6	Remove sediment from opened channels	1	LS	\$1,500.00	\$1,500.00
7	Mitigation monitoring for 404 Permit	24	HR	\$85.00	\$2,040.00

Sub-total: \$19,530.00

Contingency: 25% \$4,880.00

Sub-total: \$24,410.00

Legal and Admin: 10% \$2,441.00

Total: \$26,851.00

Scenario: Alternative 2 – Base Case plus Alternative 1 plus Removal of Sand Bar

Description: Alternative 2 is a short-term solution that **includes** the elements of both the Base Case and Alternative 1 and **adds** the removal of the sand bar located about 1.5 miles above Hwy 83 where the main channel splits into two. See the drawings in Appendix A. Information from local residents and officials indicates that this channel used to convey significant flows. During the low flow period of the mid-1980s to late 1990s, a sand bar built up at the upper end of this channel. Aerial photographs reviewed during this period confirm this statement. This sand bar was observed in 2002 by the USACE representatives and also during our June 2005 field visit. By comparing the photographs from the 2002 visit with our observations, it is clear that this sand bar has continued to grow and that vegetation, primarily phragmites, has become established. The effect contributes to flow being restricted upstream of this point so that water flows out of the main channel, into the overbank and along the area just south of North River Road. By removing this sand bar more flow is expected to pass down the north channel of the river, thereby lowering water levels upstream and reducing the flow in the overbank.

From a review of recent aerial photographs, the sand bar is estimated to contain approximately 3,750 cubic yards (cy) of material, assuming maximum dimensions of 250 feet long by 120 feet wide and 4 feet deep. To encourage flow through this channel, approximately 500 feet of the natural channel would be cleared and regraded for a width of approximately 80 feet. An access road on private property will have to be cut through the buildup of phragmites to reach this area.

Capital Cost: Estimated quantities were developed for the work as described above. The Opinion of Probable Construction Cost for Alternative 2 (includes Base Case and Alternative 1) has been estimated at \$629,010. The cost estimate is attached.

The estimated cost for the EA, \$100,000, also covers the work needed for the Base Case and Alternative 1, and is shown separately.

O&M Cost: The nature of the stream in this area is likely to result in additional sand deposits in the reopened channel. Annual maintenance to remove the accumulated material will be required. Likewise, due to the prevalence of *Phragmites australis* adjacent to the channel, control methods (spraying) will be needed annually. These costs are included in the cost estimate.

Logistics, including permitting: Permit requirements would be similar to those described under the Base Case.

Potential for additional channel aggradation: As noted above, this area is subject to continued aggradation as long as the overall characteristics of the river channel are not changed in this reach.

Probability of success: As long as the channel is kept open, this alternative is expected to have a high probability of success.

Channel capacity expected: Similar to Alternative 1, this activity should reduce flooding in the affected area. The river channel will be able to pass 3,000 cfs through



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the Hwy 83 Bridge under current conditions. Continued aggradation or encroachment by vegetation will diminish the conveyance.

**JFSA
NORTH PLATTE CHANNEL CAPACITY STUDY
CONCEPTUAL DESIGN
ENGINEER'S OPINION OF PROBABLE COST**

EXHIBIT ALT2-1

ALTERNATIVE: **ALTERNATIVE 2: (Base + Alt 1 + remove sand bar)**

CAPITAL COST:

No.	Item	Quantity	Unit	Unit Price	Total
1	Base Case + Alternative 1	1	LS	\$339,295.00	\$339,295.00
2	Access road	1	LS	\$2,500.00	\$2,500.00
3	Clear and grub	2.0	Ac	\$1,500.00	\$3,000.00
4	Excavate and haul	7100	CY	\$7.00	\$49,700.00
5	Revegetate	1	Ac	\$500.00	\$500.00
6	Additional permitting	40	Hr	\$85.00	\$3,400.00
7	Excavate and haul	2.55	Ac	\$200.00	\$510.00
8	Additional Wetland Delineation	40	Hr	\$85.00	\$3,400.00
9	Easements, temporary	1.85	Ac	\$60.00	\$111.00
10	Easements, permanent	0.75	Ac	\$200.00	\$150.00

Sub-total: \$402,566.00

Contingency: 25% \$100,640.00

Sub-total: \$503,206.00

Engineering: 15% \$75,480.00

Legal and Admin: 10% \$50,320.00

Total: \$629,010.00

Environmental Assessment (if required): \$100,000.00

ANNUAL O&M COST:

No.	Item	Quantity	Unit	Unit Price	Total
1	Alternative 1, includes Base Case	1	LS	\$19,530.00	\$19,530.00
2	Clear vegetation, additional	2	Ac	\$500.00	\$1,000.00
3	Treat Phragmites, additional	1	Ac	\$750.00	\$750.00
4	Clear culverts	0	LS	\$500.00	\$0.00
5	Road ditch maintenance	0	LS	\$1,000.00	\$0.00
6	Remove sediment from opened channels	1	LS	\$2,000.00	\$2,000.00
7	Add'l mitigation monitoring for 404 Permit	24	HR	\$85.00	\$2,040.00

Sub-total: \$25,320.00

Contingency: 25% \$6,330.00

Sub-total: \$31,650.00

Legal and Admin: 10% \$3,165.00

Total: \$34,815.00

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 3

Colorado's Initial Water Project (Tamarack I)
December 7, 2005

I. PROJECT DESIGN

Colorado's initial water project (Tamarack I) involves the use of participating existing and future wells and other water facilities in Colorado to re-regulate flows that are in excess of legal rights to and physical demands for water in Colorado in a manner that is consistent with the flow-related goals of the Platte River Recovery Implementation Program (Program). As a result of the geographic location of Tamarack I near the state line, re-timing of stream flow that results from Tamarack I is estimated to develop an average annual yield of at least 10,000 acre-feet during times of target flow shortages and after any canal interception has occurred. As stated in the Program description, all signatories have agreed that the combined operations of Tamarack I and the other two initial Program water projects in the Program shall score and be credited with reducing flow shortages by 80,000 acre-feet. Water rights for the operation of the components of Tamarack I will be obtained and exercised under Colorado law for beneficial uses in Colorado.

Participating wells, ditches or other facilities, and associated water rights, may also be operated for purposes other than those associated with the Program, for example but not by way of limitation, augmentation purposes and protection and enhancement of native species and wildlife. Such operations are not part of Tamarack I, and references to Tamarack I do not include such operations.

The components of Tamarack I will be developed within the 40 miles above the state line beginning at about the Tamarack Ranch State Wildlife Area owned by the Colorado Division of Wildlife near Crook, Colorado. The goal for the development of Tamarack I facilities will focus on private and public lands nearest the state line so interception of accretions by Colorado ditches will be minimized. These facilities will include wells located adjacent to the South Platte River that divert groundwater from the alluvial aquifer, canals that divert water from the South Platte River, and off-channel reservoirs.

When operating recharge facilities, water that percolates into the groundwater alluvium from these facilities will return to the South Platte River at a later time. Inflows to canals and recharge basins will be identified as Tamarack I water, new depletions plan water, or water for state wildlife area purposes. All such inflows will be measured and recharge or seepage will be computed as inflows minus evaporation. Evaporation in acre-feet will be determined by using available weather station data and the surface areas of the recharge sites. Recharge basins are typically located in sandy upland areas with high infiltration rates such that free water surface areas are minimal, resulting in low evaporation amounts. The evaporation computed for existing recharge projects in the lower South Platte River basin in Colorado is typically less than one percent of gross flows. Colorado will identify and account for contributions from off-channel reservoirs in the same manner as recharge accounting.

Any Tamarack I accretions intercepted by Colorado canals will be accounted for, reported to other parties to the Program and will not count towards satisfying Colorado's obligations.

By selecting the optimal location of recharge basins, the return flows are less likely to be intercepted by Colorado's senior ditches. Observation wells will be located between the recharge basins and the river so that groundwater gradients and return flows to the river from the recharge basins' seepage can be monitored. The accounting methods used by Colorado to estimate return flows to the river from the operation of Tamarack I shall be approved by the Governance Committee.

II. HISTORICAL ANALYSIS

Colorado has analyzed how Tamarack I would have operated during the period 1947-1994. For the purpose of this historical analysis, periods and amounts of excess flows for diversion by the Tamarack I to recharge facilities in Colorado were assumed to occur when the following two conditions were satisfied: (1) South Platte River Compact requirements were satisfied and (2) flows exceeded the U.S. Fish and Wildlife Service ("FWS") year round target flows at the Grand Island gage on the Platte River in Nebraska. Existing target flows for every month were used in this analysis and the monthly target values varied with hydrologic conditions of wet, average, and dry.

This analysis assumed that pumping of new groundwater wells located next to the river to recharge basins could occur during the winter because wells can operate during freezing periods due to warmer groundwater temperatures. Colorado plans to install up to forty recharge wells and/or canal lift stations in conjunction with pipelines, recharge basins, and related monitoring features. For the 1947-1994 study period, the average annual diversion to recharge in the Tamarack I would have been 29,640-acre feet. Recharge from canal systems is accomplished during periods when there is unused canal capacity. These periods occur in the fall and winter after the irrigation season until freeze-up, typically through the month of November and during spring runoff when there are excess river flows.

Tables 1 and 2 list the reregulation results of Tamarack I operations for this historical analysis of the 1947-1994 period. Table 1 lists the monthly additions or increases that would have occurred to the historic Julesburg gage flows as a result of the accretions or return flows to the river caused by the groundwater recharge of Tamarack I. As the header to Table 1 indicates, shrink during the summer months due to canal interception is included in the table values. These are net values and occurred for months when river accretions exceeded the diversions to the recharge basins. Table 2 lists the monthly net depletions that would have occurred for months when the diversion to the recharge basins exceeded the accretions in that month. From Table 1, the average annual net addition or accretion is 12.3 thousand acre-feet ("kaf") after canal interception. There was actually 15.2 kaf total of accretions but 2.9 kaf is intercepted by downstream canals resulting in the 12.3 kaf after canal interception. From Table 2, the average annual net depletion is 19.4 kaf. The difference between the total average annual accretion of 15.2 kaf and the average annual depletion of 19.4 kaf is due to

evaporation and some of the accretions to the river not being accounted for because they would have occurred after 1994, which is the last year of the modeled period.

III. CRITERIA FOR OPERATION OF TAMARACK I

- A. In operating Tamarack I, Colorado will make a good faith effort to minimize canal interception. All such facilities will be operated by Colorado and its water users in compliance with the requirements of the South Platte River Compact and for Program purposes during times of excesses to target flows.
1. Operations of Tamarack I recharge facilities during the First Increment of the Program will focus on periods for diversions that result in accretions back to the river during times of shortages in February through June when downstream canal interceptions are the least. The months of greatest diversion by Tamarack I facilities will be December and January when greatest target flow excesses exist. Operations to the extent practical will minimize accretions back to the river during July and August. These months have the greatest canal interception and losing river reaches. Diversions for Tamarack I during the First Increment of the Program will be limited to a ten-year running annual diversions average of 30,000 acre feet, with simultaneous diversions limited to 225 cfs.
 2. For the purposes of these criteria, times of target flow shortages are measured against the flow conditions that exist as of July 1997. The Grand Island gage will be compared to routed amounts of water that would be diverted by Tamarack I. This routed diversion will utilize the lag and loss factors approved by the Governance Committee. The routed amount reduced by the loss factors will be subtracted from the expected (i.e., based on trends and scheduled operational releases from Lake McConaughy) Grand Island gage flow occurring for the number of days of lag in the future and if this computed Grand Island gage flow is still above a desired target then diversions for Tamarack I will take place to the extent that Grand Island gage flows do not drop below targets.
- B. Each year the Environmental Account (EA) Manager, in consultation with project sponsors, EA Committee (EAC), and Reservoir Coordinating Committee (RCC), will develop a Program Annual Operating Plan (AOP) based on AOP's provided by project sponsors. Colorado will develop an AOP for Tamarack I and coordinate Tamarack I operations with the EA Manager.

Colorado will operate Tamarack I so not to increase shortages to target flows at the associated habitat unless requested otherwise by the EA Manager. Tamarack I facilities may also be operated for purposes other than the Program, subject to requirements of state law and the South Platte River Compact, so long as (1) such operation does not interfere with the use of those facilities for the purposes described in this plan or Colorado's new depletions plan and (2) any associated

new depletions are mitigated in accordance with Colorado's Plan for Future Depletions.

C. Consistent with Section E.2.a. of the Program Document, as long as Tamarack I is constructed and operated as described herein, the target flow shortage reduction credited to Tamarack I individually or to the three initial water projects collectively will not be reduced even if the real time frequency and magnitude of flows in excess to targets at Grand Island causes Tamarack I to produce an average annual yield that is less than that projected under historic flow conditions, regardless of the reasons for the change.

TABLE 1

Additions to Historic Julesburg Gage Flows from TAM 1 Scenario of Reregulation

Units = kAF	SUMMER SHRINK INCLUDED												Total	April-Sept Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1947	0	0	0.9	0.7	0.5	0	0	0.9	1.1	1.1	0	0	5.2	3.2
1948	0	0	0	2.5	2.5	2.2	1.9	0	0	1.3	1.1	0	11.6	9.2
1949	0	3.1	0	0	2.2	0	0	0	0	1.6	0	0	6.8	2.2
1950	0	0	3.9	3.3	3.0	0	2.3	2.0	1.8	1.7	1.5	0	19.4	12.4
1951	0	3.4	2.8	2.2	1.9	0.1	0	1.6	0	0	0	0	11.8	5.6
1952	0	0	0	0	3.7	3.5	0	0	0	0	2.1	0	9.2	7.2
1953	0	3.8	3.2	2.5	2.2	0	1.7	0	0	0	1.2	0	14.7	6.5
1954	0	3.2	2.7	2.1	0	0	0	0	0	0	1.0	0	8.9	2.1
1955	0	1.9	1.6	1.3	0	1.0	0	0	0	0	0.7	0	6.5	2.3
1956	0	1.4	1.2	0.9	0	0	0	0	0	0.6	0.5	0	4.6	0.9
1957	0.6	0.5	0.6	0.5	0.5	0	0	0.9	1.0	1.0	0.9	0	6.6	3.0
1958	0	2.9	2.4	1.2	0	0.3	0	0	0	1.7	1.5	0	10.0	1.5
1959	0	3.3	2.8	2.1	1.8	1.5	0	0	0	1.0	0.9	0	13.4	5.4
1960	0	2.9	0	1.9	1.9	1.7	0	0	0	1.1	1.0	0	10.6	5.5
1961	0	2.5	2.0	1.5	1.3	1.1	0	0	0.8	0.8	0.7	0	10.7	4.7
1962	0	2.8	0	1.9	1.9	0	0.9	1.8	1.6	1.5	1.3	0	13.7	8.0
1963	0	0	2.0	1.9	0	0	0	0	1.1	1.1	1.0	0	7.0	3.0
1964	0	3.1	2.4	1.8	1.6	0	1.2	0	0	0	0.8	0	10.9	4.6
1965	0	2.0	1.7	1.3	0	0	0	1.4	0	0	0	0	6.3	2.7
1966	0	0.9	3.9	3.2	2.8	2.3	2.1	0	1.7	1.6	1.4	1.3	21.2	12.1
1967	0	2.6	2.1	1.6	1.4	0	0	0	0	1.8	1.6	0	11.3	3.1
1968	0	3.5	2.8	2.1	1.8	1.6	1.4	1.3	1.2	1.1	0	1.1	17.8	9.4
1969	0	2.6	0	1.8	1.8	1.6	0	0	0	1.6	0	0	9.5	5.3
1970	0	0	3.4	0	2.7	2.4	0	0	2.2	2.1	1.9	0	14.7	7.3
1971	0	3.7	3.1	2.4	2.1	0	1.8	0	1.8	1.7	0	0	16.5	8.1
1972	0.1	0	2.7	2.5	2.3	2.0	1.9	1.7	1.5	1.4	1.3	0	17.4	11.9
1973	0	0	2.9	0	0	0	2.9	2.9	2.6	0	0	0	11.3	8.4
1974	0	0	0	0	3.9	3.7	0	0	2.7	2.5	0	0.5	13.3	10.3
1975	0	3.7	3.2	2.6	2.3	2.0	1.9	0	1.6	1.5	1.4	0	20.1	10.3
1976	0	3.5	2.8	2.2	1.9	0	0	1.4	1.3	1.2	1.1	1.1	16.5	6.8
1977	0	2.5	2.0	1.5	1.3	1.2	0	0	0	0.9	0.8	0	10.2	4.0
1978	1.5	1.4	0	1.3	0	1.4	0	0	1.1	1.1	1.0	0.9	9.7	3.9
1979	0.9	0.8	0.8	0.7	0.7	0	0	1.3	1.5	1.5	1.1	0	9.3	4.3
1980	0	0	0	2.6	0	0	2.8	0	2.5	2.3	2.0	0.6	12.9	7.9

1981	0	3.1	2.6	2.1	1.8	1.6	0	0	0	1.2	1.1	0	13.5	5.5
1982	0	3.1	2.6	2.0	1.7	1.4	1.3	0	1.1	1.0	0.9	0	15.2	7.5
1983	0	0	2.6	0	0	0	0	0	0	0	0	0	2.6	0.0
1984	0	0	0	0	0	0	0	4.6	0	0	0	0	4.6	4.6
1985	0	0	0	2.2	4.9	4.4	4.1	3.7	0	3.3	3.2	0	25.7	19.3
1986	0	0	4.3	0	0	0	0	0	0	0	0	0	4.3	0.0
1987	0	0	0	0	0	0	0	5.0	0	4.2	0	0	9.1	5.0
1988	0	0	5.5	4.8	4.4	3.8	0	0	0	2.8	2.6	0	26.9	16.0
1989	0	4.3	3.8	3.1	0	2.4	0	0	0	2.1	2.2	2.2	20.1	5.5
1990	0	3.3	2.9	2.3	2.1	1.9	0	0	0	1.5	1.4	1.4	18.4	7.9
1991	0	2.0	1.8	1.5	1.4	1.3	0	0	0	1.1	1.0	0	11.3	5.3
1992	0.8	1.9	1.7	1.5	1.4	1.2	1.2	1.1	1.0	1.0	0.9	0.9	14.6	7.4
1993	0	2.0	0	1.5	1.6	1.5	0	0	0	1.3	1.5	0	9.5	4.6
1994	0	3.3	2.8	2.1	1.8	1.6	0	0	0	1.2	0	0	13.9	6.7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
avg	0.1	1.8	1.9	1.6	1.5	1.1	0.6	0.7	1.2	0.8	1.2	0.9	0.2	12.3	6.2
max	1.5	4.3	5.5	4.8	4.9	4.4	4.1	5.0	2.9	4.2	3.2	2.2	26.9	19.3	
min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	
std	0.3	1.5	1.4	1.1	1.3	1.2	1.0	1.2	0.9	0.9	0.8	0.5	5.4	3.8	

TABLE 2

Depletions to Historic Julesburg Gage Flows from TAM 1 Scenario of Reregulation

These are Net Depletions which equal diversions to recharge sites reduced by return flows resulting from the COL2A Scenario recharge.

Units = kAF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1947	-6.1	-1.8	0	0	0	-7.5	-7.7	0	0	0	-7.0	-7.2	-37.3
1948	-5.9	-4.0	-5.4	0	0	0	0	0	0	0	0	-7.1	-22.5
1949	-6.1	0	-5.7	-5.9	0	-5.8	-6.0	0	-3.8	0	-5.6	-5.8	-44.7
1950	-4.6	-3.1	0	0	0	0	0	0	0	0	0	-6.8	-14.5
1951	-5.8	0	0	0	0	0	-6.8	0	-6.3	-6.4	-5.9	-5.7	-36.9
1952	-4.5	-2.8	-4.2	-4.4	0	0	0	0	0	0	0	-6.3	-22.1
1953	-5.3	0	0	0	0	0	0	0	0	0	0	-7.0	-12.3
1954	-6.0	0	0	0	0	0	0	0	0	0	0	-3.4	-9.4
1955	-2.3	0	0	0	0	0	0	0	0	0	0	-0.7	-3.0
1956	-2.5	0	0	0	0	0	0	0	0	0	0	-0.6	-3.1
1957	0	0	0	0	0	-7.5	-2.2	0	0	0	0	-7.4	-17.0
1958	-6.3	0	0	0	-6.8	0	-6.6	0	0	0	0	-6.8	-26.5
1959	-5.8	0	0	0	0	0	0	0	0	0	0	-7.3	-13.1
1960	-5.6	0	-5.9	0	0	0	0	0	0	0	0	-1.3	-12.8
1961	-6.7	0	0	0	0	0	0	0	0	0	0	-7.5	-14.2
1962	-6.4	0	-5.9	0	0	-6.3	0	0	0	0	0	-4.6	-23.3
1963	-1.2	-5.4	0	0	0	0	0	0	0	0	0	-7.3	-13.8
1964	-6.2	0	0	0	0	0	0	0	0	0	0	-3.4	-9.6
1965	-3.8	0	0	0	0	-7.0	-7.2	0	-6.4	-6.5	-6.0	-5.8	-42.5
1966	-4.6	0	0	0	0	0	0	0	0	0	0	0	-4.6
1967	-6.5	0	0	0	0	-6.7	-6.9	0	0	0	0	-5.7	-25.8
1968	-5.8	0	0	0	0	0	0	0	0	0	-3.5	0	-9.3
1969	-6.6	0	-6.0	0	0	0	-6.7	0	0	0	-6.5	-6.6	-32.4
1970	-5.4	-3.7	0	-1.7	0	0	-6.0	0	0	0	0	-6.4	-23.2
1971	-5.5	0	0	0	0	-6.2	0	0	0	0	-6.5	-6.6	-24.7
1972	0	-4.6	0	0	0	0	0	0	0	0	0	-6.9	-11.5
1973	-5.9	-4.1	0	-5.5	-5.8	-5.4	0	0	0	-5.8	-5.6	-5.6	-43.7
1974	-4.3	-2.8	-4.0	-4.2	0	0	0	0	0	0	-3.5	0	-18.8
1975	-5.4	0	0	0	0	0	0	0	0	0	0	-6.9	-12.2
1976	-5.8	0	0	0	0	0	0	0	0	0	0	0	-5.8
1977	-6.8	0	0	0	0	0	0	0	0	0	0	-7.0	-13.7
1978	0	0	-6.9	0	0	0	0	0	0	0	0	0	-6.9

1979	0	0	0	0	0	-7.3	-7.4	0	0	0	0	-6.9	-21.5
1980	-5.9	-4.0	-5.4	0	-5.6	-5.5	0	0	0	0	0	0	-26.3
1981	-5.9	0	0	0	0	0	0	0	0	0	0	-7.1	-13.1
1982	-6.1	0	0	0	0	0	0	0	0	0	0	-7.3	-13.4
1983	-6.2	-4.4	0	-5.7	-6.0	-5.6	-5.6	-5.3	-4.9	-4.8	-4.5	-4.4	-57.4
1984	-3.4	-1.8	-3.3	-3.6	-3.8	-3.6	-3.7	0	-3.6	-3.9	-3.8	-3.7	-38.2
1985	-2.7	-1.4	-2.7	0	0	0	0	0	-4.7	0	0	-5.1	-16.6
1986	-4.2	-2.7	0	-4.2	-4.6	-4.3	0	0	-4.4	-4.7	-4.4	-4.3	-37.8
1987	-3.2	-1.8	-3.0	-3.3	-3.4	-3.3	-3.3	0	-3.3	0	-3.6	-3.8	-31.9
1988	-2.8	-1.3	0	0	0	0	0	0	0	0	0	-5.7	-9.8
1989	-4.7	0	0	0	0	0	0	0	-6.0	0	0	0	-10.7
1990	-5.7	0	0	0	0	0	0	0	0	0	0	0	-5.7
1991	-3.0	0	0	0	0	0	0	0	0	0	0	-7.2	-10.2
1992	0	0	0	0	0	0	0	0	0	0	0	0	0.0
1993	-5.3	0	-6.5	0	0	0	0	0	-6.8	0	0	-4.8	-23.4
1994	-5.9	0	0	0	0	0	0	0	0	0	0	0	-5.9
avg	-4.6	-1.0	-1.4	-0.8	-0.7	-1.7	-1.6	-0.1	-1.0	-0.7	-1.4	-4.5	-19.4
max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
min	-6.8	-5.4	-6.9	-5.9	-6.8	-7.5	-7.7	-5.3	-6.8	-6.5	-7.0	-7.5	-57.4
std	2.0	1.6	2.3	1.7	1.9	2.8	2.7	0.8	2.1	1.8	2.4	2.8	12.9

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 4

Wyoming's Pathfinder Modification Project
December 7, 2005

The following description of the Pathfinder Modification Project is an excerpt from the Pathfinder Modification Stipulation (Appendix F- "Amendment of the 1953 Order to Provide for the Modification of Pathfinder Reservoir" to the Final Settlement Stipulation) that was approved by the States of Nebraska, Wyoming, and Colorado and the United States on March 13, 2001 as part of the settlement of the Nebraska v. Wyoming lawsuit. The following Final Settlement Stipulation was approved by the U.S. Supreme Court on November 13, 2001.

1. The Pathfinder Modification Project would increase the capacity of the existing Pathfinder Reservoir by approximately 54,000 acre feet to recapture storage space lost to sediment. The modification would be accomplished by raising the elevation of the existing spillway by approximately 2.39 feet with the installation of an inflatable dam or some other means. The recaptured storage space would store water under the existing 1904 storage right for Pathfinder Reservoir and would enjoy the same entitlements as other uses in the reservoir with the exception that the recaptured storage space could not place regulatory calls on existing water rights upstream of Pathfinder Reservoir other than the rights pertaining to Seminoe Reservoir.

2. Approximately 34,000 acre feet of the proposed 54,000 acre foot modification would be accounted for in an environmental account and operated for the benefit of endangered target species and their habitat in Central Nebraska.

- a. Water would accrue to the environmental account as an equal priority partner to other reservoir uses. The 34,000 acre-foot account is approximately 3.18% (34,000/1,070,000) of the capacity of Pathfinder Reservoir. Therefore, the account would accrue 3.18% of the inflow that is storable under the 1904 storage right.
- b. The environmental account could not contain more than 34,000 acre feet at any one time and will be administered under Wyoming water law. For example, if at the end of a water year, which is defined as October 1 to September 30, 10,000 acre feet of water was in the account, the account could only accrue 24,000 acre feet under its priority fill during the forthcoming water year.
- c. The account would be assessed its proportionate share of evaporation losses based on the storage water in the account.

- d. If there is a Platte River Recovery Implementation Program (Program), the environmental account could be operated, under contract with the Bureau of Reclamation, by the same manager that would manage the environmental account in Lake McConaughy. If the Program does not exist, the account would be operated by the Bureau of Reclamation, in accordance with subsequent contracts and ESA consultations and in a manner consistent with Wyoming water law and the North Platte Decree.
- e. The storage and delivery of water from the environmental account to the Wyoming/Nebraska stateline would serve as Wyoming's proposed reasonable and prudent alternative for the Pathfinder Modification Project. If there is a Platte River Recovery Implementation Program (Program) that serves as the reasonable and prudent alternative for water related activities in the Platte River basin, the storage and deliveries from the environmental account would serve as a Wyoming contribution to the water component of that Program on behalf of Wyoming's existing water users, including the federal storage water contractors located in Wyoming and Nebraska to the extent the activities of such contractors are related to the delivery of storage water from the federal reservoirs in Wyoming. If no Program exists, such storage and deliveries would serve as a proposed reasonable and prudent alternative for the ongoing section 7 consultation on the operation of Bureau of Reclamation reservoirs serving Wyoming and Nebraska. Further, if a separate program is sought by Wyoming and the federal storage contractors in Wyoming and Nebraska, they may seek credit for such deliveries for purposes of ESA evaluations.

3. The State of Wyoming would have the exclusive right to contract with the Bureau of Reclamation for the use of the remaining 20,000 acre feet of the modification capacity in a "Wyoming account" to provide municipal water to North Platte communities in Wyoming, replacement water to satisfy any obligations under the modified North Platte Decree or any stipulation in this case, or water for endangered species as described in Paragraph 3.e.

- a. Water would accrue to the Wyoming account as an equal priority partner to other reservoir uses. The 20,000 account is 1.87% (20,000/1,070,000) of the capacity of Pathfinder Reservoir. Therefore, the account would accrue 1.87% of the inflow that is storable under the 1904 storage right.
- b. The Wyoming account could not contain more than 20,000 acre feet at any one time and will be administered under Wyoming water law. For example, if at the end of a water year, which is

defined as October 1 to September 30, 5,000 acre feet of water was in the account, the account could only accrue 15,000 acre feet under its priority fill during the forthcoming water year.

- c. The Wyoming account would be assessed its proportionate share of evaporation losses based on the storage water in the account.
- d. The storage water would be used to supplement Wyoming municipalities' water rights or to satisfy any obligation under the modified North Platte Decree or any stipulation in this case. If released to meet an obligation under the Decree or stipulation in this case, the storage water will be administered under procedures adopted by stipulation in this case as such procedures may be modified from time to time by the North Platte Decree Committee. Storage water used to supplement municipal water rights will be administered as follows: When the municipal surface or hydrologically connected ground water rights, or a portion thereof, are regulated due to a priority call, the municipality whose rights are regulated, subject to state law, could continue to divert to meet its municipal demands and its depletions would be replaced from its contracted portion of the Wyoming account subject to the following conditions:
 - i. The municipality must have the capability to measure its diversions and its return flows in a manner approved by the Wyoming State Engineer in order to accurately measure the resulting depletions. If the return flows cannot be measured in a manner acceptable to the Wyoming State Engineer, the entire amount diverted will be considered a depletion and will be debited from the respective municipalities' account.
 - ii. Contracts for water from the Pathfinder Modification Project with the State of Wyoming will stipulate that the contracting municipality can only serve new individual demands less than 100 acre feet of water per year.
 - iii. If the City of Casper contracts for water in the Wyoming account, water in its portion of the account must be depleted before it can exercise its entitlements in Seminoe Reservoir. This condition serves to alleviate project impacts on Seminoe Reservoir.
- e. The Bureau of Reclamation, under contract with the State of Wyoming, will operate the 20,000 acre feet Wyoming storage account to insure an annual estimated firm yield of 9,600 acre feet.

In any year that the demand for municipal use is less than 9,600 acre feet, the remaining balance of the annual firm yield may be used by Wyoming for depletion replacement or release for endangered species in Central Nebraska. Such uses are secondary to the purpose of providing water for municipal use for North Platte communities in Wyoming. Any water used for endangered species purposes must be released from storage before the end of the water year and does not constitute a permanent water right.

4. In order for the project to be implemented, [1] the federal authorization of Pathfinder Reservoir will be amended if necessary to include municipal and environmental purposes, [2] the water right for Pathfinder Reservoir must undergo a partial change of use under Wyoming water law to allow the uses of the Wyoming and environmental accounts contemplated by this Stipulation, and [3] the Wyoming Legislature must approve the export of water for downstream environmental purposes. Further, any decision of the Bureau to proceed with the project in this Stipulation will not be made until after completion of any appropriate analysis under NEPA or consultation under the ESA.

5. In order to address the effects the Pathfinder Modification Project may have on contractors for water from Glendo, Pathfinder and Seminoe Reservoirs in Wyoming, upon completion of the Pathfinder Modification Project, Wyoming will pay the Wyoming and Nebraska federal storage water contractors' share of the Safety of Dams Modifications to the federal reservoirs to be implemented by the Bureau of Reclamation in the near future.

6. In order to address the effects the Pathfinder Modification Project may have on the Kendrick Project, upon completion of the Pathfinder Modification Project, Wyoming will assist the Casper Alcova Irrigation District with the resolution of existing selenium issues that are impacting its existing operation.

7. Existing Wyoming and Nebraska federal storage water contractors will not be held responsible for any costs assigned to the Pathfinder Modification Project.

8. Subject to the appropriate approvals and conveyance losses, Wyoming, in accordance with its water law, will assure delivery of the storage water from the Pathfinder Modification Project herein designated for downstream environmental purposes to the Wyoming/Nebraska state line. A permit will be secured under Nebraska water law by the contractor for the environmental account to conduct the quantities of water thus delivered at the state line, subject to appropriate conveyance losses, to specified locations between the state line and Chapman, Nebraska. The environmental releases will begin subsequent to completion of the project and issuance of the permits by Nebraska. Beyond the state line, Nebraska will assure delivery of the water in accordance with the terms of any such permit granted and with other applicable Nebraska law.

9. As long as the project is implemented in the manner outlined herein, the State of Nebraska hereby stipulates that it will support the project in this litigation and in any other proceeding necessary to implement and operate the project.

10. Upon completion of the Pathfinder Modification Project, Wyoming will release the 404 permit and the water rights for the Deer Creek Project, a proposed and permitted reservoir with a capacity of approximately 66,000 acre feet and provide fee simple title to the 470 acres of habitat it owns in the critical habitat area in Central Nebraska to the FWS or other entities as deemed appropriate by the FWS. Nebraska will move to dismiss Jess v. West, No. 88-1-308 (D. Neb.).

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 5

**An Environmental Account for Storage Reservoirs on the Platte River
System in Nebraska
As included in the Project 1417 FERC License**

December 7, 2005

This document was made part of the FERC license of The Central Nebraska Public Power and Irrigation District in 1998 and has not been modified for inclusion in the Program Document. Some terminology differences have occurred in the intervening years so this document's internal definitions may correspond to different terms in other parts of the Program Document. In addition, a successor agency has assumed the responsibilities of the State of Nebraska identified in this document.

I. INTRODUCTION

A. Definitions

1. "MOA" means the Memorandum of Agreement among the states of Colorado, Nebraska, Wyoming and the Department of the Interior dated June 1994, the Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats Along the Central Platte River, Nebraska (Cooperative Agreement) developed pursuant to that Memorandum of Agreement, and any Platte River Recovery Implementation Program (Program) implemented following that Cooperative Agreement.
2. "Governance Committee" means the committee designated in the Cooperative Agreement, or its successor governance body as it may be structured under the Program.
3. "Central" means the Central Nebraska Public Power and Irrigation District.
4. "NPPD" means the Nebraska Public Power District.
5. "Districts" means Central and NPPD.
6. "FERC" means the Federal Energy Regulatory Commission.
7. "Projects" means FERC Project 1417 and FERC Project 1835.
8. "NEDWR" means the Nebraska Department of Water Resources.
9. "Approved Storage Facilities" means a District facility or facilities proposed for EA storage in Nebraska by the Districts and approved by the Governance Committee and NDNR.

10. "EA" means Environmental Account, an annual account of water in Lake McConaughy, or other Approved Storage Facilities, available for release for environmental purposes during the October 1 to September 30 water year.

11. "Current Regime of the River" means the flow characteristics of the North Platte, South Platte and Platte River drainage which are available under existing conditions, as defined by the Governance Committee, determined in accordance with procedures to be adopted pursuant to the MOA. The principal purpose will be to serve as a reference point for determining whether and how relevant flow characteristics are changed by the MOA or future developments.

12. "EA Manager" means an individual designated by the Regional Director of the U.S. Fish and Wildlife Service ("FWS") to manage and coordinate operations of the EA and to be responsible for calling for releases from the EA pursuant to such contracts as may be executed to meet the objectives of the MOA.

13. "New Water" means water which is not included in the Current Regime of the River, but which is the result of the management and operation of the MOA and is available for storage in the EA.

B. The EA makes storage in, and water from, Lake McConaughy or other Approved Storage Facilities available for instream flow releases and allows the manager of the EA the flexibility to make releases that are most efficient for accomplishing the goals set by the Governance Committee.

C. This document describes how water contributed becomes part of the EA. Contributions to the EA, defined in Paragraph II.B, may be from Colorado, Wyoming, Nebraska and/or from water conservation/supply activities carried out under the MOA, or from other sources approved by the Governance Committee.

D. Nothing in this document shall preclude any entity from exercising its state water rights to ensure those water rights are not reduced, relinquished or extinguished by failure to use.

E. Consistent with the guidelines below, and to the extent possible, water released from the EA should be used for as many beneficial uses as possible.

II. ENVIRONMENTAL ACCOUNT

A. General Description

1. Water contributed to the EA, regardless of its source, loses any separate identity upon entering Lake McConaughy or other Approved Storage Facility, and simply becomes part of the EA.

2. Water remaining in the EA after September 30 of each year may be carried over and added to the following year's contributions to the EA, subject to the limitations of Paragraphs II.A.3 through II.A.6 below.

3. The total quantity of water in the EA in Lake McConaughy may never exceed 200,000 acre-feet (af) at any time during the water year.
4. Whenever Lake McConaughy fills to regulatory capacity as defined by FERC's dam safety requirements for Project No. 1417 and the EA is less than 100,000 af, the Districts shall contribute additional water to increase the EA to 100,000 af regardless of the quantity of EA water already released during that water year.
5. At any time that Lake McConaughy reaches regulatory capacity as defined by FERC's dam safety requirements for Project No. 1417 and the EA exceeds 100,000 af, the EA shall be reduced to 100,000 af regardless of the sum of the contributions from the states and from Conservation Activities, or the quantity of carryover from a prior year.
6. Storage losses for Lake McConaughy and other Approved Storage Facilities shall be calculated by the NEDWR and assigned monthly to the EA using the following formula: ((average monthly storage in the EA) divided by the (average monthly storage in total)) times the total losses for the storage facility for that month, or by another mutually agreed upon formula.
7. Transportation losses for EA water shall be calculated by the NEDWR in the same manner as the NEDWR calculates such losses for other water in the North Platte and Platte Rivers.
8. Contributions to the EA shall be protected by the NEDWR from groundwater or surface water depletion from the state line or the source of contribution from within Nebraska to Lake McConaughy or other Approved Storage Facilities.

B. EA Contributions

1. Nebraska's Contributions

a. Central and NPPD

(1) The EA contribution by the Districts, and the water users served by them, is based upon the understanding that the flows available at Lewellen on the North Platte River and at the Korty Diversion on the South Platte River remain representative of the Current Regime of the River except for changes to the Current Regime of the River which are compensated, mitigated, or offset at Lewellen or the Korty Diversion pursuant to the MOA. A system will also be established to resolve disputes on detrimental impacts and appropriate compensation, mitigation or offsetting measures, including disputes arising after the Program has been implemented.

(2) Storable Natural Inflows are those North Platte River waters entering Lake McConaughy that are measured at the Lewellen gauge and that may be stored consistent with legal, regulatory or public safety restrictions. Flows which are not considered to be

Storable Natural Inflows include: a) environmental contributions from Wyoming, Colorado, MOA Conservation Activities or other entities; b) transfers of storage water from upstream facilities; and c) demands based upon senior non-hydropower natural flow water rights.

(3) At the end of each month from October through April, the EA shall be credited with an amount equal to 10% of the Storable Natural Inflows to Lake McConaughy for that month, as determined by the NEDWR based upon the real-time gauge data available from the NEDWR for the Lewellen gauge, up to an annual limit of 100,000 af. The 100,000 af limit shall not be construed to affect the adjustment of the contents of the EA to 100,000 af when the reservoir fills, as described in Paragraphs II.A.4 and II.A.5.

b. Other Nebraska Contributions

Other Nebraska water contributions may be provided to the EA by the state or other water users through plans or programs that are approved by the Governance Committee provided that: (1) the Districts are assured that as a result of a contribution, inflows into Lake McConaughy and flows at the Korty Diversion remain representative of the Current Regime of the River, except for changes to the Current Regime of the River impacting the Districts' operations which are compensated, mitigated, or offset pursuant to the MOA; and (2) these new contributions may be characterized by the NEDWR as New Water; and (3) those contributions may be stored in Lake McConaughy or other Approved Storage Facilities.

2. Wyoming's Contributions

a. New Water attributable to the State of Wyoming may be contributed to the EA through its "Pathfinder Modification Project" or other plans or programs that are approved by the Governance Committee.

b. It is anticipated that the Governance Committee in cooperation with the Wyoming State Engineer and the NEDWR will develop an accounting system for the purpose of defining and determining the amount of New Water at the state line attributable to the State of Wyoming under its Pathfinder Modification Plan or under any other plan which may be approved by the Governance Committee. The accounting system to be developed will include a system for resolving any disputes that may arise relative to the determination of the amount of New Water provided by the State of Wyoming to the EA.

c. Wyoming's contribution to the EA shall be the quantity delivered at the state line for MOA purposes, as defined in Paragraph II.B.2.b, less losses to the Lewellen gauge on the North Platte River as determined by the NEDWR.

3. Colorado's Contributions

- a. New Water attributable to the State of Colorado may be stored in the EA under procedures developed by the Districts and Colorado and approved by the Governance Committee.
- b. It is anticipated that the Governance Committee in cooperation with the Colorado State Engineer and the NEDWR will develop an accounting system for New Water attributable to the State of Colorado and delivered to the state line which, under the procedures developed pursuant to Paragraph II.B.3.a above, is available to be stored in the EA under the Program. The accounting system to be developed will include a system for resolving any disputes that may arise relative to storage of New Water in the EA attributable to the State of Colorado.

4. Conservation Water

- a. Activities carried out under the Program Water Conservation/Supply Component may contribute to the EA any quantifiable net conserved water, as defined and accounted for in the Water Conservation/Supply Action Plan, which can be controlled and credited to storage in Lake McConaughy or other Approved Storage Facilities.
- b. The Governance Committee in consultation with the appropriate state water entity will develop an accounting system for the EA contributions developed by water conservation/supply activities, to include operational agreements with owners of the facilities in which these contributions will be stored. The accounting system developed will include a system for resolving any disputes that arise relative to the accounting process.

C. EA Operations

1. EA Committee and EA Manager

- a. The EA Manager shall possess the authority to request releases from the EA pursuant to the terms of a contract with Central in the case of Lake McConaughy or with the appropriate District in connection with releases from other Approved Storage Facilities.
- b. An EA Committee ("EAC") shall be organized by the EA Manager to work with and provide guidance to the EA Manager. The EA Manager shall invite representatives from Central, NPPD, U.S. Bureau of Reclamation ("BOR"), FWS, NEDWR, the Nebraska Game and Parks Commission, Colorado, Wyoming, the Audubon Society and the Platte River Whooping Crane Critical Habitat Maintenance Trust to participate in the EAC. The EA Manager shall meet with the EAC at least twice a year, in October and March, and more frequently at the discretion of the EA Manager.

c. Central shall release EA water from Lake McConaughy as requested by the EA Manager as it would for any other customer, and will coordinate with NPPD and the NEDWR regarding such releases. Procedures and protocol will be developed as necessary to facilitate coordination of operations with EA releases.

d. In October of each year, in consultation with the EAC, the EA Manager shall establish flow targets and an annual operating plan for the EA based on predicted water supplies, the status of the species of concern and the goals set by the Governance Committee. Consistent with the FWS priority recommendations described in “Instream Flow Recommendations for the Central Platte River, Nebraska” and attached to “The Department of the Interior's Amended Comments under Section 10j of the Federal Power Act” dated August 11, 1994, a priority will be given to the use of EA water to maintain flows throughout the summer. Adjustments throughout the year to the operating plan would be expected to reflect prevailing conditions and increased knowledge of species needs.

e. To protect the EA water stored in and released from Lake McConaughy to and through the habitat area, and for Central to have the authority to contract with the EA Manager to make releases as directed, Central will use best efforts to seek and, if granted, to maintain storage use permits and other regulatory authorities as necessary. For other Approved Storage Facilities, the appropriate District shall likewise seek and, if granted, maintain storage use permits and other regulatory authorities as necessary. The Districts will not abandon or take any action which will reduce, relinquish or extinguish the storage use permit for the EA.

f. The EA Manager shall coordinate with the NEDWR and the Districts as necessary for NEDWR to perform accounting functions related to the storage and release of the EA.

2. General Rules for EA Operations

a. EA releases may be temporarily reduced or suspended if events occur which limit or prevent the Districts' ability to provide them. The types of events which would limit or prevent EA releases include but are not limited to inspections of facilities, maintenance or repair of structures, failure of a structure, or existence of an emergency condition which is not otherwise predicted. Weather related events such as icing conditions, regional or localized rain or snowstorms, flooding events and high wind conditions may also require the alteration or suspension of EA releases. No alteration or suspension of releases for these or similar types of occurrences will be deemed to be a lack of compliance. The Districts will

coordinate all planned safety and maintenance activities with the EA Manager, and will notify the EA Manager of all events which lead to reduction or suspension of releases. The Districts will maintain appropriate records of such events.

b. If an emergency situation occurs such that water must be evacuated (in whole or part) from Lake McConaughy, the EA shall be reduced in proportion to the ratio of the total quantity of water evacuated and total storage prior to the evacuation.

c. The EA Manager may not request releases from the EA when the Platte or North Platte River at Keystone, North Platte, Brady, Cozad, Kearney or Grand Island is at or above flood stage as defined for those locations by the National Weather Service (“NWS”). If the EA Manager requests a release of EA water that the Districts believe would cause the Platte or North Platte River to rise above flood stage, the request for release may be denied. However, the EA Manager may appeal the denial by requesting the NWS to make a determination as to whether or not the requested release would cause either of the rivers to rise above flood stage at any of the previously listed sites. If the NWS determines the requested release would cause either of the rivers to rise above flood stage, the denial would stand. If the NWS determines the requested release would not cause either of the rivers to rise above flood stage, the requested releases will be made.

III. OPERATING RULES FOR PROJECT NO. 1417 AND PROJECT NO. 1835

A. General Rules for Project Operations

1. The operating rules for the Projects are based upon the understanding that flows available to the Districts in the North Platte and South Platte Rivers remain representative of the Current Regime of the River except for changes to the Current Regime of the River impacting the Districts’ operations which are compensated, mitigated, or offset pursuant to the MOA. Procedures and processes developed in consultation with NEDWR and adopted by the Governance Committee shall be used to verify that such flows are not altered in a manner which causes impacts to either of the Districts’ operations which are not compensated, mitigated, or offset pursuant to the MOA. Under the MOA, notwithstanding the foregoing, the obligations of Colorado and Wyoming are fully set forth in the Cooperative Agreement and the Proposed Program, and nothing in this EA document is intended to impose any additional or independent obligations, requirements, or restrictions of any sort on Colorado or Wyoming. For as long as there is a Program, if Colorado and Wyoming reregulate flows in accordance with their proposed Tamarack Plan (Attachment 5, Section 3) and Pathfinder Modification Plan (Attachment 5, Section 4) and their respective new depletions proposals (Attachment 5, Sections 7 and 9), existing and new water-

related activities in Colorado and Wyoming will be included in the Current Regime of the River.

2. Operations plans for the Projects which include monthly release and storage goals shall be developed annually in October and modified as necessary by the Districts through the water year after communicating with the EA as described in Paragraph IV.D.

3. Neither release requirements, nor allocation of water to the EA, nor any other provision in this document is intended to relieve the Districts or their successors or assigns from complying with the terms of the May 21, 1954 Water Storage Agreement between Central and the Platte Valley Public Power and Irrigation District (NPPD's predecessor), and amendments thereto, except to the extent that this document is in direct conflict with the terms of the agreement. Additionally, the provisions of this document are not intended to prevent the Districts or their successors or assigns from further amending such agreement, provided such amendments are not inconsistent with this document. These operating rules are not intended to favor one District or the other.

4. The Districts shall have responsibility for determining predicted Storable Natural Inflows as referenced in Paragraphs III.B.1, III.C.1, III.D.1, and III.E.1 for the purposes of determining whether very wet, wet, transitional, or dry conditions exist. Predicted Storable Natural Inflows, and the category of conditions anticipated, should be determined by October 15 of each water year and may be adjusted and refined by the Districts.

5. The Districts will use South Platte flows to the extent possible.

6. Whenever the use of surface water for irrigation in the Platte River valley ends before September 30, operational flows for Central and NPPD for the remainder of the water year shall be in the range specified for the preceding November 16 to February 14 time period.

7. Operational rules may be temporarily suspended if events occur which prevent operations in the manner prescribed. The types of events which would require suspension of the operating rules include, but are not limited to, inspections of facilities, maintenance or repair of structures, failure of a structure, hydraulic limitations of facilities or existence of an emergency condition which is not otherwise predicted. Weather related events such as icing conditions, regional or localized rain or snowstorms, flooding events and high wind conditions may also require suspension of the operating rules. No alteration or suspension of the operating rules for these or similar types of occurrences will be deemed to be a lack of compliance. The Districts will coordinate all planned safety and maintenance activities with the EA Manager, and will notify the EA Manager of all events which lead to reduction or suspension of the operational rules. The Districts will maintain appropriate records of such events.

8. Releases from Lake McConaughy may be made as needed to supplement flows and river gains to meet irrigation requirements.

9. All EA water or other water made available to the Program for environmental purposes which must be released from or passed through Lake McConaughy or other Approved Storage Facilities may be diverted by the Districts, at their discretion, into Project facilities. The diverting District shall return the diverted environmental water to the river and shall replace any losses of water in excess of those which the NEDWR determined otherwise would occur if that water had been transported via the Platte River system. Although such water released or passed through may be used for as many beneficial uses as possible, neither EA releases nor pass through of environmental water are restricted by canal capacity or hydropower generation constraints.

10. Notwithstanding Paragraph III.A.9, if the total flow in the Platte River at Brady (currently measured by USGS gauge number 06766000) at any time in March or April of a very wet, wet or transitional year as defined below is less than 200 cubic feet per second (cfs), the EA Manager may request Central to route enough EA water through its Jeffrey Return such that the quantity released from the Jeffrey return plus the Platte River at Brady totals up to 200 cfs. The total volume of EA water released in this manner shall not exceed 3000 af in any one water year unless agreed to by Central.

11. The Districts shall pass through or release waters from Lake McConaughy as needed to supplement river flows and river gains to provide at least the lowest operational flows described in Paragraphs III.B through III.F, without taking into account and in addition to any releases being made from the EA. Such operational flows may be diverted by the Districts, at their discretion, into Project facilities.

12. Throughout the water year, the combined flow from the Keystone Diversion and the Korty Diversion shall provide an average of at least 400 cfs inflow to the Sutherland Reservoir and maintain an elevation of at least 3,045 feet in Sutherland Reservoir.

13. Diversions at the Korty Diversion Dam may be up to canal capacity.

14. The rules for the Projects' operations require the Districts to accept constraints on the use of a portion of their respective water rights. These rules were specifically based upon current upstream project operations and river conditions, and the Districts' contribution to the EA. The Districts shall have no obligation to accept further constraints on the use of their respective water rights for these operational rules if the reservoir contents of Lake McConaughy are subject to greater or more frequent fluctuations as a result of, or to accommodate, contributions to the EA from others. The Districts may take any dispute regarding additional constraints to the Governance Committee for resolution.

B. Very Wet Conditions

1. Very Wet conditions are defined as those circumstances when the total Lake McConaughy contents as of October 1, including the EA, plus the predicted Storable Natural Inflows from October 1 to March 31, exceed 2.1 million acre feet (maf).
2. Releases from Lake McConaughy in the non-irrigation season for diversion at the Keystone Diversion Dam should be at least 700 cfs and average at least 875 cfs.
3. Non-irrigation season releases from Lake McConaughy shall supplement river flows and river gains to provide for a minimum diversion at the Central Diversion Dam of 1000 cfs and an average diversion of at least 1600 cfs from October 1 through November 15, a minimum diversion of 800 cfs and an average diversion of at least 1000 cfs from November 16 through February 14, and a minimum diversion of 1100 cfs and an average diversion of at least 1400 cfs from February 15 through the beginning of irrigation season (use of surface water for irrigation below Lake McConaughy or Korty Diversion).
4. Requirements in Paragraphs III.B.2 and 3 are independent of each other and each must be met.
5. There shall be no upper limit on outflows from Lake McConaughy other than meeting the standards of safety and beneficial use.

C. Wet Conditions

1. Wet conditions are defined as those circumstances when the total Lake McConaughy contents, including the EA, equal or exceed 1.50 maf as of October 1, or the total Lake McConaughy contents level as of October 1 plus the predicted Storable Natural Inflows from October 1 to March 31 is between 1.85 maf and 2.1 maf.
2. Releases from Lake McConaughy in the non-irrigation season for diversion at the Keystone Diversion Dam should be at least 700 cfs. If the October 1 lake level is less than 1.25 maf, diversions at the Keystone diversion in October may be at a reduced rate, but not less than 450 cfs.
3. Non-irrigation season releases from Lake McConaughy shall supplement river flows and river gains to provide for a minimum diversion at the Central Diversion Dam of 900 cfs and an average diversion of at least 1200 cfs from October 1 through November 15, and a minimum diversion of 800 cfs and an average diversion of at least 1000 cfs from November 16 through February 14, and a minimum diversion of at least 1000 cfs and an average diversion of at least 1240 cfs from February 15 through the beginning of irrigation season.

4. Requirements in Paragraphs III.C.2 and 3 are independent of each other and each must be met.
5. There shall be no upper limit on outflows from Lake McConaughy other than meeting the standards of safety and beneficial use.
6. Releases should be managed to allow Lake McConaughy to fill to approximately 1.5 maf by March 31 and to fill to licensed or authorized capacity thereafter. Filling to less than 1.5 maf by March 31 will be permitted if inflows expected after that date would cause reservoir spills or flooding downstream. After consultation with the EA Manager by the Districts as described in Paragraph IV.4, releases for diversion at the Central Diversion Dam may be reduced to the rates required in transitional conditions (Paragraph III.D.3) if necessary to allow Lake McConaughy to fill as provided in this paragraph.

D. Transitional Conditions

1. Transitional conditions are defined as those circumstances that exist between wet and dry conditions as they are defined in this document.
2. Non-irrigation season releases from Lake McConaughy for diversion at the Keystone Diversion Dam should be at least 450 cfs and average no more than 900 cfs (exclusive of EA releases) except as otherwise permitted herein.
3. Non-irrigation season releases from Lake McConaughy shall supplement river flows and river gains to provide for a minimum diversion at the Central Diversion Dam of 900 cfs and an average diversion of at least 1000 cfs from October 1 through November 15, and a minimum diversion of 800 cfs and an average diversion of at least 950 cfs from November 16 February 14, and a minimum of diversion of at least 850 cfs and an average diversion of at least 1100 cfs from February 15 through the beginning of irrigation season.
4. Requirements in Paragraphs III.D.2 and 3 are independent of each other and each must be met.
5. There shall be no upper limit on outflows from Lake McConaughy other than meeting the standards of safety and beneficial use.
6. Releases should be managed to allow Lake McConaughy to fill to between 1.27 and 1.5 maf by March 31 with the goal to optimize reservoir storage taking into account whether the transition is from wet to dry or from dry to wet. After consultation with the EA Manager by the Districts as described in Paragraph IV.D, releases for diversion at the Central Diversion Dam may be reduced to the rates required in dry conditions (Paragraph III.E.3) if necessary to allow Lake McConaughy to fill as provided in this paragraph.

E. Dry Conditions

1. Dry conditions are defined as those circumstances when either the total Lake McConaughy contents, including the EA, as of October 1 plus the predicted Storable Natural Inflows from October 1 to March 31 is less than 1.55 maf, or the October 1 total Lake McConaughy content is less than 800 thousand acre-feet (kaf), but excluding those conditions defined as very dry in Paragraph III.F.1.
2. Non-irrigation season releases from Lake McConaughy for diversion at the Keystone Diversion Dam should average between 250 cfs and 700 cfs (exclusive of EA releases).
3. Non-irrigation season releases from Lake McConaughy shall supplement river flows and river gains to provide a minimum diversion at the Central Diversion Dam of 700 cfs and an average diversion of at least 900 cfs from October 1 through November 15, and a minimum diversion of 700 cfs and an average diversion of at least 850 cfs from November 16 through February 14, and a minimum diversion of at least 800 cfs and an average diversion of at least 960 cfs from February 15 through the beginning of irrigation season.
4. Requirements in Paragraphs III.E.2 and 3 are independent of each other and each must be met.
5. There shall be no upper limit on outflows from Lake McConaughy other than meeting the standards of safety and beneficial use.
6. Releases should be managed to impound between 250 kaf and 550 kaf during the non-irrigation season with a goal to optimize reservoir storage. After consultation with the EA Manager by the Districts, releases for diversion at the Central Diversion Dam may be at rates less than the average but not below the minimums specified in Paragraph III.E.3 if necessary to allow Lake McConaughy to fill as provided in this paragraph.

F. Very Dry Conditions

1. Very dry conditions are defined as those circumstances when the total Lake McConaughy content, including the EA, as of October 1 is less than 650 kaf.
2. Non-irrigation season releases from Lake McConaughy for diversion at the Keystone Diversion Dam should average between 250 cfs and 700 cfs (exclusive of EA releases).
3. Non-irrigation season releases beyond those required in Paragraph III.F.2 above shall be planned in consultation with the EA Manager and other customers to maximize multiple use of water and to share the effects of shortages. It is anticipated that irrigation season releases will be adjusted by the Districts and their customers consistent with existing policies and contracts to reduce water use to preserve future drought protection.

G. Compliance Measurement

1. Compliance with release requirements for diversion at the Keystone Diversion Dam shall be accomplished if the real-time mean daily average or non-irrigation season average gauge readings meet or exceed the requirements.
2. Central shall plan its operations to target mean daily flows at its diversion which meet or exceed minimum diversion requirements. In recognition of the distance involved and potential intervening factors affecting flows, compliance with release for minimum diversion requirements at the Central Diversion Dam shall be accomplished if either: 1) the real-time mean daily gauge reading less EA flows at that location meets or exceeds the required minimum minus 5 percent; or 2) the seven-day running average of the real-time mean daily gauge readings less EA flows meets or exceeds the required minimum. Compliance with releases for average diversion requirements at the Central Diversion Dam shall be accomplished within each period provided the average for the period of real-time mean daily gauge readings less EA flows conforms with the required average. Neither the seven-day running average nor the period average shall be calculated including any day during which the operational rules were suspended pursuant to Paragraph III.A.7.
3. Details of measurement and accounting protocols to verify compliance will be developed by the Districts, the EAC and NDWR.

IV. COORDINATING RESERVOIR MANAGEMENT

- A. A Reservoir Coordination Committee (“RCC”) shall be established to provide a forum to coordinate annual operation plans. This committee shall consist of one representative each from Central, NPPD, the EA Manager, BOR, Colorado, Wyoming and NEDWR. The RCC will coordinate operations plans and review reservoir accounting, inflow projections, storage and release goals and river monitoring methodologies.
- B. The RCC shall meet at least annually and as often thereafter during the water year as is necessary to coordinate Central’s and NPPD’s water operations with the EA Manager’s operation of the EA.
- C. The RCC is for coordination purposes only. The Districts and the EA Manager retain the authority to develop their individual operations plans.
- D. Central, as the operator of Lake McConaughy, and NPPD as the operator of the Sutherland project, shall communicate with the EA Manager in the manner the Districts communicate with other water users to facilitate effective day to day coordination. Central, NPPD and the EA Manager shall communicate as necessary to effectively coordinate their respective plans as they are implemented. The EA Manager shall be informed and provided background data if the Districts conclude it is appropriate to change the designation of the type of year before the plan is changed and related changes are made in required releases for diversion. The EA Manager also shall be informed as expeditiously as possible under the circumstances, should contingencies arise such as those described in Paragraphs II.C.2.a and b and Paragraph III.A.7. Increases or decreases

in releases of operational flows or the EA shall be coordinated to ensure impacts to the hydraulic systems are minimized and beneficial uses maximized.

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

**Attachment 5
Section 6**

Reconnaissance-Level Water Action Plan



Platte River Research Cooperative Agreement



Reconnaissance - Level Water Action Plan

Prepared for

GOVERNANCE COMMITTEE OF THE COOPERATIVE
AGREEMENT FOR PLATTE RIVER RESEARCH

September 14, 2000

BOYLE
ENGINEERING CORPORATION

in association with
BBC Research & Consulting
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I. Background Information

A. Purpose of the Proposed Program

The states of Nebraska, Wyoming and Colorado and the U.S. Department of the Interior (DOI) entered into a partnership to address endangered species issues affecting water use in the Platte River Basin. This partnership is guided by the Cooperative Agreement for Platte River Research (June 1997). The Proposed Platte River Recovery Implementation Program (Program) builds upon the Cooperative Agreement and lays out several activities and contributions from the three states and federal government that are to be conducted in specified increments. A primary goal of the Program is to assist in the recovery of the target species and their associated habitats through a basin-wide cooperative approach. One of the objectives of the first phase of the Program is to develop a Water Action Plan that identifies various projects in each state that can be applied to the overall water goals of the Program.

The U.S. Fish and Wildlife Service (FWS) developed recommendations for flows that it believes are needed at different times of the year for endangered species and other wildlife. The water goals of the Program are to reduce shortages to the FWS target flows by an average of 130,000 to 150,000 acre-feet per year (ac-ft/yr) over the next 10 to 13 years. A portion of the instream flow objectives will be met through an Environmental Account (EA) in Lake McConaughy, the Pathfinder Modification Project, and the Tamarack Plan. The remaining instream flow improvements will be met through a program of incentive-based water conservation and water supply activities. The Water Action Plan is intended to address the water conservation/supply component of the Program. The primary purpose of the Water Action Plan with respect to the Program is to identify ways of reducing shortages to target flows by 130,000 to 150,000 ac-ft/yr on average including the three specific projects mentioned above.

B. Need for the Proposed Program

The driving force behind the Cooperative Agreement and the Program is that many water projects in the Platte River Basin are subject to reviews of federal government permits. Under the Endangered Species Act (ESA), federal agencies must ensure that the water projects they authorize, fund, or carry out do not jeopardize the continued existence of endangered and threatened species or result in the destruction or modification of habitat that has been determined to be critical. The Cooperative Agreement is a comprehensive approach to address ESA requirements that will eliminate the need for each individual water project to undergo a separate review of its impacts on endangered and threatened species.

DOI and the states have proposed the Program to serve as the reasonable and prudent alternative for existing and certain new water related activities. If implemented, the Program will provide regulatory certainty under the ESA to existing water related activities and to certain new water related activities that are subject to review under section seven of the ESA.

II. Process

A. Development of the Water Action Plan

Boyle Engineering Corporation (Boyle) was retained to complete a Water Conservation/Supply Reconnaissance Study (Study) to identify and evaluate water supply and conservation alternatives within the three states that could contribute toward achieving the proposed program’s objectives for reducing shortages to target flows. Boyle’s services were performed under the direction of the Water Committee (WC). The Final Report for the Study, which was submitted to the WC on December 13, 1999, provides information on local net hydrologic effects, reductions to target flow shortages at the critical habitat, and costs at a reconnaissance level for each project evaluated. A preliminary assessment of legal and institutional requirements, social issues and environmental issues was also included.

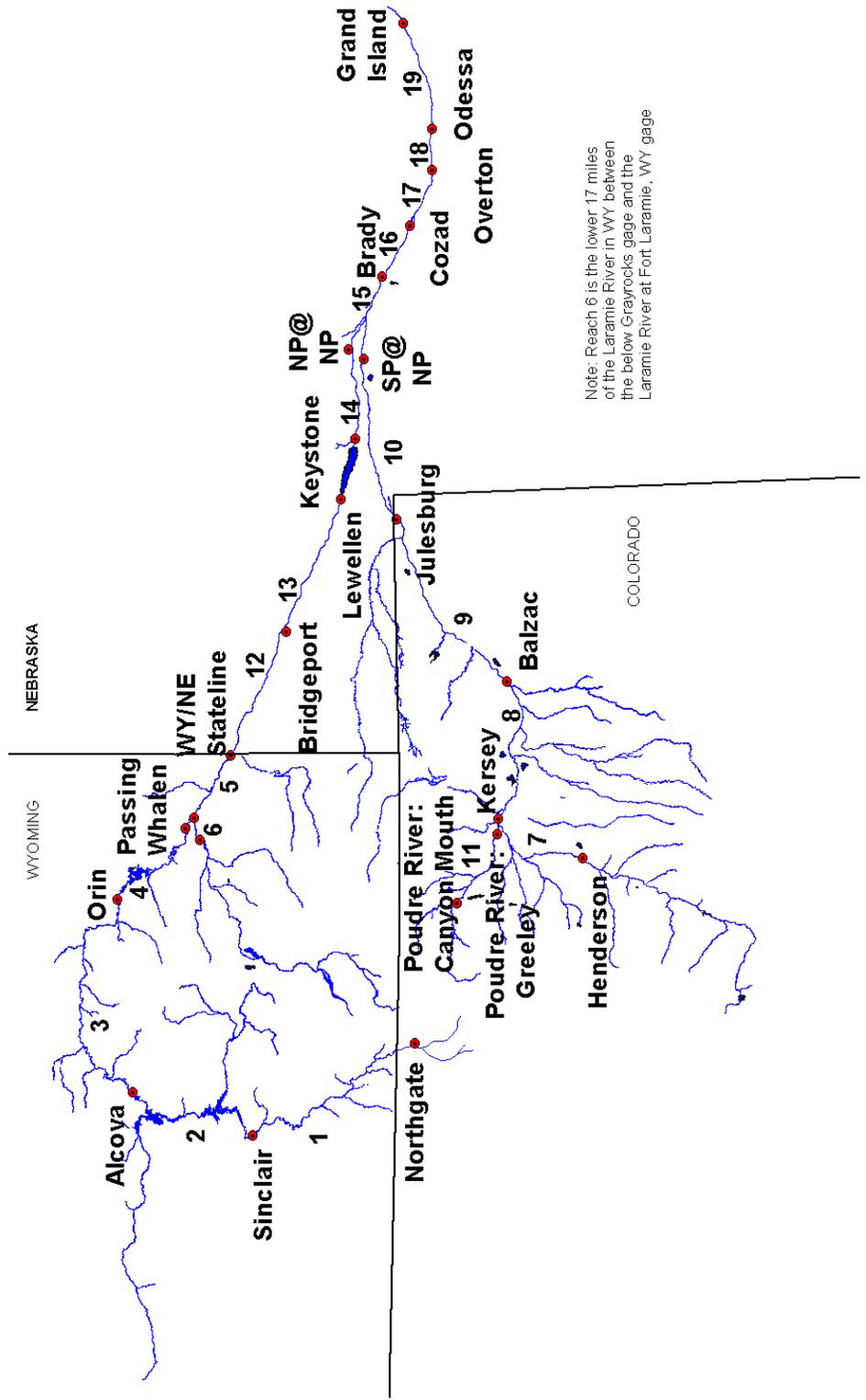
The Final Report was used by the Water Action Plan Committee in identifying and selecting the projects included in this Water Action Plan. However, the Water Action Plan includes some projects that were not analyzed by Boyle in the original study. Boyle relied on information provided by the three states and data presented in the Final Report to evaluate the projects included in this Water Action Plan. Representatives from the three states were contacted to acquire an understanding of how the states envision implementing the proposed projects. If the operating concept for a given project differed from that presented in the Final Report, information provided by the states was relied on. Likewise, if a more detailed analysis of a project has recently been completed and more information is now available regarding the yield and cost, that information has been taken into account.

The three states identified 13 potential projects for inclusion in the Water Action Plan. These projects are located throughout the Platte River Basin (Figure 1). Yield evaluations were made by the Platte River EIS/ESA team to refine the individual and cumulative yields of the projects and address the interactive effects of the projects. In developing the proposed program, each state identified a water reregulation project and agreed to the performance of the study and the development of a Water Action Plan. The combined effect of the original three projects and the Water Action Plan is intended to achieve the Program goal of reducing shortages to target flows by 130,000 to 150,000 ac-ft/yr in the first increment. A list of the projects included in the Water Action Plan is provided in the table below.

**Table II-1
Water Action Plan Projects**

State	Project
Nebraska	CNPPID Re-regulating Reservoir
Nebraska	Water Leasing
Nebraska	Water Management Incentives
Nebraska	North Dry Creek/Ft. Kearny Cutoffs
Nebraska	Dawson/Gothenburg Canal GW Recharge
Nebraska	Net Controllable Conserved Water
Nebraska	Groundwater Management
Nebraska	Power Interference
Wyoming	Pathfinder Municipal Account
Wyoming	Glendo Storage
Wyoming	Temporary Water Leasing
Wyoming	La Prele Reservoir
Colorado	Groundwater Management

Figure 1 – Platte River Basin and Study Reaches



The Water Action Plan Committee recognized that U. S. Forest Service (USFS) vegetation management may affect flows in the North, South, and Central Platte basins. The WAPC agreed that further study is required to determine these impacts and the USFS's responsibility to address these impacts. In addition, in the review of existing USFS management plans and future amendments to such plans, the FWS will establish a review criterion that vegetation management shall not lead to new depletions or a reduction in runoff from forest lands that adversely affect target flows or Program Projects for Threatened and Endangered Species. Whatever the outcome of these studies and reviews, the signatories will not be released from first increment commitments to reducing shortages to the FWS target flows by an average of 130,000 – 150,000 acre-feet per year.

All projects included in the Water Action Plan are voluntary and participation is incentive based. Inclusion of these projects in the Program is subject to reaching an agreement with the involved parties.

B. Additional Information Needs

The information presented for the projects included in the Water Action Plan is at a reconnaissance level of detail. Feasibility studies, final designs, and environmental permitting will be required before specific projects can be constructed. Where no construction is needed, implementation plans will be needed along with any necessary legislation.

Feasibility level studies will be required to address information requirements that are common to most projects. Those information needs are described in part C. of this Process.

Feasibility studies also may include the use of demonstration projects as discussed in Chapter 10 of the Study. Demonstration projects include small-scale projects that are constructed to test both the feasibility of larger scale projects and the assumptions used in their evaluation; projects that are not physically constructed, but provide further data through field investigations and measurements; and projects that focus on refining assumptions and methodologies used to analyze an alternative by developing more sophisticated analytic tools.

Additional project specific information needs are identified below.

CNPPID Re-regulating Reservoir: Information will be needed on reservoir seepage losses and the associated effects on surrounding landowners. The willingness of local landowners to sell their land will also need to be evaluated because specific parcels of land are required to construct the reservoirs evaluated.

Water Leasing in Nebraska and Wyoming: The willingness of irrigators to participate in this project must be evaluated before yields and costs can be further defined. This could be accomplished by regional or local questionnaires, public meetings, or many other methods.

Water Management Incentives: Baseline conditions will need to be established from which changes can be measured. The willingness of irrigators to participate in this project must be evaluated before yields and costs can be further defined.

Groundwater Management: Further investigation and monitoring is required prior to and during implementation of groundwater management programs to ensure the sustainability of these projects. A more in-depth hydrogeologic analysis is needed to address the dynamic response of the groundwater mound in Central Nebraska and the possible firm yield that can be attained without mining the mound. Any project designed to take water from the mound will need to be phased-in so that hydrologic impacts can be monitored and evaluated.

Dawson/Gothenburg Canal Recharge Projects: Information is needed on high groundwater levels in the area and the associated effects on surrounding landowners.

Power Interference: This project has several operational and contractual considerations that will need to be addressed, including how saved water is released, and how existing and new contractual arrangements with power generators can be executed.

La Prele Reservoir: Further analysis of the seepage from La Prele Reservoir is needed to determine whether a temporary storage contract in a downstream reservoir such as Glendo Reservoir is necessary to fully realize the yield associated with this project.

C. Process for Advancing Water Conservation/Water Supply Projects

The potential projects identified in Table II-1 have been evaluated at a reconnaissance level and will be funded for advancement to the feasibility level unless the Governance Committee decides otherwise. As more in-depth analyses of project yields and costs are completed, the Governance Committee may choose to replace projects in the Water Action Plan with alternative projects. Each state has expressed its desire to reserve the right to add or remove projects from consideration in the future if an issue arises that cannot be resolved. Circumstances that might result in projects being added to the Water Action Plan include insufficient yield to meet the water goals of the Program. A project can be removed from the Water Action Plan if the project is not implementable within the first increment (13 years), generates significantly less yield than was anticipated, is too expensive, is unacceptable to the Governance Committee for other reasons, or if an agreement cannot be negotiated with the project sponsor. New projects may or may not require a supplement to the Programmatic EIS. Elements of the Water Action Plan will be subject to site specific National Environmental Policy Act (NEPA) and ESA review as appropriate.

The following process will be used to add new projects for consideration and to advance projects, including those identified in the initial list, from conception of an idea, through reconnaissance study, through identification for feasibility study, through feasibility evaluation, to acceptance or rejection for implementation, and through implementation.

1. ADDING PROJECTS TO THOSE IDENTIFIED FOR FEASIBILITY STUDIES.

- a. Anyone can propose to the Governance Committee an additional water conservation/supply project to be considered.
- b. Any proposal to consider an additional project must be accompanied by a reconnaissance study by the project sponsor or a concept for a reconnaissance level study by the Program for that project. The Governance Committee will address funding by the Program if reconnaissance studies were not funded by the project sponsor or others.
- c. The reconnaissance study shall include, at a minimum:
 - i. preliminary estimates of shortage reduction;
 - ii. preliminary estimates of cost, including any financial or other incentives necessary to implement the project;
 - iii. preliminary identification of legal, socioeconomic and institutional impediments, compatibility with existing law, and any changes in law necessary to implement the project;
 - iv. preliminary identification of beneficial and adverse environmental impacts, including impacts on surface water, groundwater, water quality, vegetation, wildlife, and on-site threatened and endangered species;
 - v. preliminary identification of water availability based on historical flows and program projects;
 - vi. preliminary assessment of relation of project yield to other program projects;

- vii. preliminary analysis of potential beneficial and adverse direct and third party impacts, including hydrologic, economic, and social impacts on surface water and groundwater users, and preliminary identification of measures and estimate of costs to avoid, offset, or mitigate adverse impacts, if appropriate; and
- viii. preliminary identification of federal, state, county, and other permits necessary to implement the project and process for obtaining such permits.

The Governance Committee will decide how to handle the proposal, which could include: (1) requesting additional information from the project proponent; (2) referring the proposal to a committee for consideration and a recommendation; (3) adding the project to the list of those advancing to the feasibility level of study and discussing with any project sponsor other than a state whether such study will be funded and/or contracted for by the Program or the project sponsor; or (4) rejecting the proposal.

2. FEASIBILITY STUDIES AND APPROVAL OR REJECTION BY G.C.

- a. A proposal, budget and schedule for carrying out feasibility studies will be provided to the Governance Committee by the Water Committee or other Governance Committee designee. Anyone can carry out feasibility studies at their own expense and provide them to the Governance Committee for consideration.
- b. Feasibility studies will include complete and refined information about each issue identified in items 1.c.i through 1.c.viii above. Feasibility studies will also include the following information:
 - i. A reasonable implementation schedule for the project;
 - ii. The process(es) for obtaining any necessary water rights for the project, any necessary agreements with water rights holders, and/or any necessary changes of water law;
 - iii. A process for obtaining public input and reporting thereon;
 - iv. A proposed monitoring program for the project;
 - v. Proposed operating rules for the project;
 - vi. Any other necessary project construction requirements, methods, procedures, and schedules.
- c. The Governance Committee will consider the feasibility level study for each project and decide whether to: (1) request additional information; (2) refer the proposal to a committee for consideration and a recommendation; (3) accept the proposed water conservation/water supply project for implementation; or (4) reject the project. At that time DOI will advise what activities, if any, are necessary to comply with NEPA.
- d. Associated issues, such as property acquisition (if appropriate), "buy back" rights, avoidance or mitigation of direct and third party impacts, and equity and crediting if the program terminates must be resolved before a project is accepted for implementation.

3. IMPLEMENTATION OF PROJECTS ACCEPTED BY THE GC AFTER FEASIBILITY STUDIES

- a. The Governance Committee must approve funding for the project for the project to be implemented.
- b. The project may be implemented by the Governance Committee, by one or more states, or by another project sponsor or sponsors, in accordance with the plan and schedule included in the feasibility study and approved by the Governance Committee. If the project sponsor oversees implementation, the project sponsor will coordinate with a designated representative of the Governance Committee who would receive advice from the Water Committee.
- c. Implementation tasks, which will be subject to Governance Committee oversight and approval as appropriate, may include: (1) complying with state and federal laws and regulations; (2) hiring contractors; (3) completing final project design; and (4) building and operating the project. The executive director, a contractor, a state or a project sponsor as appropriate may implement some or all of these tasks.
- d. The executive director, contractor, state or project sponsor will provide appropriate information to the Governance Committee to ensure that the project is operating according to design and to determine if its performance can be improved to increase water yield, cut costs, or achieve other benefits. If the Governance Committee considers proposals to increase yield or performance of a project not operated by the executive director, another program contractor, or a state, discussions will include the project sponsor. Such changes shall not be implemented without the agreement of the project sponsor. If unanticipated changes occur during implementation, the issues shall be brought to the Governance Committee for resolution.
- e. After implementation, monitoring and research will occur as directed by the Governance Committee in accordance with the Program's Integrated Monitoring and Research Plan. Monitoring shall also occur as needed to evaluate direct and third party impacts and any mitigation process instituted.
- f. Tracking and accounting will be accomplished per Program procedures.

III. Projects

A. Introduction

The information presented in this Water Action Plan is intended to meet both the needs of the Governance Committee and the EIS/ESA Team. The proposed projects must be described in sufficient detail so the EIS/ESA Team can evaluate the benefits of the proposed Program for the target species and the general impacts of the Program on the Platte River Basin water resources and dependent economies.

The following information is provided for each project included in the Water Action Plan per the December 1, 1999 memo by Curt Brown, Platte River EIS Study Manager.

1. *Location of the Project:* Location of project facilities or associated actions.
2. *Basic Description:* The plan of operation that produces the intended benefit.
3. *On-site Yield and Timing:* A typical schedule of diversions, storage, or releases producing the local yield to the river. This corresponds with on-site hydrologic effects.
4. *Legal and Institutional Requirements for Implementation:* Issues critical to the successful implementation of the element. This may include issues related to permitting, water rights, contracts, state laws and regulations, interstate compacts, etc.
5. *Schedule for Implementation:* The likely schedule for full implementation of the project.
6. *Expected Project Life:* The projected life of the element, based on the estimated investment and operating costs.
7. *Capital and Operational Costs:* The initial and annual costs for the project.

In addition to these seven EIS team information requirements, the WAPC requested information be included on third-party impacts. Third party impacts may include hydrologic, economic, social, and environmental impacts associated with each project. A hydrologic analysis considers impacts on existing surface and groundwater users resulting from changes in the timing and quantity of water in the river while taking into account terms and conditions of interstate compacts, decrees and the Program. A socioeconomic analysis considers impacts on the local and regional economy, taxes, hydropower generation, and recreation. An environmental impact analysis considers changes in water quality and habitat areas.

A qualitative identification of potential third-party impacts associated with each project is provided, however, a more in-depth quantification of negative and positive costs, benefits, and specific impacts has not been completed. For example, third party costs may include power interference charges or compensation for adverse impacts to existing water right holders and groundwater users. Costs/benefits associated with third party impacts will need to be assessed prior to implementation. Costs associated with third party impacts could be relatively high for certain projects, resulting in higher costs than presented in this report. Likewise, positive third party impacts should be credited to the Program when possible, which could reduce the cost of a project. Information on third party impacts developed by the EIS team will be included when made available.

Two other types of information are mentioned in the WC's Scope of Services under Water Action Plan requirements, which include: 1) monitoring and accounting methods; and 2) recommendations concerning how Program water moves through the system to maximize benefits to the habitat. These two topics are addressed in Chapters IV and V, respectively.

B. Nebraska Projects

1. CNPPID RE-REGULATING RESERVOIR

◇ Location:

Several re-regulating reservoir options were evaluated by HDR Engineering Inc. (HDR) for Central Nebraska Public Power and Irrigation District (CNPPID). The HDR report, titled *Depletion Mitigation Study Phase I*, was made available to Boyle Engineering on April 13, 2000. The HDR report has been relied on for information on potential re-regulating reservoirs within CNPPID's system.

Nebraska indicated they are willing to consider a re-regulating reservoir(s) capable of yielding an annual average of up to 8,000 ac-ft of target flow reductions at the critical habitat, of which 4,000 to 5,500 ac-ft would be made available to the Program (Jim Cook, Nebraska Natural Resource's Commission, June 28, 2000 memo). The remaining portion of the yield will be retained by Nebraska to potentially offset future depletions. An average of up to 8,000 ac-ft/yr of target flow reductions could be attained through a single re-regulating reservoir or a combination of reservoirs. As such, the six most promising re-regulating reservoir options evaluated in the HDR report are presented below.

The site locations of the six re-regulating reservoirs listed in order by location from west to east are described as follows:

Option 1: Jeffrey Canyon Reservoir. This site is located south of Brady in Lincoln County on the south side of the Central District Supply (Canal). This reservoir would be fed from Jeffrey Reservoir. The reservoir capacity is estimated to be 10,390 ac-ft.

Option 2: Smith Canyon Reservoir. This site is located southwest of Gothenburg in Dawson County on the south side of the Canal. This reservoir would be fed by water pumped from the Canal. The reservoir capacity is estimated to be 12,895 ac-ft.

Options 3&4: Midway Lakes Reservoirs No. 2 and No. 5. These sites are located south of Willow Island in Dawson County on the south side of the Canal. These reservoirs would be fed by water pumped from the Canal. The capacities of Midway Lakes Reservoirs No. 2 and No. 5 are estimated to be 6,433 ac-ft and 11,429 ac-ft, respectively.

Option 5: North Plum Creek Reservoir. This site is located southeast of Cozad in Dawson County on the north side of the Canal. This reservoir would be fed by water from the Canal. The reservoir capacity is estimated to be 2,320 ac-ft.

Option 6: J-2 Forebay Reservoir. This site is located southeast of Lexington in Gosper County in the Plum Creek basin, south of the J-2 Forebay on the south side of the Canal. This reservoir would be gravity fed from the Canal. The reservoir capacity is estimated to be 3,436 ac-ft.

◇ **Basic Description:**

Re-regulating reservoirs capture Platte River water beyond that required for irrigation deliveries and mainstem instream flows during periods of excess flow at the critical habitat. In general, water would be diverted from the Central District Supply Canal during periods of excess and released during periods of shortage at the critical habitat. In the case of the Jeffrey Canyon and the J-2 Forebay Reservoirs, water would be supplied from Jeffrey Reservoir and the J-2 Forebay, respectively, as opposed to the Canal. CNPPID is proposing to re-regulate flows in their system, in which case diversions will not be increased or decreased, only return flows will change.

◇ **On-Site Hydrologic Effects:**

The HDR Report was relied on for yield estimates. The on-site yields presented have not been discounted, therefore, the EIS team will need to consider the reservation of water for Nebraska's future depletions in determining the scores associated with these reservoirs.

HDR developed a spreadsheet to analyze the flow regime of each potential reservoir. Reservoir operations were modeled on a daily basis. Daily operation is possible due to the close proximity of the reservoirs to the habitat. Days of excess can occur in months that the monthly flow does not exceed monthly target flows, in which case, the reservoirs could be operated to store on *days* of excess and release on *days* of shortage. These reservoirs can take advantage of short-term excesses and shortages in a more efficient manner than other alternatives that are further upstream.

The following assumptions and operating rules were used by HDR to determine the yield and timing associated with these reservoirs.

- No dead pool was accounted for. All reservoirs were allowed to drop until they were dry.
- Type of year for purposes of defining target flows (wet, average, or dry) is known.
- Travel time from Overton to Grand Island is two days. Historic flows at Overton were used to determine the amount of water that should be stored or released from the reservoirs to meet the target flows at Grand Island.
- Buffers were used to incorporate a factor of safety in the decision to store or release. If the flow at Overton was more than 200 cfs above the target flow, then water was diverted to storage. If the flow at Overton was more than 500 cfs below the target flow, then water was released from storage. Changes to these buffers will affect yield results.

- Incremental changes in gains and losses between Overton and Grand Island are negligible.
- Rainfall falling on water surfaces was assumed to be added to the reservoir volume in full. Historical daily precipitation data was obtained from the Holdrege weather station.
- Runoff contributed from rainfall falling on the drainage basin surrounding the reservoirs was subject to SCS losses. Antecedent moisture conditions were used.
- Seepage through the dams was estimated using Darcy's Law and the geometry of the dam along with soil characteristics. Daily seepage rates were based on the water surface elevation at the beginning of the day.
- Evaporation was based on available climate data for the North Platte weather station. A constant water surface area associated with one-half the reservoir depth was used for each reservoir for the purpose of determining evaporative losses and direct rainfall.
- The reservoirs began the study period empty.
- Inflow and outflow capacities were preliminarily set by conversations with CNPPID. Fill capacities ranged from 100 to 400 cfs, while release capacities were set at 50 cfs for all reservoirs. Changes to these capacities will affect yield results.
- No freeboard was used in the hydraulic and hydrologic analyses. Water was considered to be spilled in full beyond the normal volume of the reservoir.
- Water was available in the Canal up to the amount of the historic J-2 Return during periods when diversions into the reservoirs were made. The water diverted from the Canal to be stored in the reservoir could not exceed the flow in the J-2 Return.

Daily reservoir operations data, including diversions to storage and releases, have not yet been made available by HDR and CNPPID.

◇ **Legal And Institutional Requirements for Implementation:**

There may be several legal and institutional requirements necessary to implement any of these reservoirs. As noted by NPPD in comments received May 3, 2000, the operational rules must insure that all senior water right demands are met before storage is considered or credited to a CNPPID re-regulating reservoir. This condition should be met if water is only available for storage on days that flows downstream of the J-2 Return exceed the needs of existing water rights.

Nebraska will also explore several institutional alternatives for capturing, releasing, and protecting water generated from a re-regulating reservoir if it moves forward (Nebraska's Comments on Boyle January 17, 2000 Memo). Potential institutional alternatives presented by CNPPID, which address legal requirements, are as follows. If the reservoir

is filled by re-timing water already diverted under an existing water right when river flows below the J-2 Return exceed target flows, there will be no additional diversions from the Platte River. Therefore, one alternative may be to modify the existing water rights to permit additional regulation provided no other water right is harmed. Another alternative may be to specify the Central District Supply Canal, rather than the Platte River, as the source of water for the reservoir. In this case, the argument could be made that water is available for storage on days that flows downstream of the J-2 Return exceed the needs of existing water rights and target flows. Another option may be to file for a new storage permit to divert water from the Platte River. A new storage permit with a junior priority date may not be a significant problem given CNPPID's intentions not to harm other water rights or target flows (CNPPID's comments, February 16, 2000).

If CNPPID is able to acquire a permit to divert under their existing water rights then water could be protected from diversion under the new storage right. However, even if releases are not protected, there is little opportunity for downstream users to divert additional water associated with this project given the proximity to the critical habitat.

Based on conversations with CNPPID personnel, it is possible that CNPPID may need an amendment to the current Federal Energy Regulatory Commission (FERC) license to construct this reservoir since it could affect operations of its current FERC licensed projects. However, there is no FERC requirement that CNPPID build this reservoir to improve their system. NEPA/ESA compliance would also have to be completed on the construction of the reservoir to address any on-site issues.

Other federal and state agency permit requirements investigated and identified in the HDR report include the following. A U.S. Army Corps of Engineers 404 permit would be required in addition to a 401 Water Quality Certification, which would be addressed via the 404 permitting process. Coordination with the Nebraska State Historic Preservation Officer would be required before construction. An NPDES Permit to Discharge Storm Water Associated with Construction Activity and associated Storm Water Pollution Prevention Plan for construction activity would be required. Construction activity would require review from the State of Nebraska DEQ-Air Quality Division. Permits may be required for the construction of structures within the affected counties in Nebraska.

◇ **Schedule For Implementation:**

Comments were received from Nebraska regarding draft implementation schedules for all Nebraska projects included in the Water Action Plan. The implementation schedules provided are estimated times to implementation from the start of the Program, or if action to implement that alternative does not commence until sometime after the first year of Program implementation, the estimated time to complete implementation once it has begun. Implementation times assume that principle efforts are directed at that alternative. To the extent that efforts are being made to implement multiple alternatives, the implementation times may be longer. All of the implementation times are subject to obtaining any necessary supporting water rights and/or changes to existing water rights used to support the Program.

As noted in comments received from Nebraska, a re-regulating reservoir within CNPPID's system is estimated to take five to seven years to implement. A final design study and several state and federal permits would be required prior to construction.

◇ **Expected Project Life:**

The project life of a re-regulating reservoir would most likely extend well beyond the first increment of the Program. If properly maintained and operated, reservoir lives can exceed 75 to 100 years. Existing seepage problems associated with some of these sites could impact the project life depending on whether seepage problems can be avoided or mitigated.

◇ **Capital And Operational Costs:**

The HDR report was relied on for cost estimates with the exception of hydropower impacts. The capital and annual costs for this project include costs associated with land acquisition, access, pump intake system, outlet structure and system, spillway, construction of the earthen dam, annual operations and maintenance costs, and lost hydropower revenue.

Most of the capital construction costs were determined by estimating the quantities of the components and multiplying by a unit cost for each. Some of the assumptions used by HDR for unit costs are as follows:

- \$5 per cubic yard for embankment material complete in place.
- \$35 per square yard for riprap with a sand filter.
- \$340 per acre for mulching on the face of the dam.
- \$8,000 per drop structure on spillway channels.
- Intake and outlet system costs are variable based on site conditions.
- \$1000 per acre for land acquisition.
- Pump system costs were based on the power required to operate pumps at given flowrates and heads.
- Annual operations and maintenance costs were estimated to be 5 percent of pump capital costs.
- Mean annual lost hydropower costs were estimated to be \$3 per acre-foot per hydropower plant bypassed. (Per personal communication with Mike Drain of CNPPID, May 16, 2000, this figure is in error and should have been \$4 per acre-foot, therefore, the \$4 figure has been used in this Water Action Plan. Furthermore, this figure represents loss of hydropower revenue to CNPPID but does not reflect loss in revenue to NPPD.)¹
- \$125,000 per mile for construction of access roadway.

The total capital costs and annual operations and maintenance costs are summarized in the table below. Nebraska is reserving 31 to 50 percent of the estimated 8,000 ac-ft/yr yield (or 2,500 to 4,000 ac-ft/yr of reserved yield) to offset future depletions, in which

¹ For some reservoirs there will be annual costs associated with lost hydropower generation because releases bypass a plant. Water diverted to storage will be taken out above the hydropower plant and released below the generator.

case only a proportionate share of the cost of this project would be attributable to the Program. Fifty (50) percent of the total capital costs and annual costs attributable to the Program were estimated to range from approximately \$2.45 million to \$4.61 million and \$78,000 to \$255,000, respectively. Sixty nine (69) percent of the total capital costs and annual costs range from approximately \$3.39 million to \$6.37 million and \$108,000 to \$352,000, respectively.

**Table III-1
Re-regulating Reservoir Costs**

	Jeffrey	Smith	Midway No. 2	Midway No. 5	N. Plum	J-2
CAPITAL COSTS						
Land Acquisition	524,000	715,000	276,000	421,000	221,000	206,000
Access Roadway	450,000	925,000	137,500	1,215,000	165,720	75,000
Pump Intake System	2,075,055	1,567,580	2,088,517	1,856,685	1,893,841	4,301,481
Outlet Structure	200,000	200,000	240,000	240,000	200,000	240,000
Spillway	315,833	226,983	218,000	194,517	280,500	242,083
Earth Dam	4,662,515	4,756,115	3,155,000	3,361,574	2,033,944	1,892,599
Outlet System	1,001,775	94,612	157,254	83,179	111,308	231,328
Total Capital Cost	9,229,178	8,485,290	6,272,271	7,371,955	4,906,313	7,188,491
50% of the Capital Cost	4,614,589	4,242,645	3,136,136	3,685,978	2,453,157	3,594,246
69% of the Capital Cost	6,368,133	5,854,850	4,327,867	5,086,649	3,385,356	4,960,059
ANNUAL COSTS						
Hydropower Lost	63,796	36,612	20,648	23,908	28,288	33,880
O&M and Power Costs	315,946	408,301	485,389	485,931	128,113	209,002
Total Annual Cost	379,742	444,913	506,037	509,839	156,401	242,882
50% of the Annual Cost	189,871	222,457	253,019	254,920	78,201	121,441
69% of the Capital Cost	262,022	306,990	349,166	351,789	107,917	167,589

Potential costs associated with third party impacts have not been evaluated. The project costs presented above may be higher if there are third party impact costs.

◇ **Third-Party Impact Considerations:**

Potential third party impacts include positive and negative effects on the following:

1. Hydrologic conditions: Includes changes in streamflows, canal flows, and return flows both in terms of timing and quantity.
2. Economic and fiscal conditions: Includes changes in income, employment, sales or expenditure patterns, tax revenues, related industries, and economic development.
3. Environmental conditions: Includes changes in water quality and habitat areas.
4. Social Conditions: Includes changes in recreational areas, visitations, and expenditures.

There are potential negative economic and hydrologic third party impacts associated with this project due to changes in the quantity and timing of streamflows. If the reservoir is filled by re-timing water already diverted under an existing water right there will be no additional diversions from the Platte River. Diversions to storage will decrease return flows at the J-2 Return and reduce available flows for new downstream water users in the

future or potentially existing downstream users if they are not protected through the water rights administration process. Storage releases and return flows from reservoir seepage will also alter the quantity and timing of water available to downstream users. Reservoir seepage is a particular concern due to existing seepage problems in the Plum Creek drainage for example. Additional seepage may increase groundwater levels in the vicinity, which could have both positive and negative third party impacts. Increased groundwater levels could reduce pumping costs for nearby groundwater irrigators. Alternatively, increased groundwater levels could result in waterlogging of nearby irrigated lands causing decreased productivity and yields.

A re-regulating reservoir could generate employment opportunities on a short-term basis during construction, which is a third party economic benefit. A re-regulating reservoir should not impact crop patterns or crop production, in which case regional changes in income, sales, or tax revenues are not likely.

A CNPPID re-regulating reservoir could provide an increase in recreational opportunities, which is a third party benefit. Recreational opportunities may include swimming, picnicking, fishing, nature study, sightseeing, hiking, and boating. The extent to which recreational opportunities are enhanced depends on how the reservoir is operated and whether the other reservoirs in the vicinity, including Johnson Lake and Elwood Reservoir, already provide similar recreational opportunities.

Third party environmental impacts associated with this project can be both positive and negative. There could be negative impacts to wetlands from reservoir impoundment and positive impacts resulting from the creation of additional wildlife habitat. Reservoir projects could also have both negative and positive impacts on water quality and downstream aquatic habitat. Water quality could improve during the summer months when additional flows are added to the river. However, water quality could be degraded and fish and aquatic habitat negatively impacted during the winter months when river flows are reduced. This possibility might be minimized if water is only pumped when target flows are being met.

2. WATER LEASING IN NEBRASKA

◇ Location:

Nebraska has not yet identified specific irrigation districts or individual farmers that are willing to participate in a leasing program in conjunction with the Program. The willingness to participate is also unknown at this time. Due to these conditions, a leasing program was evaluated for Reaches 10 (Julesburg, CO gage to South Platte at North Platte, NE gage) and 14 through 19 (Keystone Diversion gage to Grand Island, NE gage). ***It was assumed that representative leasing projects are located at the mid-point of each reach because specific irrigation districts and lands willing to participate in the Program are not yet known.*** The reaches are defined as follows:

Reach 10: Julesburg, CO gage to South Platte at North Platte, NE gage
Reach 14: Keystone Diversion gage to North Platte at North Platte, NE gage
Reach 15: North Platte at North Platte, NE, gage to Brady, NE gage
Reach 16: Brady, NE gage to Cozad, NE gage
Reach 17: Cozad, NE gage to Overton, NE gage
Reach 18: Overton, NE gage to Odessa, NE gage

Reach 19: Odessa, NE gage to Grand Island, NE gage

The principal canals or irrigation districts that have irrigated lands in reaches 10, and 14 through 19 are listed below. These irrigation districts and/or canals could potentially be involved in a leasing program.

Reach 14: Keith-Lincoln Canal, Paxton-Hershey Canal, North Platte Canal, Suburban Canal and Cody-Dillon Canal

Reach 15: CNPPID

Reach 16: CNPPID, Six Mile Canal, Thirty Mile Canal, Orchard-Alfalfa Canal, Cozad and Gothenburg Canals

Reach 17: CNPPID and Dawson County

Reach 18: CNPPID and Kearney Canal

Reach 19: CNPPID

◇ **Basic Description:**

A voluntary temporary leasing program would provide incentives to farmers to annually lease water supplies that would otherwise have been used for irrigation. The amount of water available to the Program consists of the reduction in consumptive use. The project evaluated assumes that leased water rights are dependent on storage rights in Lake McConaughy. In general, water will be leased from an irrigation district or farmer with storage rights in Lake McConaughy. The reduction in consumptive use will likely be added to the EA when storage space is available and released during times of shortage at the critical habitat. The EA may not always be available to re-regulate downstream reductions in consumptive use, however, the opportunity for an exchange is greater if leasing is associated with a water right dependent on storage. For example, irrigation releases from Lake McConaughy for CNPPID and Nebraska Public Power District (NPPD) could be reduced, which would result in corresponding increases in the EA. Although it may be feasible to lease natural flow water rights, it will be more difficult to insure protection.

Under a temporary lease, irrigation districts or farmers would not relinquish ownership of their water rights. Pending approval of new legislation, water supplies could be leased for five years with an option to renew at the conclusion of the contract for another five years. To provide maximum flexibility the mix of farms participating in the program would be allowed to change over time. The leasing program that has been analyzed considers leasing approximately 25,500 ac-ft annually, which corresponds to a reduction of about 17,000 ac-ft/yr delivered on farm and a reduction in consumptive use of about 8,400 ac-ft/yr.

◇ **On-Site Hydrologic Effects:**

Estimates of on-site yield and timing presented below were based on the Final Report.

The number of acres that were assumed to be included in a leasing program are summarized in the following table. The acreage is based on the assumption that the full water supply and associated reductions in consumptive use consist of storage water. Many acres below Lake McConaughy receive storage water primarily as a supplement to natural flow supplies. To the extent that storage is used to supplement natural flow supplies, the acreage included in a leasing program and the yield it can produce may need to be adjusted.

**Table III-2
Leasing Program**

Reach	Program Acres (ac)
10	460
14	560
15	610
16	770
17	1,610
18	2,080
19	1,750
Total	7,840

The amount of water leased in each reach was based on the distribution of acres irrigated with surface supplies. Although a significant portion of the acreage included in this program is in reaches 18 and 19, which are within or near the end of the critical habitat, the savings in consumptive use may be stored in the EA as space is available. Releases from the Lake McConaughy EA will flow through the entire critical habitat, therefore, the yields of these programs have not been discounted. As mentioned earlier, the project assumes that leased water rights are associated with storage rights.

The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach. Although the reductions in diversions were assigned to a reach based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was based on county-level information obtained from the USGS Water Use Data for 1995.

**Table III-3
Reductions in Diversions from the North Platte, South Platte and Platte Rivers (ac-ft)**

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	16	19	14	19	34	23	9
May	34	41	31	41	80	55	21
June	288	279	293	458	905	983	819
July	683	639	696	1128	2622	2946	2347
August	613	575	625	1036	2115	2386	2023
September	50	59	45	80	147	134	83
Annual	1683	1611	1705	2762	5904	6528	5302

**Table III-4
Reductions in the Amount Delivered On-Farm (ac-ft)**

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	10	15	11	11	20	16	6
May	20	32	24	24	48	38	14
June	173	218	232	272	535	665	566
July	410	501	549	670	1551	1994	1620
August	368	450	494	616	1251	1615	1397
September	30	46	36	48	87	91	57
Annual	1010	1262	1346	1641	3492	4418	3661

A representative leasing program could reduce on-farm deliveries and consumptive use by about 17,000 ac-ft per year and 8,500 ac-ft per year, respectively. On-farm reductions in consumptive use were based on an on-farm efficiency of 50 percent.

The following table shows the average monthly reductions in consumptive use for the 1975-94 period.

**Table III-5
Reductions in Consumptive Use (ac-ft)**

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	5	8	6	6	10	8	3
May	10	16	12	12	24	19	7
June	87	109	116	136	268	333	283
July	205	251	275	335	776	997	810
August	184	225	247	308	626	808	699
September	15	23	18	24	44	46	29
Annual	505	631	673	821	1746	2210	1830

Based on the water budget spreadsheet, a reduction in consumptive use of about 8,400 ac-ft resulted in a yield of 7,000 ac-ft of shortage reductions at the critical habitat without diversion losses. In this case, it is important to note that flows in the critical habitat will only be increased by reductions in consumptive use. Therefore, the amount of leased water is considerably higher to account for historic return flows. The modeling being performed by the EIS team may indicate that the yield associated with 8,400 ac-ft of consumptive use savings is higher or lower than 7,000 ac-ft of reductions to target flow

shortages. If the EIS modeling indicates a yield that differs from 7,000 ac-ft at the critical habitat, the size of the leasing program may require adjustment.

◇ **Legal And Institutional Requirements for Implementation:**

There are several legal and institutional requirements necessary to implement this project. New legislation would be required to establish the conditions under which a water rights leasing program could be implemented in Nebraska. Two legislative bills, 671 and 672, which address water rights leasing, have been indefinitely postponed and will need to be reintroduced in a subsequent legislative session. These bills would need to be ratified before leasing could be implemented in Nebraska.

The Nebraska Department of Natural Resources would manage agricultural leases. Based on the conditions proposed in LBs 671 and 672, a leasing application must be approved by the DWR. For some leases, water not used for irrigation could be stored in the Lake McConaughy EA. Water released from the EA would be protected from diversion under water right A-17695. If an individual farmer within an irrigation district desires to lease water to the Program, the irrigation district must consent to the lease.

The terms and conditions under which the EA could be used to re-regulate reductions in irrigation water use downstream of Lake McConaughy would need to be agreed upon.

◇ **Schedule For Implementation:**

This project does not require any new construction or infrastructure, therefore, the implementation schedule is based primarily on the resolution of legal and institutional issues.

As noted in comments received from Nebraska, the draft schedule for implementing this project is as follows:

Year 1: Introduction of proposed legislation.

Year 2: Enactment of legislation and adoption of rules and regulations to implement leasing law.

Year 3: Governance Committee establishes an incentive based leasing program compatible with Nebraska water rights leasing law.

Year 4 to Year ? (will depend on cash flow to the Program and participant willingness): Water right leases are secured from individual water right holders and the Department of Natural Resources (DNR) reviews each lease for approval/disapproval. This assumes such approval would be required by the legislation.

◇ **Expected Project Life:**

The expected project life is dependent on the length of the leasing contracts. Proposed legislation provides for 5-year leases with an option to renew for another 5-year period at the conclusion of the lease. A leasing program could extend through the first increment of the Program and beyond if multiple lease renewals are allowed and farmers come in and out of the program.

◇ **Capital And Operational Costs:**

The Final Report was relied on for leasing cost estimates. The annual costs of a representative water leasing program were estimated based on the following components:

- Annual economic value of irrigation on lands in Reaches 10, and 14 through 19. The annual value of irrigation supplies was estimated at between \$45 and \$55 per ac-ft of consumptive use based on farm net income and land rental differentials between irrigated and non-irrigated lands. Farm net income estimates were based on average cropping patterns, yields, prices, and costs for the years 1992, 1994, and 1996 provided in an agricultural database compiled by Natural Resources Consulting Engineers, Inc. (NRCE). Information on land rental differentials was based on the information from the United States Department of Agriculture, Nation Agricultural Statistics Services (NASS) published in July 1999.
- An incentive premium of 25 percent to induce participation in the program.
- Transaction and administrative costs representing approximately 30 percent of total program costs.

On an annual basis, a leasing program was estimated to cost an average of about \$80 per acre-foot of consumptive use saved on-farm. This cost includes an incentive premium and administrative costs. A separate leasing cost analysis was completed by Vernon Nelson, co-chairman of the Land Committee. Vernon Nelson estimated that leasing water in South Central Nebraska would cost about \$123 per acre per year not including an incentive premium or administrative costs. More information is needed on the assumptions used by Vernon Nelson's study group to fully assess the reasons for the difference in costs. One potential difference could be the source of data used to determine yields, prices and costs. Vernon Nelson's estimate also assumed that taxes paid would be for irrigated land even if land involved in a lease was converted to dryland, whereas Boyle's estimate considered land rental differentials between irrigated and non-irrigated lands. Per CNPPID, (fax from Don Kraus, May 16, 2000) Mr. Nelson's approach reflects the provisions of proposed leasing bills. For comparison purposes a similar incentive premium of 25 percent and administration cost of 30 percent were added to Vernon Nelson's estimate, for a total of about \$190 per acre. It was assumed that the administration cost includes CNPPID's lost irrigation delivery fee of \$24.49 per contract acre. Both cost estimates have been provided in the table below to provide a range of potential costs associated with leasing. The total annual cost of a leasing program could range from about \$660,000 to \$1.5 million.

**Table III-6
Leasing Program – Annual Costs**

Reach	Program Acres (ac)	CU Saved (ac-ft)	Annual Cost based on Average of about \$80/ac-ft of CU saved(\$)	Annual Cost based on \$190/acre (\$)
10	460	505	39,000	87,400
14	560	630	47,000	106,400
15	610	675	53,000	115,900
16	770	820	61,000	146,300
17	1,610	1,745	123,000	305,900
18	2,080	2,210	166,000	395,200
19	1,750	1,830	172,000	332,500
Total	7,840	8,415	661,000	1,489,600

Potential costs associated with third party impacts have not been evaluated. The costs presented above may be higher if there are third party impact costs. In addition, leasing contracts need to be renewed on a periodic basis, in which case there may be additional costs associated with permitting or re-negotiating leases.

◇ **Third-Party Impact Considerations:**

A leasing program can alter the timing and quantity of water in the river, in which case, there are potential hydrologic and corresponding economic third party impacts on downstream users. If water conserved is not protected from downstream diversion, there would be third party hydrologic benefits. Additional flows under this scenario may allow downstream junior water rights holders to make greater use of their water rights. However, changing the timing and quantity of water could also result in negative hydrologic impacts on downstream irrigators. Negative third party hydrologic impacts from these alternatives are most likely to occur to nearby farmers who have traditionally relied on tailwater runoff or groundwater recharge from participating farms for a portion of their water supply.

Apart from the potential third party hydrologic impacts identified above, there could also be third party economic impacts on agricultural equipment suppliers, farm workers, processing industries and local communities that depend on agriculture. The economy in the study area is dependent on agriculture to a large degree in which case economic and fiscal conditions could be negatively impacted by changes in crop patterns and crop production. If water deliveries are significantly reduced within an individual canal company or irrigation district's service area, company or district revenues may be negatively impacted. Depending on the conditions of the lease, if land is reclassified as dryland it will have reduced value for tax purposes. A reduction in tax revenues would be a negative fiscal impact.

Third party environmental impacts associated with leasing can be both positive and negative. Water quality could improve during the summer months when additional flows are added to the river. However, water quality could be degraded and fish and aquatic habitat negatively impacted during the winter months when river flows are reduced due to reductions in return flows. It is unlikely that a leasing program will have any third party impacts on recreational activities.

3. **WATER MANAGEMENT INCENTIVES (CONSERVATION CROPPING, DEFICIT IRRIGATION, FALLOWING, AND ON-FARM IRRIGATION CHANGES)**

◇ **Location:**

Nebraska has not yet identified specific irrigation districts or individual farmers that are willing to participate in a water management program in conjunction with the Program. The willingness to participate is also unknown at this time. Due to these conditions, the following options have been analyzed.

Option 1: Conservation cropping in Reaches 16 through 19.

Option 2: Deficit irrigation in Reaches 16 through 19.

Option 3: Land fallowing in Reaches 10, and 14 through 19.

Option 4: On-farm changes in irrigation techniques in Reaches 17 through 19.

Ideally these programs would be located in downstream locations close to the critical habitat to minimize difficulties associated with “protecting” the water. ***However, because specific irrigation districts and lands willing to participate in the Program are not yet known, it was assumed that representative water management projects are located at the mid-point of each reach.*** The reaches are defined under water leasing in Nebraska.

The principal irrigation districts and/or canals that have irrigated lands in Reaches 10, and 14 through 19 are described under water leasing in Nebraska. These irrigation districts and/or canals could potentially be involved in a water management program.

The yield and cost analyses of these programs has been limited to surface water irrigation, however, if additional water generated from these options is not protected it may be institutionally easier to apply these programs close to the critical habitat. In order to achieve the proposed yields below Kearney, Nebraska these types of projects would also have to be applied to lands irrigated with groundwater because there is not a sufficient amount of surface water irrigation below Kearney to realize the proposed yield. Analysis of the yields and costs of these options as they apply to groundwater irrigated lands could be completed once more information is obtained regarding specific groundwater irrigators willing to participate in the Program.

◇ **Basic Description:**

Water management alternatives consist primarily of programs resulting in reductions in consumptive use, or in the case of on-farm changes in irrigation techniques, reductions in return flows that do not return to the Platte River above the critical habitat. The programs evaluated assume the water rights involved are dependent on storage rights in Lake McConaughy. In general, an irrigation district or farmer with storage rights in Lake McConaughy will be paid to reduce their diversions through conservation cropping, deficit irrigation, land fallowing, or changes in irrigation techniques. The reduction in consumptive use will likely be added to the EA when storage space is available and released during times of shortage at the critical habitat. Although these programs could include reductions in natural flow diversions, it will be more difficult to insure protection. The EA may not always be available to re-regulate downstream reductions in consumptive use, however, the opportunity for an exchange is greater if the project is associated with a water right dependent on storage.

Option 1: Conservation cropping. Consists of a voluntary program to encourage the conversion of a portion of commonly irrigated, water intensive crops to production of less water intensive crops or crop rotations also found in the local area. Based upon local cropping pattern information, the conversion from continuous corn cropping to an alternating rotation of corn and soybeans was evaluated in Reaches 16 through 19.

Option 2: Deficit irrigation. Consists of a voluntary program to reduce irrigation water use. This analysis focuses on reducing irrigation on corn acres by six inches per acre in exchange for incentive payments.

Option 3: Land fallowing. Consists of a voluntary program under which farmers agree not to irrigate certain lands in exchange for payment. To effectively reduce consumptive use, this fallowed acreage must be over and above historical fallowing practices for purposes of land conservation.

Option 4: On-farm changes in irrigation techniques. Consists of a voluntary program aimed at improving irrigation efficiency. These measures focus on reducing return flows from farms rather than reducing consumptive use. In Reaches 17, 18, and 19 a large proportion of return flows do not return to the river above the critical habitat. These flows either accrete to the groundwater mound in the area, travel into the Republican Basin, or return to the Platte River below the critical habitat. This circumstance, along with the proximity of these reaches to the critical habitat, makes this area the most economically and hydrologically favorable for the implementation of on-farm improvements to irrigation techniques.

For Options 1 through 3 the amount of water available to the Program consists of the reduction in consumptive use, whereas, the amount available under option 4 consists of the reduction in return flows that do not return to the Platte River above the critical habitat.

◇ **On-Site Hydrologic Effects:**

Programs capable of reducing average annual target flow shortages by 7,000 ac-ft/yr have been evaluated for each water management alternative: conservation cropping, deficit irrigation, land fallowing, and on-farm changes in irrigation techniques. Each of these projects has been analyzed *independently* of each other. Ultimately, only one of these projects or a combination of these projects would be implemented for a total yield of 7,000 ac-ft/yr in accordance with Nebraska’s estimate of the maximum yield attributable to water management that could be available to the Program.

Estimates of on-site yield and timing were based on the Final Report. Each water management alternative is described in more detail below.

Option 1: Conservation Cropping

The representative conservation cropping program evaluated focuses on a conversion from continuous corn cropping to an alternating rotation of corn and soybeans. The distribution of land involved in conservation cropping in each reach was based on the distribution of acres irrigated with surface supplies. The number of acres that were assumed to be included in a conservation cropping program are summarized in the following table. The acreage is based on the assumption that the full water supply and associated reductions in consumptive use consist of storage water. Many acres below Lake McConaughy receive storage water primarily as a supplement to natural flow supplies. To the extent that storage is used to supplement natural flow supplies, the acreage included in a conservation cropping program and the yield it can produce may need to be adjusted. This applies to all water management options.

**Table III-7
Conservation Cropping Program**

Reach	Acres Included in Program (ac)
16	3,200
17	7,200
18	9,300
19	11,000
Total	30,700

Although a significant portion of the acreage included in this program is in reaches 18 and 19, which are within or near the end of the critical habitat, the savings in consumptive use may be stored in the EA as space is available. Releases from the Lake McConaughy EA will flow through the entire critical habitat, therefore, the yields have not been discounted. This applies to all water management programs.

On-farm consumptive use savings from implementing an alternating corn and soybean rotation are estimated to be three inches per acre per year. The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach. Although the reductions in diversions were assigned to a reach

based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was based on county-level information obtained from USGS Water Use Data for 1995.

Table III-8
Conservation Cropping - Reductions in Diversions from the Platte River (ac-ft)

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	19	35	25	13
May	40	83	58	31
June	446	935	1037	1234
July	1098	2709	3107	3536
August	1010	2185	2517	3048
September	78	152	141	125
Annual	2691	6100	6887	7988

Table III-9
Conservation Cropping - Reductions in the Amount Delivered On-Farm (ac-ft)

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	11	21	17	9
May	24	49	40	22
June	265	553	702	852
July	652	1603	2103	2441
August	600	1292	1704	2105
September	46	90	96	86
Annual	1598	3608	4661	5515

A representative conservation cropping program could reduce on-farm deliveries and consumptive use by about 15,400 ac-ft per year and 7,700 ac-ft per year, respectively. On-farm reductions in consumptive use were based on an on-farm efficiency of 50 percent.

The following table shows the average monthly reductions in consumptive use for the 1975-94 period.

**Table III-10
Conservation Cropping – Reductions in Consumptive Use (ac-ft)**

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	6	10	8	5
May	12	25	20	11
June	133	277	351	426
July	326	801	1052	1221
August	300	646	852	1052
September	23	45	48	43
Annual	799	1804	2330	2758

Based on the water budget spreadsheet, a reduction in consumptive use of 7,700 ac-ft resulted in a yield of 7,000 ac-ft of shortage reductions at the critical habitat without diversion losses. In this case, it is important to note that flows in the critical habitat will only be increased by reductions in consumptive use. Therefore, the reduction in diversions is considerably higher to account for historic return flows. The modeling being performed by the EIS team may indicate that the yield associated with 7,700 ac-ft of consumptive use savings is higher or lower than 7,000 ac-ft of reductions to target flow shortages. If the EIS modeling indicates a yield that differs from 7,000 ac-ft at the critical habitat, the size of the water management program may require adjustment. This applies to all water management options evaluated.

Option 2: Deficit Irrigation Practices

A deficit irrigation program would focus on reducing water use in irrigated corn production. The representative deficit irrigation program would reduce irrigation on corn acres by six inches per year. The distribution of land involved in deficit irrigation in each reach was based on the distribution of acres irrigated with surface supplies. The number of acres that were assumed to be included in a deficit irrigation program are summarized in the following table.

**Table III-11
Deficit Irrigation Program**

Reach	Acres Included in Program (ac)
16	2,000
17	4,300
18	5,500
19	4,700
Total	16,500

The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach. Although the reductions in diversions were assigned to a reach based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was based on county-level information obtained from USGS Water Use Data for 1995.

Table III-12

Deficit Irrigation - Reductions in Diversions from the Platte River (ac-ft)

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	23	42	29	11
May	49	98	69	27
June	545	1107	1219	1063
July	1342	3207	3653	3045
August	1233	2586	2959	2625
September	95	180	166	107
Annual	3287	7220	8095	6879

Table III-13

Deficit Irrigation - Reductions in the Amount Delivered On-Farm (ac-ft)

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	14	25	20	8
May	29	58	47	19
June	324	655	825	734
July	797	1897	2472	2103
August	733	1530	2003	1813
September	57	107	112	74
Annual	1953	4271	5478	4750

A representative deficit irrigation program could reduce on-farm deliveries and consumptive use by about 16,500 ac-ft per year and 8,200 ac-ft per year, respectively. On-farm reductions in consumptive use were based on an on-farm efficiency of 50 percent. The following table shows the average monthly reductions in consumptive use for the 1975-94 period.

**Table III-14
Deficit Irrigation – Reductions in Consumptive Use (ac-ft)**

Month	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	7	12	10	4
May	14	29	23	9
June	162	327	413	367
July	399	948	1236	1051
August	366	765	1001	906
September	28	53	56	37
Annual	976	2135	2739	2375

Option 3: Land Fallowing

It was assumed that 7,800 acres would be included in a land fallowing program in Nebraska, as summarized in the following table.

**Table III-15
Land Fallowing Program**

Reach	Acres Fallowed
Reach 10	500
Reach 14	500
Reach 15	600
Reach 16	800
Reach 17	1,600
Reach 18	2,000
Reach 19	1,800
Annual Total	7,800

The amount of land fallowed in each reach was based on the distribution of acres irrigated with surface supplies. The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach. Although the reductions in diversions were assigned to a reach based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was based on county-level information obtained from USGS Water Use Data for 1995.

Table III-16
Land Fallowing - Reductions in Diversions from the North, South and Platte Rivers (ac-ft)

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	16	19	15	20	34	23	9
May	35	40	32	42	80	54	21
June	295	274	301	468	904	963	826
July	700	627	713	1153	2620	2886	2368
August	628	564	641	1060	2113	2338	2041
September	51	58	46	82	147	131	83
Annual	1725	1581	1747	2824	5898	6395	5348

Table III-17
Land Fallowing - Reductions in the Amount Delivered On-Farm (ac-ft)

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	10	15	12	12	20	16	6
May	21	31	25	25	47	37	14
June	177	214	237	278	535	652	571
July	420	491	563	685	1550	1953	1635
August	377	442	506	630	1250	1582	1409
September	31	45	37	49	87	89	58
Annual	1035	1239	1380	1678	3489	4328	3693

A representative land fallowing program could reduce on-farm deliveries and consumptive use by about 16,800 ac-ft per year and 8,400 ac-ft per year, respectively. On-farm reductions in consumptive use were based on an on-farm efficiency of 50 percent. The following table shows the average monthly reductions in consumptive use for the 1975-94 period.

**Table III-18
Land Fallowing – Reductions in Consumptive Use (ac-ft)**

Month	Reach 10	Reach 14	Reach 15	Reach 16	Reach 17	Reach 18	Reach 19
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	5	7	6	6	10	8	3
May	10	16	13	12	24	18	7
June	89	107	119	139	267	326	285
July	210	246	282	342	775	976	817
August	188	221	253	315	625	791	705
September	15	23	18	24	44	44	29
Annual	517	619	690	839	1744	2164	1846

Option 4: Changes in Irrigation Techniques

In Reaches 17, 18, and 19 a large portion of return flows return to the Republican River Basin, accrete to the groundwater mound or return to the Platte River below the critical habitat. It was assumed that 50 percent of the return flows do not return to the Platte River above the critical habitat. A 1993 survey conducted by CNPPID indicated that about 50 percent of the surface supplied irrigated acreage within their district is irrigated with techniques that have substantial potential for increases in efficiency. The distribution of land involved in each reach was based on the distribution of acres irrigated with surface supplies. The number of acres that were assumed to be included in this program are summarized in the following table.

**Table III-19
Changes in Irrigation Techniques**

Reach	Acres Included in Program (ac)
17	6,800
18	8,700
19	7,400
Total	22,900

The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach due to efficiency improvements. Although the reductions in diversions were assigned to a reach based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was based on county-level information obtained from the USGS Water Use Data for 1995.

Table III-20
Changes in Irrigation Techniques - Reductions in Diversions from the Platte River (ac-ft)

Month	Reach 17	Reach 18	Reach 19
October	0	0	0
November	0	0	0
December	0	0	0
January	0	0	0
February	0	0	0
March	0	0	0
April	33	23	9
May	78	55	21
June	881	969	822
July	2553	2902	2354
August	2059	2351	2030
September	144	132	83
Annual	5748	6431	5318

Table III-21
Changes in Irrigation Techniques - Reductions in the Amount Delivered On-Farm (ac-ft)

Month	Reach 17	Reach 18	Reach 19
October	0	0	0
November	0	0	0
December	0	0	0
January	0	0	0
February	0	0	0
March	0	0	0
April	20	16	6
May	46	37	14
June	521	655	567
July	1510	1964	1626
August	1218	1591	1401
September	85	89	57
Annual	3400	4352	3672

A representative program to improve irrigation efficiency could reduce on-farm deliveries by about 11,400 ac-ft/yr. These reductions represent gross savings. The yield of this project may be lower to the extent that return flows would have returned to the Platte River.

◇ **Legal and Institutional Requirements for Implementation:**

There is currently no existing legislation or new legislation being considered which addresses the water management options described above, in which case, permits are not required to implement these projects. However, it is not clear how water saved under these programs would be protected. Technically it will be difficult to define how much additional water is added to the river on any given day, which will complicate efforts to protect this water. While it remains untested, it may be that Section 46-252 could be used to protect water saved under the water management options outlined above (Nebraska's

Comments on Boyle January 17, 2000 Memo). A permit would be required if water generated by these projects is to be protected by Section 46-252. Due to the uncertainty regarding protection it would be beneficial to locate water management projects in locations as close to the critical habitat as possible to minimize diversion losses. In order to achieve the proposed yields below Kearney, Nebraska, these types of projects would also need to be applied to lands irrigated with groundwater because there is not a sufficient amount of surface water irrigation below Kearney to realize the proposed yields.

Agreements, which establish the conditions under which water management projects would be operated, need to be negotiated with irrigation districts or individual farmers.

◇ **Schedule For Implementation:**

These projects do not require new construction or infrastructure, therefore, the implementation schedule is based primarily on the resolution of legal and institutional issues.

As noted in comments received from Nebraska, the draft schedule for implementing this project is as follows:

Year 1 or Year 2: Governance Committee establishes an incentive based program for implementing one or more of the options for reducing shortages through water management incentives.

Year 3 to Year ? (will depend on cash flow to the Program and participant willingness): Individual irrigators come to agreement with the Governance Committee to implement one or more of the water management incentive options selected by the Governance Committee. Applications are made and processed by the Nebraska DNR to determine how much, if any, protection can be given under Section 46-252 to “new water” produced by such implementation. Processing Section 46-252 applications could take up to one year.

◇ **Expected Project Life:**

These projects could be implemented indefinitely depending on the willingness of irrigation districts and/or individual farmers to participate in these voluntary programs.

◇ **Capital and Operational Costs:**

The Final Report was relied upon to develop cost estimates for the water management projects. Potential costs associated with third party impacts have not been evaluated. The costs presented below may be higher if there are third party impact costs. In addition, contracts with irrigators or districts need to be renewed on a periodic basis, in which case there may be additional costs associated with permitting or re-negotiating contracts. The annual costs of the representative water management projects are summarized below.

Option 1: Conservation cropping

At this time, it has been assumed that participating farmers would be compensated with payments per ac-ft conserved on-site comparable to estimates for short-term leasing arrangements. On an annual basis, the cost of a leasing program was estimated to range from about \$80 to \$190 per acre-foot of consumptive use saved on-farm. Therefore, the total annual cost for conservation cropping is estimated to range from \$620,000 to \$1.5 million based on an average annual reduction in consumptive use of about 7,700 ac-ft.

Option 2: Deficit Irrigation

Based on NRCE data regarding corn production, the estimated annual impact on farm revenues from the representative deficit irrigation program would be \$90 to \$100 per participating acre planted in corn. An incentive premium of 40 percent has been added to induce farmers to participate in the program. In addition, an annual administrative cost of \$20 per participating acre has been included. The total average annual cost per participating acre is estimate to be about \$150. Based on an estimated total of about 16,500 acres participating in the program, the annual cost would be about \$2.5 million.

Option 3: Land Fallowing

The annual cost of a representative land fallowing program was estimated based on the following components:

- Annual value of irrigated lands. This value for the region as a whole is estimated to be between \$100 and \$110 per acre based on annual net income to farmers and irrigated land rental rates.
- An incentive premium of 25 percent to induce participation.
- Administrative costs, which average \$20 per acre fallowed.

On an annual basis, a land fallowing program was estimated to cost an average of about \$150 per acre. Based on an estimated total of 7,800 acres participating in the Program, the annual cost was estimated to be approximately \$1.2 million.

Option 4: Changes in Irrigation Techniques

During the past seven years, CNPPID has calculated the average annual cost of these measures based on its program to implement on-farm conservation improvements at \$217 per acre foot reduced on-farm deliveries. There is uncertainty regarding the use of this cost for the following reasons: 1) This cost may not apply to this analysis because it includes some items which are not incremental changes over the pre-improvement system (such as water delivery costs) and excludes some incremental costs to the landowner (such as production reduction in pivot corners), and 2) The validity of the method used to estimate the quantity of water saved by on-farm improvements is continuously being evaluated by CNPPID's Conservation Task Force.

Although there is uncertainty regarding the use of \$217 per acre foot reduced on-farm deliveries, it is the best available information at this time. Based on an average annual reduction of 11,400 ac-ft of on-farm deliveries in Reaches 17 through 19, the total annual cost of this project would be about \$2.5 million.

◇ **Third-Party Impact Considerations:**

A water management program can alter the timing and quantity of water in the river, in which case, there are potential hydrologic and corresponding economic third party impacts on downstream users. If water conserved through these alternatives is not protected from downstream diversion, there may be positive and negative third party hydrologic impacts. Additional flows under this scenario may allow downstream junior water rights holders to make greater use of their water rights. Additional hydrologic benefits related to changes in irrigation techniques exist for areas prone to high water tables because groundwater recharge will be reduced. Negative third party hydrologic impacts from these alternatives are most likely to occur to nearby farmers who have traditionally relied on tailwater runoff or groundwater recharge from participating farms for a portion of their water supply. Positive and negative third party hydrologic benefits may be minimal depending on how close to the critical habitat these programs are implemented.

Apart from the potential third party hydrologic impacts identified above, there could also be third party economic impacts on agricultural equipment suppliers, farm workers, processing industries and local communities that depend on agriculture. The economy in the study area is dependent on agriculture to a large degree, in which case economic and fiscal conditions are impacted by changes in crop patterns and crop production. For all programs, changes in the farm product can have negative impacts on processors, shippers, purchasers of farm products as well as local livestock growers, and local communities that depend on agriculture.

For conservation cropping there may be third party economic impacts on farm workers and input suppliers because of differing requirements between traditional crops and alternative crops grown as a result of the program. Deficit irrigation will likely result in reduced yield, potentially impacting processors, shippers, livestock growers and others relying on this production. If land is reclassified as dryland under a land fallowing program it will have reduced value for tax purposes. A reduction in tax revenues would be a negative fiscal impact. For all water management options considered, if water deliveries are significantly reduced within an individual canal company or irrigation district's service area, company or district revenues may be negatively impacted. Negative third party economic impacts can be reduced to a degree if participating properties are geographically dispersed because it is unlikely that regional crop patterns and the value of crop production would change significantly.

Third party environmental impacts associated with water management programs can be both positive and negative. Water quality could improve during the summer months when additional flows are added to the river. However, water quality could be degraded and fish and aquatic habitat negatively impacted during the winter months when river flows are reduced due to reductions in return flows. It is unlikely that a water management program will have any third party impacts on recreational activities.

4. **GROUNDWATER MANAGEMENT**

◇ **Location:**

Based on the principles submitted by Nebraska, groundwater management has been limited to a total yield of no more than 6,000 ac-ft/yr until it can be successfully demonstrated through a phased-in project that groundwater mining will not occur at this level. Nebraska has indicated they will not consider expanding groundwater management unless further investigation and study reveals that higher yields can be sustained. Nebraska also intends to reserve as much of the yield of this project as Nebraska believes is necessary to offset new depletions in that state. However, Nebraska currently estimates that 1,400 ac-ft/yr of the yield of this project would be in addition to that needed for new depletion offset and therefore could be made available to the Program. That is the yield used for purposes of the analysis in this plan.

A 13,000-acre area located under the Phelps Canal system is a potential groundwater management area due to high groundwater tables. The area is bounded by the Phelps Canal to the south and east, by the Township 6 line to the north, and by the Funk Odessa Road to the west. Another groundwater management area being considered by Tri-Basin Natural Resources District (TBNRD) is the Reynold's and Robb Wetland, which is located in Section 10, Township 8 North, Range 21 West. This area is approximately 60 acres in size and is currently managed for wildlife under an agreement with the Rainwater Basin Joint Venture. Other potential groundwater management areas in Phelps and Kearney Counties include approximately 22,000 acres in Township 7 North, Ranges 18 and 19 West, and 23,000 acres in Townships 6 and 7 North and Ranges 15, 16, and 17 West.

◇ **Basic Description:**

Groundwater management can be accomplished in a number of ways. Several options that could be implemented to manage the groundwater mound are described below.

Option 1: Active Groundwater Pumping from High Groundwater Areas. This would involve pumping from areas of high groundwater and returning water back to the Platte River.

If this option is implemented under the Phelps Canal system, wells capable of pumping 1,000 gpm for up to 100 days a year (mostly during the summer months) could be installed and tied into a collection system(s) that discharges water into Lost Creek and/or North Dry Creek for return to the Platte River. Approximately four wells would be required to pump 1,400 ac-ft/yr (roughly 30 percent additional capacity was added for redundancy).

Option 2: Passive Lowering of the Groundwater Table. This would involve paying farmers to dry-land farm every other year. The associated reduction in surface water use could either be returned to the Platte River or stored in the Lake McConaughy EA when storage space is available. This project could be implemented effectively under the Phelps Canal system. Irrigators would make beneficial use of their water every other

year in which case it would not be subject to forfeiture under the “use-it-or-lose-it” condition.

Option 3: Groundwater Irrigation. Farmers would be paid to put in wells and use groundwater as opposed to surface water to irrigate. Reductions in storage water diversions could be stored in the Lake McConaughy EA when storage is available and released as needed for the Program.

Option 4: Conjunctive Use. A conjunctive use project under CNPPID’s system would consist of shallow wells that discharge directly into CNPPID’s distribution system and a recharge system of wells, pits, or drains located in the same area. Each year, in late fall and winter, flows at the Johnson #2 Power Plant that exceed target flows would be diverted through CNPPID’s distribution system for recharge to the local groundwater aquifer. The groundwater aquifer would be recharged to a pre-determined level. Each spring and summer, an equivalent amount of water would be pumped for irrigation. Pumping during the irrigation season would replace irrigation releases from Lake McConaughy.

◇ **On-Site Hydrologic Effects:**

The options described above could be implemented to yield a total of 1,400 ac-ft/yr for the Program. Each of these projects has been analyzed *independently* of each other. Ultimately, only one of these projects or a combination of these projects will be implemented for a total yield of 1,400 ac-ft/yr.

The following table summarizes how any one of these projects could be implemented in the areas described above to yield 1,400 ac-ft/yr. It was assumed that implementation of any one of these options will reduce the water supply for the others. However, it is possible that one option or a combination of these options could be implemented to yield a total of 1,400 ac-ft/yr. For active groundwater pumping from high groundwater areas it was assumed that 280 ac-ft would be pumped each month from May through September during periods of target flow shortage, for an annual total of 1,400 ac-ft. For passive lowering of the groundwater table and groundwater irrigation the monthly distribution of reductions in surface water consumptive use was based on the monthly distribution of diversions into the Phelps County Canal. For a conjunctive use project, 1,400 ac-ft will be diverted to recharge in November, and 280 ac-ft would be pumped each month from May through September to replace irrigation storage releases. For options 2 through 4, the yield to the Platte River represents storage increases in the Lake McConaughy EA which can be released to meet target flow shortages.

**Table III-22
Groundwater Management – Yield to the Platte River**

Month	Option 1 (ac-ft)	Options 2 (ac-ft)	Option 3 (ac-ft)	Option 4 (ac-ft)
October	0	0	0	0
November	0	0	0	-1,400
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	14	14	0
May	280	140	140	280
June	280	257	257	280
July	280	504	504	280
August	280	425	425	280
September	280	60	60	280
Annual	1400	1400	1400	0

Consideration will need to be given to whether the yields associated with some of these groundwater management options should be discounted because those yields would be provided through only a portion of the full habitat or whether there are other aspects of the benefits provided by those projects which would justify giving them full credit. Water returned to the Platte River via North Dry Creek or Lost Creek is introduced partway into the critical habitat. Additional water returned to the Platte River via the North Dry Creek cutoff or the Lost Creek/Ft. Kearny cutoff flows through roughly 60 percent of the critical habitat.

Impacts on return flows or Platte River flows should be minimal if the implementation of a groundwater management program yielding 1,400 ac-ft/yr results in maintaining the water table at a level that does not create problems for residents and farmers.

◇ **Legal and Institutional Requirements for Implementation:**

Certain groundwater management options can be accomplished under current Nebraska water law. For example, no permit would be required to convert to dry-land farming and a permit would only be required for conversion to groundwater irrigation if the well used for that purpose has not yet been constructed. For dry-land farming, CNPPID would seek a modification from the Nebraska DWR to increase the EA by the same amount of reduced storage use. For a conjunctive use project, an intentional recharge permit would most likely be required to recharge the aquifer. Although legislation exists regarding intentional recharge permits it is untested. If this project targets storage water for recharge then the use of the storage right would need to be changed to include recharge. A permit would also be required to pump back into the CNPPID’s distribution system if the well used for that purpose has not yet been constructed.

Actively pumping from high groundwater areas could face several legal obstacles. Although current Nebraska water law would not require a permit from the Nebraska DWR to actively pump groundwater into North Dry Creek or Lost Creek, there is

currently no statutory authority to transfer groundwater off overlying land for environmental purposes. It is likely that new legislation would be required to implement this type of project. There is some ambiguity regarding whether this could be accomplished without new legislation, however, new legislation would be preferable if this type of project is included in the Program. According to Nebraska representatives on the WAPC, new legislation could be prepared for the legislative session next year.

Water added to the Lake McConaughy EA and released during periods of shortage would be protected downstream under water right A-17695. Protection would not be needed for water that is returned to the Platte River via North Dry Creek or Lost Creek because that water is added within the critical habitat reach and there are no significant diversions below that point which could remove water associated with these projects from the Platte River.

NEPA compliance and site-specific environmental permits may be required for the construction of infrastructure related to groundwater management depending on the severity of on-site impacts. A 404 permit from the U.S. Army Corps of Engineers would be required to construct a cutoff between Lost Creek and the Fort Kearny IPA.

◇ **Schedule For Implementation:**

As noted in comments received from Nebraska, a groundwater management project could be implemented in two years, however, it would need to be phased in over several years. Infrastructure including wells, pumps, pipeline, etc. would need to be installed. A water rights permit may need to be secured from the Nebraska DWR depending on which option is implemented. NEPA compliance and site-specific environmental permits may also be required prior to implementation.

◇ **Expected Project Life:**

The expected project life varies depending on the groundwater management plan implemented. Active pumping from the groundwater mound, groundwater irrigation, and conjunctive use projects could extend beyond the first increment of the Program. A constraint on the project life could be the wells and pumping hardware, which would most likely need to be replaced within 10 to 20 years. In addition, drawdown limits could be set by either TBNRD or CNPPID, in which case the project would be terminated if these limits are exceeded.

The project life of dry-land farming depends on the willingness of farmers to dry-land farm every other year. Some farmers may be willing to dry-land farm on a rotating cycle indefinitely, whereas, others may only be interested on an infrequent basis. However, in general, groundwater management projects have the capability of being extended through the first increment.

◇ **Capital and Operational Costs:**

Costs for the groundwater management projects summarized above include up-front infrastructure costs, consisting primarily of wells, pumps, and collection/distribution systems, and annual operations and maintenance costs. Potential costs associated with third party impacts have not been evaluated. The costs presented below may be higher if there are third party impact costs.

Several of the groundwater management options are the subject of the HDR report, *Depletion Mitigation Study Phase I*, which was recently made available to Boyle. Cost information provided in the HDR report was used to supplement this cost analysis. Costs for these projects are outlined below.

Option 1: Active Pumping from High Groundwater Areas. The cost to install a shallow well and pump capable of pumping up to 1000 gpm was estimated to be \$15,000 based on recent cost estimates obtained from TBNRD in connection with the Plum Creek demonstration project. This cost may be higher depending on site specific conditions and the depth of the well. Assuming four wells are required to pump a total of 1,400 ac-ft/yr, the total cost for wells and pumps is estimated to be \$60,000. The cost of the collection system could vary significantly depending on where this type of project is applied and the length of pipeline required to convey water back to a tributary, such as Lost Creek, or the Platte River. It was assumed that the project would be implemented under the Phelps Canal system and only one collection system would be required to deliver water to either Lost Creek or North Dry Creek. The cost of the collection system was estimated to be \$530,000. The costs to improve the cutoffs are included under the Dry Creek/Ft. Kearny Cutoff projects. The total capital cost of this project is estimated to be about \$590,000. Annual operations and maintenance costs were estimated to be \$14,000.

Option 2: Passive Lowering of the Groundwater Table. It was assumed that the cost to induce farmers to dry land farm is comparable to the estimated cost to lease water. On an annual basis, the cost of a leasing program was estimated to range from about \$80 to \$190 per acre-foot of consumptive use saved. It was assumed that the upper range of these costs includes CNPPID's revenue losses of \$24.49 per contract acre associated with reduced deliveries. The total cost could range from about \$112,000 to \$266,000 based on a reduction in consumptive use of 1,400 ac-ft/yr.

Option 3: Groundwater Irrigation. The cost associated with this project consists primarily of well construction and pump costs. Assuming four wells are required to pump up to 1,400 ac-ft/yr, the total cost for wells and pumps is estimated to be \$60,000. This does not include annual operations and maintenance costs and other associated costs to improve irrigation equipment if necessary. The conversion from surface water irrigation to groundwater irrigation may require irrigation system improvements such as the installation of center pivots.

Option 4: Conjunctive use. The costs associated with this project consist primarily of well construction and pump costs and the cost of a recharge collection/distribution system. Assuming four wells are required to pump up to 1,400 ac-ft/yr, the total cost for wells and pumps is estimated to be \$60,000. Depending on the configuration of the recharge system needed for a conjunctive use project, additional costs would be incurred

for recharge basins or pipe drains. The construction cost associated with recharge basins or pipe drains will vary based on the size and location of the basin or length of the drain. There will also be annual operations and maintenance costs. The cost of the recharge collection/distribution system and annual operations and maintenance costs were based on data provided by the EIS team. The total cost of the wells and recharge system and annual operations and maintenance costs were estimated to be about \$161,000 and \$5,900, respectively.

◇ **Third-Party Impact Considerations:**

A groundwater management program can alter the timing and quantity of water in the river, in which case, there are potential hydrologic and corresponding economic third party impacts on downstream users. Third party impacts associated with dry-land farming are similar to land fallowing as discussed under water management programs. Third party impacts associated with the remaining groundwater management programs are discussed below.

In general, groundwater programs result in positive hydrologic impacts. Actively pumping from high groundwater areas, conversion to groundwater irrigation, and conjunctive use projects all typically increase flows in the river. Additional flows under this scenario may allow downstream junior water rights holders to make greater use of their water rights. A conjunctive use project would reduce available flows for junior downstream water users during the winter months when water would typically be diverted for recharge.

Pumping from high groundwater areas may lower regional groundwater levels, which could have both positive and negative impacts. Negative impacts include increased pumping costs for nearby groundwater irrigators due to lower groundwater levels. Alternatively, lower groundwater levels would decrease waterlogging of nearby irrigated lands and alleviate problems with flooded basements, both of which are positive impacts. Conjunctive use projects will lower and raise groundwater levels at different times of the year, which could have both positive and negative impacts. There could be negative third party impacts on landowners adjacent to creeks or drains used to return groundwater to the Platte River if waterlogging problems are increased.

In general, these projects will have minimal direct or indirect impacts on business sales, employment, wages, and wealth. Any third party economic impacts will likely be related to impacts on agricultural production in the affected area. For example, lowering groundwater levels could decrease waterlogging problems and increase agricultural productivity. Diversions to recharge through existing canals will reduce the opportunity for the owner to use that conveyance capacity, however, it may increase revenues from delivery fees.

There could be numerous environmental impacts associated with groundwater management projects. Similar to the Tamarack Recharge Plan, conjunctive use projects can generate wetlands and wildlife habitat if recharge basins are incorporated. Impacts on water quality can be both positive and negative. Recharge projects could improve water quality on-site due to the creation of wetlands. Water quality could also improve during the summer months when additional flows resulting from these projects return to the

river. However, water quality could be degraded and fish and aquatic habitat negatively impacted during the winter months if river flows are reduced. Pumping and recharge in certain areas could result in the dissolution and mobilization of salts that are either native to the geologic material or a byproduct of fertilizers, which could have negative impacts on water quality.

The groundwater management programs described above would likely have minimal impact on recreational opportunities. If recharge basins are used for a conjunctive use project there could be some recreational benefits associated with the creation of additional wildlife habitat areas.

5. DRY CREEK/FORT KEARNY CUTOFFS

◇ **Location:**

The Dry Creek/Ft. Kearny Cutoffs consist of two projects within TBNRD, as shown in Figure 2. The first project involves a cutoff from Lost Creek to North Dry Creek located south of Kearney in Sections 9 and 16, Township 7 North, Range 16 West. The second project involves a cutoff from Lost Creek to the Fort Kearny Improvement Project Area (IPA) located south of Kearney in Sections 1 and 12 of Township 7 North, Range 16 West. Both of these projects are located within the area influenced by the groundwater mound. Further evaluation and study is required to define the relationship between the groundwater mound and these projects.

◇ **Basic Description:**

TBNRD has completed some preliminary investigations of the Lost-Creek cutoff projects. The two projects presented below would be operated to return existing flows in Lost Creek or releases from the Funk Lagoon to the Platte River. These cutoffs could also be operated similar to active pumping from the groundwater mound, described under groundwater management. The potential yields from active pumping were not included for these two cutoff projects since the yields were included under the groundwater management option. If active pumping were included with the cutoff projects, well(s) could be installed in high groundwater areas to pump water into Lost Creek during periods of target flow shortage.

Option 1: Lost Creek/North Dry Creek Cutoff. Through an agreement with the North Dry Creek Drainage Board, TBNRD installed a 20-cfs cutoff from Lost Creek in May 1998 to divert discharges from Funk Lagoon into North Dry Creek. North Dry Creek enters the Platte River about 1-1/2 miles west of the Kearney Bridge on Highway 44. A water management plan for Funk Lagoon is currently being developed among FWS, TBNRD, and CNPPID that will set target elevations for the lagoon's pools throughout the year for the benefit of migratory waterfowl. Opportunities within the FWS's mandate for management of the Funk Lagoon Wildlife Protection Area (WPA) may exist for the lagoon to be drawn down at times of the year when the discharged water will benefit the critical habitat along the Platte River. The water released from the lagoon would be routed to the Platte River via the existing connection between Lost Creek and North Dry Creek. Lowering lagoon levels in the summer could reduce shortages in the critical habitat and reduce flooding damage to surrounding cropland from high groundwater

levels. Replacement water for Funk Lagoon would be provided by CNPPID at the end of the irrigation season. Improvements to CNPPID's Phelps Canal may be needed to make deliveries to Funk Lagoon.

Option 2: Lost Creek/Ft. Kearny Cutoff. Lost Creek is a tributary to the Platte River. The creek flows approximately parallel and south of the river and converges with the Platte near the end of the critical habitat reach. The Fort Kearny IPA is a drainage ditch, maintained by TBNRD, which empties into the Platte River about one mile east of the Kearney Bridge on Highway 44.

This project would consist of the construction of a ditch about $\frac{3}{4}$ mile in length to connect Lost Creek to the Fort Kearny IPA, allowing increased flow through approximately 20 miles of the critical habitat. A pump station may be necessary to expand this project in the vicinity of Lost Creek. The pump station would likely be located along Crooked Creek, which intersects the IPA approximately one mile from the river.

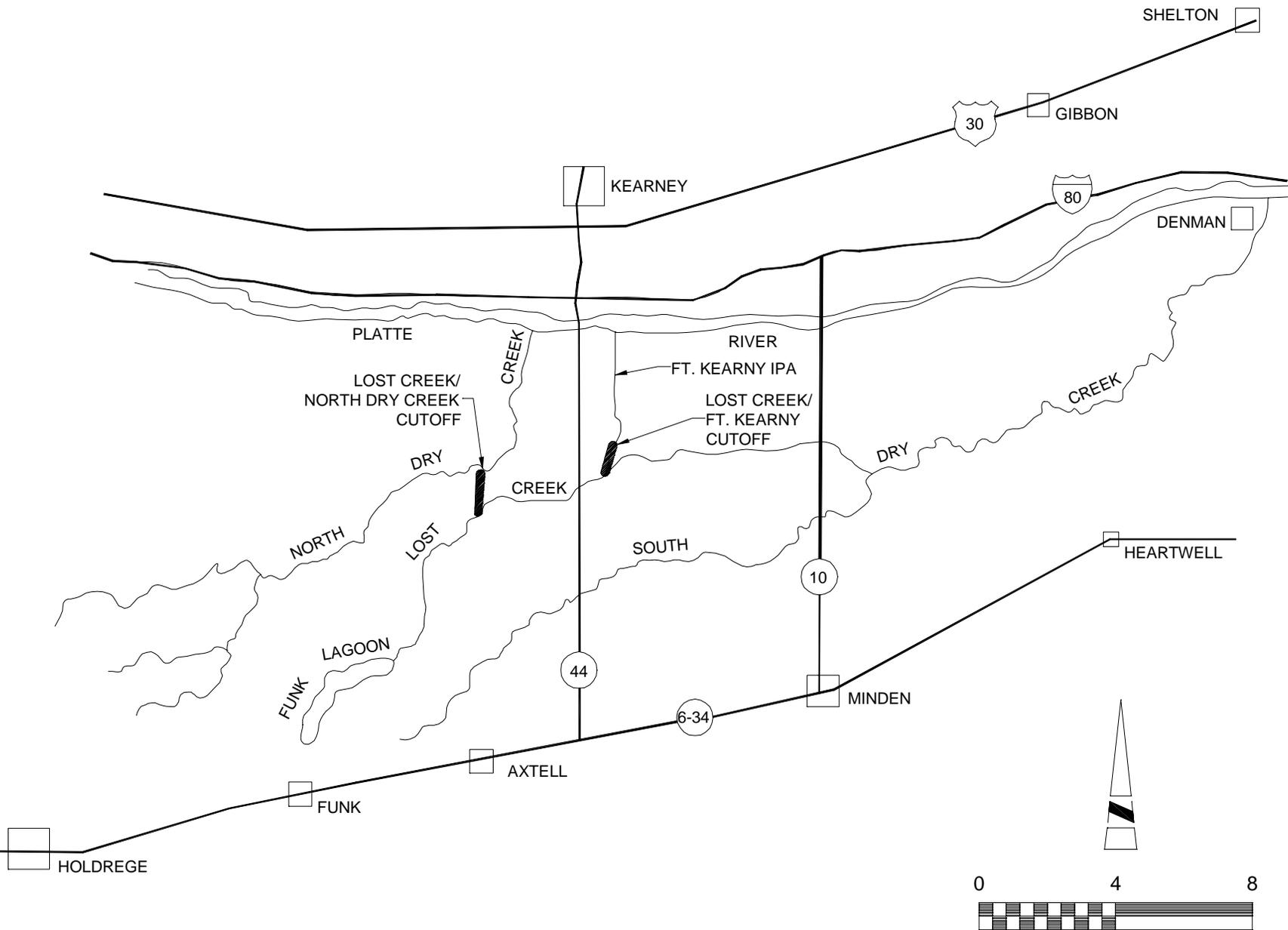
◇ **On-Site Hydrologic Effects:**

Per discussions with TBNRD personnel (Rich Holloway, May 19, 2000), Lost Creek is often dry at the North Dry Creek Cutoff and is a gaining reach downstream of this point to the Ft. Kearny Cutoff. Typical flows at the downstream cutoff may be up to 15 cfs in May decreasing to about 6 cfs in September. Therefore, the yield of the upstream cutoff was assumed to be dependent on Funk Lagoon releases whereas flows available to the downstream Ft. Kearny Cutoff might take advantage of gaining flows. The total yield associated with these projects is estimated to be 4,400 ac-ft/yr, or the equivalent of a steady year-round flow of 6 cfs that is timed such that the diversions are effective in reducing shortages to target flows. As shown below, it is assumed that this yield would be most effectively delivered in relation to target flows in the May to September period.

Per the discussion of Water Management Committee members, both of these projects would require consideration of whether the yields should be discounted because those yields would be provided through only a portion of the full habitat or whether there are other aspects of the benefits provided by those projects which would justify giving them full credit. Additional water returned to the Platte River via the North Dry Creek cutoff returns to the river approximately 1.5 miles west of Highway 44 near Kearney. The Lost Creek/Ft. Kearny cutoff returns to the river approximately one mile east of Highway 44 near Kearney. Water that is returned to the Platte River via these cutoffs flows through roughly 60 percent of the critical habitat.

Option 1: Lost Creek/North Dry Creek Cutoff. The diversion of Funk Lagoon discharges to North Dry Creek was carried out twice from 1998 to 1999, however, there is little data on the volume of water discharged and the resulting increases in flow in North Dry Creek.

SOURCE : CNPPID



SCALE 1" = 4 MILES

The yield of this project is dependent on the management plan developed by the FWS. CNPPID excess flows that fill Funk Lagoon have been approximately 300 ac-ft/yr. The FWS currently has a contract for approximately 700 ac-ft/yr from CNPPID. Return flows from upstream irrigated lands are estimated to be in the range of 1,500 ac-ft to 2,500 ac-ft per year. Thus the potential releases from Funk Lagoon for the Lost Creek-North Dry Creek cutoff could be in the range of 2,500 ac-ft to 3,500 ac-ft per year.

It was assumed that 2,200 ac-ft would be available to make releases from Funk Lagoon during periods of shortage at the critical habitat from May through September. The replacement water would come from CNPPID's system or return flows at the end of the irrigation season. The average monthly net yield to the Platte River is provided in the table below. More data and analysis is required to determine release and filling sequences for the 1975-94 period and evaluate conveyance losses en route to the Platte River.

**Table III-23
Lost Creek/North Dry Creek Cutoff – Net Yield to the Platte River**

Month	Funk Lagoon Releases (ac-ft)	CNPPID Deliveries to Funk Lagoon (ac-ft)	Net Yield (ac-ft)
October	0	-1100	-1100
November	0	-1100	-1100
December	0	0	0
January	0	0	0
February	0	0	0
March	0	0	0
April	0	0	0
May	440	0	440
June	440	0	440
July	440	0	440
August	440	0	440
September	440	0	440
Annual	2,200	-2200	0

Option 2: Lost Creek/Ft. Kearny Cutoff. This yield analysis considers diverting existing flows in Lost Creek back to the Platte River during times of shortage at the critical habitat. Routing water pumped from high groundwater areas back to the river via the Ft. Kearny IPA cutoff is evaluated under groundwater management.

It was assumed that an average of 2,200 ac-ft/yr would be available for diversion back to Platte River via the cutoff as shown in the table below.

**Table III-24
Lost Creek/Ft. Kearny IPA Cutoff – Net Yield to the Platte River (ac-ft)**

Month	Net Yield (ac-ft)
October	60
November	60
December	50
January	50
February	60
March	60
April	60
May	360
June	360
July	360
August	360
September	360
Annual	2,200

◇ **Legal and Institutional Requirements for Implementation:**

A water rights permit would be required from the Nebraska DWR to divert water into Lost Creek. CNPPID’s water rights will also need to be changed to include environmental uses to make deliveries to Funk Lagoon. Once permits are obtained water could be protected under Section 46-252, which provides for the protection of water for the purposes of instream beneficial uses. Under Section 46-252 the DWR is responsible for assuring that water conducted into or along natural channels for the purposes of instream beneficial uses is not subsequently diverted or withdrawn.

The Lost Creek/Ft. Kearny project involves the construction of a cutoff between Lost Creek and the Fort Kearny IPA, which requires a 404 permit from the U.S. Army Corps of Engineers. NEPA compliance and site-specific environmental permits may also be required for the construction of infrastructure related to this project depending on the severity of on-site impacts.

A FWS permit would be required under the Refuge Administration Act. Agreements would need to be negotiated with TBNRD, CNPPID, and FWS, which establish the conditions under which these projects would be operated if included in the Program.

Compliance with the City of Kearney Wellhead Protection Permit program would also be required.

◇ **Schedule For Implementation:**

As noted in comments received from Nebraska, the draft schedules for implementing these projects are as follows:

Option 1: Lost Creek/North Dry Creek Cutoff. The cutoff involved in this project is already constructed, therefore, the implementation schedule is based primarily on the resolution of legal and institutional issues. It may take one to two years to obtain a water rights permit and change of use from the DWR and negotiate a contract with TBNRD, FWS, and CNPPID, after which this project could be implemented.

Option 2: Lost Creek/Ft. Kearny Cutoff. The schedule for implementation is dependent on the time required to construct a cutoff between Lost Creek and the Fort Kearny IPA, obtain a permit from the Nebraska DWR, secure a 404 permit and NEPA compliance, and negotiate a contract with TBNRD. This project may take one to two years to implement.

◇ **Expected Project Life:**

The expected project lives are dependent on the agreements with TBNRD, CNPPID, and FWS. These contracts may need to be renewed on a year-to-year basis. In addition, these projects will likely be phased in and their continuation dependent on the results of monitoring impacts on local groundwater levels and Funk Lagoon. TBNRD could set drawdown limits to establish an upper bound on pumping from the Lost Creek watershed. If these limits are exceeded the project may be shutdown depending on the conditions set by TBNRD.

◇ **Capital and Operational Costs:**

The costs for these projects include up-front infrastructure costs, consisting primarily of wells, pumps, and improvements to ditches, culverts, and outlets, and annual operations and maintenance costs. Potential costs associated with third party impacts have not been evaluated. The costs presented below may be higher if there are third party impact costs.

Option 1: Lost Creek/North Dry Creek Cutoff. The Final Report was relied on for costs associated with this project. Costs to date are approximately \$300,000. This includes installation of an underdrain at the upstream end of Funk Lagoon, maintenance of seven miles of creek channel, installation of the cutoff between Lost Creek and North Dry Creek, and concrete and road culverts associated with a mile connecting ditch. Improving the system to allow available water to be discharged in the spring and summer without affecting downstream agricultural activities would require rebuilding the North Dry Creek outlet and constructing pivot bridge crossings for center pivots. Estimated costs for these improvements are about \$30,000. The total up-front capital cost associated with the entire project is \$330,000. The annual operations and maintenance costs are estimated to be about \$4,000. In addition, CNPPID would assess an annual water delivery fee. The current irrigation delivery fee is \$24.49 per contract acre for a 15-inch contract (1.25 ac-ft), therefore, the cost per ac-ft is about \$19.59. CNPPID could adjust this fee based upon changes in their irrigation delivery rates. The annual delivery fee would be \$86,200

assuming CNPPID delivers an average of 4,400 ac-ft per year to Funk Lagoon. CNPPID deliveries may be less depending on the amount of return flows from upstream irrigated lands.

Option 2: Lost Creek/Ft. Kearny Cutoff. Assuming this project is operated to return existing flows in Lost Creek to the Platte River, the costs include up-front capital costs associated with the Lost Creek – Ft. Kearny IPA cutoff and annual operations and maintenance costs. Up-front costs associated with this project consist primarily of improvements to the Ft. Kearny Ditch, installation of the cutoff, diversion structures and gates, and pivot bridges along Lost Creek. If this project is operated to pump from high groundwater areas additional costs would be incurred for wells, pumps, and pipeline. These costs are addressed under groundwater management. Preliminary estimates of the costs associated with this project were provided by TBNRD.

The total up-front capital costs and annual operations and maintenance costs associated with this entire project were estimated to be about \$333,000 and \$6,000, respectively, as summarized in the following table.

**Table III-25
Cost of Lost-Creek/Fort Kearny IPA Cutoff Project**

DESCRIPTION	COST (\$)
Diversion structure on Lost Creek	30,000
RTU and Measuring Device at Inlet	15,000
Excavate connecting ditch	60,000
Gated culvert on Crooked Ck Ditch	2,000
Bore under Highway 50A, Install Culvert	17,500
RTU and Measuring Device at Outlet	15,000
Flap Gate at Outlet	7,500
Clean Ft. Kearney Ditch, Install Culverts	65,000
Observation Wells	13,000
Pivot Crossings	20,000
Berm at Outlet	10,000
Clearing and grubbing trees along Lost Creek	42,500
Surveys	2,500
Secure 404 Permit, DWR Water Right	3,000
CNPPID Capitalized Costs	11,770
CNPPID Estimated Costs - Year 2000	9,500
TBNRD Capitalized Costs	4,815
TBNRD Estimated Costs - Year 2000	4,000
Total Capital Cost	333,085
Annual Operations and Maintenance Cost	6,000

◇ **Third-Party Impact Considerations:**

There are potential positive and negative hydrologic and economic third party impacts on downstream users due to changes in the quantity and timing of water in the river as a result of these projects. There could be third party benefits to homeowners and landowners in areas where groundwater levels are lowered due to pumping. Waterlogging

in several areas throughout the Central Platte has resulted in decreased agricultural productivity and yield. Lowering the groundwater table could improve productivity, and in some cases bring waterlogged land back into production. Conversely, lowering groundwater levels may have negative third party economic impacts if pumping costs are increased. There are also potential negative hydrologic impacts associated with potential increases in groundwater levels adjacent to diversion ditches, cutoffs and creeks that are used to return water to the Platte River.

There are potential third party hydrologic benefits associated with the Funk Lagoon project to downstream homeowners and landowners. The channel capacity of Lost Creek is currently not sufficient to handle irrigation return flows and storm events, therefore, diversions from Lost Creek via the cutoff would free up additional channel capacity.

These projects would likely have minimal impact on recreational opportunities. There are potential third party environmental impacts related to removing water from Lost Creek. Water quality could be degraded and fish and aquatic habitat negatively impacted when flows in the creek are reduced.

6. DAWSON AND GOTHENBURG CANAL GROUNDWATER RECHARGE

◇ Location:

The Dawson and Gothenburg Canals are both located on the north side of the Platte River primarily in Dawson County. The Gothenburg Canal headgate is located approximately eight miles upstream of Gothenburg, Nebraska. The Dawson Canal headgate is located near Cozad, Nebraska.

◇ Basic Description:

Recharge projects under the Dawson and Gothenburg Canals would involve diverting surface water directly from the Platte River into these canals during the non-irrigation season. Canal seepage would percolate into the alluvium and recharge the groundwater aquifer. Excess water that is not recharged would be returned to the river via spillways within the same month. Return flows that result from canal seepage would accrue to the river for some duration after the recharge event. Diversions should be possible throughout the non-irrigation season if there is enough hydraulic head in the canals to produce flow velocities high enough to prevent freezing.

It may be possible to check up the canals to enhance recharge. This would in effect create a recharge basin along the canal, which may help achieve the same recharge with less diversion. The use of check dams should not impact the yield analysis significantly because the same amount of recharge would be achieved. Wells and/or drains could also be used to enhance recharge by lowering areas of high groundwater in the vicinity of the canal. Lower groundwater tables would increase the potential for recharge. Yields could also be realized sooner if these projects are operated as conjunctive use projects. During late fall and winter, flows that exceed target flows could be diverted into the Gothenburg and Dawson Canals for recharge to the local aquifer. During spring and summer months, an equivalent amount of water could be pumped for irrigation. Pumping during the irrigation season would replace irrigation releases from Lake McConaughy.

◇ **On-Site Hydrologic Effects:**

The total potential yield associated with these projects is estimated to be 2,600 ac-ft/yr. Nebraska is reserving 800 ac-ft of that yield to offset future depletions, therefore, approximately 1,800 ac-ft/yr is available to the Program (Jim Cook, Nebraska Natural Resources Commission, June 28, 2000 memo). Yield estimates and timing were based on the Final Report. Diversions from the Platte River and monthly accretions to the river provided in the Final Report were prorated to reflect only 69 percent of the yield as available to the Program. Underlying canals, such as the Cozad Canal, could potentially intercept recharge water returning to the river, in which case the yields of these projects may be less. Further monitoring and investigation is required to determine the extent to which underlying canals and irrigated lands intercept recharge water returning to the Platte River.

Monthly diversions are limited based on the amount of flow that can seep from the canals without generating a significant amount of tailwater. Information was provided by NPPD regarding the maximum rates that can be diverted when no one is taking water for irrigation and the spillways back to the river are running at maximum capacity. Based on this information, monthly diversions to the Gothenburg and Dawson Canals were limited to 150 cfs and 200 cfs, respectively. The ditch loss is about 20 percent according to information provided by NPPD, therefore, the maximum ditch loss that would be lagged back to the river is 30 cfs and 40 cfs for the Gothenburg and Dawson Canals, respectively. Monthly diversions to recharge could also potentially be limited by climatic cycles. During wet years, it may not be possible to recharge the aquifer when groundwater levels are excessively high.

The available flow to the Gothenburg Canal during the non-irrigation season was assumed to be the flow at the North Platte River gage at Brady, which is just upstream of the headgate. The available flow to the Dawson Canal during the non-irrigation season was assumed to be the flow at the North Platte River gage at Cozad, which is just downstream of the headgate. The Gothenburg Canal and Dawson Canal recharge projects rely on the same water supply to a degree, in which case, the yield of these projects together may not be as great as the sum of the individual yields.

Diversions to recharge were limited to months of target flow excesses at the critical habitat. The amount diverted into the Gothenburg Canal is equal to the available flow or 150 cfs, whichever is less. The amount diverted into the Dawson Canal is equal to the available flow or 200 cfs, whichever is less. The distance from the canal to the river varies along the length of the canal. An average SDF factor of 3250 days was used to lag seepage from the canals back to the river. The following tables show the total depletion from the Platte River and the net yield to the Platte River for the 1975-1994 period for the Dawson and Gothenburg Canals, respectively. Negative numbers indicate months when diversions to recharge exceed the accretion to the river whereas positive numbers indicate months when river accretions exceed diversions to recharge.

**Table III-26
Gothenburg Canal – Diversions from the Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	6140	0	0	0	0	0	0	0	0	6140
1976	0	0	5810	6120	0	0	0	0	0	0	0	0	11930
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	6380	0	0	0	0	0	0	6380
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	6380	6380	6380	6380	6380	0	0	0	0	0	31900
1981	0	0	4680	5130	0	0	0	0	0	0	0	0	9810
1982	0	0	6350	4730	0	0	0	0	0	0	0	0	11080
1983	0	0	6380	6380	6380	6380	6380	0	0	0	0	0	31900
1984	6380	0	6380	6380	6380	6380	6380	0	0	0	0	0	38280
1985	6380	6380	6380	6380	6380	6380	0	0	0	0	0	0	38280
1986	0	0	6380	6380	6380	6380	6380	0	0	0	0	0	31900
1987	6380	6380	6380	6380	6380	6380	6380	0	0	0	0	0	44660
1988	0	6380	6380	6380	6380	0	0	0	0	0	0	0	25520
1989	0	0	5870	6380	0	0	0	0	0	0	0	0	12250
1990	0	0	0	5450	0	0	0	0	0	0	0	0	5450
1991	0	0	5760	6220	0	0	0	0	0	0	0	0	11980
1992	0	0	6080	6330	0	6380	0	0	0	0	0	0	18790
1993	0	0	5840	6380	0	6380	0	0	0	0	0	0	18600
1994	5440	6380	6380	6380	0	0	0	0	0	0	0	0	24580
Average	1229	1276	4572	5196	2233	2871	1595	0	0	0	0	0	18972

**Table III-27
Gothenburg Canal – Unlagged Seepage (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	1228	0	0	0	0	0	0	0	0	1228
1976	0	0	1163	1225	0	0	0	0	0	0	0	0	2387
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	1276	0	0	0	0	0	0	1276
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	1276	1276	1276	1276	1276	0	0	0	0	0	6381
1981	0	0	936	1027	0	0	0	0	0	0	0	0	1963
1982	0	0	1269	947	0	0	0	0	0	0	0	0	2216
1983	0	0	1276	1276	1276	1276	1276	0	0	0	0	0	6381
1984	1276	0	1276	1276	1276	1276	1276	0	0	0	0	0	7657
1985	1276	1276	1276	1276	1276	1276	0	0	0	0	0	0	7657
1986	0	0	1276	1276	1276	1276	1276	0	0	0	0	0	6381
1987	1276	1276	1276	1276	1276	1276	1276	0	0	0	0	0	8933
1988	0	1276	1276	1276	1276	0	0	0	0	0	0	0	5105
1989	0	0	1174	1276	0	0	0	0	0	0	0	0	2450
1990	0	0	0	1091	0	0	0	0	0	0	0	0	1091
1991	0	0	1153	1244	0	0	0	0	0	0	0	0	2397
1992	0	0	1215	1266	0	1276	0	0	0	0	0	0	3758
1993	0	0	1168	1276	0	1276	0	0	0	0	0	0	3720
1994	1088	1276	1276	1276	0	0	0	0	0	0	0	0	4916
Average	246	255	914	1039	447	574	319	0	0	0	0	0	3795

**Table III-28
Gothenburg Canal – Net Yield to the Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	-1228	0	0	0	1	2	3	4	5	-1213
1976	7	7	-1154	-1216	9	10	11	12	14	17	20	22	-2242
1977	24	26	27	28	28	29	29	29	29	29	29	28	335
1978	28	27	27	27	26	-1251	25	25	24	24	25	26	-967
1979	27	28	28	29	29	30	30	30	29	29	29	29	346
1980	28	28	-1249	-1249	-1250	-1250	-1250	27	30	34	39	45	-6015
1981	51	57	-874	-961	69	71	73	75	78	80	82	83	-1116
1982	84	85	-1184	-861	85	84	84	84	85	87	88	89	-1191
1983	89	89	-1187	-1187	-1188	-1189	-1189	88	90	93	97	102	-5290
1984	-1169	112	-1160	-1157	-1155	-1152	-1150	130	134	139	144	150	-6135
1985	-1120	-1115	-1112	-1109	-1106	-1104	175	179	184	189	195	200	-5544
1986	205	208	-1066	-1065	-1065	-1065	-1066	210	211	213	215	219	-3848
1987	-1054	-1051	-1049	-1048	-1047	-1046	-1044	234	238	243	248	253	-6123
1988	258	-1015	-1012	-1010	-1010	266	267	267	269	271	274	275	-1899
1989	276	276	-899	-1003	271	269	266	264	263	262	260	259	765
1990	257	255	252	-841	246	243	240	236	234	231	229	226	1808
1991	223	221	-935	-1029	212	209	206	205	204	203	203	202	123
1992	201	200	-1016	-1069	195	-1083	191	191	191	191	192	194	-1422
1993	195	196	-972	-1081	195	-1082	193	193	193	194	195	197	-1385
1994	-889	-1077	-1077	-1077	199	199	201	203	206	209	212	214	-2479
Average	-114	-122	-781	-905	-313	-441	-185	134	135	137	139	141	-2175

**Table III-29
Dawson Canal – Diversions from the Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	8510	0	0	0	0	0	0	0	0	8510
1976	0	0	8510	8510	0	0	0	0	0	0	0	0	17020
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	8510	0	0	0	0	0	0	8510
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	8510	8510	8510	8510	8510	0	0	0	0	0	42550
1981	0	0	7590	8200	0	0	0	0	0	0	0	0	15790
1982	0	0	8510	8170	0	0	0	0	0	0	0	0	16680
1983	0	0	8510	8510	8510	8510	8510	0	0	0	0	0	42550
1984	8510	0	8510	8510	8510	8510	8510	0	0	0	0	0	51060
1985	8510	8510	8510	8510	8510	8510	0	0	0	0	0	0	51060
1986	0	0	8510	8510	8510	8510	8510	0	0	0	0	0	42550
1987	8510	8510	8510	8510	8510	8510	8510	0	0	0	0	0	59570
1988	0	8510	8510	8510	8510	0	0	0	0	0	0	0	34040
1989	0	0	8510	8510	0	0	0	0	0	0	0	0	17020
1990	0	0	0	8510	0	0	0	0	0	0	0	0	8510
1991	0	0	8510	8380	0	0	0	0	0	0	0	0	16890
1992	0	0	8510	8510	0	8510	0	0	0	0	0	0	25530
1993	0	0	8510	8510	0	8510	0	0	0	0	0	0	25530
1994	8510	8510	8510	8510	0	0	0	0	0	0	0	0	34040
Average	1700	1700	6340	7190	2980	3830	2130	0	0	0	0	0	25870

**Table III-30
Dawson Canal – Unlagged Seepage (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	1702	0	0	0	0	0	0	0	0	1702
1976	0	0	1702	1702	0	0	0	0	0	0	0	0	3403
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	1702	0	0	0	0	0	0	1702
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	1702	1702	1702	1702	1702	0	0	0	0	0	8508
1981	0	0	1518	1640	0	0	0	0	0	0	0	0	3158
1982	0	0	1702	1633	0	0	0	0	0	0	0	0	3335
1983	0	0	1702	1702	1702	1702	1702	0	0	0	0	0	8508
1984	1702	0	1702	1702	1702	1702	1702	0	0	0	0	0	10209
1985	1702	1702	1702	1702	1702	1702	0	0	0	0	0	0	10209
1986	0	0	1702	1702	1702	1702	1702	0	0	0	0	0	8508
1987	1702	1702	1702	1702	1702	1702	1702	0	0	0	0	0	11911
1988	0	1702	1702	1702	1702	0	0	0	0	0	0	0	6806
1989	0	0	1702	1702	0	0	0	0	0	0	0	0	3403
1990	0	0	0	1702	0	0	0	0	0	0	0	0	1702
1991	0	0	1702	1676	0	0	0	0	0	0	0	0	3378
1992	0	0	1702	1702	0	1702	0	0	0	0	0	0	5105
1993	0	0	1702	1702	0	1702	0	0	0	0	0	0	5105
1994	1702	1702	1702	1702	0	0	0	0	0	0	0	0	6806
Average	340	340	1267	1439	596	766	425	0	0	0	0	0	5173

**Table III-31
Dawson Canal – Net Yield to the Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	-1702	0	0	0	1	2	4	6	7	-1682
1976	9	10	-1690	-1689	13	14	15	17	20	24	28	31	-3199
1977	34	36	38	39	40	41	41	41	41	41	40	40	473
1978	39	39	38	38	37	-1665	35	35	34	34	35	36	-1265
1979	37	38	40	40	41	41	41	41	41	40	40	40	480
1980	39	38	-1664	-1664	-1665	-1665	-1665	38	41	47	54	62	-8005
1981	70	77	-1435	-1552	93	96	99	102	105	109	112	115	-2009
1982	117	118	-1583	-1515	118	118	117	118	120	122	124	125	-1901
1983	126	127	-1575	-1575	-1576	-1577	-1577	125	127	131	137	144	-6961
1984	-1551	157	-1540	-1536	-1533	-1530	-1526	179	184	191	198	206	-8100
1985	-1488	-1482	-1476	-1473	-1470	-1467	239	244	250	257	265	272	-7328
1986	277	282	-1417	-1416	-1416	-1416	-1417	284	285	287	291	296	-5079
1987	-1401	-1397	-1395	-1393	-1392	-1391	-1389	316	321	327	333	341	-8122
1988	347	-1350	-1346	-1344	-1344	358	358	360	362	365	368	370	-2497
1989	371	371	-1332	-1334	364	361	358	355	353	352	350	348	917
1990	346	343	340	-1366	332	327	323	319	315	312	309	306	2206
1991	302	299	-1406	-1385	287	284	280	278	277	276	276	275	44
1992	274	273	-1431	-1433	266	-1438	261	260	260	261	263	265	-1918
1993	266	267	-1434	-1435	266	-1437	263	263	263	265	267	269	-1919
1994	-1431	-1430	-1429	-1430	272	272	274	277	282	286	290	292	-3475
Average	-161	-159	-1085	-1256	-413	-584	-244	183	184	187	189	192	-2967

Based on an SDF factor of 3,250 days, 28 percent of the amount recharged will have returned to the river within 3,250 days, or approximately nine years. As currently modeled, the majority of the benefits from this program would accrue after the first increment. Benefits could be realized sooner if recharge basins are constructed along the canal or the canals are checked up in locations that are close to the river corresponding with much smaller SDF factors. This would allow seepage to return to the river faster

and provide a more immediate benefit to the species. Alternatively, benefits could be realized sooner if these projects are operated as conjunctive use projects.

◇ **Legal and Institutional Requirements for Implementation:**

It is unlikely that new legislation would be required to implement this project. An intentional recharge permit to divert water into these canals for recharge must be obtained from the Nebraska DWR. The intent of these recharge projects would be to designate augmentation of stream flow to the Platte River as their major purpose, in which case seepage is intentional rather than incidental.

Although legislation regarding intentional recharge exists, it is untested. There are questions regarding the issue of protection and whether additional water generated from recharge projects would become natural flow or protected water. Recharge water may be protectable from diversion under Section 46-252, however, the use of Section 46-252 to protect return flows is untested. One obstacle could be that under current Nebraska law return flows from canal seepage are considered to be natural flow, which is available to the next senior water right holder. In addition, an accounting procedure would be needed to distinguish return flows associated with irrigation operations from return flows due to intentional off-season recharge. The accounting system could be similar to that which is used in Colorado, where numerous recharge projects are conducted using irrigation canals to offset the stream depletion caused by pumping of irrigation wells.

A contract would need to be negotiated, which establishes the conditions under which the Gothenburg and Dawson Canals are used for recharge during the non-irrigation season.

◇ **Schedule For Implementation:**

These projects require limited, if any, new construction or infrastructure, therefore, the implementation schedule is based primarily on the resolution of legal and institutional issues. As noted in comments received from Nebraska, it may take 2 to 4 years to implement these projects.

◇ **Expected Project Life:**

The expected project life of a Gothenburg/Dawson recharge project is dependent on the length of the contract and the conditions for contract renewal. This project could potentially extend well beyond the first increment of the Program.

◇ **Capital and Operating Costs:**

The costs of these projects include the construction of diversion and storage facilities and annual delivery fees. The costs were based on data provided by the Northern Colorado Water Conservancy District for the Tamarack Plan.

Up-front costs consider capital costs of subsurface investigations, a diversion structure and recharge basin if necessary, and measuring devices. A cost of \$3,500 was included for subsurface investigations. The cost for a diversion structure off the main canal (to a recharge basin) and recharge basin was estimated to be about \$9,000. A cost of \$4,000 was included for regulation and measurement, which includes the cost of flumes, stilling wells, and stage recorders. Engineering costs were assumed to be 10 percent of the total construction cost of the project. The total capital cost associated with each of these recharge projects is \$20,000. These costs may be incurred if the canal is checked up to simulate a recharge basin or if this project is operated as a conjunctive user project. If this project is operated as a conjunctive use project, these costs could be applied to wells or drains. Assuming Nebraska reserves 31 percent of the potential yield of these projects for offset purposes, the total capital cost attributable to the Program is \$13,800.

A fee of \$10 per ac-ft recharged per year is included as an annual operating cost. The annual operating cost or delivery fee was applied to the amount recharged as opposed to the amount diverted because it may be possible to check up the canals and achieve the same amount of recharge with significantly less diversion. The annual costs associated with the Gothenburg and Dawson Canal recharge projects are about \$38,000 and \$51,800, respectively.

Potential costs associated with third party impacts have not been evaluated. The costs presented above may be higher if there are third party impact costs.

◇ **Third-Party Impact Considerations:**

Third party impacts associated with these groundwater recharge projects are similar to those discussed for groundwater management. The primary hydrologic and economic third party impacts are due to changes in the quantity and timing of water in the river. Unlike projects that involve active pumping from high groundwater areas, however, these projects will likely result in higher groundwater levels due to increased recharge return flows. This could present a problem for lands underlying the Dawson and Gothenburg Canals as groundwater levels in these areas have risen in recent years. Raising groundwater levels could have the opposite positive and negative third party impacts as lowering groundwater levels.

7. CENTRAL PLATTE POWER INTERFERENCE

◇ **Location:**

A power interference project would operate primarily at CNPPID's Kingsley Dam Hydro, the two Johnson Hydros and Jeffrey Hydro in conjunction with the Lake McConaughy EA. NPPD's Sutherland System and North Platte Hydro facility would also be involved as NPPD and CNPPID power generation operations are closely related.

◇ **Basic Description:**

Nebraska intends to reserve as much of the yield of this project as Nebraska believes is necessary to offset new depletions in that state. However, Nebraska currently estimates that 1,400 ac-ft/yr of the yield of this project would be in addition to that needed for new

depletion offset and therefore could be made available to the Program. That is the yield used for purposes of the analysis in this plan. A power interference project entails a monetary payment to a hydroelectric generator sufficient to induce that generator to modify the release of water through the hydropower turbines. The modification might include a change in the timing of such generation or perhaps a bypass of the turbines in order to reduce target flow shortages at the critical habitat. The two Johnson units and Jeffrey are owned by CNPPID, which has expressed an interest in a power interference compensation program. Although CNPPID owns these facilities, it should be noted that any change to their operation affects NPPD's operations.

In general, Lake McConaughy releases would be scaled back during times of excess at the critical habitat. The "excess" flow could be stored in the EA to be released at a later time when planned releases and downstream river gains do not meet instream flow recommendations. When the water is subsequently released, it may or may not be available for diversion and routing through the district's hydro facilities depending on river conditions in effect. The monetary compensation must at least equal the market value of the hydropower that is forsaken on behalf of the target flows.

◇ **On-Site Yield and Timing:**

Yield estimates and timing were based on the Final Report. The following constraints reflect certain operational constraints and physical system relationships that define the maximum amount of water available for hydropower interference.

- An ac-ft loss to Jeffrey amounts to an ac-ft loss at Johnson No. 1 (J-1) and Johnson No. 2 (J-2) because the same water passes through all three plants and also the North Platte Hydro.
- Storage at Jeffrey or the two Johnson units is insufficient to effectively operate a power interference program. It is assumed that this alternative will rely upon Lake McConaughy storage without affecting total annual Kingsley generation.
- Following its authority, CNPPID has confirmed the priority of water releases for its irrigation customers. CNPPID believes that this priority can be accommodated with power interference.
- Minimum stream flow requirements under the new FERC license include a range of releases from Lake McConaughy, which will limit hydropower interference. These minimum flows change according to very wet to very dry conditions and are measured at the Keystone Diversion Dam and the CNPPID Diversion Dam in Nebraska. This constraint is reflected in this analysis.
- Since the benefit of power interference lies not with increases in average annual flows but with timing of releases, the "yield" of this alternative is in balancing periodic excesses at Grand Island with periodic shortages. This consideration has been accounted for in the yield analysis.

Modeling of power interference and Lake McConaughy storage contents was provided by CNPPID. The following steps offer additional detail regarding the calculation of yields and timing.

- The maximum theoretical water available for power interference is the minimum of the J-2 return flows and the maximum Kingsley Release, provided in Tables 8.H.20 and 8.H.21, respectively, in the Final Report. By considering the J-2 returns, this avoids a negative impact on CNPPID's irrigation customers since that water is not removed from the system. Although Kingsley may not experience diminished annual generation, this retiming could result in lost power generation at the North Platte, Jeffrey, and Johnson Nos.1 and 2 Hydros.
- The minimum stream flow requirements represent another constraint on power interference yield. Table 8.H.22 in the Final Report indicates the minimum release requirements below Keystone at the Sutherland Supply Canal. Because of minimum flow requirements at Keystone, minimum flow requirements at CNPPID's North Platte Diversion are likely to be met so any changes would not have substantive effects upon yield. The difference between historical McConaughy releases and minimum flow release requirements is presented in Table 8.H.23 of the Final Report. This represents potential storage without regard to Grand Island excesses, shortages or McConaughy storage restrictions.
- Potentially retimed hydropower interference volume, or the total available water, is equal to the minimum of: (1) J-2 return flows; (2) historical McConaughy releases less McConaughy minimum release requirements; and (3) Grand Island excesses, as shown in Table 8.H.24 of the Final Report. These amounts exceed McConaughy storage restrictions in some months.
- Excess flows at Grand Island are considered to be the source of potential storage. This storage cannot exceed available McConaughy storage, nor can it carry over to the following month without available storage during that month. Releases from Lake McConaughy were scaled back from the power interference project presented in the Final Report based on the ratio of the yield proposed by Nebraska to target flow reductions without diversion losses presented in Table 8.H.18 of the Final Report.

Based on the assumptions and criteria outlined above and the yield target provided by Nebraska, the re-timed releases from Lake McConaughy due to power interference are shown in the following table.

**Table III-32
Re-timed Releases from Lake McConaughy**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	2843	0	0	0	0	0	0	0	2843
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	2176	0	2176
1980	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	1070	1070
1982	0	0	0	0	296	0	0	0	0	0	0	0	296
1983	0	0	0	0	1567	0	0	0	0	0	0	0	1567
1984	1475	0	0	0	4372	0	0	0	5643	0	0	0	11491
1985	0	0	0	0	3312	677	416	157	0	0	0	0	4561
1986	479	0	0	0	379	0	0	0	2580	0	0	0	3437
1987	1088	2015	1580	0	3996	0	0	0	0	0	3252	0	11932
1988	4299	0	0	0	1224	2757	1153	0	0	0	0	0	9433
1989	0	0	0	0	1668	0	0	0	0	0	30	0	1698
1990	748	0	0	0	492	0	0	0	0	0	0	0	1239
1991	0	0	0	0	870	462	0	0	0	2549	0	0	3880
1992	0	0	0	0	542	0	195	0	0	0	0	0	737
1993	0	0	0	0	0	0	0	0	0	0	36	0	36
1994	0	0	0	0	5082	140	3850	0	0	0	661	0	9734
Average	404	101	79	0	1332	202	281	8	411	127	308	53	3306

NPPD noted in comments received May 3, 2000 that the analysis of water availability for hydropower interference must consider the existence of additional senior natural flow rights held by NPPD and others and cannot be based solely on Lake McConaughy storage and releases as related to target flows. This condition will have to be evaluated before implementing this project.

Based on the water budget spreadsheet, an average annual release of approximately 3,300 ac-ft will generate approximately 1,400 ac-ft of target flow reductions at the critical habitat without diversion losses. The losses appear relatively high for this project because some releases were made, particularly in February, when storage space was unavailable. As a result, releases were made during several months that shortages do not exist at the critical habitat due to storage capacity constraints. This project could be operated differently to reduce the amount of water that is retimed in an effort to minimize releases during periods of excess at the critical habitat.

◇ **Legal and Institutional Requirements for Implementation:**

A permit to increase contributions to the Lake McConaughy EA resulting from power interference must be obtained from the Nebraska DWR. Once a permit is obtained water released from the EA would be protected from downstream diversion losses under water right A-17695.

An agreement will need to be negotiated between CNPPID and NPPD, which establishes the conditions under which power interference would be implemented.

◇ **Schedule For Implementation:**

This project does not require any new construction or infrastructure, therefore, the implementation schedule is based on the resolution of legal and institutional issues. As noted in comments received from Nebraska, a power interference project could potentially be implemented in two to four years depending on how long it takes to

negotiate an agreement between CNPPID and NPPD. This agreement or contract would probably need to be renewed on an annual basis. This project would most likely be phased in to ensure that it is working as planned, there are no unanticipated effects, and it is acceptable to NPPD and CNPPID.

◇ **Expected Project Life:**

The project life of power interference is primarily dependent on the agreement between CNPPID and NPPD. This project could potentially be implemented on a year-to-year basis through the first increment of the Program.

◇ **Capital and Operating Costs:**

There are two elements of cost to consider for power interference charges: payments to CNPPID for the lost revenue (since less energy will be sold to NPPD) and the net cost NPPD will incur to replace the energy it would have received from CNPPID, plus the value of associated capacity loss encompassed by generation and replacement costs. The latter is not simply a third party impact because NPPD has a multi-year contract with CNPPID to obtain energy under specified terms. NPPD and CNPPID also signed an operating agreement in 1954 that recognizes responsibilities of both parties with regard to Lake McConaughy operations. NPPD might experience other losses associated with generation and capacity reductions at its North Platte Hydro if Lake McConaughy is storing for power interference when the North Platte Hydro is below capacity. Compensation for damages or losses to NPPD are likely to be required.

The first cost element can be derived by relating CNPPID's power revenues to net energy delivered and then to water released from the district's three hydrogenerating facilities. For the 1994 through 1998 period, this amounted to an average of \$12 per ac-ft released by the three plants.

It is noted that power generation could still occur with power interference, but it will be at different times or later in the year. Except for the Kingsley hydro, power generation could only occur with power interference if water is released from the EA when canal capacity is available. A loss in value may result if power generation is re-timed. The loss/revenue associated with re-timed power generation requires further analysis.

The second cost component, NPPD's losses, is more uncertain. NPPD has indicated that it does, in fact, need this power and would have to replace it. Since NPPD relies on power generated by CNPPID, it would need to purchase outside power resources that would have the components of capacity charges, energy charges, transmission costs, and transmission losses. These costs would vary by peak, off-peak and season. The costs need to be projected in an electric industry marketplace that faces tightening supplies and is moving to market-based rates. These accumulated costs, less the payments to CNPPID, represent the avoided costs that NPPD faces and would seek to recover. As noted by NPPD in comments received May 3, 2000, lost hydropower revenue costs must also include additional hydropower generation replacement costs.

Avoided costs must be derived on a utility-specific and specific resource replacement basis. The value lost to NPPD in this circumstance depends on the nature of NPPD's system load over time, other generation capabilities within their system, and other opportunities to acquire power resources from other generators. A quantification of these

costs is complicated by considering electric industry restructuring and other uncertainties. A study of NPPD power system requirements and sources by cost over time will be needed to confirm present power values to NPPD. Information provided by NPPD included formulas to convert acre-feet of water re-timed to the amount of power that could be generated at the North Platte, Jeffrey, Johnson, and Kingsley hydroelectric plants. NPPD also provided a forecast of the future market value of power generation from the New York Mercantile Exchange's "Entergy" forecast. The forecast projects monthly power values 18 months into the future. NPPD suggested that prices beyond the 18-month forecast period be escalated to a Consumer Price Index projection ranging from 2.7 to 3.4 percent annually over the next fifteen years. These escalation rates are generally consistent with the uniform 3.0 percent rate used to compute present value costs in chapter VI.

The following approach was used to prepare a conservative estimate of NPPD's costs (without transmission, operations, or maintenance costs, which are dependent on the source of replacement power). It was assumed that no power could be generated from re-timed releases from Lake McConaughy due to potential system constraints. In other words, NPPD would incur the additional cost to replace lost power associated with all re-timed releases.

It was assumed that water stored for hydropower interference would have been "historically" released and run through the generating plants. The costs associated with the "historical" releases represents NPPD's avoided costs. The following table shows water stored for hydropower interference. This water is then re-timed and released during periods of target flow shortages as shown previously in Table III-32.

Table III-33
Hydropower Interference Storage at End-of-Month
(ac-ft)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	1907	937	0	0	0	0	0	0	0	0	2843
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	2176	0	0	2176
1980	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	1070	0	1070
1982	0	0	210	85	0	0	0	0	0	0	0	0	296
1983	0	0	899	668	0	0	0	0	0	0	480	995	3042
1984	0	0	0	4372	0	1927	532	3184	0	0	0	0	10015
1985	0	0	113	4448	0	0	0	0	0	0	0	479	5040
1986	0	0	68	310	0	0	0	2580	0	0	4010	2600	9568
1987	0	0	0	2069	0	508	2071	1179	1136	612	0	2045	9620
1988	0	1231	2662	1241	0	0	0	0	0	0	0	0	5134
1989	0	0	972	696	0	0	0	0	0	30	0	748	2445
1990	0	0	0	492	0	0	0	0	0	0	0	0	492
1991	0	0	541	791	0	0	0	1014	1535	0	0	0	3880
1992	0	0	342	395	0	0	0	0	0	0	0	0	737
1993	0	0	0	0	0	0	0	0	0	2884	0	1037	3921
1994	234	1878	1927	1150	0	0	0	0	0	661	0	0	5849
Average	12	155	482	883	0	122	130	398	134	318	278	395	3306

The average monthly volumes of water stored for hydropower were used to determine NPPD's avoided costs. Monthly averages were used to be consistent with all other alternatives. For all other alternatives the average annual net hydrologic effect was multiplied by a present day annual cost. In this case, it is not sufficient to use an annual cost because power values change on a monthly basis.

The average monthly volumes of water stored for hydropower interference were converted to MWH of power generation assuming a linear relationship exists between the flow through the turbines and power generation. The previously mentioned formulas for computing power generation at each of the four plants were reviewed with NPPD personnel on August 2, 2000. NPPD's more detailed spreadsheet model indicated that 3,300 ac-ft of flow would result in 2,100 MWH of energy production. Therefore, monthly flow volumes were multiplied by 2,100 MWH/3,100 ac-ft to convert to MWH. The projected monthly power values for the year 2001 were multiplied by the monthly hydropower generated to determine the monthly costs to NPPD to replace lost power. As shown in the following tables, the maximum total annual cost to NPPD would be about \$123,100/year without ancillary transmission, operation, and maintenance costs.

**Table III-34
Hydropower Generation (MWH)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	7	99	306	561	0	77	83	253	85	202	177	251	2100

**Table III-35
Energy Prices for Energy (\$/MWH)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	51.75	48.25	44.00	44.00	49.75	79.00	147.50	127.50	45.00	40.50	40.50	40.50

**Table III-36
Hydropower Costs (\$)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	384	4764	13472	24671	0	6110	12195	32222	3817	8185	7153	10165	123137

The total cost to CNPPID would amount to about \$12 per ac-ft or approximately \$39,600 per year to redistribute 3,300 ac-ft. Therefore, the total annual cost would be about \$162,700 plus ancillary costs. Potential costs associated with third party impacts have also not been evaluated. The costs presented above may be higher if there are third party impact costs. In addition, an agreement or contract between CNPPID and NPPD to implement power interference would need to be renewed on a periodic basis, in which case there may be additional costs associated with permitting or re-negotiating contracts.

◇ **Third-Party Impact Considerations:**

Power interference will likely produce third party hydrologic, economic and environmental effects. Water release schedules from Lake McConaughy will differ from the historical pattern, primarily in non-irrigation months. There will also be changes in the timing and quantity of water available downstream of the J-2 return. Changes in release schedules and J-2 returns could have potential positive and negative economic and hydrologic third party impacts on downstream water users that rely on these flows.

Economic effects might stem from modified stream flows, but more likely from the diverse impacts associated with securing replacement power. NPPD will experience direct impacts associated with acquiring power resources from other generators. NPPD may also experience an increased need for reactive volt-ampere (VAR) support and need to replace voltage control supplied by the hydros. NPPD customers could likely experience higher electricity costs because of more expensive non-hydro power or, worse, experience a reduction in power availability that could produce economic constraints. The loss of system generating capacity will be evident for the Mid-America Power Pool.

Third party environmental consequences are likely as hydro generation, usually very low in environmental impacts, is potentially replaced by fossil fuel generation, which often affects air quality and other environmental resources.

Third party impacts on recreational opportunities relate primarily to fluctuations in reservoir pools due to changes in storage and release schedules. Fluctuating reservoir levels can be a detriment to recreation activities such as boating and fishing if they occur.

8. NET CONTROLLABLE CONSERVED WATER

◇ **Location:**

This project consists of conservation activities implemented by CNPPID within their system.

◇ **Basic Description:**

Net controllable conserved water has resulted from actions taken by CNPPID to comply with the agreement with the National Wildlife Federation to provide reductions in average annual diversions of surface water. The net controllable conserved water resulting from a grant from the Bureau of Reclamation will be added to the EA at no cost to the Program. The net controllable conserved water not attributed to a grant from the Bureau of Reclamation will be made available to the Program at the average cost of the conservation activities.

The three main categories of water conservation measures that have been implemented address: 1) reservoirs, 2) canal distribution and delivery system, and 3) on-farm irrigation. Reservoir improvements include a water conservation alternative developed for Elwood Reservoir that revised the fill/release operations to minimize seepage. Canal distribution and delivery system improvements include installation of pipelines, earth

compaction, membrane lining, canal structures, structure automation and turnout relocation. These improvements are aimed at reducing losses in the system. On-farm irrigation changes include system improvements, such as installation of center pivots, gated pipe, flow meters, and surge valves, or management improvements, such as irrigation scheduling, adjustments to irrigation set times, and alternate furrow irrigation. On-farm irrigation changes are intended to improve irrigation efficiencies.

◇ **On-Site Yield and Timing:**

The amount of net controllable conserved water associated with conservation measures is currently being evaluated but has not yet been finalized. Nebraska has indicated that 5,000 ac-ft/yr of net controlled conserved water is available to the Program, however, there is uncertainty regarding this estimate as the yield analysis of CNPPID's conservation activities has not yet been completed. This amount is subject to change pending the results of an on-going study.

Conserved water will be added to the Lake McConaughy EA on October 1 of each year as specified in the license agreement. This water can then be released during times of shortage at the critical habitat.

◇ **Legal and Institutional Requirements for Implementation:**

Net controllable conserved water will be stored in the EA and released during periods of target flow shortages. Approval from the Nebraska DWR will be required to add additional conserved water to the EA. There should be no other legal and institutional requirements as these conservation activities have already been implemented.

◇ **Schedule For Implementation:**

The yield associated with this alternative is the result of conservation activities that have already been implemented. As noted in comments received from Nebraska, this project could be implemented in zero to two years.

◇ **Expected Project Life:**

The expected life of this project extends well beyond the first increment of the Program. Under the FERC license agreement, CNPPID is obligated to perform conservation activities for 40 years.

◇ **Capital and Operating Costs:**

The net controllable conserved water resulting from a grant from the Bureau of Reclamation will be added to the EA at no cost to the Program. It is assumed that 500 ac-ft/yr is available at no cost to the Program (Jim Cook, Nebraska Natural Resources Commission, June 28, 2000 memo). The 4,500 ac-ft/yr of net controllable conserved water, which is not attributed to the grant from the Bureau of Reclamation, will be made available to the Program at the cost of the conservation activities.

The Central Nebraska Regional Water Conservation Task Force (Task Force) developed a cost-effectiveness analysis to evaluate the feasibility of conservation improvements. There is uncertainty regarding the use of these costs because certain assumptions regarding project lifetimes and interest rates may differ from those used to evaluate other Program projects. As such, further evaluation of these costs is required. Based on information developed by the Task Force, the total cost for gross water savings associated with net controllable conserved water is estimated to be about \$3.2 million. Of this amount, CNPPID received a \$500,000 grant from the Bureau of Reclamation. The total cost to the Program excluding the Bureau of Reclamation funds is estimated to be about \$2.7 million. Using a discount rate of 6 percent and a term of 13 years, the annual cost is \$305,000.

The amount of conserved water available to the Program could change pending the results of an on-going study.

◇ **Third-Party Impact Considerations:**

Conservation activities associated with net controllable conserved water have already been implemented in which case there are no additional third party impacts associated with allocating this water to the Program.

C. Wyoming Projects

1. *PATHFINDER MODIFICATION MUNICIPAL ACCOUNT*

◇ **Location:**

Pathfinder Dam is located on the North Platte River about three miles below the confluence with the Sweetwater River and about 47 miles southwest of Casper, Wyoming.

◇ **Basic Description:**

The Pathfinder Modification Stipulation, agreed to by the parties to the Nebraska v. Wyoming lawsuit (NE, WY, CO, US) in September 1997, provides for the Pathfinder Modification Project, which would increase the capacity of the existing Pathfinder Reservoir by approximately 54,000 ac-ft. The increased capacity is proposed to be filled with water stored under the existing 1904 storage right for Pathfinder Reservoir with the exception that regulatory calls can not be placed on existing water rights upstream of Pathfinder Reservoir other than the storage rights pertaining to Seminoe Reservoir.

The Pathfinder Modification Project will serve both environmental and municipal uses. An environmental account of 34,000 acre-feet will be operated for the endangered species and habitat in Central Nebraska in accordance with certain conditions. A municipal account of 20,000 acre-feet will provide municipal water to North Platte communities in Wyoming through contracts between the municipalities and the State of Wyoming in accordance with certain conditions.

As noted in Wyoming comments received on April 5, 2000, the Bureau of Reclamation will operate the 20,000 acre-foot municipal storage account to provide an annual estimated firm yield of 9,600 ac-ft. The Pathfinder Modification Stipulation restricts municipal carry-over storage to 20,000 ac-ft. In any year the municipal demand is less than 9,600 ac-ft, the remaining balance is available to Wyoming to be released for the benefit of the endangered species in the critical habitat at Wyoming's discretion. The delivery of water contributed from the municipal account would be considered in addition to the storage and delivery of water from the Pathfinder environmental account.

As summarized in Wyoming's proposal, storage water in the Pathfinder municipal account would be made available to the Program each year as follows:

- Storage water that is not used to supplement the water rights of municipalities in the North Platte River basin in Wyoming and mitigate future depletions as defined in Wyoming's "Depletion Mitigation Program, Platte River Basin, Wyoming" could be leased to the Program.
- To determine the amount of water available to the Program, Wyoming would review the status of water availability within the North Platte River basin. Wyoming will not know in advance exactly how much water they will need to meet all anticipated uses, therefore, prior to June 1 of each year, state officials will make a conservative judgement as to the amount of water that may be required for Wyoming's purposes.
- Wyoming would advise the Governance Committee in June as to how much water the EA manager could move from Pathfinder municipal account to the EA in Lake McConaughy from July 1st through September 30th of the same year.
- After September 30th, Wyoming would quantify its depletions for the previous year (October 1 through September 30). If the quantification indicates that Wyoming exceeded its "existing water related activity baseline", Wyoming will quantify the excess depletion at the Wyoming/Nebraska state line. Using the tracking and accounting procedures and providing for replacement water from its other sources, the amount of storage released from the Pathfinder municipal account needed to offset the excess depletions at the state line will be determined. This amount of storage would be subtracted from the amount of water provided to the Program to determine the amount of credit Wyoming would get from the Program. Wyoming would expect lease payments for the difference between the volume of water provided to the Program from July through September and any amount in excess of Wyoming's "existing water related activity baseline".

◇ **On-Site Hydrologic Effects:**

The total capacity of the municipal storage account is 20,000 ac-ft. As noted in Wyoming comments received on April 5, 2000, the firm yield of this account is 9,600 ac-ft. It is appropriate to consider the firm yield as opposed to average yield for this project because the municipal account will be operated to provide a firm yield. The amount of water available to the Program is dependent on the amount needed to supplement municipal water rights and/or mitigate excess depletions and cannot exceed the firm yield in any year. Wyoming anticipates that 4,800 ac-ft of storage water from the municipal account could be available for lease to the Program on an average annual basis (Wyoming’s December 16, 1999 proposal). The amount available to the Program will vary on a year to year basis depending on Wyoming’s needs. In some years no water from this account will be available to the Program, whereas, in other years, up to 9,600 ac-ft could be available to the Program.

Because the average annual amount that would be released from the Pathfinder Reservoir municipal account and delivered to the Lake McConaughy EA is relatively small, the EA manager may choose to move all of the water downstream during the month of September to minimize conveyance losses.

Two potential schedules are provided in the table below for releases from the Pathfinder Reservoir municipal account. Accumulations to storage are not required by the EIS/ESA team because they are already incorporated in the North Platte River Water Utilization Model (NPRWUM). The NPRWUM model stores water in Pathfinder Reservoir when the water rights are in priority.

**Table III-37
Pathfinder Municipal Account – Yield to the North Platte River**

Month	Option #1 : Releases from Pathfinder Municipal Account (ac-ft)	Option #2 : Releases from Pathfinder Municipal Account (ac-ft)
October	0	0
November	0	0
December	0	0
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	1,600	0
August	1,600	0
September	1,600	4,800
Annual	4,800	4,800

◇ **Legal and Institutional Requirements for Implementation:**

Although the 1997 Pathfinder Modification Stipulation was agreed to by the parties to the Nebraska v. Wyoming lawsuit, it has not yet been ratified by the Supreme Court. For this analysis, it was assumed that the Pathfinder Modification Stipulation will be ratified and approved by the U.S. Supreme Court. As the Pathfinder Modification Project will be funded by the Wyoming Water Development Program, the Wyoming Legislature must approve the project and its funding.

There are several other legal changes and requirements necessary to implement this project. The federal authorization of Pathfinder Reservoir will be amended, if necessary, to include municipal and environmental purposes. The 1904 Wyoming water right for Pathfinder Reservoir would have to undergo a partial change of use for Pathfinder storage water to be stored for municipal and downstream environmental purposes in the critical habitat. In addition, a secondary supply water right would be needed to ensure the protection of storage water downstream to the Wyoming/Nebraska state line. The change of use and the secondary supply water right would be contingent upon the existence of the Program and Wyoming's participation in that Program. The secondary supply water right would need to be secured from the Wyoming State Engineer and the change of use would need to be secured from the Wyoming Board of Control.

In order to obtain regulatory certainty for the delivery of Pathfinder storage releases to the Wyoming/Nebraska state line, the Wyoming State Engineer and Legislature must approve the export. In addition, a permit under Nebraska water law is needed to protect project environmental releases delivered to the Wyoming/Nebraska state line to specified locations between the state line and Chapman, Nebraska.

NEPA/ESA compliance and a federal 404 permit are also required to implement this project. It is anticipated that the NEPA/ESA review of the proposed Program will include the necessary NEPA/ESA review for this project in sufficient detail to secure the federal approvals required for implementation.

◇ **Schedule For Implementation:**

As noted in Wyoming comments received on April 5, 2000, the schedule for the implementation of this alternative is as follows. In year 1, the following activities will be completed by the State of Wyoming:

- Seek and obtain project authorization and funding from the Wyoming Legislature,
- Conduct environmental assessments required by NEPA,
- Seek an amendment to the federal authorization of Pathfinder Reservoir from Congress if necessary,
- Seek a partial change of use through the Wyoming Board of Control for the water right for Pathfinder Reservoir under Wyoming water law,

- Seek the statutory review by the Wyoming State Engineer on the potential export of storage water for downstream environmental uses.

In year 2, pending the outcome of year 1 activities, the State of Wyoming will:

- Seek approval from the Wyoming Legislature for the export of water for downstream environmental uses,
- Seek a secondary supply water right, issued to the Wyoming Water Development Commission, from the Wyoming State Engineer to protect the deliveries of Pathfinder storage water to the Wyoming/Nebraska state line,
- Seek a permit under Nebraska water law to protect project environmental releases delivered to the Wyoming/Nebraska state line to specified locations between the state line and Chapman, Nebraska.

In year 3, pending the outcome of year 2 activities, project construction will be initiated and completed. The storage and release of project water will be available upon completion of the project.

◇ **Expected Project Life:**

The inclusion of this project in the Program is contingent on the existence of the Program and Wyoming's participation in that Program. The expected project life is dependent on the length of the contract with the State of Wyoming. For purposes of this plan, it is assumed that the first increment of the program will be 13 years and Wyoming will participate in the Program for the duration of the first increment. Subject to these terms, it is likely Wyoming would agree to a contract length through year 13 year with an option to renew at the end of the first increment, depending on the terms of the second increment and Wyoming's participation in that second increment as noted in Wyoming's comments received on April 5, 2000.

◇ **Capital And Operational Costs:**

The amount of water available to the Program, for which Wyoming would expect lease payments, is the difference between the volume of water provided to the Program from July through September and any amount that Wyoming uses to replace depletions in excess of Wyoming's "existing water related activity baseline" during the water year.

Based on Wyoming's comments received on April 5, 2000, Wyoming has noted that the cost should be based on the projected costs of acquiring other Program water. Alternatively, the cost to lease this water could be based on recovering the capital cost attributable to the Pathfinder municipal account, including construction costs and costs of mitigating third party impacts, plus annual operating, maintenance and replacement costs. Wyoming has estimated that construction and third party mitigation costs for the Pathfinder Modification Project will total approximately \$10 million. Of this amount, the total third party impact costs to irrigators are estimated to be \$7.9 million as presented in the 3-Brick Proposal (Bureau of Reclamation, May 1996). Third party impact costs

include 1) an estimated cost of about \$3.8 million for repayment of the Safety of Dams Corrective Action Study (SOD CAS) modifications that will be incurred by irrigators that benefit from the North Platte and Kendrick Projects and the Glendo Unit, and 2) an estimated cost of about \$4.1 million for selenium remediation that will be incurred by the Kendrick Project irrigators. The total cost of this project is not comparable to other total costs presented in this report as third party impact costs are included.

Of the total cost of \$10 million, approximately 37 percent (20,000/54,000) or \$3.7 million can be attributed to the municipal account. Using a discount rate of 6 percent and a term of 13 years, the annual cost for the construction and mitigation of third party impacts is \$418,000. Thus, the estimated cost per acre-foot of yield would be \$418,000/9,600 ac-ft or \$43.50 per ac-ft per year. The operation and maintenance costs that would be paid annually to the Bureau of Reclamation are estimated to be \$20,000 per year. According to the 3-Brick Proposal the inflatable dam has a design life of 35 years. Based on an estimated cost of \$1.9 million for the inflatable dam, which was prepared by the EIS team, the annual amount needed to replace the inflatable dam at the end of 35 years would be approximately \$17,000. Therefore, the annual costs per acre-foot of yield would be \$37,000/9,600 ac-ft or \$4 per ac-ft per year. Under these assumptions, the annual breakeven cost to Wyoming would be \$47.50 per acre-foot of yield. Assuming that Wyoming would lease water to the Program at this price, the average annual cost to the Program for 4,800 ac-ft is \$47.50 times 4,800 ac-ft or \$228,000 per year from year 4 through year 13 of the Program. However, Wyoming has noted it may reserve the right to recover the actual cost and loss in potential revenue earnings associated with third-party impacts when computing the lease price on an acre foot basis.

◇ **Third-Party Impact Considerations:**

Third party impacts that have been identified include costs to irrigators that benefit from the North Platte and Kendrick Projects and the Glendo Unit for repayment of the SOD CAS modification and costs incurred by Kendrick Project irrigators for selenium remediation.

Third party impacts on other Wyoming appropriators associated with the Pathfinder Modification Project will be evaluated by the Wyoming Board of Control during its consideration of the partial change of use for the water right for Pathfinder Reservoir and as part of the State Engineer's and legislators' review and approval of the export of water. Wyoming has attempted to address these impacts in its project implementation plan, however, the Wyoming Board of Control will make the final decision regarding impacts to other appropriators. Originally, the water in the municipal account would have only been released to meet the needs of the municipalities during times of water rights regulation or to mitigate excess depletions in Wyoming. Both of these events are expected to occur sporadically. Leasing water to the Program will result in a more constant demand on the municipal account. Water that is leased to the Program under this project will be protected downstream to Lake McConaughy in which case it must not be available to downstream diverters. Although leased water will not be available to users in Wyoming, it is anticipated that only water in excess of the amount required to meet all anticipated uses will be leased to the Program.

There is a possibility that fluctuating reservoir levels due to releases from the municipal account could have an impact on recreational activities within Wyoming. Leasing water from the municipal account of the Pathfinder Modification Project should not significantly increase the overall environmental impacts associated with this project.

2. GLENDO STORAGE

◇ Location:

Glendo Dam is located on the North Platte River about four and one half miles southeast of the town of Glendo, Wyoming upstream of Guernsey Reservoir.

◇ Basic Description:

The 1953 Order Modifying and Supplementing the North Platte Decree (1953 Order) provides for the storage of 40,000 ac-ft in Glendo Reservoir during any water year for the irrigation of lands in western Nebraska and in southeastern Wyoming below Guernsey Reservoir. Of the 40,000 ac-ft available for irrigation, the 1953 Order allocates 25,000 ac-ft for the irrigation of lands in western Nebraska and 15,000 ac-ft of storage for the irrigation of lands in southeastern Wyoming.

A recent stipulation entitled “Amendment of the 1953 Order to Provide for Use of Glendo Storage Water” (Glendo Stipulation) was agreed to by the parties to the Nebraska v. Wyoming lawsuit (WY, NE, CO, US) in September 1997. Although the parties have agreed to the stipulation, the Supreme Court has not yet ratified it. For this analysis, it has been assumed that the Glendo Stipulation will be ratified and become an amendment to the 1953 Order prior to the storage and release of water for the Program.

The Glendo Stipulation provides for several changes to the 1953 Order that relax the conditions under which Glendo storage water can be used. Significant changes include the following:

- The potential use of Glendo storage water was expanded to municipal, industrial, and other uses and the service area expanded from the North Platte River basin to the Platte River basin.
- Glendo storage may be used for fish and wildlife purposes downstream of Glendo Reservoir. Any releases made for such purposes shall be administered and protected as storage water in accordance with Wyoming and Nebraska law.

These changes facilitate the use of Glendo storage water as a component of the Program. Of the 15,000 ac-ft of Glendo storage water allocated to Wyoming, there are currently permanent contracts for 4,400 ac-ft. The remaining 10,600 ac-ft is leased by the Bureau of Reclamation under temporary water service contracts for up to one year. Wyoming is considering negotiating a permanent contract with the Bureau of Reclamation for all of the remaining 10,600 ac-ft of storage (Wyoming December 16, 1999 proposal).

Water in excess of that needed to meet Wyoming's contracted demands and replace Wyoming's potential excess depletions would be available to the Program. Wyoming estimates that 2,650 ac-ft of Glendo storage water could be available to the Program on an average annual basis (Wyoming's December 16, 1999 proposal).

Wyoming would make Glendo storage water available to the Program each year in the following manner.

- Any storage water that is not used for municipal, industrial, or agricultural purposes within Wyoming or to mitigate future depletions as defined in Wyoming's "Depletion Mitigation Program, Platte River Basin, Wyoming", could be leased to the Program.
- To determine the amount of water available to the Program, Wyoming would review the status of water availability within the North Platte River basin. Wyoming will not know in advance exactly how much water they will need to meet all anticipated uses, therefore, prior to June 1 of each year, state officials will make a conservative judgement as to the amount of water that may be required for Wyoming's purposes.
- Wyoming would advise the Governance Committee in June as to how much water the EA manager could move from Glendo Reservoir to the EA in Lake McConaughy from July 1st through September 30th of the same year.
- After September 30th, Wyoming would quantify its depletions for the previous year (October 1 through September 30). If the quantification indicates that Wyoming exceeded its "existing water related activity baseline", Wyoming will quantify the excess depletion at the Wyoming/Nebraska state line. Using tracking and accounting procedures and providing for replacement water from its other sources, the amount of storage water released from Wyoming's contracted storage in Glendo Reservoir needed to offset the excess depletions at the state line will be determined. This amount of storage would be subtracted from the amount of water provided to the Program to determine the amount of credit Wyoming would get from the Program. Wyoming would expect lease payments for the difference between the volume of water provided to the Program from July through September and any amount in excess of Wyoming's "existing water related activity baseline".

◇ **On-Site Hydrologic Effects:**

The amount of water available to the Program is dependent on the yield of the uncontracted storage, which is presently 10,600 ac-ft and the amount needed by Wyoming to meet municipal, industrial, or agricultural uses within Wyoming or to mitigate future depletions. This amount will vary on a year to year basis, however, Wyoming anticipates that 2,650 ac-ft could be available for lease to the Program on an average annual basis. Because the average annual amount that would be moved from Glendo Reservoir to the Lake McConaughy EA is relatively small, the EA manager may choose to move all of the water downstream during the month of September to minimize conveyance losses.

Two potential schedules are provided in the table below for releases from Glendo Reservoir to the Lake McConaughy EA. Accumulations to storage are not included because they are already incorporated in the NPRWUM model. The NPRWUM model stores water in Glendo Reservoir when the water rights are in priority.

**Table III-38
Glendo Reservoir – Yield to the North Platte River**

Month	Option #1 : Releases from Glendo Reservoir (ac-ft)	Option #2 : Releases from Glendo Reservoir (ac-ft)
October	0	0
November	0	0
December	0	0
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	883	0
August	883	0
September	883	2,650
Annual	2,650	2,650

◇ **Legal and Institutional Requirements for Implementation:**

Although the recent Glendo Stipulation was agreed to by the parties to the Nebraska v. Wyoming lawsuit, it has not yet been ratified by the Supreme Court. For this analysis, it has been assumed that the Glendo Stipulation will be ratified and become an amendment to the 1953 Order.

A contract would need to be negotiated between the Bureau of Reclamation and the State of Wyoming. NEPA compliance will also be required on this contract. As Wyoming’s obligations under the contract will be funded by the Wyoming Water Development Program, the Wyoming Legislature must review the proposal and approve the needed funding.

There are several other legal and institutional requirements necessary for implementation of this project. The Glendo Stipulation provides federal authorization to use Glendo storage water for fish and wildlife purposes, however, the state water right for Glendo Reservoir will need to be modified to provide for the use of Glendo storage water for environmental and related purposes. A secondary supply water right is also necessary to ensure the protection of Glendo storage water downstream to the Wyoming/Nebraska state line. The change of use and the secondary supply water right would be contingent upon the existence of the Program and Wyoming’s participation in that Program. The secondary supply water right would need to be secured from the Wyoming State Engineer and the change of use would need to be secured from the Wyoming Board of Control.

In order to obtain regulatory certainty for the delivery of Glendo storage releases to the Wyoming/Nebraska state line, the approval of the Wyoming State Engineer and Legislature will be required under Wyoming's export law.

◇ **Schedule For Implementation:**

This project does not require any new construction or infrastructure, therefore the implementation schedule is based primarily on the resolution of legal and institutional issues.

As noted in Wyoming comments received on April 5, 2000, the schedule for the implementation of this alternative is as follows. In year 1, the following activities will be completed by the State of Wyoming:

- Conduct environmental assessments required by NEPA,
- Finalize the contract for Glendo storage between the Bureau of Reclamation and the State of Wyoming,
- Seek and obtain a modification to the 1945 Decree, as amended in 1953, in accordance with the 1997 stipulation,
- Seek authorization and funding from the Wyoming Legislature,
- Seek a partial change of use through the Wyoming Board of Control for the water right for Glendo Reservoir under Wyoming water law,
- Seek the statutory review by the Wyoming State Engineer on the potential export of storage water for downstream environmental uses.

In year 2, Wyoming will:

- Seek approval from the Wyoming Legislature for the export of water for downstream environmental uses,
- Seek a secondary supply water right, issued to the Wyoming Water Development Commission, from the Wyoming State Engineer to protect the deliveries of Glendo storage water to the Wyoming/Nebraska state line to the critical habitat,
- Seek a permit under Nebraska water law to protect project environmental releases delivered to the Wyoming/Nebraska state line to specified locations between the state line and Chapman, Nebraska.

In year 3, pending the outcome of year 2 activities, the storage and release of Glendo water will be available.

◇ **Expected Project Life:**

The inclusion of this project in the Program is contingent on the existence of the Program and Wyoming's participation in that Program. The expected project life is dependent on the length of the contract. For purposes of this plan, it is assumed that the first increment of the Program will be 13 years and Wyoming will participate in the Program for the duration of the first increment. Subject to these terms, it is likely Wyoming would agree to a contract length through year 13 with an option to renew at the end of the first increment, depending on the terms of the second increment and Wyoming's participation in that second increment as noted in Wyoming's comments received on April 5, 2000.

◇ **Capital and Operational Costs:**

The cost of this project consists of lease payments for the difference between the water provided to the Program from July through September and any amount that Wyoming is required to use to offset excess depletions during the water year. Wyoming has noted that the cost should be based on the project costs of acquiring other Program water. Alternatively, costs to lease Glendo storage water could be based on the costs of Bureau of Reclamation temporary water service contracts, which currently range from \$5/ac-ft/yr for irrigation uses to \$75/ac-ft/yr for municipal and industrial purposes. If the Program leases an average of 2,650 acre-feet annually, the total annual cost could range from \$13,250 to \$198,750 beginning in year 3 through year 13 of the Program.

Potential costs associated with third party impacts have not been evaluated. The costs presented above may be higher if there are third party impact costs.

◇ **Third-Party Impact Considerations:**

Glendo Reservoir is already constructed and the storage water considered under this alternative has been used for other purposes under short term contracts, therefore, third party impacts associated with leasing uncontracted for water will likely be minimal but will require further evaluation.

Water that is leased to the Program under this project will be protected downstream to Lake McConaughy in which case it must not be available to downstream diverters. Although leased water will not be available to users in Wyoming, it is anticipated that only water in excess of the amount required to meet all anticipated uses will be leased to the Program. Environmental impacts associated with this alternative are expected to be minimal.

3. **TEMPORARY WATER LEASING**

◇ **Location:**

Specific irrigation districts or individual farmers that are willing to participate in a temporary water leasing program are not yet known. At this time a temporary water leasing program has been evaluated for Reaches 1 through 4 (Northgate, CO gage to Whalen Diversion Dam gage) and Reach 6 (Laramie River below Grayrocks Reservoir gage to Fort Laramie, WY gage). *It is assumed for this analysis that leasing projects are located at the mid-point of each reach because specific irrigation districts and landowners willing to participate in the Program are not yet known.* The reaches are defined as follows:

Reach 1: Northgate, CO gage to Sinclair, WY gage

Reach 2: Sinclair, WY gage to Alcova, WY gage

Reach 3: Alcova, WY gage to Orin, WY gage

Reach 4: Orin, WY gage to Passing Whalen Diversion Dam gage

Reach 6: Laramie River below Grayrocks Reservoir gage to Fort Laramie, WY gage

◇ **Basic Description:**

A voluntary temporary water leasing program would provide incentives to farmers to annually lease water supplies that would otherwise have been used in irrigation. The amount of water available to the Program consists of the reduction in consumptive use, which is reviewed and approved by the State Engineer or Board of Control, as provided by Wyoming law. The program evaluated assumes that leased water rights are dependent on storage rights. Although it may be feasible to lease natural flow water rights, it will be more difficult to insure protection from downstream water users.

Under a temporary water lease the irrigation districts or farmers would not relinquish ownership of their water rights. To provide maximum flexibility the mix of farms participating in the leasing program would be allowed to change over time and the length of the temporary lease allowed to vary based on the needs of the irrigation district or farmer. Individual farm owners could choose to lease a portion of their water supplies on a temporary basis, likely subject to a minimum lease volume to manage practical administrative and program management costs.

The leasing program that has been analyzed considers leasing approximately 22,700 ac-ft of water supplies annually, which corresponds to about 16,400 ac-ft delivered on farm and 8,200 ac-ft of historic consumptive use.

◇ **On-Site Hydrologic Effects:**

The Final Report was relied on for estimates of yield and on-farm timing. The estimated amount of water leased in each reach was based on the distribution of acres irrigated with surface supplies. The number of acres that were assumed to be included in a leasing program are summarized in the following table.

**Table III-39
Leasing Program**

Reach	Acres Included in Leasing Program (ac)
1	680
2	1,520
3	600
4	590
6	1,610
Total	5,000

The tables below show the proposed average monthly reductions in diversions and the reductions in on-farm deliveries for each reach. Although the reductions in diversions were assigned to a reach based on the distribution of irrigated acres, in some cases the reductions would occur further upstream depending on the location of the mainstem headgate. The amount delivered on-farm was based on the average conveyance loss for each reach. Data on conveyance losses was obtained from county-level information obtained from USGS Water Use Data for 1995.

**Table III-40
Reductions in Diversions from the North Platte River (ac-ft)**

Month	Reach 1	Reach 2	Reach 3	Reach 4	Reach 6
October	106	289	136	150	252
November	0	0	0	0	0
December	0	0	0	0	0
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	49	71	32	35	56
May	311	689	305	259	533
June	619	1572	698	522	1159
July	811	2205	1001	828	1528
August	660	1949	911	754	1347
September	350	932	436	391	721
Annual	2905	7707	3518	2939	5597

**Table III-41
Reductions in the Amount Delivered On-Farm (ac-ft)**

Month	Reach 1	Reach 2	Reach 3	Reach 4	Reach 6
October	80	210	84	108	194
November	0	0	0	0	0
December	0	0	0	0	0
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	38	52	20	24	44
May	236	500	190	184	410
June	468	1142	436	374	890
July	614	1602	626	592	1174
August	500	1416	570	538	1036
September	264	678	272	280	554
Annual	2200	5600	2198	2100	4302

A representative leasing program could potentially reduce on-farm deliveries and consumptive use by about 16,400 ac-ft per year and 8,200 ac-ft per year, respectively. On-farm reductions in consumptive use were based on an on-farm efficiency of 50 percent. The following table shows the average monthly reductions in consumptive use for the 1975-94 period.

**Table III-42
Reductions in Consumptive Use (ac-ft)**

Month	Reach 1	Reach 2	Reach 3	Reach 4	Reach 6
October	40	105	42	54	97
November	0	0	0	0	0
December	0	0	0	0	0
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	19	26	10	12	22
May	118	250	95	92	205
June	234	571	218	187	445
July	307	801	313	296	587
August	250	708	285	269	518
September	132	339	136	140	277
Annual	1100	2800	1100	1050	2150

Based on the water budget spreadsheet, a reduction in consumptive use of 8,200 ac-ft resulted in a yield of 3,900 ac-ft of shortage reductions at the critical habitat without diversion losses. In this case, it is important to note that flows in the critical habitat will only be increased by reductions in consumptive use. Therefore, the amount of leased water is considerably higher to account for historic return flows. The modeling being performed by the EIS team may indicate that the yield associated with 8,200 ac-ft of consumptive use savings is higher or lower than 3,900 ac-ft of reductions to target flow

shortages. If the EIS modeling indicates a yield that differs from 3,900 ac-ft at the critical habitat, the size of the leasing program may require adjustment.

◇ **Legal and Institutional Requirements for Implementation:**

There are several legal changes and requirements necessary to implement this project. There is an existing statute, 41-3-110, that provides for leasing on a temporary basis but it was originally intended for the acquisition of temporary water rights for highway or railroad roadbed construction or repair. This statute provides for temporary leases not to exceed two years. The Wyoming State Engineer is investigating whether this statute is broad enough to cover temporary agricultural leases for longer periods and for a broader set of users.

A temporary change of use would be required for the lease of irrigation water to be used for downstream environmental purposes in the critical habitat. The change of use would need to be secured from the Wyoming Board of Control. If the leased water is storage water or is converted to storage water, secondary supply water rights would have to be secured from the Wyoming State Engineer. The change of use and secondary supply water right would be contingent upon the existence of the Program and Wyoming's participation in that Program.

In order to obtain regulatory certainty for the delivery of leased water to the Wyoming/Nebraska state line, the approval of the Wyoming State Engineer and Legislature will be required under Wyoming's export law. The approval of the Bureau of Reclamation may also be required if storage water is leased from irrigation districts with federal contracts for storage water.

◇ **Schedule For Implementation:**

As noted in Wyoming comments received on April 5, 2000, the schedule for implementation of this alternative is as follows. In year 1, the following activities must be completed:

- The Governance Committee must develop procedures for seeking temporary water leases including the prices it is willing to offer and the terms needed for Program purposes. In addition, the determination must be made as to the NEPA compliance required for each transaction.

In year 2, the State of Wyoming will address the following activities:

- It is likely that statutory changes will be needed to implement intermediate and long-term temporary water leasing. The Wyoming State Engineer is discussing this issue with state legislators and other affected parties. Therefore, it is difficult to predict what the final decision of the Wyoming Legislature will be. For purposes of this analysis, it is assumed that the Wyoming Legislature will approve the needed statutory changes in year 2 of the Program. Further, it is assumed that, as the lease of water is a temporary change of use, the state's approval process will be similar to that of a permanent change of use.

In year 3, the following activities may occur:

- The Governance Committee must seek temporary water leases,
- Potential lessees will need to develop technical information regarding such issues as the historical consumptive use of the water they may be willing to lease,
- It is likely that agreements must also be negotiated with reservoir owners for the temporary storage of the leased water.

In year 4, the following activities may occur:

- The lessees must seek and obtain temporary changes of use through the Wyoming Board of Control,
- The lessees must seek and obtain the statutory reviews by the Wyoming State Engineer on the potential export of leased water for downstream environmental uses.

In year 5, the following activities may occur:

- The lessees must seek and obtain approval from the Wyoming Legislature for the export of water for downstream environmental uses,
- If the leased water is storage water, the lessees must seek and obtain a secondary water right, issued to the Wyoming Water Development Commission, from the Wyoming State Engineer to protect the deliveries of water to the Wyoming/Nebraska state line,
- A party, perhaps the State of Wyoming, must seek and obtain a permit under Nebraska water law to protect leased water for environmental purposes, delivered to the Wyoming/Nebraska state line to specified locations between the state line and Chapman, Nebraska.

In year 6, the storage and release of leased water could be available.

◇ **Expected Project Life:**

The inclusion of temporary water leasing in the Program is contingent on the existence of the Program and Wyoming's participation in that Program. The expected project life is dependent on the length of the temporary leasing contracts. The length of the temporary leasing contracts will depend of the requirements of the Program, the willingness of potential lessees to participate under those requirements, and the conditions placed in the proposed leasing statutes by the Wyoming Legislature.

◇ **Capital and Operational Costs:**

In order for this alternative to be feasible, Wyoming has noted that the price must be attractive to potential lessees. Potential lessees may expect lease payments commensurate with prices being paid by the Program for other water supplies providing the same benefits at the critical habitat. Prices have not been established for water supplies to be included in the Program, therefore, leasing cost estimates were based on the Final Report. The annual cost of a representative temporary water leasing program was estimated based on the following components:

- Annual economic value of irrigation on lands in Reaches 1, 2, 3, 4, and 6. The annual value of irrigation supplies was estimated at between \$22 and \$38 per ac-ft of consumptive use based on farm net income and land rental differentials between irrigated and non-irrigated lands. Farm net income estimates were based on average cropping patterns, yields, prices, and costs in the NRCE database for the years 1992, 1994, and 1996. Information on land rental differentials was based on the information from the United States Department of Agriculture, National Agricultural Statistics Services (NASS) published in July 1999.
- An incentive premium of 25 percent to induce participation in the program.
- Transaction and administrative costs representing approximately 30 percent of total program costs.

On an annual basis, the study team estimates that a temporary water leasing program would cost an average of \$35 per acre foot of consumptive use saved on-farm in Reaches 1, 2, 3, 4, and 6. The cost to lease water on a temporary basis increases from upstream to downstream reaches. The total annual cost for water leasing in Reaches 1, 2, 3, 4, and 6 is estimated to be \$279,000, as shown in the following table.

**Table III-43
Temporary Water Leasing Program – Annual Costs**

Month	CU Saved (ac-ft)	Estimated Annual Cost (\$)
Reach 1	1,100	32,000
Reach 2	2,800	85,000
Reach 3	1,100	38,000
Reach 4	1,050	42,000
Reach 6	2,150	82,000
Total	8,200	279,000

Potential costs associated with third party impacts have not been evaluated. The costs presented above may be higher if there are third party impact costs. In addition, contracts with irrigators or districts need to be renewed on a periodic basis, in which case there may be additional costs associated with permitting or re-negotiating contracts.

◇ **Third-Party Impact Considerations:**

Third party impacts on other Wyoming appropriators associated with this alternative will be evaluated by the Wyoming Board of Control during its consideration of the temporary change of use for the various water rights offered for lease and as part of the State Engineer's and legislator's review and approval of the export of water. The Wyoming Board of Control will only allow a change of use of historic consumptive use. This will serve to reduce or eliminate third-party impacts to other Wyoming appropriators.

4. LA PRELE RESERVOIR

◇ **Location:**

La Prele Reservoir is an existing irrigation and industrial supply reservoir in Wyoming located on La Prele Creek approximately 13 miles upstream of the confluence with the North Platte River. The confluence of La Prele Creek and the North Platte River is approximately 115 miles downstream of the Alcova gage.

◇ **Basic Description:**

La Prele Reservoir was constructed between 1905 and 1909. The current capacity of the reservoir is approximately 20,000 ac-ft and it is permitted for irrigation, domestic and industrial uses. In 1974 an agreement was made between the Douglas Water Users Association (Association) and the Panhandle Eastern Pipeline Company (PEPL) to rehabilitate the reservoir. The terms of the agreement provided that PEPL buy 5,000 ac-ft of storage space at the price equivalent to the principal and interest of a loan which was used to rehabilitate the reservoir and associated ditches.

This analysis assumes that PEPL's storage right in La Prele Reservoir is available for lease by the Program. PEPL's 5,000 ac-ft share of space in La Prele Reservoir is limited by the yield of its share and the conditions under which it may be put to beneficial use in the context of the Program.

◇ **On-Site Yield And Timing:**

The Final Report was relied on to estimate yields and timing. To evaluate the yield of PEPL's portion of La Prele Reservoir, a simplified operations study was conducted for the study period from 1975 through 1994. The study is based on a similar investigation done by Banner and Associates in 1981. Further discussions with representatives with the La Prele Irrigation District and the local Hydrographer/Water Commissioner indicate that further evaluation is needed to accurately represent operations of the La Prele Reservoir as it relates to seepage, potential winter time releases and current irrigated acreages. Based on conversations with the La Prele Irrigation District, the Banner and Associates 1981 report does not accurately reflect *current* operations of the reservoir. The assumptions used to model La Prele Reservoir are outlined below:

- **Inflow to La Prele Reservoir:** The USGS maintained a streamflow gage on La Prele Creek a short distance above the reservoir. The Bureau of Reclamation (Bureau) estimated reservoir inflow as 105.5 percent of gage flow in a 1969 feasibility report

on La Prele Reservoir. The extra 5.5 percent accounts for inflow between the gage and the dam. Where USGS data does not exist (October through February 1975-92, and all of 1993 and 1994) averages were used.

- **Senior Downstream Rights:** The reservoir must bypass water to downstream senior, direct-flow diverters that have no storage in La Prele Reservoir. The bypass requirement is based on 1,469 irrigated acres and the statutory diversion allowance of 1 cfs per 70 irrigated acres. In addition, the bypass requirement is reduced by 800 ac-ft distributed uniformly over the irrigation season based on the Bureau's estimate of average annual return flows that are used for irrigation.
- **La Prele Irrigation District (District) Demand:** The reservoir must bypass water to project lands after the senior direct flow users have been satisfied. Project lands consist of 11,454 irrigated acres, of which, 10,305 acres are District lands, and about 1,150 acres are associated with "carrier rights". The bypass requirement is based on the Bureau's estimate of annual water requirements and its monthly distribution. Information provided by the La Prele Irrigation District indicates that District lands have increased to 11,472 irrigated areas since the 1981 Banner and Associates report. Further evaluation should consider any changes in irrigated acreage.
- **Seepage:** The current stage-seepage relationship as reported by the Hydrographer-Water Commissioner is that seepage varies linearly with stage, from 0 cfs at the dead pool elevation to 7 cfs at the spillway height. Seepage calculations were simplified to be 3.5 cfs throughout the study period. Further evaluations should consider any additional data compiled on seepage rates and stage relationships.
- **Evaporation:** Evaporation is based on the reservoir surface area and appropriate monthly evaporation rates. Evaporation calculations were simplified using an average surface area of approximately 450 acres throughout the study period, which corresponds with a storage volume of approximately 10,000 ac-ft, or half of the current capacity. Evaporation was prorated 25 percent to PEPL's storage account and 75 percent to the remaining storage, respectively, based on the maximum storage capacities of each account.

The District is currently using PEPL's storage water in La Prele Reservoir for irrigation purposes, therefore, diversions to storage under PEPL's account were not treated as negative flows. If water was available in PEPL's account it was released whenever there was a shortage at the critical habitat. The amount released is equal to the shortage at the critical habitat or the total storage attributable to PEPL's account, whichever amount is less. The table below shows monthly reservoir releases and seepage from PEPL's storage account in La Prele Reservoir for the 1975-94 period.

**Table III-44
La Prele Reservoir – Net Yield to the North Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	549	537	513	211	672	0	0	786	0	0	0	0	3268
1976	549	537	211	211	965	0	0	1485	0	0	0	0	3958
1977	549	537	513	475	426	0	0	560	0	0	0	0	3060
1978	549	537	513	475	426	0	0	2500	0	0	0	0	5000
1979	549	537	513	475	426	0	0	143	0	0	0	0	2643
1980	549	537	211	211	211	211	211	211	211	2177	0	0	4740
1981	549	537	211	211	965	0	0	0	0	0	0	0	2473
1982	549	537	211	211	965	0	0	950	0	0	0	0	3423
1983	549	537	211	211	211	211	211	211	211	211	211	211	3195
1984	211	2257	211	211	211	211	211	211	211	211	471	0	4627
1985	211	211	211	211	211	211	1107	0	0	0	0	0	2373
1986	549	537	211	211	211	211	211	211	211	211	211	211	3195
1987	211	211	211	211	211	211	211	211	211	211	577	0	2687
1988	549	211	211	211	211	1045	0	2500	0	0	0	0	4938
1989	549	537	211	211	965	0	0	0	0	0	0	0	2473
1990	549	537	513	211	672	0	0	0	0	0	0	0	2482
1991	549	537	211	211	965	0	0	211	211	1897	0	0	4791
1992	549	537	211	211	965	0	0	0	0	0	0	0	2473
1993	549	537	211	211	965	0	0	2500	0	0	0	0	4973
1994	211	211	211	211	1581	0	0	2500	0	0	0	0	4925
Average	481	558	287	251	622	116	108	760	63	246	73	21	3585

Water released from La Prele Reservoir could be re-stored in the Lake McConaughy EA and re-regulated. One negative aspect of this project is that seepage from La Prele Reservoir is not controllable. A temporary storage contract in Glendo Reservoir would most likely be needed to store seepage losses attributable to PEPL’s account, particularly during the non-irrigation season.

◇ **Legal and Institutional Requirements for Implementation:**

There are several legal changes and requirements necessary to implement this project. There is an existing statute, 41-3-110, that provides for leasing on a temporary basis but it was originally intended for the acquisition of temporary water rights for highway or railroad roadbed construction or repair. This statute provides for temporary leases not to exceed two years. The Wyoming State Engineer is investigating whether this statute is broad enough to cover leases with other entities for longer periods and for a broader set of uses.

La Prele Reservoir is currently permitted for irrigation, domestic, and industrial uses. A change of use of storage water rights would be required for this water to be used for downstream environmental purposes in the critical habitat. In addition, a secondary supply water right would be needed to ensure the protection of releases downstream to the Wyoming/Nebraska state line. The change of use and the secondary supply water right would be contingent upon the existence of the Program and Wyoming’s participation in that Program. The secondary supply water right would need to be secured from the Wyoming State Engineer and the change of use would need to be secured from the Wyoming Board of Control.

In order to obtain regulatory certainty for the delivery of water to the Wyoming/Nebraska state line, the approval of the Wyoming State Engineer and Legislature will be required under Wyoming’s export law.

Any agreement with PEPL to lease storage water would require the approval of the La Prele Irrigation District. The District may object to the lease of PEPL's water or to changing the use of this water right. It is possible that obtaining the approval of the District could impact the yield and cost of PEPL's storage water.

◇ **Schedule For Implementation:**

As this alternative is basically a water lease, its schedule for implementation would be the same as that depicted under the heading of "Water Leasing" in Wyoming, with the exception that prior to year 3 an agreement must be reached with PEPL. Any such agreement will need to address the impacts to the operations of the La Prele Irrigation District. The schedule for implementation will be negatively impacted if the District objects to the lease of PEPL's water or to changing the use of this water right.

◇ **Expected Project Life:**

The inclusion of this project in the Program is contingent on the existence of the Program and Wyoming's participation in that Program. PEPL's agreement with the Association/District began in October 1986 and is in effect for 25 years. At PEPL's option, the agreement can be extended for up to 15 years. Therefore, 12 years remain on PEPL's original agreement, with the option to renew the agreement for another 15 years. Accordingly this project could be sustainable well beyond the first increment of the Program. The expected project life is dependent on the length of the lease contract with PEPL. The lease could be short-term (two to five years) or could extend 13 years or longer through the first increment. An option to renew the lease at the end of the contract could also be provided depending on the terms of the second increment and Wyoming's participation in that second increment.

◇ **Capital and Operational Costs:**

PEPL's position in La Prele Reservoir was obtained, in effect, by PEPL agreeing to indemnify the full repayment of the rehabilitation loan that was made by the State of Wyoming Farm Loan Board to the District. The total loan by the Farm Loan Board to the District was \$4,975,000 and bears interest at an annual rate of four percent on the declining balance. The annual debt service payment is a constant amount of about \$318,460. The remaining principal payment on the note is approximately \$1,156,000. The terms of the agreement between PEPL and the District indicate that PEPL is also responsible for a portion of the annual operation and maintenance costs associated with the reservoir, however, this cost is minimal.

The cost to lease PEPL's storage water would likely consist of the annual debt service payment of about \$318,460, an incentive premium to induce participation in the Program, some transaction and administrative costs, and annual operation and maintenance costs associated with PEPL's share of the reservoir beginning in year 6 of the first increment. Any transaction involving the lease of PEPL's water right would require the approval of the Board of Directors of the District. Obtaining the approval of the District could further impact the cost of leasing PEPL's water and storage.

Potential costs associated with third party impacts have not been evaluated. The costs presented above may be higher if there are third party impact costs. In addition, a leasing contract with PEPL would need to be renewed on a periodic basis, in which case there may be additional costs associated with permitting or re-negotiating the contract.

◇ **Third-Party Impact Considerations:**

Potential third party economic impacts associated with La Prele Reservoir are related primarily to impacts on the District. The District is currently using water stored under PEPL's right for irrigation. If this water is purchased or leased for the Program it will no longer be available for use by the District, which is a potential negative third party economic impact depending on how reliant the District is on PEPL's storage right. As the District is already water short, any additional reductions in supply could potentially have a significant impact on the local agricultural economy and crop production.

Third party impacts on Wyoming appropriators associated with this alternative will be evaluated by the Wyoming Board of Control during its consideration of the temporary change of use for the water right offered for lease and as part of the State Engineer's and legislator's review and approval of the export of water. The Wyoming Board of Control will only allow a change of use of historic consumptive use. This will serve to reduce third-party impacts to other appropriators.

D. Colorado Projects

1. *GROUNDWATER MANAGEMENT — TAMARACK III*

◇ **Location:**

An expanded Tamarack project (Tamarack Phase III) will likely be located along the south side of the South Platte River in the Tamarack Ranch State Wildlife Area (SWA) and the Pony Express SWA, which is 40 miles upstream from the Colorado/Nebraska state line. Expanded recharge is also being considered for the Peterson and South Reservation Ditches, which divert from the South Platte River just downstream of Sedgwick, Colorado.

◇ **Basic Description:**

Colorado has proposed Tamarack Phase III in order to provide water to the Program. Per Colorado's comments and the direction of the WAPC Chair, the Beebe Draw project has been removed from further consideration and analysis. As a replacement, the yield associated with the Beebe Draw project will be provided by further expansion of Tamarack Phase III.

An expanded Tamarack project involves diverting surface water directly from the South Platte River via canals or wells located adjacent to the river. Water that is diverted or pumped is conveyed to recharge sites at various distances from the river where it is allowed to percolate into the alluvium for recharge of the groundwater aquifer. Return flows that result from such recharge accrue to the river for some duration after the

recharge event depending on the hydrogeologic conditions and the distance from the site to the river.

Recharge sites must overlie the alluvial aquifer and be hydraulically connected to the river. In general, Colorado is considering sites with SDF factors ranging from 60 days to 300 days. For this analysis it was assumed that representative recharge sites are located at an SDF factor of 270 days.

◇ **On-Site Hydrologic Effects:**

Estimates of yields and timing were based on the Final Report. The expanded Tamarack project that has been evaluated is expected to reduce target flow shortages by an average of approximately 17,000 ac-ft/yr. The facilities required for an expanded Tamarack Project include wells located adjacent to the South Platte River and existing canals that divert water from the South Platte River, including the Peterson and South Reservation Canals. Excess accretion credits associated with current ditch recharge programs that are not needed for well augmentation will also be targeted for Tamarack Phase I and Phase III.

The amount of water available for diversion was determined based on the following conditions:

- All existing legal rights and physical demands and GASP augmentation requirements are satisfied above the State Compact requirements. According to the Division 1 Office of the Colorado Department of Water Resources this condition occurs when the flows at the Colorado/Nebraska state line exceed 180 cfs between April 1 and October 15.
- The amounts needed for operation of Colorado's proposed Tamarack Plan (Phase I) are met. State line flows have been adjusted to account for depletions/additions to historic Julesburg gage flows from Phase 1.
- Water is only available when monthly target flow shortages do not exist at the critical habitat.

While the above conditions were used to determine the yield of Tamarack Phase III, the three states have initiated discussions about other potential criteria for use in determining when such recharge projects can withdraw from the river. The final yields will be dependent upon the conclusions reached in those discussions.

The following tables show the diversions to recharge, recharge accretions to the South Platte River, and the net yield to the South Platte River for the 1975-94 period. Diversions or depletions from the South Platte River were treated as negative numbers, whereas positive numbers indicate months when recharge back to the river exceeded diversions.

Table III-45
Enlarged Tamarack Project : Diversions from the South Platte River to Recharge(ac-ft)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	12791	0	0	0	0	0	0	0	0	12791
1976	0	0	14355	14355	0	0	0	0	0	0	0	0	28710
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	14355	0	0	0	0	0	0	14355
1979	0	0	0	0	0	0	0	0	0	11038	0	0	11038
1980	0	0	14355	14355	14355	14355	14355	14355	14355	0	0	0	100485
1981	0	0	14355	14355	0	0	0	0	0	0	0	0	28710
1982	0	0	14355	7842	0	0	0	0	0	0	0	0	22197
1983	0	0	14355	14355	14355	14355	14355	14355	14355	14355	14355	14355	143550
1984	14355	0	14355	14355	14355	14355	14355	14355	14355	0	0	14355	129195
1985	14355	14355	14355	14355	14355	14355	0	0	0	0	0	14355	100485
1986	0	0	14355	14355	14355	7014	14355	14355	14355	0	0	14355	107499
1987	14355	14355	14355	14355	3543	14355	14355	14355	14355	0	0	14355	132738
1988	0	14355	14355	14355	14355	0	0	0	0	0	0	0	57420
1989	0	0	13879	14355	0	0	0	0	0	0	0	14355	42589
1990	0	0	0	14355	0	0	0	0	0	0	0	0	14355
1991	0	0	6640	11440	0	0	0	0	14355	0	0	0	32435
1992	0	0	14355	14355	0	14355	0	0	0	0	0	0	43065
1993	0	0	11829	14355	0	14355	0	0	0	0	0	14355	54894
1994	2871	14355	14355	14355	0	0	0	0	0	0	0	0	45936
Average	2297	2871	10230	11652	4484	6093	3589	3589	4307	1270	718	5024	56122

Table III-46
Enlarged Tamarack Project : Recharge Accretions to the South Platte River (ac-ft)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	16	1079	1235	1011	767	631	514	418	366	6036
1976	307	277	297	1325	2844	2657	2179	1690	1422	1185	980	874	16036
1977	744	680	608	500	502	445	422	377	361	336	304	294	5573
1978	268	260	246	211	221	242	1431	1561	1307	1050	842	734	8372
1979	614	556	494	405	407	361	343	309	297	318	1150	1336	6590
1980	1066	897	801	1724	3262	4173	5166	5616	6364	6755	5725	4814	46363
1981	3867	3364	2939	3338	4890	4442	3834	3142	2789	2438	2100	1946	39087
1982	1710	1612	1534	2274	3374	3025	2631	2180	1959	1735	1514	1421	24970
1983	1265	1207	1175	1990	3687	4607	5612	6040	6793	7226	7326	7914	54840
1984	7917	8395	7417	6920	7931	8065	8672	8626	9146	9267	7944	6969	97269
1985	6952	7867	8391	7897	9161	9114	9575	8254	7230	6216	5287	4906	90850
1986	5405	5395	4815	4899	6543	7080	7324	7419	8207	8573	7446	6593	79697
1987	6688	7677	8267	7829	9089	8238	8591	8689	9344	9556	8281	7358	99607
1988	7316	7069	7421	7549	8702	8792	8189	6822	6123	5414	4718	4427	82542
1989	3939	3760	3548	3975	5686	5285	4758	4069	3767	3427	3060	2990	48263
1990	3831	4008	3569	2934	4144	4006	3653	3152	2941	2695	2422	2339	39694
1991	2134	2087	2007	2202	3445	3307	2994	2571	2447	3433	3344	3028	33000
1992	2595	2410	2253	3033	4556	4263	4949	4490	3957	3417	2926	2711	41560
1993	2394	2275	2156	2653	4261	4054	4782	4360	3846	3323	2847	2692	39640
1994	3506	3934	4756	5096	6494	5735	4979	4126	3710	3290	2876	2707	51208
Average	3126	3186	3135	3338	4514	4456	4555	4213	4132	4008	3575	3321	45560

**Table III-47
Enlarged Tamarack Project : Net Yield to the South Platte River (ac-ft)**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1975	0	0	0	-12775	1079	1235	1011	767	631	514	418	366	-6754
1976	307	277	-14058	-13030	2844	2657	2179	1690	1422	1185	980	874	-12674
1977	744	680	608	500	502	445	422	377	361	336	304	294	5573
1978	268	260	246	211	221	-14113	1431	1561	1307	1050	842	734	-5983
1979	614	556	494	405	407	361	343	309	297	-10720	1150	1336	-4448
1980	1066	897	-13554	-12631	-11093	-10182	-9189	-8740	-7991	6755	5725	4814	-54122
1981	3867	3364	-11416	-11017	4890	4442	3834	3142	2789	2438	2100	1946	10377
1982	1710	1612	-12821	-5568	3374	3025	2631	2180	1959	1735	1514	1421	2773
1983	1265	1207	-13180	-12365	-10669	-9748	-8743	-8315	-7562	-7129	-7030	-6441	-88710
1984	-6438	8395	-6938	-7435	-6424	-6290	-5683	-5729	-5209	9267	7944	-7386	-31926
1985	-7403	-6488	-5964	-6458	-5195	-5241	9575	8254	7230	6216	5287	-9449	-9635
1986	5405	5395	-9540	-9456	-7812	66	-7031	-6936	-6148	8573	7446	-7763	-27802
1987	-7667	-6678	-6088	-6526	5546	-6117	-5764	-5666	-5011	9556	8281	-6997	-33131
1988	7316	-7286	-6934	-6806	-5653	8792	8189	6822	6123	5414	4718	4427	25122
1989	3939	3760	-10331	-10380	5686	5285	4758	4069	3767	3427	3060	-11365	5674
1990	3831	4008	3569	-11421	4144	4006	3653	3152	2941	2695	2422	2339	25339
1991	2134	2087	-4633	-9239	3445	3307	2994	2571	-11908	3433	3344	3028	564
1992	2595	2410	-12102	-11322	4556	-10092	4949	4490	3957	3417	2926	2711	-1505
1993	2394	2275	-9673	-11702	4261	-10302	4782	4360	3846	3323	2847	-11663	-15253
1994	635	-10421	-9599	-9260	6494	5735	4979	4126	3710	3290	2876	2707	5272
Average	829	315	-7096	-8314	30	-1636	966	624	-174	2739	2858	-1703	-10562

Colorado has noted that Tamarack will be operated consistent with the operations of the Lake McConaughy EA. Comments received from Colorado imply that the same rules, which apply to the EA regarding diversions during periods of shortage at the critical habitat, should also apply to Tamarack. In other words, Colorado believes Tamarack should receive credit for bypassing water if the EA is storing water during times of shortage at the critical habitat.

◇ **Legal and Institutional Requirements for Implementation:**

Phase I of the Tamarack Plan fell under the auspices of NEPA because federal dollars are used to partially fund the state wildlife areas. To satisfy NEPA compliance an Environmental Assessment (EA) was completed for Phase I of the Tamarack Plan. The EA was approved for a total diversion of about 30,000 ac-ft from the South Platte River, of which approximately 20,000 ac-ft could be pumped from wells and 10,000 ac-ft could be diverted into existing canals. For an enlarged Tamarack project the existing EA would need to be amended to provide for increased diversions from the South Platte River.

A new water right filing is required for increased diversions under an enlarged Tamarack project. In Colorado, an in-state beneficial use, such as fishery or wildlife use, must be decreed for water generated from recharge projects to be protected within the State. Similar to Phase I of the Tamarack Plan, in-state wildlife enhancement benefits associated with the recharge sites could constitute an in-state beneficial use. The water rights filing should take less than one year. The necessary hardware could be installed and the project operated under a temporary substitute supply plan in the interim while the water rights filing is being approved.

◇ **Schedule For Implementation:**

The schedule for implementation is dependent on the time required to install the necessary hardware, i.e. wells, pumps, pipeline, recharge basins, etc., and the time needed to resolve legal and institutional requirements including the water rights filing, EA amendment, and approval of a temporary substitute supply plan if necessary.

Wells and credits from recharge in existing canals are the basis of Colorado's Tamarack Phase III. As noted in comments received from Colorado, agreements with existing canals would be developed by year 2. Wells for recharge on public SWA lands and private lands would be developed at a rate of about 10 wells per year or 5 years to develop up to 50 wells. An enlarged Tamarack project would be fully implemented after 5 years.

◇ **Expected Project Life:**

The expected project life of an expanded Tamarack project would extend beyond the first increment of the Program. A constraint on the project life could be the wells and pumping hardware, which would most likely need to be replaced within 10 to 20 years.

◇ **Capital and Operational Costs:**

The direct costs were estimated based on the capital costs associated with the construction of diversion and storage facilities and annual operating costs. The costs for these types of projects were based on data provided by Northern Colorado Water Conservancy District. Costs estimated for an expanded Tamarack project consider the following items.

- Subsurface investigations
- Construction of wells
- Pumps and related facilities
- Diversion facilities
- Construction of recharge ponds
- Regulation and measurement
- Conveyance facilities
- Engineering costs associated with the design of facilities and analysis of operations
- Compensation provided to the canal company
- Operations and maintenance

Up-front capital costs for an expanded Tamarack project were estimated as follows. A cost of \$3,500 was included for subsurface investigations. A total cost of \$30,000 per well was included for the well drilling, casing material, pump, pump column and shaft, discharge head assembly, and electric motor. It was assumed that electrical power would not be available at all well sites, therefore, an additional cost of \$4,000 was included to provide power to the well. A pipeline cost of \$20,000 per well was included for conveyance facilities and \$7,000 was included for pipeline installation. A cost of \$6,000 was included for recharge basin construction. Engineering costs associated with the design of facilities and analysis of operations were assumed to be 10 percent of the total construction cost of the project.

There are some additional capital costs associated with recharge diversions to existing canals. Costs for diversion structures from an existing canal are typically about \$3,000. A cost of \$4,000 was included for regulation and measurement, which includes the cost of flumes, stilling wells, and stage recorders.

Annual costs consist of operations and maintenance costs and delivery fees. Pump operation costs, which consist primarily of electricity costs, are typically about \$8 per ac-ft pumped. Annual maintenance costs are minimal and typically less than \$300 per well. For diversions to existing canals, canal companies typically charge the owner of the recharge basin a delivery fee per ac-ft delivered. The delivery fee was assumed to be \$5 per ac-ft per year.

An expanded Tamarack project will consist of a combination of wells and diversions to existing canals. The maximum monthly amount diverted from the river is approximately 14,500 ac-ft. About 50 wells would be required to pump up to 14,500 ac-ft per month based on an average pumping rate of 2,200 gpm per well. The average annual diversion from the South Platte River is approximately 56,000 ac-ft. It was assumed that on average about one-third of the annual amount or 20,000 ac-ft/yr would be diverted into existing canals and about two-thirds or 36,000 ac-ft/yr would be diverted via pumps located adjacent to the river. It was assumed that 20 recharge sites would be needed for canal diversions to recharge, and about 50 sites would be needed for pumping to recharge (one site per well).

The total capital cost and annual cost for an expanded Tamarack project is estimated to be about \$4.2 million, and \$403,000, as shown in the table below.

**Table III-48
Cost of an Enlarged Tamarack Project**

DESCRIPTION	Cost for Existing Canals (\$)	Cost for Wells (\$)	Total Cost (\$)
Subsurface Investigations	3,500	3,500	
Diversion Structures	3,000		
Recharge Basins	6,000	6,000	
Measuring Devices	4,000		
Well Construction & Pumps		30,000	
Conveyance Conduit		7,000	
Power Hook-up		4,000	
4000' 12" dia pipe @ \$5/ft		20,000	
Total Cost per Structure or Well	16,500	70,500	
No. of structures or wells	20	50	
Total Construction Cost	330,000	3,525,000	
Engineering Fees (10%)	33,000	353,000	
Total Capital Cost	363,000	3,878,000	4,241,000
ANNUAL COSTS			
Amt. Diverted	20,000	36,000	
Delivery Cost	100,000		
Pump operation cost (\$8/af)		288,000	
Annual Maintenance Costs (\$300/well)		15,000	
Total Annual Cost	100,000	303,000	403,000

Potential costs associated with third party impacts have not been evaluated. Costs may be higher if there are third party impact costs.

◇ **Third-Party Impact Considerations:**

Third party impacts associated with an expanded Tamarack project are similar to those described for groundwater management programs and recharge projects in Nebraska. However, there are potential additional third party hydrologic and economic impacts associated with an expanded Tamarack project as it relates to downstream users. Third party hydrologic effects may include potential impacts on downstream users including CNPPID, NPPD, irrigated lands served by Lake McConaughy, the EA in Lake McConaughy, and hydropower production. These impacts may be minimal or significant depending on how the recharge project is operated. There could be potential negative economic and hydrologic impacts to downstream users if water that is diverted from the river for recharge was historically diverted by downstream irrigators and hydropower generators. Colorado representatives indicated that they have been working with water users in Nebraska to evaluate potential impacts on downstream users, including CNPPID and NPPD, due to an expansion of Tamarack. Preliminary work suggests that potential negative impacts may be minimal. At times an expansion of Tamarack may produce positive impacts.

The three states have initiated discussions about potential criteria, such as effects on downstream senior water rights that can be used in determining when such projects can withdraw from the river. The conditions of the interstate compact and the terms of the Program will impact how Tamarack is operated with regard to river withdrawals. Each state has the right to manage and use water within its boundaries consistent with interstate compacts and decrees and the terms of the Cooperative Agreement and Program.

E. Yield at the Critical Habitat:

The Platte River EIS team modeled the three states' projects (Pathfinder Modification Project, Lake McConaughy EA, and Tamarack Phase I) and the projects included in the Water Action Plan (Revision No. 3 dated April 18, 2000) to determine a total yield score. This score coincides with the average annual reduction to target flow shortages at the critical habitat. Based on the model results, the total score of the combined North Platte, South Platte, and Central Platte projects is approximately 144,000 ac-ft. The EIS team recommends the WAPC consider the "true score" to be in the range of approximately 135,000 to 137,000 ac-ft/yr to account for additional losses not captured in the current models. This score meets the water goals of the Program, which are to reduce shortages to the FWS target flows by 130,000 to 150,000 ac-ft/yr.

There are significant differences between the EIS team models and the water budget spreadsheet, which was used by Boyle to determine reductions in target flow shortages. As a result, the EIS team made adjustments to either the net hydrologic effects provided in the Water Action Plan or to the EIS models to simulate certain projects. Boyle was directed by the WAPC to meet with the EIS team to assist with interpretations of Boyle's methods and findings to minimize the possibility of changes to the proposed operations of the Water Action Plan projects. The primary assumptions or changes indicated by the EIS team are summarized below.

- **Study Period:** For all projects, the study period used by Boyle (1975-1994) is different than the study period being used for the Programmatic EIS (1947-1994). As such, the EIS team extended the net hydrologic effects data presented in the Water Action Plan to be consistent with the period of record used for the Programmatic EIS.
- **La Prele Reservoir:** La Prele Reservoir was modeling independently of the Boyle analysis. Most of the assumptions used by the EIS team were consistent with the Boyle analysis, however, the following additional assumptions were used by the EIS team: 1) any available storage is released each year from May through September, 2) the Program does not get credit for reservoir seepage, and 3) La Prele deliveries are charged a 10 percent loss between La Prele Reservoir and Glendo Reservoir.
- **Wyoming Water Leasing:** The consumptive use savings associated with leasing in Wyoming were assumed to be 8,200 ac-ft, which is consistent with Boyle's analysis. However, the EIS team determined the reduction in deliveries based on the assumption that 50 percent of any diversion returns to the river. The Boyle analysis takes into account both canal losses and farm losses, which average about 65 percent in reaches 1, 2, 3, 4, and 6. The difference in losses assumed by the EIS team and Boyle should not affect the yield score because the total reduction in consumptive use is the same for both analyses.
- **CNPPID Re-regulation Reservoir:** There are six potential re-regulating reservoirs presented in the Water Action Plan. To simplify the modeling of this project, the J-2 Forebay re-regulating reservoir was chosen as a representative project. OPstudy, which is a monthly model, was used by the EIS team to determine the score associated with the J-2 Forebay reservoir. Because daily operation of the reservoir is possible due to the close proximity of the reservoir to the habitat, the EIS team adjusted the score of this project by multiplying by a factor of 2.0 to account for the benefits of daily operation.
- **Nebraska Water Leasing and Water Management Incentives:** These projects were simulated together by the EIS team because the models do not distinguish between reductions in consumptive use due to water leasing versus water management incentives. Based on comments received from Nebraska during the April 26, 2000 WAPC meeting, the total yield associated with water management incentives was increased from 3,500 ac-ft/yr, presented in Revision #3 of the Water Action Plan, to 7,000 ac-ft/yr. There are four potential water management options presented in the Water Action Plan. To simplify the modeling of this project, conservation cropping was chosen as a representative project. All reductions in consumptive use were assumed to be tied to storage in Lake McConaughy except reductions associated with Reach 10, which coincides with the Western Canal. Water leasing in that reach is related to reductions in natural flow diversions and consumptive use. The reaches used in the Boyle analysis were translated into corresponding reaches used in the OPstudy model.
- **Groundwater Management:** There are four potential groundwater management options presented in the Water Action Plan. To simplify the modeling of groundwater management, a conjunctive use project was chosen as a representative project. The option chosen should not impact the yield score significantly because the intended yields of all four options are the same. The average annual volume diverted to recharge was 2,800 ac-ft, which is slightly lower than the 3,000 ac-ft/yr proposed in the Water Action Plan. The difference is due to the fact that the EIS team limited diversions to the J-2 return flow during the non-irrigation season when excesses occurred.

- **Lost Creek/North Dry Creek Cutoffs:** There are two potential cutoff options presented in the Water Action Plan. To simplify the modeling of these projects, the Lost Creek/Ft. Kearny cutoff was modeled assuming existing flows in Lost Creek are diverted back to the Platte River via the cutoff. The maximum monthly flow back to the river was assumed to be 500 ac-ft, which is slightly higher than the 440 ac-ft assumed by Boyle. This change was necessary to achieve a yield close to the 2,200 ac-ft/yr identified in the Water Action Plan. The EIS team reduced the final score of this project by 50 percent because water enters the river midway through the critical habitat.
- **Net Controllable Conserved Water:** Based on comments received from Nebraska during the April 26, 2000 WAPC meeting, the total yield available to the Program was increased from 2,000 ac-ft/yr, presented in Revision #3 of the Water Action Plan, to 5,000 ac-ft/yr.
- **Dawson/Gothenburg Canal:** Due to time constraints, the EIS team did not model this project.

The remainder of this Section E consists of a memo prepared by the EIS team and transmitted to Boyle on May 4, 2000. The memo discusses the results of the EIS team modeling effort and summarizes how each proposed component of the plan was incorporated into the North Platte and Central Platte EIS models.

The Platte River EIS team modeled the Draft Water Action Plan (Revision No. 3 dated April 18, 2000) after further guidance and clarification from Boyle Engineering. In many instances, the exact target yield or score of each separate project could not be “fixed” or held to the desired target due to interaction between the different projects. This effect is not deemed critical as the modeling demonstrates that the combined range of yield and/or score for the individual projects is available to the Water Action Plan. We are also not able to “score” each project individually in terms of its specific contribution to the total reduction in instream flow shortage. However, we do list either the yield of a project on site, the amount contributed to the Environmental Account (EA) if applicable, or an actual “score” for each project.

Although the total combined score is approximately 144,000 acre-feet in average shortage reduction, we recommend that the Water Action Plan Committee consider this value as an over-estimate because we have not been able to address Environmental Account losses to the extent we believe is necessary to fully support that “score”. At this time, we recommend that the Committee consider the “true” score to be in the range of approximately 135,000 to 137,000 acre-feet in order to account for additional losses not captured in the current models. However, it is our assessment that the proposed mix of projects, if implemented to the scale outlined in the draft plan, is followed then the target result in re-regulating flows to reduce shortages will be achieved.

We also did not consider any competition between the Water Action Plan and the ability of the State’s Future Depletion Plans to also provide water at the scale envisioned over the first proposed increment (13-15 years). This is mentioned not as a perceived problem, only to clarify the analysis that was done.

Following is a summary of how each proposed component of the plan was incorporated into the North Platte and Central Platte EIS OPstudy models.

NORTH PLATTE RIVER EIS MODEL

La Prele Reservoir

(Average yield = 2,225 acre-feet per year at the reservoir)

Because the study period used by Boyle Engineering to prepare the Water Action Plan is less than the study period being used for the Programmatic EIS, it was necessary to independently model La Prele Reservoir. To do so, the following assumptions were made.

1. Inflows to La Prele Reservoir are based on a USGS gage that was maintained on La Prele Creek a short distance above La Prele Reservoir. The inflow is assumed to be 105.5% of the gaged flow. This assumption was adopted from the DWAP prepared by Boyle. Where USGS data does not exist (November-February 1972, October-February 1973-1992, and all of 1993 and 1994) averages are used.
2. System bypass demands and the distribution of those demands are from the 1981 report titled “Preliminary Technical Data report, WyCoalGas Project Water System” prepared by Banner and Associates for Panhandle Eastern Pipe Line. These are also the demands that were utilized by Boyle for the DWAP and include senior downstream rights and La Prele Irrigation District demands.

3. Storable flows are the difference between the inflows and system bypass demands, storable flows are split 25% to PEPL and 75% to the district, and PEPL's storable flows are limited to 5000 acre-feet in any water year.
4. Seepage is 3.5 cfs throughout the study period. This assumption was adopted from the DWAP prepared by Boyle. All seepage is charged against the PEPL storage account to the extent that storable flows plus storage are greater than the seepage amount. In simple words, the PEPL account is not allowed to accrue negative amounts when seepage is greater than 25% of the inflows plus storage in PEPL's account.
5. Evaporation calculations are simplified using an average surface area of approximately 450 acres and evaporation is prorated 25% to Panhandle Eastern Pipe Line's account and 75% to the remaining storage. This assumption was adopted from the DWAP prepared by Boyle. Similar to seepage, evaporation is not allowed to cause PEPL storage to drop below zero. Evaporation rates for each month are from the 1981 report titled "Preliminary Technical Data report, WyCoalGas Project Water System" prepared by Banner and Associates for Panhandle Eastern Pipe Line.
6. Demand on the PEPL account for the Program was structured such that any available storage would be released each water year and releases occur in May-Sept.
7. The storage in the PEPL account equals the storage from the previous month plus the storable flow minus seepage minus 25% of the evaporation minus the demand, not to be less than zero. Therefore, demand is limited to the available storage adjusted for seepage and evaporation.
8. The Program does not get credit for seepage amounts because seepage is part of the current regime of the river and does not constitute "new" water.
9. La Prele deliveries are charged a 10% loss between La Prele Reservoir and Glendo Reservoir. This was adapted from the 1981 report titled "Preliminary Technical Data report, WyCoalGas Project Water System" prepared by Banner and Associates for Panhandle Eastern Pipe Line.

Using these assumptions the average annual delivery from the La Prele project for 1947-1994 is 2,225 acre-feet per year at the reservoir.

Pathfinder Municipal Account

(Average yield = 4,800 acre-feet per year at the reservoir)

The input to the North Platte River EIS model was modified such that the municipal demand is 4,800 acre-feet per year. The demand is 9,600 in dry years, 0 in wet years and 5,664 in the remaining years. The annual flows into Seminoe Reservoir for 1941-1994 were ranked from lowest (1954) to highest (1984) and the top 33% were considered wet and the bottom 25% were considered dry. After determining the Pathfinder Municipal demand, the remaining delivery (9,600 minus the municipal demand) was made available to the program and delivered in September.

Glendo Storage

(Average yield = 2,650 acre-feet per year at the reservoir)

The North Platte EIS model has a demand for the 10,600 acre-feet of Glendo conservation storage. In order to provide water for the Program, an additional demand had to be put on the system. The Program would not receive any storage during dry years as described above. In the remaining years, the Program could take up to the difference between the existing demand and the maximum 10,600 acre-feet delivery. In order to achieve a yield of 2,650 acre-feet at the reservoir, approximately 50% of the difference was delivered to the Program.

Water Leasing

(Average yield is approximately 8,200 acre-feet per year at the reservoir)

Given the declaration by the Water Committee that water leasing should be tied to storage, water leasing in reaches 1, 2, 3, and 4 was concentrated in the Kendrick Project. In order to achieve the reduction in consumptive use of approximately 6,100 acre-feet, the deliveries to the Kendrick Project were reduced by 17% or around 12,200 acre-feet per year. This incorporates the assumption that approximately 50% of any diversion returns to the North Platte River, which is different from Boyle's analysis. Boyle's analysis includes conveyance losses which are considered to be 100% consumptive use. The EIS analysis uses the assumptions that are included in the North Platte River EIS model, which are that 50% of any diversion returns to the river. Water leasing in reach 6 is assumed to be tied to the storage associated with the Wheatland Irrigation District and the consumptive use portion of the leasing is added as an inflow to the North Platte River EIS model at the Laramie River.

CENTRAL PLATTE RIVER EIS OPSTUDY MODEL

CNPPID Re-Regulating Reservoir

("Score" = 6.2 kaf)

Following receipt of Central's Depletion Mitigation Study Phase I (HDR Engineering, April 7, 2000), Boyle advised using the J-2 Forebay project as an example project with a capacity of 3,436 acre-feet. The project included an inflow rate (when instream flow excess existed at Overton, Grand Island, and the J2 return) of 100 cfs to the reservoir, and an outflow rate of 50 cfs whenever shortages were occurring. In the monthly OPstudy model, the average annual release was approximately 3,100 acre-feet. Based on EIS team comparisons of monthly and daily flow data for a reregulating project in the vicinity of the J2-Forebay area (and the size of the inlet & outlet), the EIS team scored this project by multiplying by a factor of 2.0. This resulted in a "score" of 6,200 acre-feet for this example project.

Water Leasing and Water Management Incentives

(Yield to EA = 15.9 kaf + Western Canal reduction of 0.947 kaf)

Projects of these types basically involve reductions in consumptive use and depending upon the location, the "saved" water may or may not be directly available to the McConaughy Environmental Account. For example, the Western Canal (Boyle reach 10) does not receive storage water from Lake McConaughy. Therefore, Water Leasing and Management Incentives in that reach are related to reductions in natural flow diversions combined with recognition of the saved volume and protection from diversion for consumptive use. The Western Canal volume associated with Leasing/Incentives averaged 947 acre-feet per year.

The other reaches in the Boyle report were translated into the corresponding OPstudy reaches and the reduction in consumptive use assumed to be from reduced storage deliveries:

Keystone - Sutherland Canals (North Platte River)	898 acre-feet
Sutherland - North Platte Canals (North Platte River)	268 acre-feet
Brady - Cozad Canals (Platte River)	1,558 acre-feet
Central District (Platte River)	12,217 acre-feet
Kearney Canal (Platte River)	221 acre-feet

The sum of the savings in consumptive use (except for the Western Canal) is 15,160 acre-feet. This volume was allocated annually to the EA in each October. The Boyle report recognizes that to achieve a certain volume of consumptive use reduction, a larger reduction in on-farm deliveries is needed in order to provide previous levels of return flow to the system. By modeling the reduction in Consumptive Use, the OPstudy model is consistent with Boyle's analysis.

Ground Water Management

(Amount stored below J2 area = 2.8 kaf, amount credited to EA = 4.5 kaf)

Option 4 in the Boyle report (conjunctive use project in CNPP&ID area) was used as a representative project. An annual target storage volume of 3,500 acre-feet was used in the OPstudy model, and diversion from the J2-return flow available was allowed during the non-irrigation season when excess occurred. The average annual volume stored over the study period from excess was approximately 2,800 acre-feet and it was assumed that this volume was subsequently pumped during the irrigation season to meet demands. Accounting for losses in the NPPD and Central District systems resulted in an average of 4,500 acre-feet being credited to the Environmental Account.

Lost Creek/North Dry Creek Cutoff

(2.2 acre-feet contributed to river, "score" = 1.1 kaf)

This project was simulated by introducing water into the OPstudy model above Kearney (in the Overton - Odessa reach of the model). A maximum inflow rate of 500 acre-feet was allowed whenever instream flow excess was occurring during May thru September. This is somewhat higher than the 440 acre-feet volume identified by Boyle in Table III-26 in order to achieve a yield closer to that identified in the draft plan (2,200 acre-feet). Because the water enters in the mid-section of the habitat, the final score was 50% of the volume introduced.

Power Interference

(Yield to EA of 5.5 kaf)

The OPstudy model was modified to make the operation of the Power Interference Scenario compatible with the analysis done by Boyle. Specifically, excess to FERC requirements is considered during the non-irrigation season, and excess to "system needs" (irrigation, minimum canal flow, etc.) is considered during the irrigation season. Nebraska identified a target yield from this component of 4,000 acre-feet. The potential yield of this component is greater than 4,000 acre-feet, and in order to achieve results closer to the target level only a portion of the available power interference volume was reregulated and credited to the Environmental Account. The total amount credited was 5,500 acre-feet and this is assumed to be close to 4,000 acre-feet in "score".

Net Controllable Conserved Water

Based on discussions with Boyle and direction from the Water Action Plan Committee, an annual volume of 5,000 acre-feet was contributed to the Environmental Account from Lake McConaughy storage in each October.

Dawson/Gothenburg Canal GW Recharge

Due to time constraints and the need for additional modifications to model this component, the EIS team did not model this recharge project. It is noted that the projected yield is approximately 1,300 acre-feet. It is assumed that the project is feasible (i.e. enough “excess” remains to reregulate), and that the yield of 1,300 acre-feet is somewhat included in the other projects over/under-estimate of the total yield.

Tamarack Phase III

(Yield of 27.8 kaf exchanged into EA)

This was modeled by increasing the pumping capacity of Wells 1, 2, 3, & 4 such that the reregulated volume exchanged into the McConaughy EA approximated the target level of 27,000 acre-feet.

Total Score

The total score of the combined North Platte, South Platte, and Central Platte projects is approximately 144 kaf

Source: EIS team.

IV. Monitoring and Accounting

A. Monitoring

Per the WC's Scope of Services, monitoring methods will be necessary to assess the effectiveness of projects as they are implemented. These methods must be compatible with the tracking and accounting methods being developed separately by the WC in concert with each state's water administration. To a certain extent there may be overlap between monitoring and tracking and accounting methods. This section provides information on the types of information needed to support assessments of project effectiveness.

The extent to which monitoring is necessary will depend to a large degree on how much information is currently available for each of the projects included in the Water Action Plan. Monitoring requirements will be similar for certain types of projects, therefore, they have been described for four general types of projects.

- **Reservoir Projects**

Reservoir projects include the CNPPID Re-regulating Reservoir, La Prele Reservoir, Glendo storage and the Pathfinder municipal account. For all these projects monitoring will be required to account for diversions to storage and releases. In the case of Pathfinder Reservoir and Glendo Reservoir, diversions to the municipal account, and the 40,000 ac-ft pool, respectively, are of primary interest. In the case of the CNPPID Re-regulating Reservoir and La Prele Reservoir, additional monitoring of seepage may be required to assess impacts on downstream landowners and track seepage gains to the river.

- **Agricultural Conservation**

These projects include water leasing and water management programs. For agricultural conservation projects it will be necessary to define baseline conditions prior to implementing the project. Baseline conditions are necessary to ensure the programs are implemented as designed. Monitoring will be required to assess the acreage involved in the program, crop mixes, consumptive irrigation requirements, natural flow and storage water deliveries, and surface and groundwater return flows. Baseline conditions can be determined primarily through surveys and diversion records, however, observation wells may need to be installed and hydrogeologic investigations conducted to measure return flows. On-farm efficiency tests may also be necessary to quantify surface and groundwater return flows.

Once baseline conditions are defined it will be possible to determine the incremental hydrologic effects of water leasing, land fallowing, deficit irrigation, conservation cropping, or changes in irrigation techniques, and monitor whether programs are being implemented as designed.

- **Groundwater Management**

These projects include groundwater management, groundwater recharge, and the North Dry Creek/Fort Kearny cutoff projects. There is a significant amount of monitoring required for groundwater management and recharge projects to confirm projects generate the proposed yields. The estimated yields of recharge projects were calculated using the Steam Depletion Factor (SDF)

method. These estimates do not account for site-specific variations in geologic conditions. Therefore, observation wells would need to be installed and hydrogeologic investigations and modeling conducted to more accurately measure recharge water returning to the river.

With respect to groundwater management projects in Nebraska there is uncertainty regarding the dynamic response of the groundwater mound in Central Nebraska and the extent to which water from the mound can be used to supplement streamflows. Further investigation and monitoring is required prior to implementing groundwater management programs in Central Nebraska to ensure the sustainability of these projects. Observation wells and hydrogeologic investigations will be needed to monitor and assess the impacts of the proposed projects. Any project designed to take water from the mound will need to be phased-in so that hydrologic impacts can be monitored and evaluated.

- **Power Interference**

The modeling tool that was appropriately used in the study for basin-wide comparisons of projects must be supplemented with a detailed reservoir operations model to more accurately predict the yield of the power interference project. Current uncertainties associated with this alternative are primarily the amount of water available for power interference, and the operation of Lake McConaughy as it relates to power interference.

In addition to the yield analysis, there are also needs for accurate monitoring and accounting tools. Monitoring and accounting methods for power interference must use reservoir operations data consistent with other day-to-day management activities. Accounting will be required to track how much water is available for power interference, power interference releases, and changes in storage.

B. Tracking and Accounting

Pursuant to Milestone W14-1 of the Cooperative Agreement, the three states have developed tracking and accounting procedures for tracking water contributions to the Program. To the extent possible, existing laws and water administration will be used, however, in some instances laws and/or water administration procedures may need to be changed. Presented below are tracking and accounting procedures provided by the three states.

1. *NEBRASKA'S TRACKING AND ACCOUNTING*

Under existing water law in Nebraska there are two types of water that can be tracked and protected from diversion: storage water and water conducted down a stream under statute 46-252. Essentially, the tracking and accounting program keeps track of the amount of storage water introduced and/or diverted in a given river reach. Pre-set conveyance losses are assessed in each reach. Losses to storage water are assessed in proportion to the relative amounts of storage water and natural flow in the reach. The residual water in the reach is considered to be natural flow. River reaches are established based on the distance water can travel within one day.

Storage water is water that has been permitted to be stored in a reservoir. In Nebraska before storage water released into a stream can be protected for specific uses, the water must also have a storage use permit. This permit indicates the use of the water, point of release and the point of use or diversion. For instream uses, the water is protected from diversions from its

point of release to the permitted end point of the beneficial use. Once storage water has passed the last point of diversion or the “end point” of the instream use indicated on the permit, any remaining water is considered to be natural flow.

Traditionally Nebraska statute 46-252 has allowed the state to protect from diversion water that is put into a natural stream simply to convey that water to a downstream point of diversion. This statute could also be used to protect water for instream uses from the point of introduction to the end point of the instream use. A key provision of this law is that the protected water is water that otherwise would not have been available in the stream.

There are several projects in the proposed Water Action Plan that rely on the release of water from a storage reservoir. The CNPPID Re-regulating Reservoir, Power Interference, Pathfinder Municipal Account, Glendo Storage, and La Prele Reservoir options would all involve the use of storage water. Under existing Nebraska law these projects could obtain a storage use permit allowing the state to protect the water for instream environmental uses.

As stated above, Nebraska statute 46-252 has traditionally been used to allow a natural stream to be used as a conduit to move water from release into the stream downstream to another point of diversion. The statute did contemplate allowing the state to protect from diversion water introduced into the stream for instream purposes. There is no reason to believe that this statute could not be used to protect water derived from the other projects listed in the proposed Water Action Plan. However, to date there are no legal precedents to indicate precisely how this law would work in any given situation. Until an actual application has been duly heard and granted, it is impossible to know whether such permits would be granted.

If permits are granted under statute 46-252, one key premise would be that the protected water would not otherwise have been available for use. In each case, the applicant would have to show that the water to be protected would not otherwise have been available. For example, return flows from a project that were historically available for other water rights would presumably have to remain available for use by these rights. However, if the applicant could show that water from water leasing, ground water management or a recharge project would not have been otherwise available in the stream, the Director could grant a permit to protect this water for beneficial instream uses.

2. WYOMING’S TRACKING AND ACCOUNTING

1. Wyoming has agreed to contribute water from the Environmental Account of the Pathfinder Modification Project to the proposed Program. The release from this account will be tracked by adding the necessary lines to the existing daily accounting program. Conveyance losses will be charged proportionally to the Program water in the same manner that losses will be charged to other storage deliveries, according to the North Platte Decree (Decree) and its stipulations.
2. Wyoming has suggested that water may be leased from the Municipal Account of the Pathfinder Modification Project and/or its allocation from Glendo Reservoir, subject to certain specified conditions. Again, the releases from these accounts will be tracked by adding the necessary lines to the existing daily accounting program. Conveyance losses will be charged proportionally to the Program water in the same manner that losses will be charged to other federal storage deliveries, according to the Decree.

3. Wyoming has also suggested that water may be leased to the proposed Program, subject to certain specified conditions. At a minimum, such a lease would require a temporary change of use and must meet the requirements of Wyoming water law. The lease would be subject to the review and approval of the Wyoming Board of Control. The Board of Control would place conditions on the transaction to ensure the protection of other appropriators. These restrictions will address the amount of water that can be leased and conveyance losses to be charged, as well as address other issues specific to the individual transactions. The existing daily accounting program can be revised to accommodate any of the four following categories of lease transaction:
 - a. If the leased water comes from **federal storage**, it will be tracked and accounted as explained in item 2. above.
 - b. If the leased water comes from **non-federal storage**, it will be assessed a conveyance loss by the Board of Control for the distance to the state line.
 - c. If the leased water comes from **natural flow and is not stored**, the Board of Control will determine the appropriate conveyance loss from the point of historic use to the state line. It is likely that this category will be difficult, if not impossible, to achieve and implement.
 - d. If leased **natural flow is to be stored** in a reservoir, the Board of Control will assess conveyance losses from the point of historic use to the reservoir. The release of such water from the reservoir will be assessed conveyance losses in accordance with a. or b. above depending on the ownership and location of the reservoir.
4. Future depletions will be computed and reported in accordance with Wyoming's Depletion Mitigation Program. Wyoming will calculate the impacts of any excess depletions to flows at the state line. Wyoming will determine the cause of the excess depletion and determine the amount of water that would have arrived at the state line had the excess not occurred. In order to make this determination, conveyance losses must be considered. The losses specified in the Decree and past Board of Control orders will be used to the extent possible. After the impact from the excess depletions has been determined, Wyoming will calculate the amount of water that would have to be released from the Municipal Account of the Pathfinder Modification Project or its contract storage in Glendo Reservoir to offset the impact, giving full consideration to the conveyance losses specified in the Decree. The resulting calculated release would be subtracted from releases made of leased water (see item 2 above). Wyoming would not expect lease payments for any water which served to offset the impact of excess depletions.

3. COLORADO'S TRACKING AND ACCOUNTING

In Colorado, water rights are property rights, which can be freely changed, subject to a non-injury standard. The Water Right Determination and Administration Act of 1969, § 37-92-101 *et seq.*, C.R.S. (1990 & 1996 Supp.), requires the holder of a water right who wants an enforceable priority date to adjudicate the water right in water court. § 37-92-302 (1) (a). The Act allows the holder of a junior water right to adjudicate a water right so long as no injury occurs to other existing water rights.

The state engineer and division engineers are responsible for administering and distributing the waters of the state based on priorities. § 37-92-301 (1) and (3). This includes protecting water to a water right's decreed point of diversion and, in the case of storage releases or recharge

projects, delivering it to a beneficial use within Colorado. Examples of this could be the Tamarack Ranch and Pony Express State wildlife recharge projects. The division engineer has authority to protect the return flows from the recharge projects, which have a first beneficial use of wildlife and augmentation on the State Lands and then subsequently route water for beneficial uses close to the state line. Depending on the actual location of any project in the Lower South Platte River, diversion structures may have to be modified and measuring devices installed to assure that water can be delivered to the downstream point of beneficial use in Colorado. Transit losses would be assessed based upon river conditions at the time of delivery.

Existing Colorado law provides several possible mechanisms for protecting water to the state line. First, the Colorado Water Conservation Board would appropriate or acquire instream flows in Colorado to the state line. Colorado's instream flow statute, § 37-92-102 (3) & (4), C.R.S. (1990 & 1996 Supp.), vests the CWCB with the exclusive authority to obtain a decree adjudicating a water right for instream flows in a stream channel between specific points. The Board is empowered to appropriate such water or to acquire such water, water rights, or interests in water as it determines may be required for minimum stream flows to preserve the natural environment to a reasonable degree. *Id.* Under section 102 (3) (c), the Board must find, specifically,

that the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made; that there is a natural environment that can be preserved to a reasonable degree with the board's water right, if granted; and that such environment can exist without material injury to water rights.

Section 102 (3) also provides that the Board is not authorized "to deprive the people of the State of Colorado of the beneficial use of those waters available by law and interstate compact."

Thus, to protect flows to the state line, the Board would have to determine that the amount and timing of flows was necessary to preserve the natural environment to a reasonable degree in Colorado and that doing so would not deprive the people of Colorado of the beneficial use of water available under the South Platte River Compact.

Another possible way to deliver additional water to Nebraska for the endangered species would be for some entity to appropriate or acquire water, water rights, or interests in water to be transported to and used in Nebraska. However, it is unlawful to divert, carry or transport any surface or ground water out of the state without complying with Colorado's export statute, § 37-81-101 *et seq.*, C.R.S. (1990), which established standards for approving exports. The statute applies to the transportation of water from the state by any means, including natural streams or watercourses. § 37-81-101 (2). Depending on the source of water, the would-be exporter must file an application with and receive approval from the State Engineer, Ground Water Commission or water court. *Id.* Since the export statute has never been used, this would be a case of first impression.

A third option would be for Colorado to enact new legislation expressly authorizing the protection of water to the state line to benefit endangered species in Nebraska. If this alternative is selected by the Governance Committee and the water is proposed to be protected, the existing statutes would have to be changed. Any proposed change to the Export Statute would face stiff opposition in the State since it affects other Compacts throughout Colorado. Colorado would only consider changing the law if no other alternative is available to meet Colorado's obligation.

It is important to recognize that even water that is not legally protected to the state line may still reach it anyway depending on the location and timing. If a proposed project is located close to the state line, where no Colorado water user will have the opportunity to divert the water, this water will unavoidably result in changes in the timing of flows at the state line, for which Colorado may receive credit in a Platte Basin Endangered Species Recovery Program. Tracking and accounting of the recharge rates and subsequent return flow rates would have to be done by someone other than the State Engineer's Office. Depending on the actual location of any project in the lower river, diversion structures may have to be modified and measuring devices installed. If the water is not protected then Colorado would keep track of any water that is not diverted by vested water users. It should be noted that we are considering the possibility of tracking the use of any water that is diverted by any irrigation system. This tracking of the irrigation diversions would be done by someone other than the State Engineer's Office and is envisioned to happen if only a few diverters are involved. It is Colorado's position that if the water is new retimed water that any return flows that can be quantified should be credited towards the program. The tracking of any return flows to the river from the original recharge efforts and including subsequent return from any irrigation diversions would be reported to the State Engineer's Office.

The existing accounting of the State Engineer's Office would need to be revised to track the Tamarack Plan Water that moves through the lower reaches of the river. This would require making minor additions to our existing tracking system to specifically track this water.

V. Water Movement through the Hydrologic System

Water movement through the hydrologic system refers to effects on conserved or additional water as it flows downstream to the critical habitat. Depending on how a project is operated there are options for management, storage, and delivery that could maximize benefits for the critical habitat.

Conserved water or retimed water suffers losses en route to the critical habitat. Additional water flowing through the system as a result of an alternative is subject primarily to evaporation, seepage, and diversion losses. Depending on the water rights status associated with a project, diversion losses may or may not apply. If the additional water generated by a project can be protected there are no downstream diversion losses. However, if a project cannot be protected additional water will suffer diversion losses as it moves downstream through the system.

The primary method to increase a project's reductions to target flow shortages is to re-regulate additional water through the Lake McConaughy EA. As indicated in Section D of Attachment II of the Cooperative Agreement, "It is an operational goal to coordinate upstream conservation activities so as to increase storage in the Environmental Account." For projects that are upstream of Lake McConaughy, the EA could be used to re-regulate additional or retimed water provided storage space is available. Projects in Wyoming that are located on the North Platte River above Lake McConaughy can be easily re-regulated through the EA. The EA could also be used to re-regulate additional program water downstream of Lake McConaughy through exchanges, however, the EA may not always be available to re-regulate downstream projects. Users downstream of Lake McConaughy such as CNPPID and/or NPPD could divert the additional water generated by an alternative in exchange for reduced releases, which would result in corresponding increases in the EA. South Platte and Platte River exchanges for projects downstream of Lake McConaughy are less certain because of minimum flow requirements and the requirement that water be of use to CNPPID and NPPD. The opportunity for such exchanges is greater if a project, such as water leasing, is already associated with Lake McConaughy storage.

It may be possible to use storage accounts in other reservoirs to re-regulate Program water to enhance benefits at the critical habitat. For example, a temporary storage contract in Glendo Reservoir would most likely be needed to store seepage losses attributable to PEPL's storage account in La Prele Reservoir so that water can be released during periods of shortage. Likewise, temporary water leasing in Wyoming is more effective if it is tied to storage water. For example, there may be opportunities to lease water from the Kendrick Project and potentially store that water in an environmental account in Seminoe Reservoir.

VI. Summary

The Program is based on an incremental approach to achieve the goal of providing 130,000 to 150,000 ac-ft per year over the next 10 to 13 years. A portion of the instream flow objectives will be met through the Lake McConaughy EA, the Pathfinder Modification Project, and the Tamarack Plan. The primary purpose of the Water Action Plan with respect to the Program is to identify ways of reducing the remaining target flow shortages. The three states have identified 13 projects for inclusion in the Water Action Plan. These projects consist primarily of reservoir, groundwater management and recharge, agricultural leasing and conservation, and power interference projects.

A. Estimated Yields

The estimated yields at the critical habitat associated with the 13 projects are summarized in Table VI-1. These yields are based on model runs using the water budget. The EIS team has modeled the combined effects of the three state's projects and the 13 projects included in the Water Action Plan. Recent EIS team modeling of the three states' projects, which include the Lake McConaughy EA, Pathfinder Modification Project, and the Tamarack Plan indicate a score of about 80,000 ac-ft per year of average reductions to target flow shortages. The total score associated with the three state's projects and all 13 projects included in the Water Action Plan is 144,000 ac-ft/yr (EIS team memo, May 4, 2000). As stated in their May 4, 2000 memo, the EIS team recommends the WAPC consider the "true score" to be in the range of approximately 135,000 to 137,000 ac-ft/yr to account for additional losses not captured in the current models.

B. Cost Estimates

The initial and annual costs associated with each project are summarized in Table VI-1. The total up-front capital costs associated with the 13 projects range from 8.0 to 11.9 million. A financial analysis of the total funding requirements through the first increment has also been completed. To determine the total funding requirements through the first increment the annual operations and maintenance costs for 13 years of use were estimated and an equivalent present value cost was computed using a six-percent discount rate. The up-front capital costs were added to the present value of annual costs to obtain a total capitalized cost. The estimated total capitalized cost of the 13 projects ranges from \$36.9 to \$68.8 million, as summarized in Table VI-1. To provide distinction for projects that have an infrastructure value beyond the first increment, the total cost and unit cost of each project in year 14, which is the first year of the second increment, is included in Table VI-1. For example, the costs of a reservoir project in year 14 consist only of operations, maintenance, and replacement costs because the initial capital costs are included in their entirety in the first increment. However, the cost of an agricultural leasing project in year 14 is assumed to be the same as it is in year 1 because there are no large capital construction costs associated with this type of project.

**Table VI-1
Water Action Plan
Summary Table⁸**

Project	State	Initial Cost (\$)	Annual Cost (\$)	Present Value of Annual Cost through the First Increment ⁵ (\$)	Present Value of Total Cost through the First Increment (\$)	Estimated Yield at Critical Habitat (ac-ft)	First Increment Unit Cost (\$/ac-ft) ⁶	Year 14 Total Cost (\$)	Year 14 Unit Cost (\$/ac-ft)
1. CNPPID Reregulating Reservoir (min. yield)	Nebraska	\$2,450,000 - \$4,610,000	\$78,000 - \$255,000	\$690,000 - \$2,258,000	\$3,140,000 - \$6,868,000	4,000	\$790 - \$1,720	\$78,000 - \$255,000	\$20 - \$60
CNPPID Reregulating Reservoir (max. yield)	Nebraska	\$3,390,000 - \$6,370,000	\$108,000 - \$352,000	\$956,000 - \$3,120,000	\$4,350,000 - \$9,490,000	5,500	\$790 - \$1,720	\$108,000 - \$352,000	\$20 - \$60
2. Water Leasing	Nebraska		\$661,000 - \$1,489,000	\$5,852,000 - \$13,182,000	\$5,852,000 - \$13,182,000	7,000	\$840 - \$1,880	\$661,000 - \$1,489,000	\$90 - \$210
3. Water Management Incentives ³	Nebraska		\$620,000 - \$2,500,000	\$5,489,000 - \$22,132,000	\$5,489,000 - \$22,132,000	7,000	\$780 - \$3,160	\$620,000 - \$2,500,000	\$90 - \$360
4. GW Management ¹	Nebraska								
Active Pumping		\$590,000	\$14,000	\$124,000	\$714,000	1,400	\$510	\$14,000	\$10
5. North Dry Creek/Fort Kearny Cutoffs	Nebraska								
Lost Ck/North Dry Ck Cutoff		\$330,000	\$86,200	\$763,000	\$1,093,000				
Lost Ck/Ft. Kearny IPA Cutoff		\$333,000	\$6,000	\$53,000	\$386,000				
Subtotal		\$663,000	\$92,200	\$816,000	\$1,479,000	4,400	\$340	\$92,200	\$20
6. Dawson/Gothenburg Canal GW Recharge	Nebraska								
Gothenburg Canal GW Recharge		\$13,800	\$38,000	\$336,000	\$349,800				
Dawson Canal GW Recharge		\$13,800	\$51,700	\$458,000	\$471,800				
Subtotal		\$27,600	\$89,700	\$794,000	\$821,600	1,800	\$460	\$89,800	\$50
7. Power Interference ²	Nebraska		\$162,700	\$1,440,000	\$1,440,000	1,400	\$1,030 ²	\$162,700	\$120
8a. Net Controllable Conserved Water	Nebraska		\$0	\$0	\$0	500	\$0	\$0	\$0
8b. Net Controllable Conserved Water	Nebraska		\$305,000	\$2,700,000	\$2,700,000	4,500	\$600	\$305,000	\$70
9. Pathfinder Municipal Account	Wyoming		\$228,000	\$2,018,000	\$2,018,000	4,800	\$420	\$228,000	\$50
10. Glendo Storage ⁴	Wyoming		\$13,250 - \$198,750	\$117,000 - \$1,759,000	\$117,000 - \$1,759,000	2,650	\$40 - \$660	\$13,250 - \$198,750	\$5 - \$75
11. Water Leasing	Wyoming		\$279,000	\$2,470,000	\$2,470,000	3,900	\$630	\$279,000	\$70
12. LaPrele Reservoir	Wyoming		\$318,500	\$2,820,000	\$2,820,000	2,200	\$1,280	***	***
13. GW Management (Tamarack III)	Colorado	\$4,241,000	\$403,000	\$3,568,000	\$7,809,000	17,000	\$460	\$403,000	\$20
Total/Average		\$8.0 - 11.9 million			\$36.9 - \$68.8 million	62,550 - 64,050	\$580 - \$1070	\$2.9 - \$6.1 million	\$47 - \$95

Notes:

1: Potential groundwater management projects include active pumping, dry-land farming, conversion to groundwater irrigation and conjunctive use.

Only one of these projects is necessary to yield 1,400 ac-ft, therefore, only the costs associated with active pumping have been included in the total.

The estimated annual cost associated with passive lowering of the groundwater table with dry-land farming ranges from \$112,000 to \$266,000.

The estimated capital cost associated with conversion to groundwater irrigation is \$60,000. This does not include costs to improve irrigation equipment if necessary.

The estimated capital cost associated with a conjunctive use project is \$161,000, with an annual operations and maintenance cost of \$5,900.

2: The annual costs associated with power interference include NPPD's generation costs but not transmission, operation and maintenance costs for replacement power.

3: Water management programs consist of conservation cropping, deficit irrigation, land fallowing, and on-farm irrigation changes. The costs presented provide the range for these projects.

4: The cost for Glendo storage is based on costs to lease Glendo storage water under temporary water service contracts, which range from \$5/ac-ft/yr for irrigation uses to \$75/ac-ft/yr for municipal and industrial purposes.

5: The present value of annual costs is based on a period of 13 years, which corresponds with the First Increment, and a discount rate of 6 percent. These costs may need to be adjusted once implementation schedules are better defined. Replacement costs were not included.

6: The unit cost equals the present value of total cost divided by the yield.

7: The minimum and maximum costs are based on the North Plum Creek and Jeffrey Canyon Reservoirs, respectively.

8: Costs to mitigate potential third party impacts are not included.

*** PEPL will no longer have an annual debt service payment after the remaining principal payment on the loan is paid off. After the remaining principal is paid off the annual cost per ac-ft may change.

It is important to note that the annual costs may not be incurred for the entire 13 years of the first increment. As discussed below, some projects will likely be phased in and other projects will take several years to implement. The present value of annual costs during the first increment will depend upon the time and level of implementation. There is considerable uncertainty regarding the implementation schedules, therefore, the present value of annual costs was based on the entire first increment, or 13 years. The total capitalized costs presented in Table VI-1 may be less depending on when projects are implemented and how many years annual costs are incurred. The funds for the Program are scheduled to be provided throughout all of the first increment. When potential schedules and costs are better defined, schedules will need to be reassessed and possibly modified strictly for cash flow reasons. This is further discussed in section E.

C. Legal and Institutional Issues

There are specific legal and institutional requirements related to each individual project, however, some generalizations can be made regarding the legal requirements in each state. In Nebraska for example, Section 46-252 provides for the protection of water for the purposes of instream beneficial uses. It is possible that additional water generated by several Nebraska projects included in the Water Action Plan will be protected under Section 46-252. In the case of agricultural conservation and leasing projects in Nebraska there is currently no existing legislation that addresses these programs. New legislation would be required to implement a leasing program in Nebraska. In general, permits would be required from the Nebraska DWR to implement any project in Nebraska. In Wyoming, secondary supply water rights would be required from the Wyoming State Engineer to ensure the protection of additional water downstream to the Wyoming/Nebraska state line. In addition, the Wyoming State Engineer and Legislature must approve any exports. Any partial change of use needed for water to be used for downstream environmental purposes in the critical habitat would need to be secured from the Wyoming Board of Control. It is likely that an amendment to existing legislation would be required to lease agricultural water rights or La Prele Reservoir water as the existing statute, 41-3-110, only provides for leases up to two years. In Colorado, in-state wildlife enhancement benefits must be decreed for water generated from recharge projects to be protected within Colorado. Such water may then reach Nebraska, where it can be delivered to the associated habitats. For all three states NEPA compliance and site-specific environmental permits may be required for the construction of any infrastructure depending on site impacts.

D. Third Party Impacts

Third party impacts were identified and discussed qualitatively. Third party effects that have been considered include hydrologic, economic, environmental and socioeconomic impacts. Third party hydrologic impacts on existing surface and groundwater users are due primarily to changes in the timing and quantity of water in the river. Diversions, storage releases, and return flows alter the quantity and timing of water available to downstream users. Third party economic impacts related to agricultural conservation and leasing programs are related primarily to effects on agricultural equipment suppliers, farm workers, processing industries and local communities that depend on agriculture. The economy in the study area is dependent on agriculture to a large degree in which case economic and fiscal conditions are impacted by changes in crop patterns and crop production. Some projects, including reservoir and recharge projects, provide an increase in recreational opportunities. Third party environmental impacts for most projects can be both positive and negative as they relate to water quality. Water quality could improve during the summer months when

additional flows are added to the river, and degrade during the winter months when river flows are reduced.

E. Implementation Schedule

The states were requested by the WAPC to develop implementation schedules for their projects as shown in the second column of Table VI-2 below. These schedules are estimated times to implementation from the start of the Program, or if action to implement the alternative does not commence until sometime after the first year of Program implementation, the estimated time to complete implementation once it has begun. The third column of Table VI-2 provides the estimated times used in the analysis of funding requirements presented below.

**Table VI-2
Implementation Schedule**

Project	Years to Implement	Assumed Time Required
CNPPID Re-regulating Reservoir	5-7	7
Water Leasing in Nebraska	4-?.	4
Water Management Incentives	3-?	3
Groundwater Management (Nebraska)	2	2
North Dry Creek/Ft. Kearny Cutoffs	1-2	2
Dawson/Gothenburg Canal GW Recharge	2-4	4
Power Interference	2-4	4
Net Controllable Conserved Water	0-2	2
Pathfinder Municipal Account	3	3
Glendo Storage	2	2
Temporary Water Leasing in Wyoming	5	5
La Prele Reservoir	5	5
Groundwater Management (Tamarack III)	5	5

Note: Groundwater management in Nebraska will be phased in over several years.
Tamarack III will be phased in and fully implemented after 5 years.

All projects included in the Water Action Plan are capable of extending through the first increment. There are some projects that could potentially extend well beyond the first increment because of the infrastructure in place, while other projects, such as water leasing are subject to annual or periodic extensions.

Two of the basic ways to evaluate funding requirements for the program are: 1) Escalate the initial and annual costs to the year in which the costs are estimated to occur to account for inflation and compute the total cost that might be incurred in each year of the first increment of the Program; and 2) Compute the discounted funding required assuming that funds are set aside in the first year of the Program. Both analyses assume that funds are required in accordance with the implementation schedule shown in Table VI-2 above. The analyses also assume a three (3) percent compound annual rate of inflation. Since Table VI-1 presents a range of initial and annual costs for several projects, two figures are shown below to present the low and high range of costs. Under the first approach, the total funding required, including inflation, would range from approximately \$50 million to \$90 million for the low and high ranges, respectively.

Figure 3: Low Range Costs with Inflation

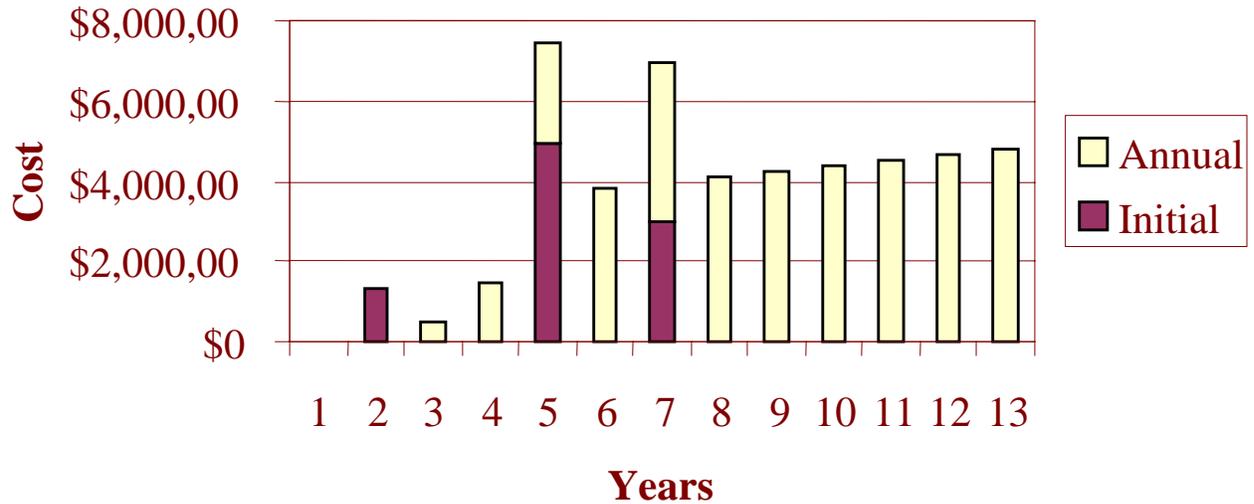
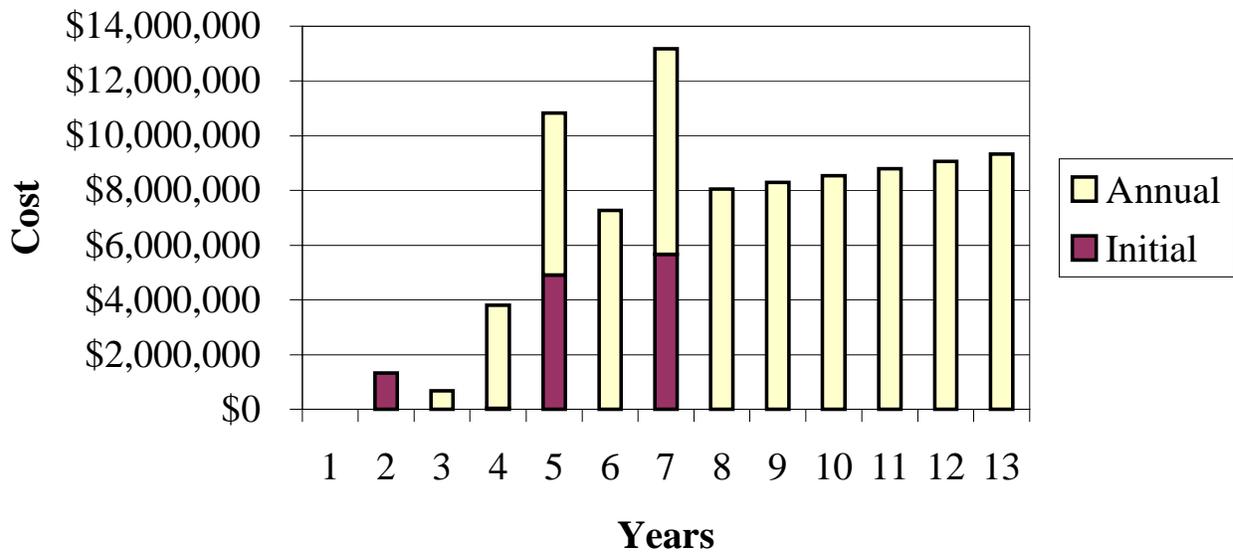


Figure 4: High Range Costs with Inflation



The second approach to evaluating funding requirements is to discount the costs expected to be incurred each year of the thirteen-year first increment to the same base year. Using a six percent discount rate, the Program's up-front funding requirement would be approximately \$30 million for the low range costs and \$55 million for the high range costs.

The information presented above is based on reconnaissance-level cost estimates and very general assumptions regarding when specific projects and programs would be implemented. Feasibility studies, final design, permitting, and the resolution of legal and institutional requirements will be necessary before the implementation of any project can proceed.

ATTACHMENT 5
SECTION 7

Depletions Plan, Platte River Basin, Wyoming
(Wyoming’s Depletions Plan)
October 24, 2006

Outline

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CHAPTER 1-GENERAL INFORMATION

I. Purposes

Wyoming's Depletions Plan serves the following purposes of the Platte River Recovery Implementation Program (PRRIP) as described in subsection I.A.4 of the Program Document:

“Mitigating the adverse impacts of new water related activities on (a) the occurrence of FWS target flows (as described in Section E.1.a) and (b) the effectiveness of the Program in reducing shortages to those flows, such mitigation to occur in the manner and to the extent described in Section E.3 and in the approved depletions plans;”

This depletions plan serves these Program purposes by:

I.A. Specifying the existing water related activities in Wyoming that are covered by the PRRIP;

I.B. Identifying the means by which new water related activities, both those subject to and those not subject to Section 7(a)(2) of the Endangered Species Act (ESA) will be addressed; and

I.C. Describing depletion mitigation measures Wyoming intends to implement.

II. Description of Principles

II.A. Cooperative Agreement-On July 1, 1997, the "Cooperative Agreement for Platte River Research and other Efforts relating to Endangered Species Habitats along the Central Platte River, Nebraska" (Cooperative Agreement) was executed by the Governors of Colorado, Nebraska and Wyoming and the Secretary of the Department of Interior (collectively referred to as the "Signatories").

II.B. Platte River Recovery Implementation Program (PRRIP) – The PRRIP describes the basin-wide cooperative program envisioned in the Cooperative Agreement. The PRRIP will provide Endangered Species Act (ESA) compliance relative to the four federally listed target species (whooping crane, piping plover, least tern and pallid sturgeon) and their associated habitats for existing and new water related activities in the Platte River Basin. The term of the PRRIP is thirteen (13) years after its approval by the Governors of the three states and the Secretary of the DOI.

II.C. ESA compliance-“ESA compliance” means: (1) serving as the reasonable and prudent alternative to offset the effects of water-related activities that the U.S Fish and Wildlife Service (FWS) found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat before the Program was in place; (2) providing offsetting measures to avoid the likelihood of jeopardy to one or more of the target species or adverse modification of the critical habitat for new or existing water-related activities evaluated under the ESA after the Program was in place; and (3) avoiding any prohibited take of target species.

II.D. Associated habitats-With respect to the interior least tern, whooping crane, and piping plover, “associated habitat” means the Platte River Valley beginning at the junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and extending eastward to Chapman, Nebraska, including designated critical habitat for the whooping crane and that portion of any designated critical habitat for piping plover within that Lexington to Chapman reach. With respect to the pallid sturgeon, the term “associated habitat” means the lower Platte River between its confluence with the Elkhorn River and its confluence with the Missouri River.

II.E. Water related activities-“Water related activities” means activities and aspects of activities which (1) occur in the Platte River Basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a "water related activity" to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of "water related activities" do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

II.F. Existing water related activities-“Existing water related activities” include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. The PRRIP will provide ESA compliance for the following existing water related activities in Wyoming:

II.F.1. The existing operations of federal and other reservoirs in Wyoming.

II.F.2. Wyoming’s allocation of Glendo storage water in accordance with Appendix C of the Final Settlement Stipulation and the Modified North Platte Decree entered in Nebraska v. Wyoming, No. 108 Original (hereafter referred to as the Final Settlement Stipulation and the Modified North Platte Decree).

II.F.3. Pathfinder Modification Project as described in Appendix F of the Final Settlement Stipulation and Modified North Platte Decree.

II.F.4. Transfers approved by the Wyoming Board of Control as long as only the historic consumptive use is transferred, thereby preventing approved transfers from causing increases in depletions.

II.F.5. Water conservation projects to the extent they do not increase depletions or consumptive use. Any increases in consumptive use resulting from irrigation conservation projects will be considered in periodic updates of unit consumptive use rates.

II.F.6. Existing water related activities as defined by the baselines set forth below and further described in this depletions plan.

II.F.6.a. North Platte River Basin (NPRB) Existing Water Related Activities Baseline No. 1-The baseline for irrigation water related activities above Guernsey Reservoir includes some water related activities allowed by the Final Settlement Stipulation and Modified North Platte Decree.

II.F.6.b. NPRB Existing Water Related Activities Baseline No. 2-This baseline covers water use categories and geographic areas not covered by Baseline No. 1. The water use categories under this baseline are: (1) irrigation, (2) municipal, (3) industrial, and (4) “other” water uses as defined in this depletions plan. If a water use under this baseline becomes obsolete and there is evidence that the use occurred in 1992 through 1996, a new use may be substituted for that obsolete use and that new use will be considered an existing water related activity covered by the PRRIP. The standards for implementing these substitutions are set forth in this depletions plan.

II.F.6.c. South Platte River Basin (SPRB) Existing Water Related Activities Baseline-This baseline is discussed in Chapter 3 of this depletions plan.

II.G. New water related activities-“New water related activities” include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

II.H. Timing of depletions and mitigation-Depletions in excess of existing water related activities baselines and new water related activities will be quantified for the irrigation season (May 1 through September 30) and the non-irrigation season (October 1 through April 30). Mitigation for these depletions will be provided to ensure that the benefits of that mitigation will occur at the state line in the same season as the impacts of the corresponding excess or new depletions, with one possible exception. It may be necessary to time replacement water during September for excess or new depletions that impact flows at the state line in the non-irrigation season because Guernsey Dam on the North Platte River, the Wheatland Irrigation District’s dams on the Laramie River, and the Hawk Springs Dam on Horse Creek are basically closed in the non-irrigation season.

II.I. Hydrologically connected groundwater well-A well so located and constructed that if water were withdrawn by the well continuously for 40 years, the cumulative stream depletion would be greater than or equal to 28% of the total volume of groundwater withdrawn from that well. Use from groundwater wells in Wyoming that are not hydrologically connected does not effect the purposes of the PRRIP, is not a new water related activity, and requires no mitigation.

II.J. FWS target flows-These target flows are species and annual pulse flow recommendations for the Platte River at Grand Island, Nebraska developed by U.S. Fish and Wildlife Service as described in Attachment 5, Section 11. Wyoming has not agreed that these target flows are biologically or hydrologically necessary to benefit or recover the target species. These target flows will be under review during the PRRIP.

II.K. Governance Committee-The Committee is established to oversee implementation of the PRRIP. The approval of this depletions plan by the Governance Committee warrants that it meets the goals, objectives and purposes of the PRRIP and the requirements of subsection III.E.3 of the Program Document. During the term of the PRRIP, the Governance Committee will

review implementation of this depletions plan. Amendments to this depletions plan must be reported to and approved by the Governance Committee.

II.L. Scheduled Reports:

December 31, 2007-Complete the Interim Depletions Mitigation Plan described in subsection II.B of Chapter 2. The plan will address any new depletions that commenced between the beginning of the 1997 water year (October 1, 1996) and the end of the 2007 water year (September 30, 2007).

December 31, 2008-Complete the first annual report describing the implementation of this depletions plan addressing water year 2008 (October 1, 2007 through September 30, 2008)

December 31, 20XX-Complete subsequent annual reports for the preceding water year.

III. FWS and State of Wyoming Coordination

This section of Wyoming's Depletion Plan explains the coordination that will occur between the U.S. Fish and Wildlife Service (FWS) and its consultations and the State of Wyoming (state) and its evaluations of water related activities during the PRRIP under this depletions plan. If the FWS, project proponent and State of Wyoming do not concur on a particular issue, the parties will work together to resolve the disagreement and may refer the matter to the Governance Committee for guidance.

III.A. Definitions

The following subsection describes the coordination process with a narrative and schematic. The following definitions are offered to clarify the terms used in the description:

III.A.1. "New water related activities" are defined in subsection II.G of Chapter 1.

III.A.2. New water related activities subject to a consultation with the FWS under section 7(a)(2) of the ESA have a "federal nexus."

III.A.3. The "State Coordinator" is the state employee within the Wyoming State Engineer's Office responsible for administering this depletions plan.

III.A.4. A "project proponent" is the party seeking approval of a water related activity. A federal agency may be a project proponent under this depletions plan.

III.A.5. "Federal Action Agency" is the agency responsible for providing the necessary federal clearances or approvals for a project proponent's proposed action. The Federal Action Agency must assure that a project proponent complies with the ESA through consultation with the FWS.

III.B. Description

The following narrative corresponds with the brief descriptions displayed in the schematic provided after page 9 of this plan.

Box 1. Platte River Basin Water-Related Activities

The FWS Representative will become aware of water related activities through communications with project proponents or Federal Action Agencies. The State Coordinator will become aware of water related activities through the permitting process for new water rights or through the Wyoming Water Development Office. Go to Box 2. (Is there a federal nexus?)

Box 2. Is there a federal-nexus?

The Federal Action Agency, FWS Representative and State Coordinator will determine if the water related activities have a federal nexus.

If no, go to Box 3. (Use Wyoming's Depletions Plan.)

If yes, go to Box 4. (Initiate ESA consultation.)

Box 3. Use Wyoming's Depletions Plan.

Does the water related activity conform to the definition of an existing water related activity provided in subsection II.F of Chapter 1 of this depletions plan? If yes, document the activity and stop.

Does the water related activity conform to the definition of a new water related activity provided in subsection II.G of Chapter 1 of this depletions plan? If yes, go to section II of Chapter 2 or section II of Chapter 3 of this depletions plan depending on whether the new water related activity is located in the North Platte River basin or South Platte River basin, respectively.

Box 4. Initiate ESA consultation

All proposed water related activities with a federal nexus are subject to ESA consultation with the FWS. Go to Box 5. (Existing or new water related activity?)

Box 5. Existing or new water related activity?

Does the water related activity with the federal nexus conform to the definition of an existing water related activity provided in subsection II.F of Chapter 1 of this depletions plan? If yes, the activity is covered by the PRRIP. Go to Box 6. (Existing Water Related Activity-Streamlined ESA consultation)

Does the water related activity with the federal nexus conform to the definition of a new water related activity provided in subsection II.G of Chapter 1 of this depletions plan? If yes, go to Box 7. (Depletions analyses)

Box 6. Existing water related activity-Streamlined ESA consultation.

The activity is covered by the PRRIP. A streamlined ESA consultation will be completed. Attachment No. III to this depletions plan provides a description of the streamlined ESA consultation and provides template documents that will be used. Stop.

Box 7. Depletions analyses

The Federal Action Agency, consulting with the water user, is responsible for providing a project description of the proposed federal action, including a monthly estimate of the annual depletions at the location of the proposed action resulting from the new water related activity. The Federal Action Agency will provide the State Coordinator with a copy of the depletions analyses and other information pertinent to the new water related activity. Go to Box 8. (Proponent desire State assistance?)

Box 8. Proponent desire state assistance?

Because the PRRIP is voluntary, the applicant or project proponent must request that the new water related activity with a federal nexus be addressed by this depletions plan and the PRRIP.

If yes, go to Box 9. (State proposal for coverage?)

If no, go to Box 13. (Independent ESA Section 7 consultation)

Box 9. State proposal for coverage?

The State Coordinator will review and comment on the depletions analyses. In addition, the State Coordinator, in consultation with the Director of the Wyoming Water Development Office (Director), may recommend to the Federal Action Agency and FWS Representative that the new water related activity be covered by the state's mitigation process described in subsection II.D of Chapter 2 of this plan. Working with the project proponent and the Director, the State Coordinator will provide a proposal outlining the terms of that coverage using the parameters of subsection II.D of Chapter 2 of this plan.

The proposal will be developed using Template No. 1-Wyoming Platte River Recovery Agreement, provided in Attachment III.

If yes, go to Box 10. (Federal concurrence with state proposal?)

If no, go to Box 13. (Independent ESA Section 7 consultation)

Box 10. Federal concurrence with state proposal?

The Federal Action Agency and FWS Representative will determine if the state's proposal meets the requirements of section III.E.3 of the Program Document and the programmatic biological opinion (PBO) issued by the FWS on June 16, 2006. The Federal Action Agency and FWS Representative may work with the State Coordinator to develop a mutually acceptable proposal.

The FWS Representative and State Coordinator may elevate the discussions to the Regional Director of the FWS, the Wyoming State Engineer, and Director of the Wyoming Water Development Office.

If yes, go to Box 11. (New water related activity-Streamlined ESA consultation)

If no, go to Box 12. (G.C. approved amendment?)

Box 11. New water related activity-Streamlined ESA consultation

If a mutually acceptable proposal (Wyoming Platte River Recovery Agreement) is reached, a streamlined ESA consultation will be completed. Attachment No. III to this depletions plan provides a description of the streamlined ESA consultation and provides template documents that will be used. Stop. Annual reporting of all streamlined ESA consultations will be provided to the Governance Committee.

Box 12. G.C. approved amendment?

If a mutually acceptable proposal within the parameters of subsection II.D of Chapter 2 of this plan cannot be developed, the FWS Representative and State Coordinator may offer amendments to this plan to the Governance Committee for approval. The amendments would include changes to this plan needed to address specific new water related activities with a federal nexus.

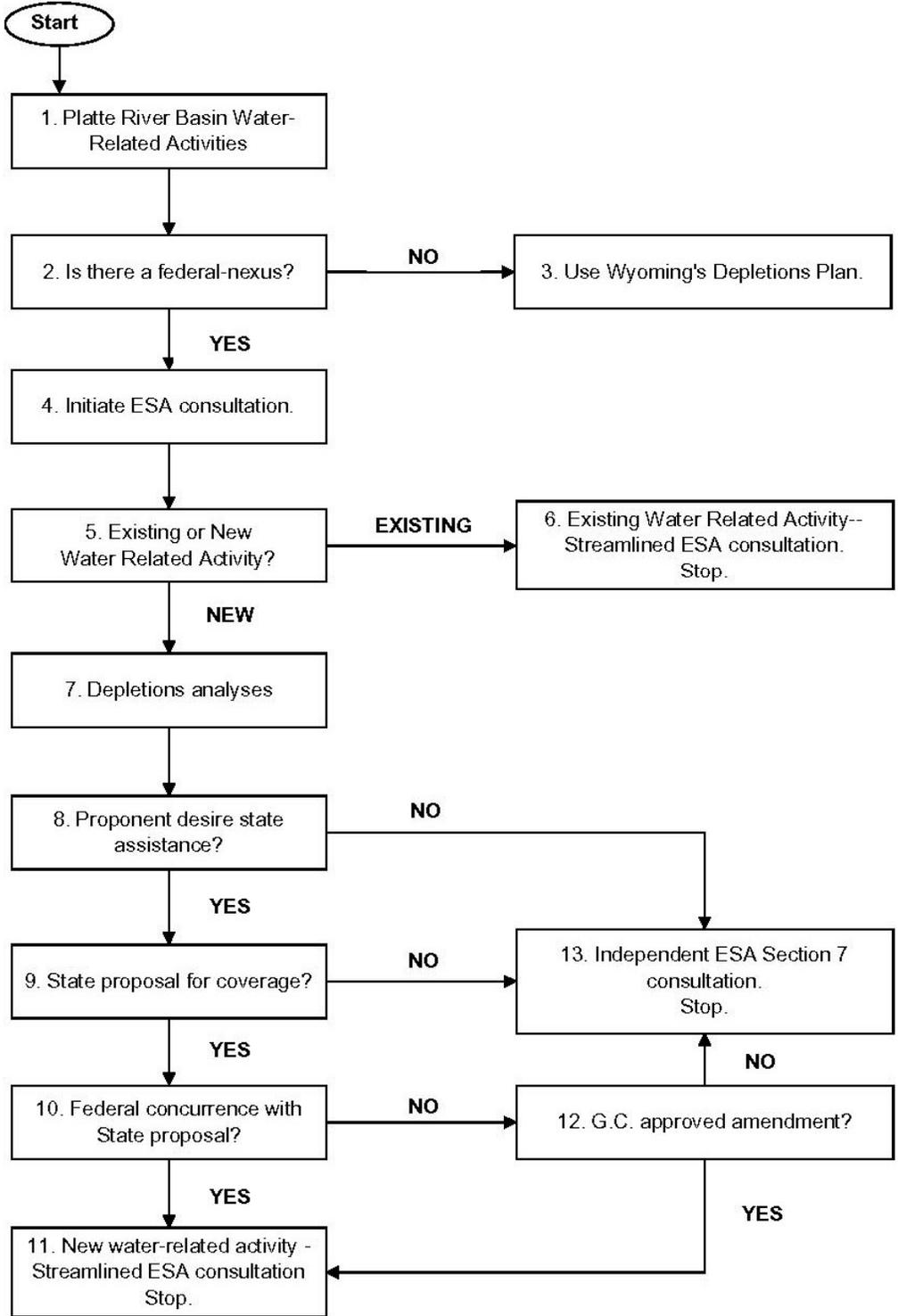
If yes, go to Box 11. (New water related activity-Streamlined ESA consultation)

If no, go to Box 13. (Independent ESA Section 7 consultation)

Box 13. Independent ESA Section 7 consultation

The new water related activity will be subject to a ESA Section 7 consultation conducted “outside of the PRRIP” by the FWS. Upon completion of the FWS consultation, the project proponent will be required to independently provide mitigation as required by that consultation. Stop.

**Wyoming's Depletions Plan
Schematic of ESA Review of
Water Related Activities**



CHAPTER 2-NORTH PLATTE RIVER BASIN, WYOMING

I. Existing Water Related Activities

I.A. Description

The existing water related activities covered by Wyoming's Depletions Plan and the PRRIP are defined in subsection II.F of Chapter 1. Wyoming's Depletion Plan contains two (2) independent existing water related activities baselines for the North Platte River basin (NPRB) in Wyoming. That means that any "overruns" in one baseline cannot be offset by "under-runs" in the other baseline.

I.B. NPRB Existing Water Related Activities Baseline No. 1

I.B.1. Description

The only water use category under Baseline No. 1 is irrigation water use in the NPRB above Guernsey Reservoir. Wyoming's compliance with the Final Settlement Stipulation and Modified North Platte Decree will provide confirmation that Wyoming has not exceeded this baseline for purposes of the PRRIP. The activities that are required as part of Wyoming's reporting obligations under the Final Settlement Stipulation and Modified North Platte Decree will serve as Wyoming's monitoring for Baseline No. 1.

The following is a summary of those provisions of the Final Settlement Stipulation and Modified Decree that define Baseline No. 1:

I.B.1.a. Wyoming is enjoined from diverting or permitting the diversion of water from the North Platte River and its tributaries, including water from hydrologically connected groundwater wells, upstream of Guernsey Reservoir for the intentional irrigation of more than a total of 226,000 acres of land in Wyoming during any one irrigation season, exclusive of the Kendrick Project. In the year 2012, this injunction will be replaced with two injunctions, one that limits the number of acres that can be irrigated above Pathfinder Dam and one that limits the number of acres that can be irrigated between Pathfinder Dam and Guernsey Reservoir; the two injunctions will total 226,000 acres. (See Modified North Platte Decree, ¶ II(c) and Exhibit 4 to the Final Settlement Stipulation.)

I.B.1.b. Wyoming is enjoined from diverting or permitting the diversion of water for irrigation from the North Platte River and its tributaries, including water from hydrologically connected groundwater wells, upstream of Pathfinder Dam for the consumption in any period of ten consecutive years of more than 1,280,000 acre feet. Wyoming is enjoined from diverting or permitting the diversion of water for irrigation from the North Platte River and its tributaries, including water from hydrologically connected groundwater wells, between Pathfinder Dam and Guernsey Reservoir for the consumption in any period of ten consecutive years of more than 890,000 acre feet exclusive of the Kendrick Project. (See Modified North Platte Decree, ¶ II(a) and (b) and Exhibit 6 of the Final Settlement Stipulation.)

I.B.1.c. No more than 35,000 acres of land in the First Unit of the Kendrick Project may be irrigated. (See ¶ VII of the Final Settlement Stipulation.) The Wyoming water rights held by the Casper Alcova Irrigation District, the contractor for storage water from the Kendrick Project, restricts its irrigated acreage to 24,248.23 acres. The acreage limitation in the water rights will serve as the existing water related baseline for monitoring the operations of the Casper Alcova Irrigation District.

I.B.2. Reporting of Existing Water Related Activities-Baseline No. 1

The Modified North Platte Decree requires Wyoming to annually report acreage irrigated by surface water and hydrologically connected groundwater wells in the area above Guernsey Reservoir, excluding those lands irrigated within the Kendrick Project. In addition, Wyoming is required to annually report the consumptive use resulting from the irrigation of these lands within the area covered by the acreage limitation. These reports are provided to the North Platte Decree Committee (NPDC). The purpose of these reports is to monitor compliance with the provisions in the Modified Decree, described in subsections I.B.1.a. and I.B.1.b. above.

Wyoming's compliance with the Final Settlement Stipulation and Modified North Platte Decree will provide confirmation that Wyoming has not exceeded this baseline for purposes of the PRRIP, with the exception of the irrigated acreage limitation for the Kendrick Project that is specific to this depletions plan. If Wyoming's reports to the NPDC indicate that the acreage and consumptive use limitations were not exceeded, the annual report to the Governance Committee will simply note that Wyoming complied with the Modified Decree.

If Wyoming exceeds the acreage or consumptive use limitations for the areas above Guernsey Reservoir as defined in the Modified Decree, Wyoming will have exceeded Baseline No. 1, independent of the acreage limitation for the Kendrick Project. The annual report to the Governance Committee will include the excess depletions resulting from the overruns to the limitations in the Modified Decree. The effects of overruns will be translated to the Wyoming/Nebraska state line using the methodology described in Attachment I.

The annual report to the Governance Committee will also indicate whether the Kendrick Project exceeded the acreage limitation described above in B.1.c. Kendrick irrigated acreage will be monitored by the Wyoming State Engineer's Office and through reports available through the Bureau of Reclamation.

If the acreage limitation (24,248.23 acres) for the Kendrick Project is exceeded, the annual report to the Governance Committee will quantify the excess acreage and calculate the excess depletions. The effects of excess depletions will be translated to the Wyoming/Nebraska state line using the methodology described in Attachment I to this depletions plan.

Under-runs to the acreage and consumptive use limitations in the Modified Decree or under-runs to the acreage limitation for the Kendrick Project will not be used to offset overruns to Baseline No. 2, described in section I.C of this plan. However, if revisions to the Modified Decree or Kendrick operations result in permanent reductions in depletions, Wyoming reserves the right to seek credit for such reductions through the Governance Committee.

I.B.3. Mitigation of Excess Water Related Activities-Baseline No. 1

If the acreage limitations or consumptive use limitations, described respectively in subsections I.B.1.a. and I.B.1.b, are exceeded, it will mean that Wyoming did not meet the limits of the Modified Decree. The North Platte Decree Committee (NPDC) will need to address the situation. The deliberations of NPDC will be independent of the PRRIP and this depletions plan. The NPDC resolution of the matter may or may not meet the program purposes described in subsection I.A.4 of the Program Document. If resolution by the NPDC is not satisfactory for program purposes, Wyoming will remain obligated to mitigate the effects of the excess depletions at the state line.

If the acreage limitation for the Kendrick Project, described in subsection B.1.c., is exceeded, it will mean that the Casper Alcova Irrigation District did not comply with its water rights. The Wyoming State Engineer's Office (WSEO) will need to address this situation. The deliberations by the WSEO will be independent of the PRRIP and this depletions plan. The WSEO resolution of the matter may or may not meet the program purposes described in subsection I.A.4 of the Program Document. If resolution by the WSEO is not satisfactory for program purposes, Wyoming will remain obligated to mitigate the effects of the excess depletions at the state line.

Mitigation for the depletions in excess of Baseline No. 1 will be provided in the same manner as depletions in excess of Baseline No. 2, described in subsection I.C.3. However, if Baseline No. 1 is exceeded in a water year in which there is a spill routed over or through Guernsey Dam or Kingsley Dam, Wyoming reserves the right to present evidence to the Governance Committee that exceeding the baseline or acreage limitation did not adversely affect the program purposes identified in subsection I.A.4 of the Program Document. A finding by the Governance Committee that the replacement of excess depletions is not necessary or could be reduced will have precedence over any mitigation described in this depletions plan.

I.C. NPRB Existing Water Related Activities Baseline No. 2

I.C.1. Description

For purposes of this depletions plan, the NPRB is broken down into the following sub-basins. (See Figure No. 1)

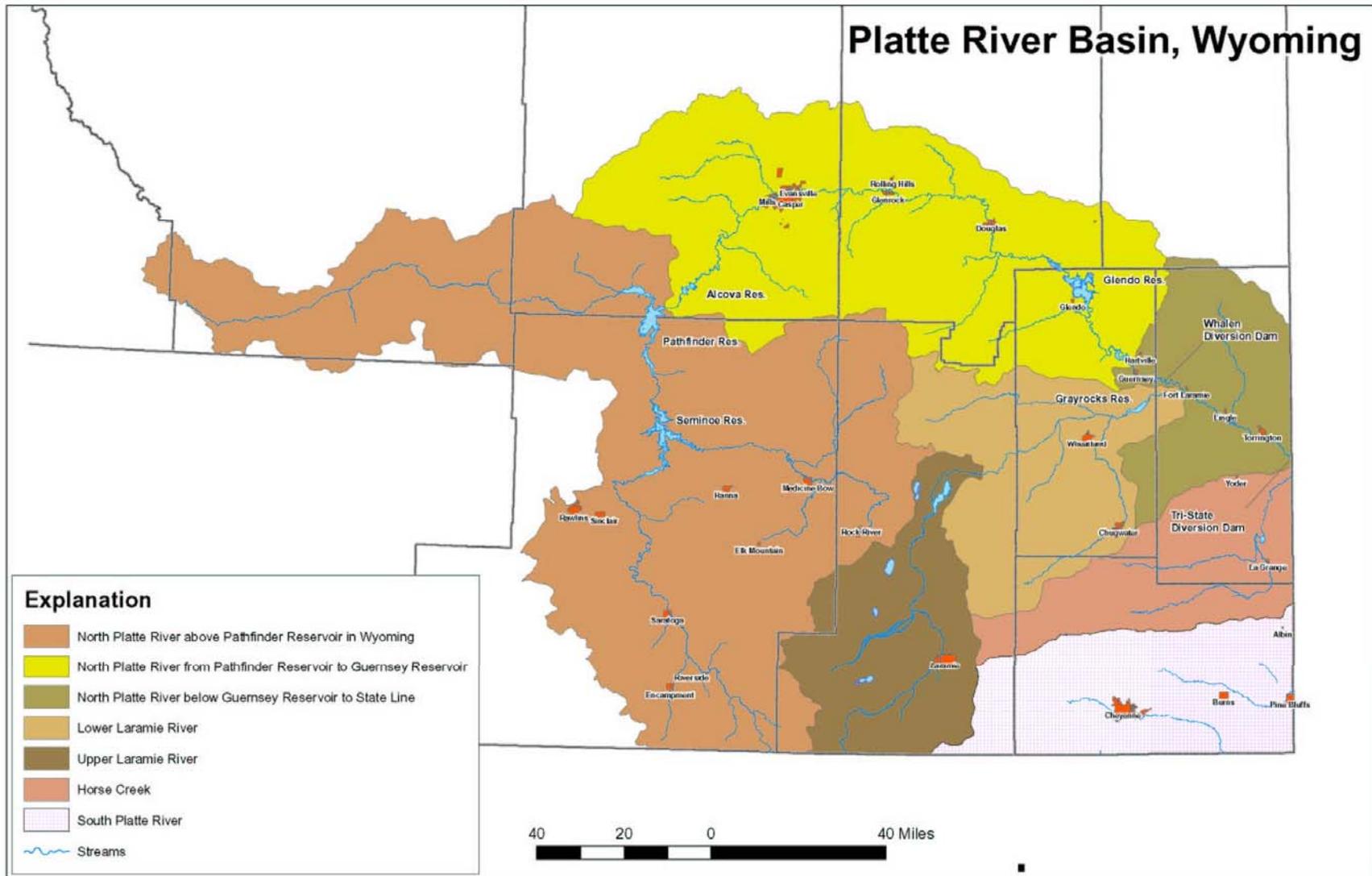
<u>Sub-basin</u>	<u>Description</u>
1.	NPRB from the CO/WY state line to Pathfinder Dam
2.	NPRB from Pathfinder Dam to Guernsey Dam.
3.	NPRB from the Guernsey Dam to the WY/NE state line with the exception that downstream of the Whalen Diversion Dam the southern boundary will be the Gering/Fort Laramie Canal.
4.	Upper Laramie River Basin, upstream of Wheatland Irrigation District's tunnel no. 2
5.	Lower Laramie River Basin, downstream of Wheatland Irrigation District's tunnel no. 2 and upstream of the Gering/Fort Laramie Canal, and including those lands between the Horse Creek and Laramie River Drainages.
6.	Horse Creek Drainage, following its topographic boundary until it intersects with the Gering/Fort Laramie Canal, then the canal becomes the drainage boundary for purposes of this plan.

Baseline No. 2 covers water use categories not covered by Baseline No. 1. The following are the water use categories under Baseline No. 2:

Water Use Categories

1. Irrigation use in sub-basins 3 through 6. Irrigation use in sub-basins 1 and 2 is covered by Baseline No. 1.
2. Municipal use in sub-basins 1 through 6.
3. Industrial use in sub-basins 1 through 6.
4. Other uses in sub-basins 1 through 6.

The following describes the water use categories and Benchmarks that are included under the existing water related activities Baseline No. 2.



I.C.1.a. Irrigation Water Use

The Benchmark Acreages for sub-basins 3 through 6 are based on field inspections completed by State Engineer Office personnel in 1995 through 1997. The field inspectors were provided 7.5 minute quadrangles that depicted irrigated acreage obtained from infrared photography purchased by the Wyoming Water Development Commission (WWDC). The WWDC obtained this photography in the summers of 1983 and 1984. The field inspectors added and deleted lands depicted on the quadrangles to accurately represent lands irrigated from 1995 to 1997 by surface water and groundwater. The following table depicts the results of the field inspections:

<u>Sub-basins (as defined above)</u>	<u>Benchmark Acreage</u>
NPRB-Guernsey Dam to the WY/NE state line	108,964
Upper Laramie River Basin	92,440
Lower Laramie River Basin	86,271
Horse Creek Basin	41,179

Wyoming will annually complete field inspections of irrigated acreage for each sub-basin and compare the results to the Benchmark Acreages listed above. By the end of year 7 of the PRRIP, a comprehensive inspection will be completed using aerial photography or satellite imagery and field verifications.

The total annual depletions resulting from the irrigation of the Benchmark Acreages listed above will not be calculated. However, the unit consumptive use rates (acre feet/acre) for each sub-basin will be used in this plan in order to calculate the volumetric effects of “overruns” and “under-runs” to the Benchmark Acreages. Unit consumptive use rates have been developed using methods similar to those agreed upon for assessment of compliance with the consumptive use provisions of the settlement of Nebraska v. Wyoming. That methodology was applied to local climatic data and surveys of crop yields and cropping patterns published by the National Agricultural Statistics Service. To capture average climate conditions, unit consumptive use rates for individual crops were averaged over a baseline period, i.e. the most recent 20-30 years, depending upon data availability. These average unit values for each crop were then applied to the actual crop mix (i.e. the proportions of corn, beets, alfalfa, etc.) for a 20-year baseline period (1982-2001). The result is average unit annual consumptive use values for each sub-basin which reflect the application of the long-term, average climate to the most recent 20-year cropping patterns. The following table provides these average unit values which were developed by TriHydro Corporation for the Wyoming Water Development Commission’s “Platte River Basin Plan” and will be used for purposes of this plan:

<u>Unit Consumptive Use Rates</u>	
<u>Sub-basin (as defined above)</u>	<u>acre feet/acre</u>
NPRB-Guernsey Dam to the WY/NE state line	1.32
Upper Laramie River Basin	0.79
Lower Laramie River Basin	1.31
Horse Creek Basin	1.16

Cropping patterns; irrigation practices, such as increases in supplemental supplies; and other factors that may affect the average unit consumptive uses in each sub-basin will be reviewed every five years. The average annual unit consumptive use rates will be revised if the review indicates that changes are warranted.

As explained in the discussion related to Baseline No. 1, the Final Settlement Stipulation and Modified North Platte Decree place consumptive use limitations on Wyoming in the areas above Pathfinder Dam and between Pathfinder Dam and Guernsey Reservoir. As the administration of these limitations evolves, information may become available which will warrant changes to the methods used to calculate the average unit consumptive use rates listed above.

I.C.1.b. Municipal Water Use

A Benchmark has been developed for municipal water use for each of the six (6) sub-basins defined in Chapter 2, Section I.C.1. The Benchmarks are based on water use information for each municipality within the respective sub-basins. The water use information was used to determine each of the 26 municipality’s maximum annual depletions from 1992 through 1996. The majority of the water use calculations were based on actual diversion records. In the event that records were not available, diversions were estimated using populations and estimated per capita use. Some municipalities have expanded their service areas beyond their corporate limits to serve adjacent rural domestic water users. Some industries obtain water from municipal water systems. These factors were included in the water use for the municipalities, rather than the Benchmarks for rural domestic and industrial water use. Return flow factors were used to convert diversions to depletions. The depletions were calculated using effluent records or other available information. The following table depicts the Benchmarks for each of the six (6) sub-basins:

Sub-basin	Municipal Water Use-Benchmarks	
	Benchmark (Annual Depletions in acre feet)	
	<u>Irrigation Season</u>	<u>Non-irrigation season</u>
1. Above Pathfinder Dam	2,290	1,040
2. Pathfinder Dam to Guernsey Dam	8,265	1,555
3. Guernsey Dam to the WY/NE state line	2,405	860
4. Upper Laramie River Basin	2,990	670
5. Lower Laramie River Basin	935	325
6. Horse Creek Drainage	95	55

Additional baseline information will be used to monitor future water related activities. This additional baseline information for each municipal system addresses the status of the water supply as of July 1, 1997 and includes information relating to the water system, water rights, population, water use, and the wastewater system. The information will be used to estimate the depletive or accretive impacts of changes in operations. For example, a municipality may convert from a surface water supply to non-hydrologically connected groundwater wells. A municipality may convert from a zero discharge wastewater system to a flow-through system,

thereby reducing depletions. These types of changes may allow municipalities to accommodate additional growth without increasing depletions. This baseline information will also be used to determine if increased population or a particular change in operations will cause a municipality to permanently exceed its 1992-1996 water use and, therefore, should be considered a new water related activity.

I.C.1.c. Industrial Water Use

The major industrial water user in the NPRB in Wyoming is the Basin Electric Power Cooperative (BEPC), who owns and operates the Laramie River Station near Wheatland, Wyoming. On December 4, 1978, an Agreement of Settlement and Compromise (Agreement) was executed by the BEPC, the State of Nebraska, the Rural Electrification Administration (REA), the U.S. Army Corps of Engineers (USCOE) and several environmental groups to resolve disputes regarding the issuance of loan guarantees by the REA and the issuance of the dredge and fill permit by the USCOE for BEPC’s Grayrocks Dam and Reservoir. The Agreement contains annual consumptive use limitations on the Laramie River Station, places operating conditions on the water supplies for the power plant, and established the “Platte River Whooping Crane Habitat Maintenance Trust.” The parties agreed that compliance with the Agreement satisfies the requirements of the Endangered Species Act. The Benchmark for this existing water related activity, the various water supplies for the Laramie River Station, is to comply with the 1978 Agreement of Settlement and Compromise. Wyoming will monitor any amendments to the Agreement or issues related to non-compliance resolved by the parties to ensure conformance with the purposes of the PRRIP. If BEPC seeks to amend its water rights or operations in a manner that would permanently reduce depletions, Wyoming reserves the right to seek credit for the reduced depletions under this plan through the Governance Committee.

There are six (6) other significant industrial water users in the NPRB in Wyoming: the Sinclair Refinery, the former Amoco Refinery, the former Texaco Refinery, the Little America Refinery, the Dave Johnson Power Plant, and a sugar beet processing plant in Torrington. Each of these six industrial water supply systems has a Benchmark. The Benchmarks are based on each system’s maximum depletions during the 1992-1996 water years. The following table depicts the Benchmarks for the six industrial water supply systems:

Industrial Water Use-Benchmarks for Major Industries

Sub-basin	Benchmark (Annual Depletions in acre feet)	
	<u>Irrigation Season</u>	<u>Non-irrigation season</u>
1. Above Pathfinder Dam		
Sinclair Refinery	1,110	1,340
2. Pathfinder Dam to Guernsey Dam		
Amoco Refinery	2,050	1,015
Texaco Refinery	320	140
Little America Refinery	505	700
Dave Johnson Power Plant	4,640	5,520
3. Guernsey Dam to the WY/NE state line		
Sugar beet processing plant	40	1,140

Additional baseline information will be used to monitor future water related activities. This additional baseline information for each of the above systems will address the status of their water supply as of July 1, 1997 and will include information relating to the water system, water rights, water use, and the wastewater system. The information will be used to estimate the depletive or accretive impacts of proposed changes in operations to determine if those changes can be accommodated under the existing Benchmark or if they should be considered new water related activities.

Lack of specific data on the annual water use of the other industries within the basin makes it difficult to establish a meaningful history of their industrial water use. However, each of the industries has a portfolio of water rights under which they operate. These portfolios would have to be revised if the industries were to replace or modify their water supplies. The Benchmark for these other industries is based on their water rights. A tabulation of the industrial water rights issued on or before July 1, 1997 has been developed. If one of these industrial water users wants to replace or modify their water supplies, the depletions resulting from those projects would be considered existing water related activities if they do not increase the depletions beyond those that occurred from 1992 through 1996. If the projects result in depletions beyond this threshold, the excess depletions would be considered new water related activities.

I.C.1.d. Other Water Uses

This water use category includes those uses that do not fit under the irrigation, municipal or industrial permitting processes. The following is a description of other uses that will be considered by this depletions plan.

I.C.1.d.i. Rural Domestic Water Use

This category addresses the water use by the population in each sub-basin outside the service areas of the municipal water supply systems, which are served by individual wells or centralized systems for rural subdivisions. A Benchmark has been developed for the rural domestic water use in each of the sub-basins within the NPRB.

The Wyoming Department of Administration and Information provided estimates of the population in each of the sub-basins. The populations served by municipal water systems were subtracted from the estimates to determine the rural population in each sub-basin from 1992 through 1996. It is estimated that depletions resulting from personal use, including irrigation of lawns and gardens, equates to 100 gallons per capita per day or 0.11 acre feet per year. For purposes for this depletions plan, this use is reduced to 0.10 acre feet per person per year to account for the fact that approximately 10% of the rural population is served by non-hydrologically connected groundwater wells. The following Benchmarks were established using the rural population estimates and a depletion factor of 0.1 acre feet per person per year:

Rural Domestic Water Use-Benchmarks

Sub-basin	Benchmark (Annual Depletions in acre feet)	
	<u>Irrigation Season</u>	<u>Non-irrigation season</u>
1. Above Pathfinder Dam	160	80
2. Pathfinder Dam to Guernsey Dam	360	180
3. Guernsey Dam to the WY/NE state line	270	130
4. Upper Laramie River Basin	270	130
5. Lower Laramie River Basin	200	100
6. Horse Creek Drainage	80	40

I.C.1.d.ii. Livestock Use

In Wyoming, there is a simplified water right permitting process for stock wells as long as the proposed capacity of the well does not exceed 25 gallons per minute. This depletions plan considers the use of stock wells permitted under this process to be non-depletive. If the proposed capacity of a well exceeds 25 gallons per minute, the water user must undergo a more detailed water rights permitting process and seek a permit for a miscellaneous use well.

There is also a simplified water right process for stock watering reservoirs as long as the proposed storage capacity of the reservoir does not exceed 20 acre feet in capacity and 20 feet in dam height. If the proposed stock water reservoir exceeds these limitations, the water user must undergo a more detailed water right permitting process for the reservoir. Both categories of stock watering reservoirs will be administered under this plan in the same manner as miscellaneous uses.

Water supplies for feed lots and hog farms are permitted as miscellaneous wells or miscellaneous surface water diversions. Miscellaneous uses will be addressed by this plan as described below.

I.C.1.d.iii. Miscellaneous Uses

* **Miscellaneous Use Wells**-This designation for ground water rights is used for the following: 1) domestic wells, 2) stock/domestic and 3) stock wells with a permitted capacity greater than 25 gallons per minute. This use designation is also used for rural commercial establishments, cemeteries, golf courses, dewatering, and uses that do not fit other defined water right categories.

* **Miscellaneous Surface Water Diversions**-There is no formal “miscellaneous” permit category for surface water diversions within the WSEO. However, permits for surface water diversions are issued for recreational, commercial, and other uses that do not fit under the irrigation, municipal or industrial permitting categories.

* **Fish and Recreation Reservoirs**-This designation is used for impoundments that serve fish propagation, wetlands development, golf courses, and aesthetic purposes. Small reservoirs in this category are treated like stock reservoirs in that there is a

simplified water right permitting process if the proposed storage capacity does not exceed 20 acre feet or the proposed dam height does not exceed 20 feet. If the proposed project exceeds these limitations, the water user must undergo a more detailed permitting process.

There is no annual water use information available on stock watering reservoirs or the miscellaneous uses described above. The Benchmark for these water uses is based on their water rights. Tabulations of the water rights issued on or before July 1, 1997 for these uses have been developed. If one of these water users wants to replace or modify their water supplies, the depletions resulting from those projects would be considered existing water related activities if they do not increase the depletions beyond those that occurred from 1992 through 1996. If the projects result in depletions beyond this threshold, the excess depletions would be considered new water related activities.

I.C.2. Reporting of Existing Water Related Activities-Baseline No. 2

Wyoming will generate an annual report to describe its water use during the previous water year. The depletions from the annual water use will be compared against the Benchmarks. Overruns and under-runs to these Benchmarks will be quantified. The effects of the overruns and under-runs will be translated to the state line using the tracking factors described in Attachment I. If it cannot be demonstrated that there were sufficient under-runs to offset the overruns, Wyoming will be responsible for mitigating the effects of the net overruns at the state line in the manner described in subsection I.C.3 of this chapter.

In circumstances where water related activities shift among various categories, but depletions remain within baseline quantities, it may be necessary to modify the Benchmarks under Baseline No. 2. For example:

I.C.2.a. Changes in water use may occur formally, as water right transfers. Under Wyoming law, the consumptive use from the use of existing water rights can be transferred to new or different beneficial uses. These changes of use are reviewed and approved by the Wyoming Board of Control (WBOC). These transactions do not increase depletions and are not new water related activities subject to mitigation. However, these changes of use may result in modified Benchmarks under Baseline No. 2.

I.C.2.b. Similarly, but without an explicit water right transfer, if an existing water use becomes obsolete and there is evidence that the use occurred in the 1992-1996, an alternative use may be substituted and thus be covered by Wyoming's Depletions Plan and the PRRIP. These substitutions may be made between Benchmarks in those categories under Baseline No. 2. For example, a municipality may increase its service area and, as a result, use of individual domestic wells may decline. The Benchmark for the municipality should increase, while the Benchmark for rural domestic water use would decrease. The standard for such substitutions will be to ensure that reassigning the use between Categories and Benchmarks will not increase overall depletions.

Data and information used to develop the benchmarks under Baseline No. 2 will be provided for inclusion in PRRIP files. Wyoming's annual reports will advise the Governance Committee of any changes to the Benchmarks.

I.C.3. Mitigation of Excess Depletions-Baseline No. 2

There are differences between excess existing water related activities and new water related activities. In general, if an existing water related activity baseline is exceeded, it will typically be a one-time event or a limited number of sporadic events caused by above-average water supply conditions. New water related activities result in the depletion of additional water on a regular basis. Section II of Chapter Two of this plan describes how new water related activities will be reported and mitigated. The following describes how Wyoming would mitigate excesses to the existing water related activities Baseline No. 2.

Wyoming will annually monitor and report water uses covered by Existing Water Related Baseline No. 2 in the manner described in Section I.C of Chapter 2 of the depletions plan. The depletions from annual water use will be compared against the Benchmarks included under this baseline. Overruns and under-runs to these Benchmarks will be quantified. The effects of overruns and under-runs will be translated to the state line using the methods described in Attachment I for irrigation season and non-irrigation season overruns and under-runs. If the overruns are not offset by under-runs, Wyoming will provide a mitigation plan for the review and approval of the Governance Committee. The mitigation plan will:

I.C.3.1. Identify the net overruns at the state line that occurred in the irrigation season and offer a means to replace those overruns in the irrigation season of the year following the year the overruns occurred.

I.C.3.2. Identify the net overruns at the state line that occurred in the non-irrigation season and offer a means to replace those overruns in the non-irrigation season of the year following the year the overruns occurred. It may be necessary to time replacement water during September for excess or new depletions that impact flows at the state line in the non-irrigation season because Guernsey Dam on the North Platte River, the Wheatland Irrigation District's dams on the Laramie River, and the Hawk Springs Dam on Horse Creek are basically closed in the non-irrigation season.

If there is a system spill routed over or through Guernsey Dam or Kingsley Dam, Wyoming reserves the right to present evidence to the Governance Committee that Wyoming's excess depletions did not adversely affect the program purposes identified in subsection I.A.4 of the Program Document and that replacement water is not required or could be reduced. A finding by the Governance Committee that the replacement of excess depletions is not necessary or could be reduced will have precedence over any mitigation described in this depletions plan.

II. New Water Related Activities

II.A. Description

“New water related activities” are defined in subsection II.G of Chapter 1.

II.B. Interim Depletions Mitigation Plan

Wyoming has provided annual reports to the Governance Committee relating to water right permitting activities that have occurred since July 1, 1997. The WSEO has advised anyone seeking new water rights of the proposed PRRIP and that mitigation may be required for new depletions occurring after July 1, 1997.

Wyoming will review the permitting activities and pertinent water use information to quantify any new depletions that commenced between the beginning of the 1997 water year (October 1, 1996) and the end of the 2007 water year (September 30, 2007). Wyoming will also determine if the existing water related baselines are being exceeded by existing water related activities in the year the PRRIP is implemented. An “Interim Depletions Mitigation Plan” (IDMP) will be provided to the Governance Committee. The IDMP will quantify new and excess depletions and propose a mitigation plan for those depletions. The Governance Committee must approve the IDMP before any required mitigation is implemented.

II.C. State Evaluations of New Water Related Activities

New water related activities that are not subject to a consultation with the FWS under section 7(a)(2) of the ESA will undergo state evaluations. Wyoming will use the following process to define, quantify, and mitigate new water related activities:

II.C.1. The Wyoming State Engineer’s Office (SEO) is responsible for the following activities related to water rights: 1) appropriation (permitting); 2) adjudication (confirmation of beneficial use by the Wyoming Board of Control (WBOC) and issuance of certificates); 3) amendments (changes to water rights as approved by the WBOC); and 4) administration (regulation under the prior appropriation doctrine). The SEO and WBOC will decide whether permits for new water rights should be approved. These decisions will consider compliance with Wyoming law and the Modified North Platte Decree, as well as impacts to other appropriators. The determination as to whether approval of permits for new water right related activities should be granted is independent of this depletions plan.

II.C.2. If the Surface Water or Groundwater Divisions of the SEO concludes that a permit for a new water right related activity should be approved, the State Coordinator will be provided a copy of the permit application and any other pertinent information. The Administrator will complete the following initial review:

II.C.2.a. If it is evident that the new water related activity will not increase depletions, the State Coordinator will document that there are no new depletions associated with the activity for potential future reporting related to the depletions plan. Examples of such

activities are changes of use approved by the Wyoming Board of Control (WBOC) or Wyoming State Engineer (WSE) or replacement of an existing water supply that was active in 1992 through 1996. The documentation could be in the form of a copy of the order by the WBOC or WSE, a copy of a permit condition, an affidavit or other evidence documenting that the project is a replacement for an existing water related activity that has been or will be abandoned.

II.C.2.b. If it is apparent that the new water right activity will result in increased depletions, the State Coordinator will estimate the associated increase in depletions that would occur in the irrigation season and non-irrigation season using information on the application for the water right and, if necessary, additional information provided by the proponent. As an alternative, the SEO may require the proponent to complete a form that would accompany the applications for new water rights that would provide the State Coordinator information from which to determine the increased depletions and other information that would be helpful in the deliberations relating to this depletions plan.

II.C.3. The State Coordinator will contact the proponent of the new water right activity to determine if that proponent has existing uses in the same sub-basin as the new depletion that could be transferred or retired to offset anticipated new depletions that would occur during the irrigation season and non-irrigation season, respectively. If the proponent cannot offset new depletions in this manner, they will be advised that mitigation will be required. The mitigation may be achieved through the following processes:

II.C.3.a. The proponent may be allowed to participate in the Wyoming Water Bank, described below.

II.C.3.b. If the new depletions cannot be covered by the Wyoming Water Bank, the proponent will be required to submit a mitigation plan to the Administrator. The plan must document the means by which the increased depletions would be mitigated. The State Coordinator will receive and review the plans and submit the plan to the Surface Water or Groundwater Divisions to determine what, if any, permitting actions are required to implement the plan.

II.C.4. If the increased depletions can be mitigated as described above, a Recovery Agreement will be developed and executed by the project proponent and the State Coordinator. The State Coordinator will notify the appropriate permitting division within the SEO. The division may condition authorization for the new water right to ensure compliance with the approved means of mitigation.

II.D. Mitigation for New Water Related Activities

The following mitigation process will be used for the following: 1) new water related activities undergoing state evaluations, or 2) new water related activities with a federal nexus in which the FWS has approved the use of this process in the manner described in Section III of Chapter 1 of this plan. In either event, the mitigation responsibilities under the PRRIP are described in subsection I.A.4 of the Program Document. The mitigation must occur in the

manner and to the extent described in subsection III.E.3 of the Program Document and this depletion plan.

Wyoming will meet its obligations to the PRRIP by translating the net depletions from new water related activities and the benefits from the corresponding point of mitigation to the Wyoming/Nebraska state line using the tables in Attachment I with one notable exception. If the delivery of replacement water is protected by state water law, the conveyance losses established by the SEO will be used to translate the benefits of the replacement water at the state line. The impacts of new water related activities occurring at the state line in the irrigation season must be mitigated during the same irrigation season and the impacts of new water related activities occurring in the non-irrigation season must be mitigated in the same non-irrigation season. However, it may be necessary to time replacement water during September for excess or new depletions that impact flows at the state line in the non-irrigation season because Guernsey Dam on the North Platte River, the Wheatland Irrigation District's dams on the Laramie River, and the Hawk Springs Dam on Horse Creek are basically closed in the non-irrigation season.

If there is a system spill routed over or through Guernsey Dam or Kingsley Dam, Wyoming reserves the right to present evidence to the Governance Committee that depletions from Wyoming's new water related activities did not adversely affect the program purposes identified in subsection I.A.4 of the Program Document and that mitigation is not required or could be reduced. A finding by the Governance Committee that mitigation of new depletions is not necessary or could be reduced will have precedence over any mitigation described in this depletions plan.

Mitigation for depletions from new water related activities will be provided in the following manner:

II.D.1. Wyoming Water Bank

The State of Wyoming will administer a Wyoming Water Bank (WWB). Project proponents, including federal agencies, may be allowed to participate in the WWB if it is determined that the WWB has sufficient assets to accept the responsibility for mitigating the depletions for the term of the PRRIP and potential future increments of the PRRIP. Federal agencies' participation in the WMDP will be limited to a total of 350 acre feet per year, unless increased participation is approved by the State Coordinator, in consultation with the Director of the Wyoming Water Development Office (Director). WWB assets may include the following:

II.D.1.a. The State Coordinator will maintain a tabulation of abandoned, obsolete or reduced depletions that were considered under existing water related activities baselines. Reduced depletions may result from water right abandonment actions or the simple retirement of an existing water use. Examples of activities that may result in decreased depletions include a reduction in irrigated acreage due to revised operations, the down-sizing of an industrial facility or the conversion of irrigated lands for subdivisions or other less depletive activities. If the tabulation of obsolete or reduced depletions indicates there have been sufficient reductions under the existing water related baselines to offset the depletions from the new projects, the new projects may be covered by the WWB. If the State Administrator concludes

that there are not sufficient reductions under the existing water related baselines to offset the depletions from new projects, the Director will be consulted to determine if there is sufficient replacement water available to offset the depletions as per subsection II.D.1.b.

II.D.1.b. The Wyoming Water Development Office (WWDO) will maintain an inventory of replacement water supplies. Storage water available through an existing water related activity, such as existing reservoirs in Wyoming, or the delivery of new water to the system, such as imported water or non-hydrologically connected groundwater, could be used as a replacement supply. Water available from the Wyoming Account in the Pathfinder Modification Project and Wyoming's allocation of Glendo storage water will not be considered a replacement water option for new water related activities as it is needed for other purposes.

Prior to the beginning of each water year, the State Coordinator and the Director will make a determination of the obligations the WWB could accept for the following water year. Initially, the WWB may only be able to serve projects with very small depletions like domestic wells or stock watering reservoirs. If the WWDO is successful in securing replacement water or there are considerable reductions in depletions covered by the existing water related baselines, the WWB may be capable of serving projects with larger depletions in the future.

II.D.2. Activities outside the WWB

Wyoming will require proponents of projects not covered by the WWB to provide project specific mitigation. A mitigation plan identifying the proposed replacement supply must be provided for review and approval. The following describes the alternate means in which mitigation may be provided by a project proponent:

II.D.2.a. An existing water related activity covered under the existing water related activity baseline in the same river reach as the new depletion could be transferred or retired. For example, if a project proponent wants to implement a new project, the proponent could retire an existing water use that depletes water in the same quantity as the new project if the timing of the retired depletions at the state line would have occurred in the same irrigation or non-irrigation season as the depletions from the new project. As previously noted in II.C.3, project proponents will be encouraged to pursue this alternate if possible.

II.D.2.b. An activity covered under the existing water related activity baseline but within a different river reach as the new depletion could be retired. Both the effects of the new depletion and the benefits of the retired water related activity would be translated to the WY/NE state-line to ensure the depletion is effectively replaced. Replacement water achieved from simply retiring an existing use cannot be protected under state water law, so the depletions and benefits will be translated to the state line using the tables in Attachment I.

(Note: Under II.D.2.a.or II.D.2.b above, project proponents cannot seek involuntary abandonments of water rights and propose that, if successful, the resulting reductions in depletions can be used as mitigation for their projects.)

II.D.2.c. The project proponent could elect to provide replacement water by acquiring storage water available under the existing water related baseline, such as existing reservoirs in Wyoming, or the delivery of new water to the system, such as imported water or non-hydrologically connected groundwater. The project proponent would have the following options:

II.D.2.c.i Simply release and measure the water entering a stream or river under the assumption that it will not be protected under Wyoming water administration. Under this option, the effects of the new depletions and the benefits of the replacement supply must balance at the WY/NE state line using the tables in Attachment I.

II.D.2.c.ii. Seek protection of the delivery of the replacement water to the WY/NE state line. Under this option, the effects of the new depletion at the state line would be calculated using the tables in Attachment I. However, the replacement supply would be assessed losses (conveyance and other) imposed by the Wyoming State Engineer's Office from the point of delivery to the stream or river to the WY/NE state line.

II.D.2.c.iii. Seek protection of the delivery of the replacement water from the state line to the Lewellen gage upstream of Lake McConaughy in Nebraska from the State of Nebraska.

II.D.3. Groundwater Wells

The definition of non-hydrologically connected groundwater wells is provided in Chapter 1, subsection II.I. Attachment No. II to this depletions plan includes maps of areas in which wells are classified as not hydrologically connected and provides a description of the methodology used to develop them. Groundwater wells within these areas are categorically excluded as new water related activities and are exempt under this plan due to lack of hydrological connection. If wells fall outside the areas depicted on the map, the project proponents or State Coordinator may complete analyses of hydrological connection to determine if the wells meet the criteria for non-hydrologically connected wells. Proponents of new groundwater projects, in which the wells are determined to be hydrologically connected, may elect to assume the water pumped has the same effects as a surface water diversion or may complete groundwater modeling to determine actual effects on surface water. The annual report to the Governance Committee will include a map depicting those new wells with a permitted capacity of 500 gpm, or greater, that are considered non-hydrologically connected during the reporting period.

II.D.4. Reporting

Wyoming will annually report to the Governance Committee the new water related activities and the manner in which the depletions were addressed. The report will address the new depletions in each sub-basin and water use category. The Governance Committee may review the annual report and seek clarifications and modifications if it is deemed that Wyoming is not complying with sub-section III.E.3 of the Program Document.

CHAPTER 3-SOUTH PLATTE RIVER BASIN, WYOMING

I. Existing Water Related Activities

I.A. Description

The major streams in Wyoming's South Platte River Basin (SPRB) are Crow Creek, which flows into Colorado, and Lodgepole Creek, which flows into Nebraska. Both of these streams are dry at the respective state lines, except during periods of peak flows, which occur during the spring runoff or flash floods.

The City of Cheyenne receives a portion of its water supply from direct flow diversions and storage reservoirs in the upper Crow Creek drainage. When surface water could no longer meet its demands, the city turned to groundwater and, ultimately, developed the Cheyenne Stage I and Stage II projects.

The Cheyenne Stage I and Stage II Projects consist of a collection and transmission system in the Little Snake River Drainage within the Upper Colorado River Basin. The system collects stream flows in the Little Snake River Drainage and delivers them to a tunnel that transports the water under the continental divide to Hog Park Reservoir in the North Platte River Basin. Storage in Hog Park Reservoir is released to replace water stored in Rob Roy Reservoir or diverted by other supply components of the Stage I and Stage II projects located in the Douglas Creek Drainage in the NPRB. The water released from the Rob Roy supply system is delivered by gravity to Cheyenne's reservoirs in the Upper Crow Creek drainage in the SPRB.

From 1970 to 1997, Cheyenne's use of the Stage I and Stage II projects supplemented the flows of Crow Creek through return flows from the use of trans-basin water by an average of approximately 3,000 acre feet per year. None of this return flow arrives at the Colorado state line due to intervening agricultural water use. As Cheyenne continues to grow, there will be more demands placed on the Stage I and Stage II projects, which will result in increased return flows to Crow Creek. Whether this increased return flow will arrive at the state line is irrelevant. If the return flow arrived at the state line, it would be considered an accretion rather than a depletion. It would take extraordinary efforts to protect any such accretions to serve the PRRIP.

In Wyoming, importers of water, such as the City of Cheyenne, have the right to fully deplete their imported water subject to the development of a monitoring plan approved by the WSEO. Therefore, the City may find a use for the water that returns to Crow Creek. However, this future activity will not affect the existing water related baseline, because none of the return flow left Wyoming prior to July 1, 1997.

I.B. Existing Water Related Activities Baseline

Under Wyoming's Depletion Plan, the existing water related activities Baseline for water leaving the SPRB in Wyoming for most of the water use categories is zero. For several years prior to July 1, 1997, water passed the state lines only during some spring runoffs or large

rainfall events. The only water use category that could impact these events would be the construction or enlargement of reservoirs to store what little natural flow is passing the state lines. Therefore, the Benchmark for the SPRB will be the existing reservoir capacity as of July 1, 1997, as evidenced by water rights and field inspections.

II. New Water Related Activities

Due to the limited availability of storable natural flow and cost of construction of storage facilities, it is unlikely that reservoirs proposing to store natural flow in the SPRB will be constructed in Wyoming. If reservoirs were proposed, they would likely fall under the federal nexus and a consultation with the FWS would be required. In the unlikely event that a reservoir is proposed that falls outside the federal nexus, Wyoming will complete a state evaluation in the manner described in subsection II.C of Chapter 2 of this depletions plan. If the project undergoes a separate state evaluation, the standard for mitigation is described in subsection I.A.4 of the Program Document. The mitigation must occur in the manner and to the extent described in subsection III.E.3 of the Program Document and this depletions plan.

Attachment No. I
Wyoming's Depletions Plan
Tracking of Depletions and Accretions

Wyoming is committed to comply with Section III.E.3 of the Program Document through the implementation of Wyoming's Depletions Plan. However, Wyoming has long contended that new depletions in Wyoming will have very little effect on the occurrence or magnitude of FWS target flows at the critical habitat or the effectiveness of the Program in reducing shortages to those target flows. Further, Wyoming has consistently requested that the Governance Committee prepare an "analytical tool" that could be used to track the impacts of depletions on the program purposes identified in Section I.A.4 of the Program Document.

The following presentation is offered as an "interim tool" with the understanding that time constraints will not allow the development of the "analytical tool" before the Program must be approved for implementation and the understanding that the Governance Committee will develop and approve such an "analytical tool" as soon as possible during the first increment of the Program.

The interim tool would be used in the Wyoming Depletions Plan for the following purposes:

1. Calculating the effects of overruns and the benefits of under-runs relating to the various Benchmarks under Existing Water Related Baseline No. 2 at the Wyoming/Nebraska state line.
2. Determining the amount of retired water use that would be necessary to offset new water related activities to allow those new water related activities to be covered by an existing water related baseline.
3. Calculating the amount of unprotected replacement water that would be necessary to offset new water related activities that cannot be covered by an existing water related baseline.

This "interim tool" is based on the assumption that balancing the effects of depletions and the benefits of accretions at the Wyoming/Nebraska state line mitigates the impacts of excess depletions and new water related activities in Wyoming on FWS target flows and maintains the effectiveness of the Program in reducing shortages to those target flows. Balancing the effects and benefits at the Wyoming/Nebraska state line suggests that, in Nebraska, if the depletions had not occurred, flows would have incurred the same losses from the state line to the habitat as unprotected replacement water supplies and, therefore, the program purposes are met. However, if there is a system spill routed over or through Guernsey Dam or Kingsley Dam, Wyoming reserves the right to present evidence to the Governance Committee that any excess depletions or new water related activities in Wyoming did not adversely affect the program purposes that mitigation is not required or could be reduced in the year the spill occurred.

In order to balance the effects and benefits at the Wyoming/Nebraska state line, it must be recognized that the storage water delivered to the Guernsey-State Line reach from the federal reservoirs approximates 75% to Nebraska and 25% to Wyoming. In addition, the Modified North Platte Decree (Decree) apportions the natural flow in the irrigation season (May 1 through

September 30) in the reach 75% to Nebraska and 25% to Wyoming. Nebraska's share of water is diverted at the Whalen Diversion Dam into the Interstate or Gering-Fort Laramie Canals; at a diversion just upstream of the state line into the Mitchell Canal; or at the Tri-State Diversion Dam, just downstream of the state line. The system is operated to ensure that no water passes the Tri-State Diversion Dam with the exceptions of system spills and some minor storage deliveries. Therefore, the only way to balance the effects or benefits at the Wyoming/Nebraska state line of the three activities described above is to make the balance point the Guernsey-State Line reach as flows arriving in this reach will automatically divided 75% to Nebraska and 25% to Wyoming.

Tables I and II serve to track the effects of depletions and the benefits of accretions in the sub-basins within the North Platte River Basin (NPRB) in Wyoming to the Guernsey- State Line reach during the irrigation season (May 1 through September 30) and the non-irrigation season (October 1 through April 30), respectively.

The tables were developed to estimate the amount of water that would arrive at the Guernsey to State Line reach if the depletions had not occurred and the amount of water that would arrive at the reach if there were under-runs to baselines, retirement of existing water uses, or replacement water was provided but not specifically protected by Wyoming water administration.

The tables recognize that Guernsey Dam on the North Platte River, the Wheatland Irrigation District's dams on the Laramie River, and the Hawk Springs Dam on Horse Creek are basically closed in the non-irrigation season. Therefore, the tables assume that depletions that occur in the non-irrigation season above these dams do not show up at the Guernsey-State Line reach until the dams begin releasing water in the irrigation season.

A. Overruns/Under-runs to Existing Water Related Baseline No. 2

Wyoming will annually monitor and report water uses covered by Existing Water Related Baseline No. 2 in the manner described in Section I.C of Chapter 2 of the depletions plan.

The depletions from annual water use will be compared against the Benchmarks included under this baseline. Overruns and under-runs to these Benchmarks will be quantified. The effects of overruns and under-runs will be translated to the state line using the tracking factors in Tables I and II for irrigation season and non-irrigation season. If the overruns are not offset by under-runs, Wyoming will provide a mitigation plan for the review and approval of the Governance Committee. The mitigation plan will:

1. Identify the net overruns at the state line that occurred in the irrigation season and offer a means to replace those overruns in the irrigation season of the year following the year the overruns occurred.
2. Identify the net overruns at the state line that occurred in the non-irrigation season and offer a means to replace those overruns in the non-irrigation season of the year following the year the overruns occurred.

The mitigation plans will be specific to each occurrence of excess depletions to Existing Water Related Baseline No. 2. If the mitigation plan proposes to mitigate the excess depletions with natural flow, Tables I and II may be an appropriate tool to quantify the benefits in the Guernsey-State Line reach. If the mitigation plan proposes to mitigate the excess depletions with storage water, it may be protected by Wyoming water administration and administered to arrive at the Wyoming/Nebraska state line rather than just the Guernsey-State Line reach and Tables I and II would not be applicable. In either event, the mitigation plans would be subject to review and approval by the Governance Committee.

B. Retirement of Existing Water Uses to Offset New Water Related Activities

Section II.D of Chapter 2 of Wyoming’s Depletions Plan explains that new water related activities can be mitigated by retiring an existing water related activity covered by a baseline. The following examples are offered to explain how the tables could be applied to alternative retirement plans for the development of a hypothetical new subdivision in the Upper Laramie River sub-basin that will deplete 100 acre feet of water per year (60 acre feet in the irrigation season and 40 acre feet in the non-irrigation season).

1. The developer could acquire and permanently retire irrigated lands in the Upper Laramie River sub-basin that are included under the existing water related baseline. However, the benefits of retiring irrigated land occur in the irrigation season. Review of Tables I.E and II.C indicate that the effect of depletions in the non-irrigation season have twice the effect at the Guernsey-State Line reach as depletions in the irrigation season.

The following calculations quantify the amount of water needed at the Guernsey-State Line reach to offset the effects of the new subdivision in the Upper Laramie River sub-basin.

Irrigation season effects = 60 acre feet x 0.25 (Table I.E)	=	15.0 acre feet
Non-irrigation season effects = 40 acre feet x 0.50 (Table II.C)	=	<u>20.0 acre feet</u>
Effects at the Guernsey-State Line reach		35.0 acre feet

Due to the intervening reservoirs, the effects of the depletions resulting from the subdivision in the Upper Laramie River basin in both the irrigation and non-irrigation seasons arrive at the Guernsey-State Line reach during the irrigation season. Therefore, retiring irrigated lands, an irrigation season depletion, serves to mitigate the total effects of the subdivision at the reach in terms of quantity and timing under this particular example. The following calculation quantifies the amount of water needed in the Upper Laramie River basin to provide 35 acre feet at the Guernsey-State Line reach in the irrigation season.

Replacement needed = 35 acre feet/0.25 (Table I.E)	=	140.00 acre feet
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Therefore, the developer could acquire and permanently retire irrigated lands that consumed 140 acre feet of water per year. At a consumptive use rate of 0.79 acre feet/acre, 177 acres would have to be retired in the Upper Laramie River sub-basin.

2. The developer will be encouraged to mitigate new water related activities in the river reach in which the resulting depletions will occur. However, if there are no implications to intervening water rights or those implications are mitigated, the developer may propose to retire water use in another river reach. For example, assume the developer proposes to acquire and permanently retire irrigated land in the Guernsey to State Line sub-basin that is included under the existing water related baseline.

The following calculations quantify the amount of water needed at the Guernsey-State Line reach to offset the effects of the new subdivision in the Upper Laramie River sub-basin.

Irrigation season effects = 60 acre feet x 0.25 (Table I.E)	=	15.0 acre feet
Non-irrigation season effects = 40 acre feet x 0.50 (Table II.C)	=	<u>20.0 acre feet</u>
Effects at the Guernsey-State Line reach		35.0 acre feet

Due to the intervening reservoirs, the effects of the depletions resulting from the subdivision in the Upper Laramie River basin in both the irrigation and non-irrigation seasons arrive at the Guernsey-State Line reach during the irrigation season. Therefore, retiring irrigated lands, an irrigation-season depletion, serves to mitigate the total effects of the subdivision at the reach in terms of quantity and timing under this particular example. The following calculation quantifies the amount of water needed in the Guernsey to State Line sub-basin to provide 35 acre feet in the irrigation season.

Replacement needed = 35.0 acre feet/1.00 (Table I.D)	=	35.0 acre feet
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Therefore, the developer could acquire and permanently retire irrigated lands in the Guernsey to State Line sub-basin that consumed 35 acre feet of water per year. At a consumptive use rate of 1.31 acre feet/acre, 27 acres would have to be retired.

C. Unprotected Replacement Water to Offset New Water Related Activities

The developer, discussed in the examples in B. above, could purchase 100 acre feet of storage water per year from a reservoir in the Upper Laramie River sub-basin that is an existing water related activity and release 60 acre feet of the water in the irrigation season and 40 acre feet of water in the non-irrigation season into the river system without the benefit of protection under water administration. As the released replacement water is in the same sub-basin as the new water related activity, the effects of the depletions and the benefits of the replacement will be the same at the Guernsey-State Line reach and the loss factors in the tables do not have to be considered.

The developer will be encouraged to mitigate new water related activities in the river reach in which the resulting depletions will occur. However, if there are no implications to intervening water rights or those implications are mitigated, the developer may propose to provide unprotected replacement water in a different water reach. The tables would be used as part of the evaluation of such proposals. The term “unprotected” is used to suggest that the water would not be protected under Wyoming water administration but would be considered natural flow that could be used by intervening appropriators. Unprotected replacement water could be achieved by

simply releasing and measuring water into a stream or river under the assumption that it will not be protected under Wyoming water administration.

If replacement water is protected by Wyoming water administration, the tables are not applicable, as losses assessed by the Wyoming State Engineer's Office for each specific project would prevail. For the replacement water to be protected, it will need to be storage water. If the replacement/storage water is to be protected, it may be administered to arrive at the Wyoming/Nebraska state line rather than just the Guernsey-State Line reach.

**Table I-Tracking One (1) Acre Foot of Depletion or Accretion
Irrigation Season**

A. Above Pathfinder Reservoir (Main Stem)-Irrigation season

Reach	Use/Reach	Remaining Flow	Comments
Above Pathfinder	5%	0.95	Conveyance loss (12% for total reach)
Pathfinder to Guernsey	5%	0.90	Conveyance loss
Effects @ Guernsey-State Line		0.9	Irrigation season

B. Pathfinder to Guernsey Reservoir (Main Stem)-Irrigation season

Pathfinder to Guernsey	2.5%	0.975	Conveyance loss (5% for total reach)
Effects @ Guernsey-State Line		0.975	Irrigation season

**C. Above Guernsey Reservoir (Tributaries)-
Irrigation Season**

Above Guernsey	50%	0.50	Use and conveyance loss within reach
Effects @ Guernsey-State Line		0.50	Irrigation season

D. Guernsey Reservoir to State Line-Irrigation season

Effects @ Guernsey-State Line		1.00	Irrigation season
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E. Upper Laramie-Irrigation season

Above Wheatland Res.	50%	0.50	Use and conveyance loss within reach
Wheatland ID (WID)	50%	0.25	Use and conveyance loss within reach
Grayrocks Reservoir	0%	0.25	Assumes direct bypasses
Effects @ Guernsey-State Line		0.25	Irrigation season

F. Lower Laramie-Irrigation season

Above Grayrocks	50%	0.50	Use and conveyance loss within reach
Grayrocks Reservoir	0%	0.50	Assumes direct bypasses
Effects @ Guernsey-State Line		0.50	Irrigation season

G. Horse Creek-Irrigation season

Horse Creek	100%	0.00	There is no flow from HC during the irrig. season.
Effects @ Guernsey-State Line		0.00	Irrigation season

**Table II-Tracking One (1) Acre Foot of Depletion or Accretion
Non-Irrigation Season**

A. Above Pathfinder Reservoir-Non-irrigation season

Reach	Use/Reach	Remaining Flow	Comments
1. Pathfinder in priority			
Above Pathfinder	2.5%	0.975	Conveyance loss (5% for total reach)
Pathfinder-Guernsey	5%	0.93	Conveyance loss-Water released in irrigation season
Effects @ Guernsey-State Line		0.93	Irrigation season*
2. Seminoe in priority			
CAID/Casper Canal	50%	0.50	Water released/used in irrigation season
Effects @ Guernsey-State Line		0.50	Irrigation season*

B. Pathfinder to Guernsey Reservoir-Non-irrigation season

Stored in Guernsey		1.00	
Effects @ Guernsey-State Line		1.00	Irrigation season*

C. Upper Laramie-Non-irrigation season

Stored in Whtld. Res.		1.00	
Wheatland I.D. (WID)	50%	0.50	Water released/used in irrigation season
Grayrocks Reservoir	0%	0.50	Assumes direct bypasses
Effects @ Guernsey-State Line		0.50	Irrigation season*

D. Lower Laramie-Above Grayrocks

Stored in Grayrocks		1.00	
Grayrocks Reservoir	0%	1.00	Assumes direct bypasses
Effects @ Guernsey-State Line		1.00	Non-irrigation season

E. Horse Creek-Above Hawk Springs Reservoir-Non-irrigation season

Stored in Hawk Springs		1.00	
Below Hawk Springs Res.	100%	0.00	Water released/used in irrigation season
Effects @ Guernsey-State Line		0.00	Irrigation season*

F. Below Guernsey, Grayrocks, and Hawk Springs Reservoirs-Non-irrigation season

Effects @ Guernsey-State Line		1.00	Non-irrigation season
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* Depletions and accretion in the non-irrigation season translate to effects at the Guernsey-State Line during the irrigation season due to the intervening reservoirs.

Attachment II
Wyoming's Depletions Plan
Groundwater Areas Not Considered to be Hydrologically Connected

Introduction

Attachment 5, Section 7 to the Platte River Recovery Implementation Program is the “Depletions Plan, Platte River Basin, Wyoming”, known as “Wyoming’s Depletion Plan”. Chapter 1, Sec.II.I. provides criteria for the designation, “hydrologically connected”, and exempts groundwater development that does not meet these criteria from the provisions of the Depletion Plan:

Hydrologically connected groundwater well - A well so located and constructed that if water were withdrawn by the well continuously for 40 years, the cumulative stream depletion would be greater than or equal to 28% of the total volume of groundwater withdrawn from that well. Use from groundwater wells in Wyoming that are not hydrologically connected does not effect the purposes of the PRRIP, is not a new water related activity, and requires no mitigation.

Chapter 2, Sec. II.D.3. of Wyoming’s Depletion Plan references maps of areas determined to be not “hydrologically connected” with respect to groundwater development, and explains the use of those maps in the categorization and accounting of groundwater wells:

The definition of non-hydrologically connected groundwater wells is provided in Chapter 1, subsection II.I. Attachment No. II to this depletions plan includes maps of areas in which wells are classified as not hydrologically connected and provides a description of the methodology used to develop them. Groundwater wells within these areas are categorically excluded as new water related activities and are exempt under this plan due to lack of hydrological connection. If wells fall outside the areas depicted on the map, the project proponents or State Coordinator may complete analyses of hydrological connection to determine if the wells meet the criteria for non-hydrologically connected wells. Proponents of new groundwater projects, in which the wells are determined to be hydrologically connected, may elect to assume the water pumped has the same effects as a surface water diversion or may complete groundwater modeling to determine actual effects on surface water. The annual report to the Governance Committee will include a map depicting those new wells with a permitted capacity of 500 gpm, or greater, that are considered non-hydrologically connected during the reporting period.

The definition of “hydrological connection” in Wyoming’s Depletion Plan was adopted from criteria included in the Modified North Platte Decree to govern the accounting of irrigated acreage. Acreage irrigated from wells determined to be not hydrologically connected was excluded from the Decree limitations on irrigation in the lower-Laramie River Basin and in the North Platte River Basin above Guernsey Dam. As a screening tool to assist the Wyoming State Engineer’s Office in the consideration of future irrigation well applications, the North Platte Decree Committee (NPDC) agreed to the preparation of maps of those areas for which additional analysis of hydrological connection would not be necessary. In these areas – called “exclusion

area”, “area determined to not be hydrologically connected”, and, informally, “green area” – any future wells are presumed to not be hydrologically connected under the “28/40” criteria. Outside of the mapped areas, wells may or may not be hydrologically connected, but more detailed, site-specific investigations are required to adequately assess this issue.

The development of maps of exclusion areas in those portions of the North Platte River Basin subject to Modified North Platte Decree limitations is detailed in a series of technical memoranda developed by Wyoming in cooperation with the NPDC Groundwater Wells Subcommittee and subsequently approved by the NPDC for use in Modified Decree compliance reporting. Those memoranda are included with the minutes of the relevant NPDC meetings. They are cited below, in reference to their specific sub-basins, but are not repeated here. The following general discussion of the methodology, however, is drawn from those memoranda. The methodology, data sources, calculations, etc. approved by the NPDC have been extended to the rest of the North Platte Basin in Wyoming to complete Wyoming’s Depletion Plan.

Figure 1 provides a general location map for the North Platte River Basin and the individual sub-basins discussed below. Figures 2 through 5 present calculation details for those sub-basins (and portions of sub-basins) not previously examined by the NPDC. An appendix to this memo compiles the six individual sub-basin maps produced from the NPDC work and the present discussion.

Procedure

The basic approach to the definition of areas in which groundwater wells are presumed not to meet the Depletion Plan criteria for hydrological connection comes from the evaluation of stream depletion by the U.S. Geological Survey (USGS) as laid out in papers by Jenkins (1968). This technique uses a term called “stream depletion factor” (sdf):

$$\text{sdf} = d^2S/T$$

where (all parameters expressed in consistent units):

- d = distance from well to stream
- S = aquifer storativity (dimensionless)
- T = aquifer transmissivity

The “sdf” parameter has units of days. It’s functional relationship with stream depletion is defined in equation and graphical form by Jenkins (1968).

The conceptual model behind this formulation is that of a linear stream with a well at the specified perpendicular distance from the stream, in an infinite, homogeneous, and isotropic aquifer, with both the well and the stream fully penetrating the aquifer. Drawdown in the system is assumed to be insignificant in relation to aquifer thickness, and the stream is assumed to have an unlimited water supply and no streambed resistance to groundwater flow.

Generally, to define exclusion areas, aquifer parameters are entered into the above equation and the distance parameter is calculated to define the “setback distance” where an sdf value corresponding with 28% depletion in 40 years is achieved. Areas beyond the setback distance are exclusion areas. Where area-wide groundwater modeling has been developed (e.g the lower-Laramie River Basin), and provides an integration of spatial variations in aquifer and stream parameters, such modeling is used in preference over the above, simplified approach. However, such models are rare in the North Platte Basin of Wyoming.

Obviously, this is a highly-generalized, screening-level approach to hydrogeologic conditions that can be quite complex in detail. The objective is to define areas for which additional analysis is not necessary to reasonably conclude that the depletive impact of a groundwater well would fall below the threshold of 28% in 40 years. Areas not so defined may or may not meet the “28/40” criteria, but more detailed study is deemed necessary to make that determination.

The conceptual model behind this method is inherently conservative, in the sense of over-predicting rather than under-predicting stream depletion (i.e. smaller rather than larger exclusion zones), and has generally been applied so as to enhance rather than compromise that conservatism. For example, where streams are accompanied by a high-permeability alluvial aquifer, setbacks have generally been calculated from the edge of the alluvial aquifer rather than from the stream channel, with the effect of increasing the setback distance by the width of the alluvial aquifer (i.e. as though the alluvial aquifer were infinitely permeable). Where pump test data provide a range of transmissivity or permeability values for a formation, the larger values generally have been used for setback calculation. Similarly, in the absence of specific data, a value of 0.1 is used as the default for the storage parameter, increasing setback distances over what would be calculated using the higher values typical of site-specific studies (e.g. 0.15, 0.23, 0.25). As a final step in the delineation of exclusion areas, setback distances are manually smoothed (either increasing the distance or leaving it unchanged in all cases) to provide qualitative compensation for multiple-stream effects.

In some cases, the boundaries of exclusion areas are defined stratigraphically rather than by setback distance calculations. For example, the large setback distances associated with high-permeability formations may be truncated where the lower contact of the formation outcrops if the underlying formation is of significantly lower permeability (i.e. rather than the large setback being extended on into the area of known low-permeability material). Such boundaries are indicated as “stratigraphic boundary” on the attached figures.

Portions of some sub-basins have not been evaluated for hydrological connection due to the character of the hydrogeology and stream system. This generally applies to areas in which aquifer materials have little primary permeability, so groundwater movement is dominated by fracture-producing structural features that may be ill-suited to the simplified analysis as homogeneous porous media. The primary example is the mountainous areas underlain by granites and other crystalline rocks. There, the perennial stream network is commonly sufficiently dense that the fracture systems necessary to provide useful groundwater production may also provide ready connection to nearby surface water. Areas for which evaluations have not been made are subject to the same qualification as cited above for all other locations not identified as in exclusion areas, i.e. groundwater wells in these areas may or may not meet the

hydrologically-connected criteria, but more detailed, site-specific investigations are required to adequately assess this issue.

Following the procedures developed for the NPDC, the standard, USGS 1:100,000-scale map coverage is used to identify “perennial” streams. With exceptions as noted in the sub-basin by sub-basin discussions, setback distances are only considered for perennial streams that flow into the North Platte River or one of its tributaries. Streams in topographically closed basins or streams which lose their flow to evaporation/infiltration well before reaching the North Platte system are not considered avenues for North Platte River depletion. (The flow in intermittent streams is commonly a function of storm events rather than a connection with groundwater. The logic of generally excluding intermittent streams from consideration here is that if the groundwater table is significantly below the stream, stream losses are a function of streambed permeability, and are insensitive to changes in groundwater levels as would be caused by well development.)

Unless otherwise noted, all geologic contacts come from the statewide geologic mapping of Love and Christiansen (1985).

North Platte River Basin above Alcova Dam

This area falls within that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Areas presumed not to meet the “28/40” hydrological connection criteria have been developed and approved by the NPDC for purposes of irrigated acreage accounting under the Decree. The details of that development are provided in the October 12, 2006 memo attached to the minutes of the October 17, 2006 NPDC meeting. The exclusion areas approved by the NPDC are adopted without modification for the PRRIP Wyoming Depletion Plan. These areas are presented on the attached map entitled, “Above Alcova Dam - North Platte River Basin Areas Not Hydrologically Connected” dated October 17, 2006.

North Platte River Basin between Alcova and Guernsey Dams

This area falls within that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Areas presumed not to meet the “28/40” hydrological connection criteria have been developed and approved by the NPDC for purposes of irrigated acreage accounting under the Decree. The details of that development are provided in the April 13, 2004 memo attached to the minutes of the April 13, 2004 NPDC meeting. The exclusion areas approved by the NPDC are adopted without modification for the PRRIP Wyoming Depletion Plan. These areas are presented on the attached map entitled, “Alcova Dam to Guernsey Dam - North Platte River Basin Areas Not Hydrologically Connected” dated April 13, 2004.

Laramie River Basin above Wheatland Irrigation District Tunnel

This area falls outside that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Thus, the methodology developed for the

NPDC for the areas outlined above has been applied to this area specifically for Wyoming's Depletion Plan. Setback distances, stratigraphic boundaries, and the assignment of exclusion areas so defined are presented on Figure 2. The exclusion areas are also presented on the attached map entitled, "Upper Laramie Basin Areas Not Hydrologically Connected" dated July 10, 2006. The following discussion provides the details of development.

Those portions of the upper Laramie River basin underlain by crystalline rocks (all rocks of Precambrian age) are excluded from the present analysis due to the high density of perennial streams, the fracture-dominated character of the permeability, and the unlikelihood of substantial groundwater development, as discussed in the "Procedure" section. (See "no analysis" designation on Figure 2.)

In areas adjacent to perennial streams, e.g. the downstream end of this basin, this same "no analysis" approach is taken to the Casper Fm. and underlying strata. (Due to the potential similarities in fracture conditions within the Forelle Limestone and the underlying Casper Fm., and to provide an additional margin of conservatism, the "top" of the Casper aquifer is here considered as the Forelle / Chugwater Fm. contact. This approach leaves the 250 ft. of strata in the Forelle and Satanka Shale (between the Forelle Lms. and the Casper Fm.) as a buffer against Casper Fm. depletions being transmitted to overlying strata.)

Upstream of the crystalline rocks of the Laramie Range (T22, R73), where the river runs across younger, sedimentary rocks, generalized transmissivities, storage coefficients, and the resultant sdf-calculated exclusion-zone setback distances are adopted for groups of hydrologically similar formations as developed by the NPDC analysis of adjacent North Platte sub-basins. Figure 2 presents the setback values (in ft.). (No applicable large-area groundwater modeling has been identified for the upper-Laramie basin.)

The following list presents the generalized setback values adopted from NPDC (2004) and NPDC (in preparation) for the various formations through which the Laramie River and its tributaries flow in this basin:

<u>Formation(s)</u>	<u>Setback distance</u>
Chugwater Fm.	2800 ft.
Sundance, Thermopolis, Mowry, Frontier	8300 ft.
Niobrara and Steele Shales	2800 ft.
Mesaverde	8300 ft.
Lewis Shale	2800 ft.
Hanna Fm.	13700 ft

Quaternary deposits in this basin vary from extremely-low permeability glacial moraine to well-sorted stream alluvium. However, the occurrence of thick deposits of high-permeability alluvium in the upper Laramie basin is relatively rare. Most of the extensive mapped Quaternary deposits (e.g. Love and Christiansen, 1985; 1:500,000-scale) form a relatively thin veneer over the bedrock which controls groundwater flow. Lowry et al. (1973) describe the Quaternary aquifer: "most of the deposits are thin and often occur in elevated positions, there is little or no saturation of most deposits shown on the map. Deposits near stream level generally contain

some water ...”. (Their map is quite similar to that of Love and Christiansen with respect to these deposits.) The sporadic geologic mapping available for the upper Laramie River basin at 1:25,000 scale (e.g. McAndrews, 1966) commonly shows the situation of bedrock units exposed in scattered outcrops where the thin Quaternary veneer has been stripped away.

To further investigate this issue, Statements of Completion filed with the Wyoming State Engineer’s Office were reviewed for 41 individual wells located in the areas of Quaternary deposits mapped by Love and Christiansen (1985). These wells were selected to investigate the thickness of Quaternary deposits in areas for which there are no nearby bedrock outcrops, i.e. in those areas most likely to provide relatively thick unconsolidated deposits. This examination provided site-specific confirmation of the generalizations presented above. There is rarely more than 20 ft. of material above bedrock, and unless the well is beside a stream, that material is most commonly unsaturated. Many of the wells completed in the shallow sand and gravel deposits alongside the Laramie or Little Laramie River, however, are reported to be quite productive.

In addition, records for all water wells permitted for yields of 100 gpm or more that are not at locations obviously meeting the “hydrologic connection” criteria were individually examined. (The generally poor groundwater conditions in the upper Laramie Basin are indicated by there only being 12 wells with reported yields of 100 gpm or more that fall in the exclusion areas defined herein.) In all areas except one (discussed below), these wells are completed in locally productive bedrock strata rather than in unconsolidated surficial materials. For example, wells P295G and P371C, located in T15, R73W, Sec. 17 are on an exclusion area boundary line¹. The lithologic log for the former describes “earth and clay” for the first 10 ft., then “rock” to the total depth of 85 ft. The latter well is 1629 ft. deep. In both cases, it is clear that the mapped surface deposit of Quaternary alluvium is not controlling groundwater production or hydrologic connections.

The exception cited in the previous paragraph is a group of “wells” (some are simply open pits) along the Pioneer Canal and the associated string of lakes in topographic depressions between T14, R76, Sec. 15 and T14, R75, Sec. 1. It is concluded that these wells are largely pumping irrigation seepage and return flows which would not otherwise return to the Laramie River.

Thus, to delineate areas of potentially hydrologically connected alluvial material in the upper Laramie River basin, larger-scale mapping (1:100,000) by the Wyoming Geological Survey has been consulted. From Hallberg and Case (2005) and VerPloeg and Boyd (2000) the “Alluvium” and “Alluvial deposits”, respectively, have been extracted for identification of exclusion area setbacks. Mapped setbacks are the greater (further from the stream) of 1) the extent of the mapped deposits of alluvium; or 2) the setback calculated based on the underlying bedrock as listed above.

Checking this approach against individual well data indicated that well P394G (T16, R75, Sec. 8) had been inappropriately classified. The lithologic log for this well reports 30 ft. of gravel,

¹Well locations are based on Wyoming State Engineer’s Office Statements of Completion. These documents list only the permittee-supplied 1/4, 1/4 Section, the center of which is assumed as the well location for the present analysis.

from which a yield of 300 gpm is obtained. Thus, in the area west of the Steele Shale ridge in the northwest portion of the Township, the “Qal”/”Qt” contact of Love and Christiansen (1985) is used to define a somewhat smaller exclusion area than provided by the above approach. (East of this ridge, well permits report small yields, and well depths up to 100 ft.. Even close to the river (e.g. T17, R74. Sec. 19), lithologic logs report “shale”and “clay” at around 10 ft.

In T19, R74, the Laramie River skirts an area of Wind River Formation outcrop (west of the river), mostly located in the topographically closed Dutton Creek Basin. This formation has been found to be locally quite permeable in the Shirley Basin, further west (“above Alcova” sub-basin). In recognition of the possibility of high-permeability Wind River Fm. strata being in contact with the river through this reach, the setback distance of 21,000 ft. from the Shirley Basin area is adopted for the west side of the river here. This approach reaches beyond the topographic boundary of the Laramie River Basin, into the topographically closed basin of Dutton Creek. It is assumed that the groundwater divide is, or could be modified through groundwater extraction to be, west of the topographic divide in this case. Because the Wind River Fm. lies on top of the adjacent formations exposed upstream and downstream (as opposed to extending its influence beyond its surface outcrop as an underlying formation), its associated setback distance is applied only to the area of Wind River Fm. outcrop. This creates a truncation of the 21,000-ft setback at the lower contact of the formation.

On the east side of the Laramie River through this reach, groundwater communication with the river is controlled by the Lewis Shale and a 2800-ft. setback is applied. In recognition of the small area in which the Wind River Fm. extends to the east side of the river (T19, R74), the Lewis-Shale setback is applied from the edge of the Wind River Fm. rather than from the river channel².

The only perennial tributary of the Laramie River from the downstream end of the upper-Laramie sub-basin to where the river flows out of the mountains southwest of Laramie city, is the Little Laramie River. The drainage of the Little Laramie River is addressed as above, i.e. setbacks applied as a function of underlying formations. Upstream of the junction of Mill Creek and the Little Laramie River (T16, R76, Sec.3) setbacks are larger than the inter-stream distances, so the exclusion area boundary is defined by the relatively large, Hanna-Fm.-based setback north from the North Fork of Mill Creek and the Mesaverde-based setback south from the Little Laramie River. Thus, the areas of more complex structural conditions along the mountain face (e.g. T17, R77, Sec. 31) are not indicated for exclusion and the analysis need not consider separate setbacks for individual formations.

Detailed studies of the Casper Fm. associated with the City of Laramie municipal supply wells (e.g. Western Water, 1993) have identified a regional permeability of 20 ft/day for the active portion of this formation around the Laramie wells (i.e. the largely saturated portion of the aquifer adjacent to its contact with the overlying Satanka Shale). Applied to the formation thickness of 700 ft., a transmissivity of 14,000 ft²/day (105,000 gpd/ft) is indicated. Entry of this value into the sdf calculation produces a “28/40” setback distance of 8.6 miles (45,000 ft.). This

²The setback from this contact instead of from the river channel is indicated by a short red line marking the contact on Figure 2.

distance is applied to the Casper Formation north and south of the natural springs feeding Spring Creek, a tributary of the Laramie River³. It is this radius of potential influence centered on the head of Spring Creek, and truncated at the Forelle / Chugwater contact, that creates the semicircle, “windshield wiper”, shape in the lower right portion of Figure 2.

Laramie River Basin below Wheatland Irrigation District Tunnel

With the exception of the Wheatland Irrigation District, this area falls within that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Areas presumed not to meet the “28/40” hydrological connection criteria have been developed and approved by the NPDC for purposes of irrigated acreage accounting under the Decree. The details of that development are provided in the March 27, 2003 memo attached to the minutes of the April 3, 2003 NPDC meeting (for the main part of the basin) and the April 11, 2006 memo attached to the minutes of the April 11, 2006 NPDC meeting (for the southern basin and other peripheral areas). The exclusion areas approved by the NPDC are adopted without modification for the PRRIP Wyoming Depletion Plan.

Because the area within the Wheatland Irrigation District (WID) is outside the irrigated acreage restrictions of the Decree, exclusion areas are developed here. Aquifer transmissivities and storage characteristics for WID are taken from groundwater modeling prepared by Nebraska experts for the Nebraska v. Wyoming lawsuit (Hydroscience Associates, 2000a) – the same modeling that was used in the NPDC analysis for the surrounding areas subject to Decree restrictions. Similarly, exclusion area setbacks are calculated using the same simplified, “sdf”, method. Setback distances, stratigraphic boundaries, and the assignment of exclusion areas so defined for the Wheatland Irrigation District area are presented on Figure 3. These exclusion areas are combined with those adopted by the NPDC and presented on the attached map entitled, “Lower Laramie Basin Areas Not Hydrologically Connected” dated July 10, 2006.

A setback of 13,514⁴ ft. is applied to the reach of Wheatland Creek downstream of the town of Wheatland, where the groundwater model produced a transmissivity of 1500 ft²/day and a storage coefficient of 0.12. Given the proximity of these setbacks (in some cases overlapping) to those along Sybille Creek (west) and Chugwater Creek (east) and the presence of a second, shallower and more permeable aquifer layer across much of this area, no exclusion zone is proposed west of Wheatland.

Upstream of Wheatland, to a point on the eastern of the two perennial forks of Wheatland Creek (also known as Ayers Draw) the groundwater model transmissivity of 1000 ft²/day generates a setback of 11,034 ft. for the lower aquifer layer (the Arikaree Fm.). Along both this and the west

³Although this stream is not identified as perennial on the 1:100,000-scale USGS mapping, it is known to carry Casper-Formation water westward to the Laramie River, and thus provides a stream-depletion connection to the river as long as it is flowing. Groundwater production beyond the point of complete depletion of this small stream no longer has a ready mechanism for transmission of depletion to the Laramie River / North Platte system and may qualify as “not hydrologically connected”.

⁴Although the five significant digits listed here are well beyond the accuracy of the input and analysis, they are retained for conformity with the NPDC-approved values in the surrounding lower-Laramie River basin.

fork (also known as Rock Creek), the shallow aquifer layer (Quaternary terrace deposits) is present and appears to be sufficiently permeable that wells penetrating significant saturated thickness cannot be categorically excluded under the “hydrological connection” criteria. Thus, no extensions of the previously-defined exclusion zones into the area of terrace deposits (“Qt” or “Qs” on Love and Christiansen, 1985) are indicated. (This contact defines the “stratigraphic boundary” on Figure 3 at the south end of WID.)

In the headwaters of the east fork of upper Wheatland Creek, the groundwater model transmissivity of 70 ft²/day generates a setback of 2,919 ft., although this setback is mostly subsumed by the larger setback from downstream segments.

The exclusion area established previously for the area south of Wheatland Irrigation District is extended northward based on the above setbacks and boundaries and the same process of manual smoothing as was applied in the surrounding NPDC-approved areas.

North Platte River Basin below Guernsey Dam (excluding Laramie River and Horse Creek drainages)

This area falls outside that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Thus, the methodology developed with the NPDC for the areas outlined above has been applied to this area specifically for Wyoming’s Depletion Plan. Setback distances, stratigraphic boundaries, and the assignment of exclusion areas so defined are presented on Figure 4. The exclusion areas are also presented on the attached map entitled, “Guernsey to State Line Basin Areas Not Hydrologically Connected” dated July 10, 2006. The following discussion provides the details of development.

This sub-basin provides the most widespread, productive aquifer of the North Platte River basin in Wyoming. The alluvial sands and gravels along the river create what has been termed the “valley-fill aquifer” (Crist, 1975), which has been extensively developed for irrigation. It is basically coincident with the “alluvium” mapped by Love and Christiansen (1985), with the addition of areas mapped as “dune sand” northeast of Torrington.

Due to its well-demonstrated production potential and location within the “pivotal reach” of the North Platte River with respect to the North Platte Decree, the alluvial aquifer along the North Platte River below Guernsey Dam has been the subject of several modeling studies (e.g. Crist, 1975, Hydroscience, 2000b). This aquifer extends from approximately the Interstate Canal on the north, to the geologic contact with Brule and Chadron Formation outcrops approximately 2 miles south of the river. Transmissivities in the 100s of thousands of gpd/ft provide groundwater connections well within the 40-year time frame of the “hydrological connection” criteria. No exclusion zones are proposed for this aquifer. Furthermore, to maintain a conservative approach for the underlying deposits, setbacks are applied from the edge of the valley-fill aquifer as though it were the stream.

Beneath the valley-fill aquifer, groundwater modeling in this area has consistently considered materials to be essentially impermeable. These are largely the siltstone and mudstone-dominated

strata of the White River Fm. (Brule and Chadron Fms.) that appear at the surface to the north and south of the valley-fill aquifer.

At the upstream end of this reach of the North Platte River, and beyond the valley-fill aquifer, hydrological connection with the river is controlled by the Arikaree Fm. Along the south side of the North Platte in this reach, exclusion zones have been developed previously, for the lower-Laramie River Basin and for the Alcova-to-Guernsey Basin. In the former, an effective transmissivity of 400 ft²/day and a calculated setback distance of 7,000 ft. (6,979 ft.; NPDC, 2003) were developed from groundwater modeling work centered in the Wheatland area. In the latter, an effective transmissivity of 250 ft²/day and a calculated setback distance of 5,500 ft. (NPDC, 2004) were developed from groundwater modeling work along Horseshoe Creek. The larger of the two setback values – 7,000 ft. – is adopted here, and is applied to the north side of the North Platte River as well. (West of the “valley-fill aquifer” modeled by Crist (1975), i.e. in Platte Co., the “Qa” unit of Love and Christiansen (1985) is used for the boundary from which the setback distance is applied.)

Nearly coincident with the hydrologic boundary between the above-Guernsey and below-Guernsey reaches of the North Platte River is the axis of the Hartville Uplift. Outcrops of Paleozoic formations to the west (“North Platte Basin between Alcova and Guernsey Dams” reach) are afforded a large setback (16,000 ft.) to reflect the potential for widespread, fracture-enhanced permeability. East of the lower contacts of these aquifers are granitic rocks and thin, overlying deposits of Arikaree Fm. The Arikaree Fm. thickens eastward to provide a useful aquifer in northern Goshen Co. Thus, at the extreme upstream end of the Guernsey to State Line reach of the North Platte River, a large setback is applied to the area of Paleozoic-rock outcrop on the north side of the North Platte, and the Arikaree Fm. setback (7,000 ft.) is applied eastward from those outcrops.

Downstream of the Arikaree Fm., hydrological connections beyond the valley-fill aquifer are controlled by the lower-permeability strata of the Brule, Chadron, and Lance Fms. The Brule Fm. was evaluated for the NPDC in the adjacent lower-Laramie River Basin (NPDC, 2003; NPDC, 2006), where a transmissivity of 120 ft²/day and a setback of 4200 ft. were applied. HRS (2000; p. 4-5) evaluated groundwater flow between the Horse Creek and lower North Platte River basins (i.e. the southwest portion of the below-Guernsey reach of the river being considered here, primarily in the Chadron and Lance Fms.), for which they applied an effective transmissivity of 267 ft²/day. Application of the larger of these values – 267 ft²/day – generates a setback distance of 6,200 ft., which is applied from the edge of the valley-fill aquifer on the north and south sides of the North Platte River.

Although not recognized as perennial on the USGS 1:100,000-scale stream coverage, agricultural drains in the area south of the North Platte River and north of the Ft. Laramie Canal are known to flow year-round due to irrigation return flows. To reflect the potential for North Platte depletions via groundwater development adjacent to these drain systems, a 6,200-ft buffer is applied to these features (Cherry Creek Drain, Katzer Main Drain) as well.

Rawhide Creek is the only significant tributary to the North Platte River in this reach that is not confined to the area discussed above (excluding the Laramie River, which is considered in other

sections of this report). Rawhide Creek is an intermittent stream for 4.4 miles above the Interstate Canal, but is perennial through a large area in northern Goshen County underlain by the Arikaree Fm.. The aquifer in this area is adequate to support irrigation-well development (see Crist, 1977), but it is separated from the valley-fill aquifer along the North Platte by several miles of intervening Brule Fm. (Crist (1975) and the refined “Crist” model developed by Nebraska for the Nebraska v. Wyoming lawsuit (Hydroscience, 2000b) modeled the Brule as creating an effectively impermeable boundary to the “valley fill” aquifer. Thus, groundwater-development caused depletion of Rawhide Creek is primarily transmitted through to the North Platte River via the narrow alluvial aquifer along the intermittent stretch of Rawhide Creek.

Crist (1975) provides a transmissivity estimate for the alluvium along Rawhide Creek north of the Interstate canal of 4,300 ft²/day. Calculation of a setback distance based on this transmissivity produces a value of 4.75 miles. Since this setback calculation assumes a widespread aquifer rather than a narrow band of alluvium, it is concluded that the Rawhide connection to the Arikaree aquifer in northern Goshen Co. does not meet the “hydrological connection” criteria of this report.

Horse Creek Basin

This area falls outside that portion of the North Platte River Basin subject to the irrigated acreage restrictions of the Modified North Platte Decree. Thus, the methodology developed with the NPDC for the areas outlined above has been applied to this area specifically for Wyoming’s Depletion Plan. Setback distances, stratigraphic boundaries, and the assignment of exclusion areas (“Area Determined to be Not Hydrologically Connected”) so defined are presented on Figure 5. The exclusion areas are presented on the attached map entitled, “Horse Creek Basin Areas Not Hydrologically Connected” dated July 10, 2006. The following discussion provides the details of development.

The lower Horse Creek basin in Wyoming (i.e. downstream of T20, R61, Sec. 4) is underlain by the Lance and Chadron Fms. HRS (2000) evaluated groundwater flow northward through these deposits from the Horse Creek basin south of this area, concluding that such flow was minimal due to the relatively low permeability. The effective transmissivity of 267 ft²/day from that report generates a setback distance of 6,200 ft., which is applied throughout the areas of Chadron and Lance outcrop. (The same approach was applied above, for the adjacent portions of the Guernsey-to-stateline basin.)

Upstream of this area, and downstream of T19, R63, Sec.4 on Bear Creek and T18, R63, Sec. 3 on Horse Creek, the basin is underlain by the Brule Formation. This formation consists primarily of fine-grained materials (clay, silt, ash), commonly produces springs along its upper contact as downward-moving groundwater encounters its low permeability, and produces lab-sample permeabilities of 0.1 and 0.2 gpd/ft² (Rapp et al., 1957). However, the uppermost Brule includes abundant fractures and sand and gravel lenses and stringers in local areas of the Horse Creek basin, which can produce highly favorable local conditions for groundwater production. Examples of such extraordinary areas include the Pine Bluffs lowland (Lowry and Crist, 1967), 25 miles south of Horse Creek, and the LaGrange area in the eastern Horse Creek Basin.

Borchert (1976) presents the results of two Brule Fm. pump tests in T19, R61, Secs. 9 and 11, where transmissivities of 70,000 - 100,000 ft²/day were found. However, he also reports a pump test of the overlying alluvial aquifer only ½ mile to the north of the first of the Brule wells (T19, R61, Sec. 4) in which a negative boundary was observed corresponding to the alluvium / Brule contact. Borchert explains this: “Because the Brule in this area has a low permeability, it acts as a hydrologic barrier ...”, seemingly strongly at odds with the Brule pump tests cited above. Borchert (1985) later developed a groundwater model for a 10–mile X 10-mile are in the central Horse Creek basin around Hawk Springs Reservoir (T20, R61), combining the Brule with the overlying alluvial deposits to define the “LaGrange Aquifer”. Model-calibrated hydraulic conductivities ranged from 0.01 to 950 ft/day. (A map of the distribution of hydraulic conductivity used in this model has not been located.)

To address this evidence of localized high Brule-Fm. transmissivities, Statements of Completion filed with the Wyoming State Engineer’s Office have been reviewed for 21 Brule Fm. water wells in the Horse Creek Basin to supplement the published research (e.g. Rapp et al., 1957; Borchert, 1976; Borchert, 1985; Libra et al., 1981). Although interpretation of driller-reported production tests (often run by bailer) is somewhat speculative, a picture of highly-variable conditions again emerges. Apparently credible drawdown data from this sample set range from 6 gpm with 134 ft. of drawdown for a well east of Hawk Springs Reservoir (T20, R60, Sec. 18; U.W.154754), to 10 gpm with no measurable drawdown from a well at the southern end of the area of Brule outcrop (T18, R62, Sec. 13; U.W.110562).

Thus, the present level of investigation is insufficient to identify the stream depletion relationships of the Brule Fm. in the Horse Creek basin. No exclusion areas are mapped for the area underlain by this formation, including the overlying Quaternary alluvial and terrace deposits in the east-central Horse Creek Basin. Given the generally low permeabilities of the Brule Fm., however, this area is a likely candidate for additional, site-specific studies demonstrating a relatively low level of hydrological connection. The northwest-southeast trending Brule outcrop in the northeast Horse Creek basin has been evaluated in conformance with the adjacent Guernsey-to-stateline and lower-Laramie River basins, i.e. assumed to be of relatively low permeability. The boundary between these two approaches (“no analysis” vs. low-permeability Brule) is drawn as a straight line defined by the upper Brule contacts in the topographic low spots in T20, R64, Sec. 13 and T21, R63, Sec. 32. Brule outcrops northeast of this line are more than 5 miles from the nearest point on Fox Creek (northern tributary of Bear Creek), a distance through which the persistence of high Brule transmissivity is considered quite unlikely.

Upstream of the “Goshen Hole” area, Horse Creek and its only perennial tributary, Bear Creek, flow across the Arikaree Fm. and , in Laramie County, the Ogallala Fm. Lowry and Crist (1967) present an average specific capacity for the Arikaree of 0.016 gpm/ft/ft of saturated thickness, and map a saturated thickness of approximately 200 ft. for most of the Arikaree reach of Horse Creek. Estimation of an effective transmissivity based on a specific capacity of 3.2 gpm/ft (i.e. 0.016 * 200) suggests a value of approximately 4,800 gpd/ft (640 ft²/day)⁵. (Borchert (1976) presents Arikaree Formation transmissivities of 1,240 to 3,300 gpd/ft from pump tests near Albin

⁵Transmissivity (in gpd/ft) can be approximated as 1500 * specific capacity (in gpm/ft) based on the empirical equation of Driscoll (1986, p. 1021).

(T17, R62), south of Horse Creek.) Use of the 4,800 gpd/ft value generates an exclusion area setback distance of 9,700 ft. which is applied to Horse Creek and its tributaries through the Arikaree Fm.⁶ In consideration of the potentially high permeabilities locally present in the underlying Brule Fm. (discussed above), the effective eastern boundary of the Arikaree-Fm. exclusion zone is mapped by drawing a straight line that connects the Arikaree / Brule contact in each of the stream-valley bottoms rather than following the upland contact of Love and Christiansen, 1985. (This approach treats the areas where relatively thin, upland Arikaree deposits overly the Brule as effectively part of the Brule “outcrop”.)

Kellehan Creek is a south-bank tributary of Horse Creek which the USGS 1:100,000-scale mapping identifies as perennial only downstream to (T18, R61, Sec.28), several miles short of its confluence with Horse Creek. Recognizing the possibility that communication between Kellehan and Horse Creeks may be locally enhanced due to Brule permeabilities, setback distances are applied to upper Kellehan Creek (in the Arikaree Fm.) as though it were a through-flowing tributary.

Upstream of the Arikaree, Horse Creek flows across the Ogallala Fm. Lowry and Crist (1967) cite Ogallala transmissivities from 5,000 to 38,000 gpd/ft from the much-studied area of the Cheyenne municipal wells (20 miles south of Horse Creek). Setback calculation using the high end of this range produces a value of 27,000 ft. This setback is not extended into the area of Brule-Fm. outcrop because the Arikaree lies on top of the Brule, i.e. the higher Arikaree-Fm. permeabilities clearly terminate at its contact with the underlying Brule.

Upstream of the Ogallala outcrop, setbacks are adopted from the geologically similar conditions on upper Chugwater Creek, 5 - 10 miles to the north (NPDC, 2006). In both areas a Brule-Fm. based setback of 4200 ft. is applied to that formation and to the underlying, less-permeable strata of the Pierre Shale. Exclusion-area analysis is terminated where uppermost Horse Creek flows across crystalline rocks (and across the short interval of steeply eastward-dipping sedimentary strata on the mountain flank).

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⁶Along Fox Creek, e.g. T20N, R64W, Love and Christiansen (1985) map a deposit of Quaternary sand. As elsewhere, this is largely a veneer over groundwater-controlling bedrock, as evidenced by Rapp et. al (1957) ignoring it entirely in their geologic mapping of the area.

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Figure 1 - North Platte River Basin and Sub-Basin Location Map
State of Wyoming

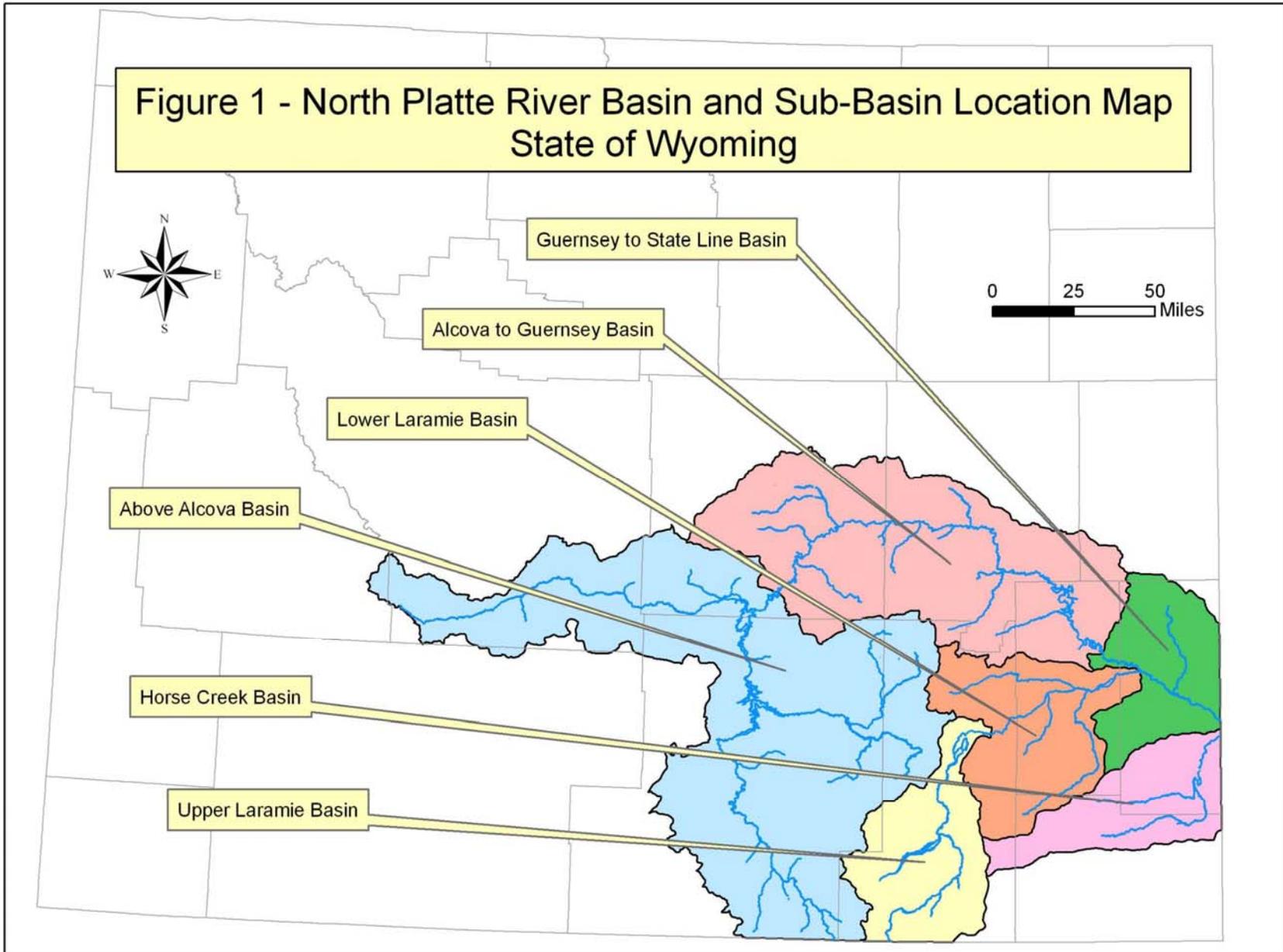
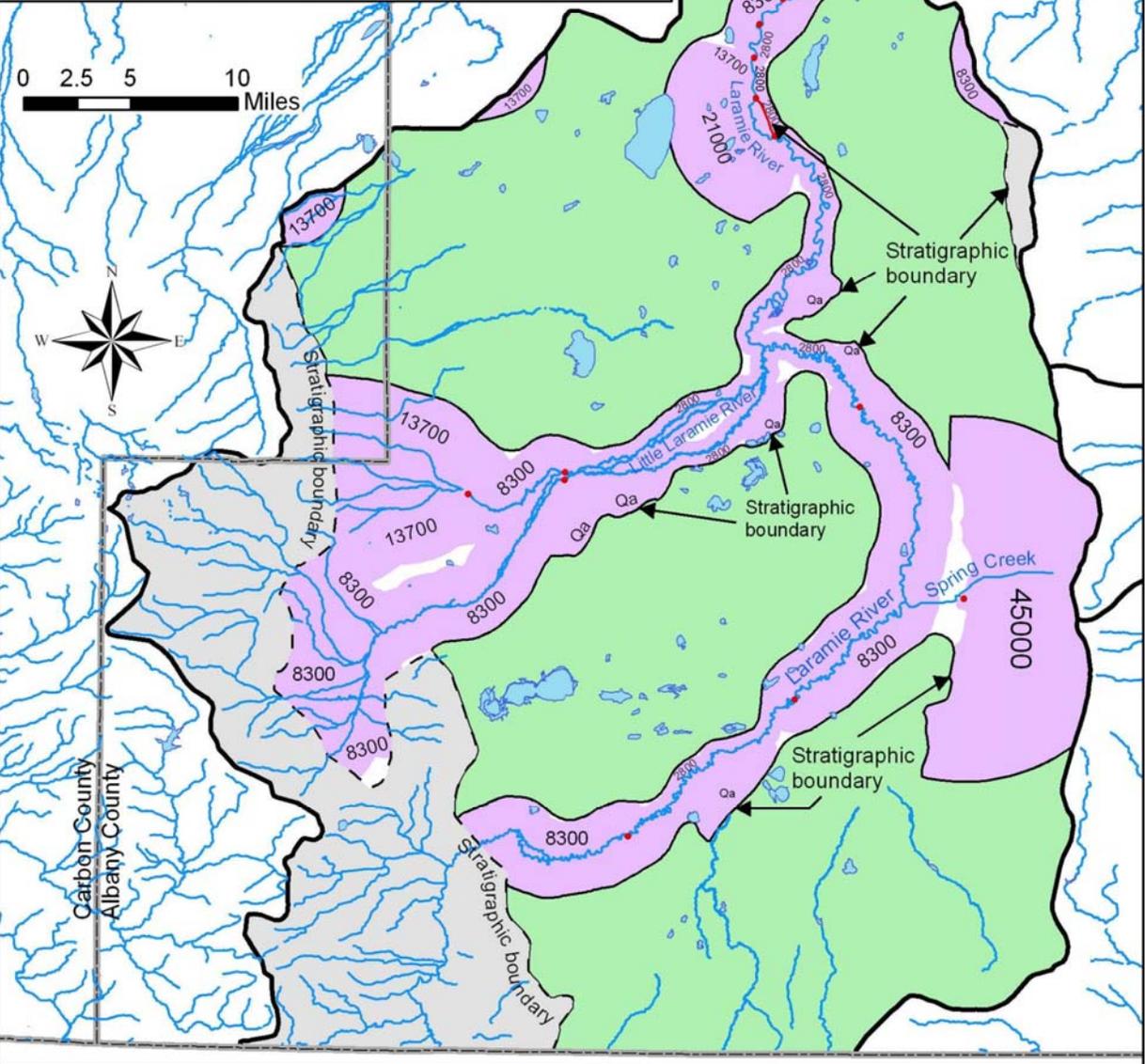


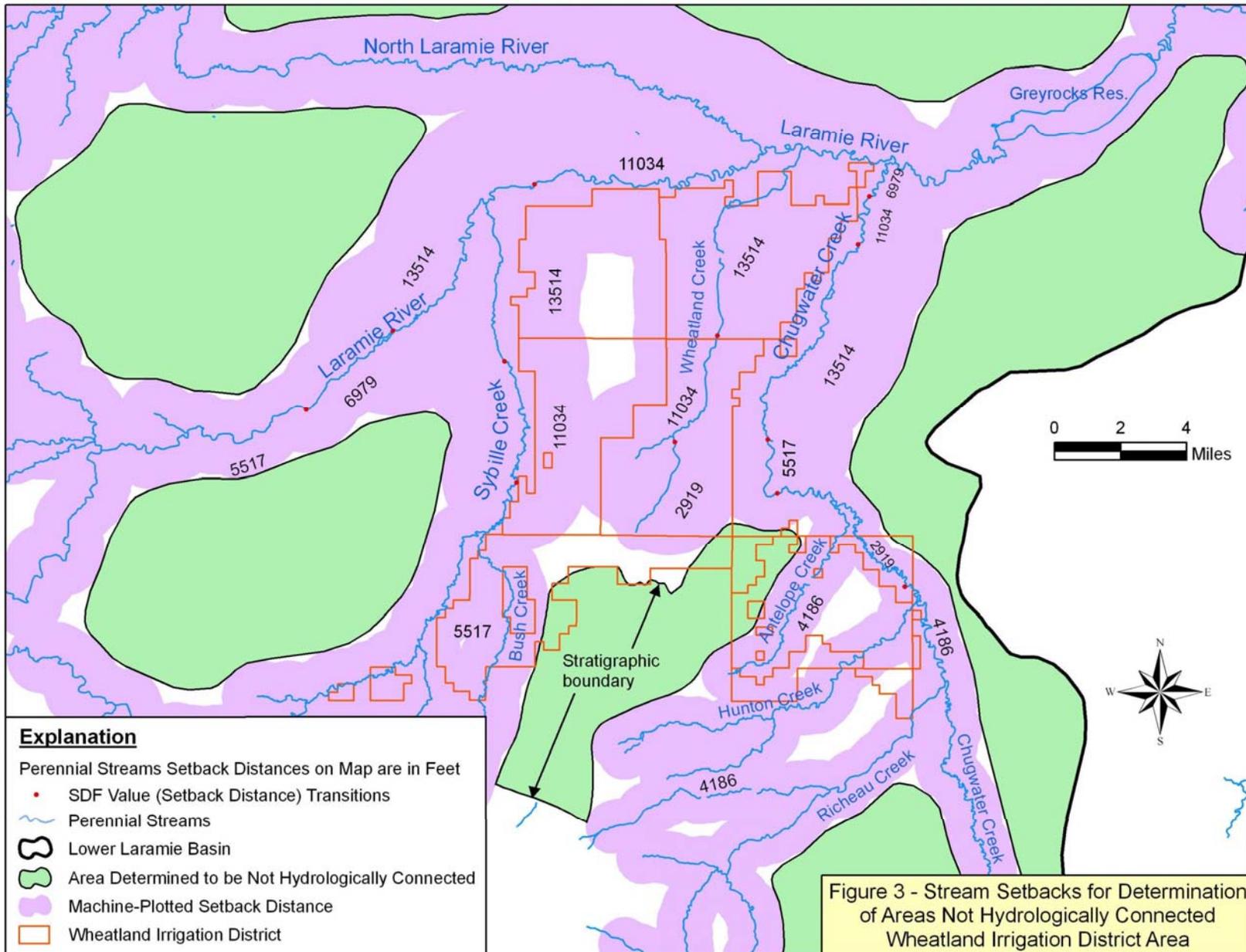
Figure 2 - Stream Setbacks for Determination of Areas Not Hydrologically Connected Upper Laramie Basin

Explanation

Perennial Streams Setback Distances on Map are in Feet

- SDF Value (Setback Distance) Transitions
- ~ Perennial Streams
- ⬭ Upper Laramie Basin
- ⬭ Area Determined to be Not Hydrologically Connected
- ⬭ Machine-Plotted Setback Distance
- ⬭ No Analysis





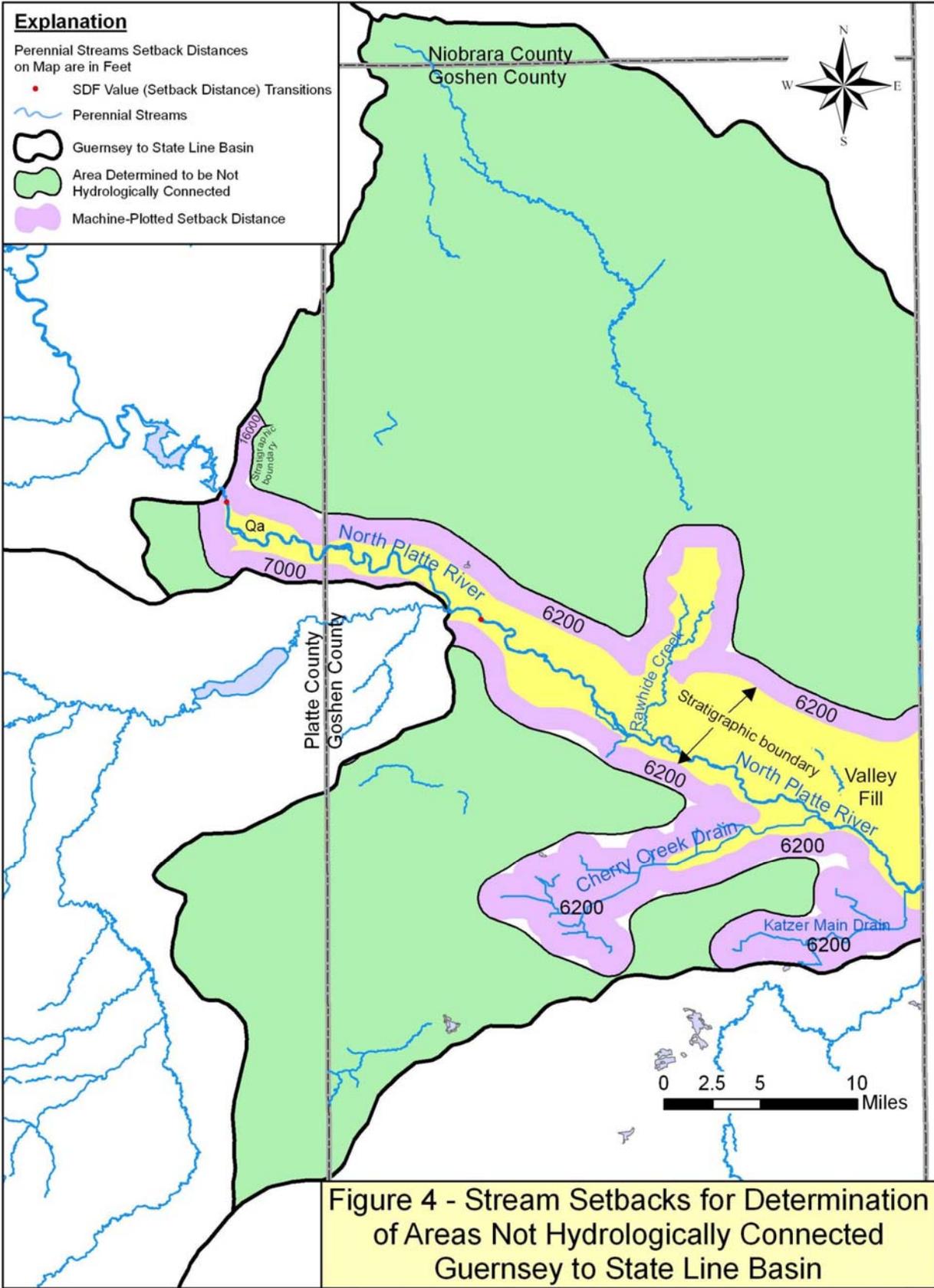
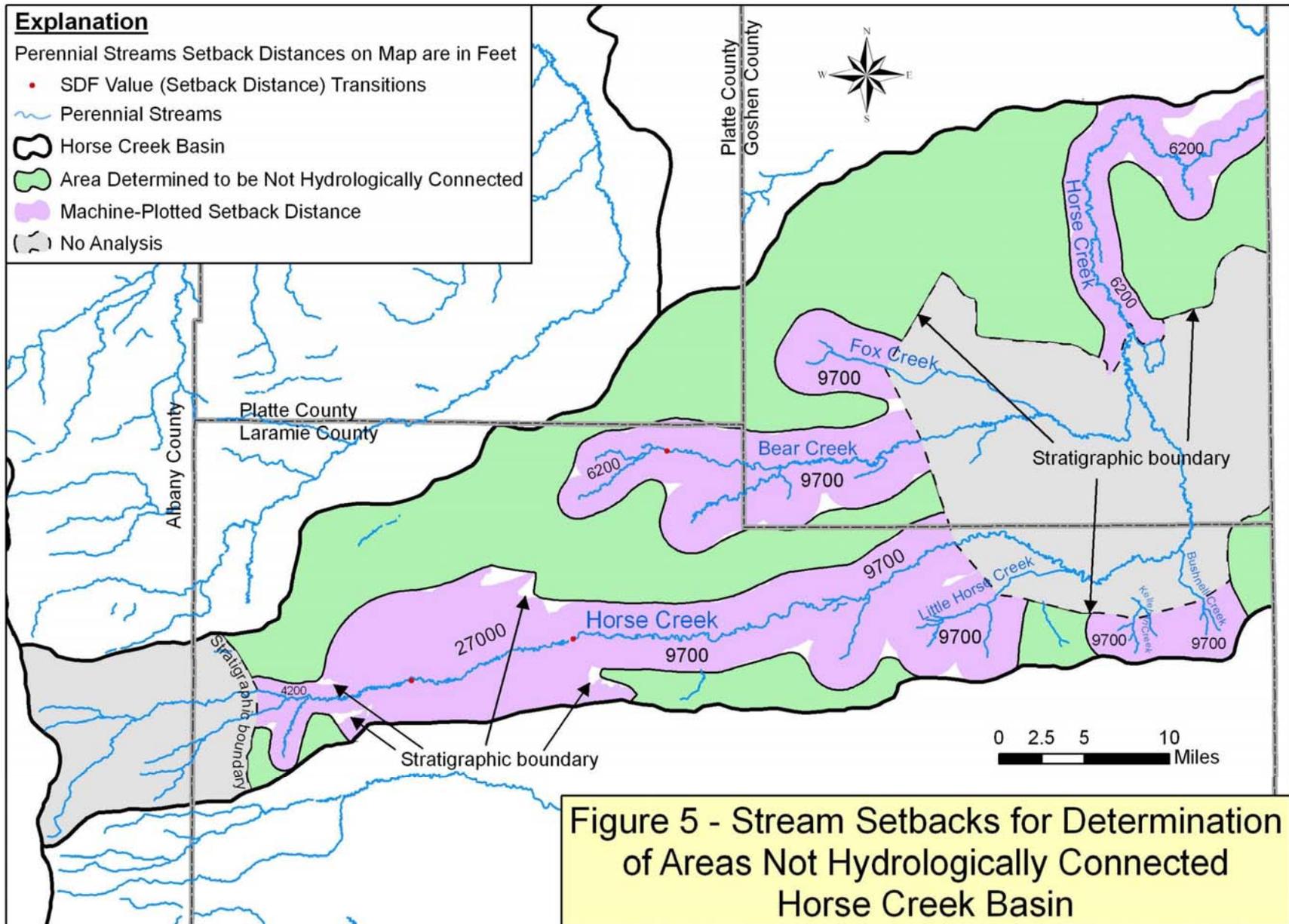
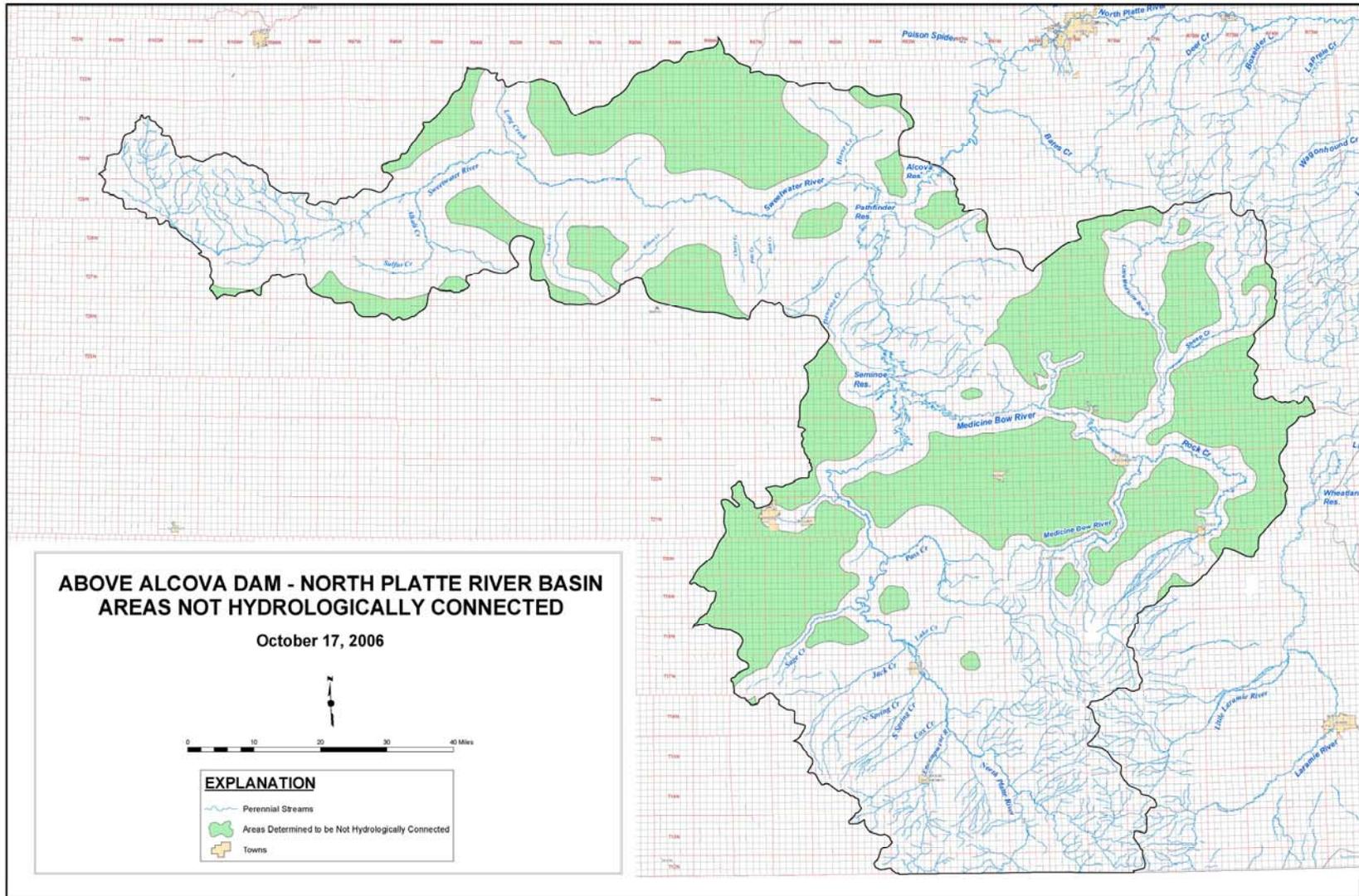
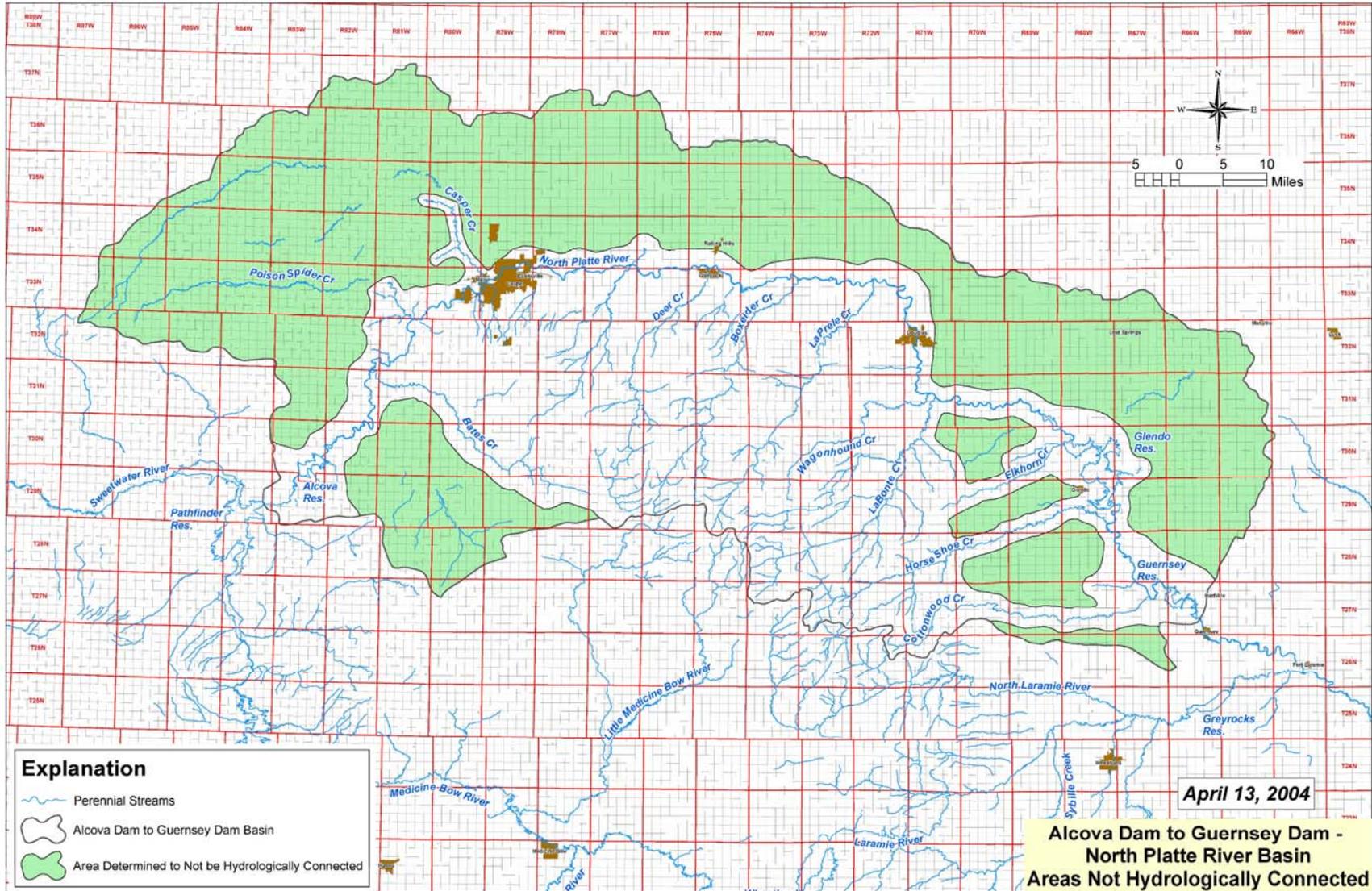
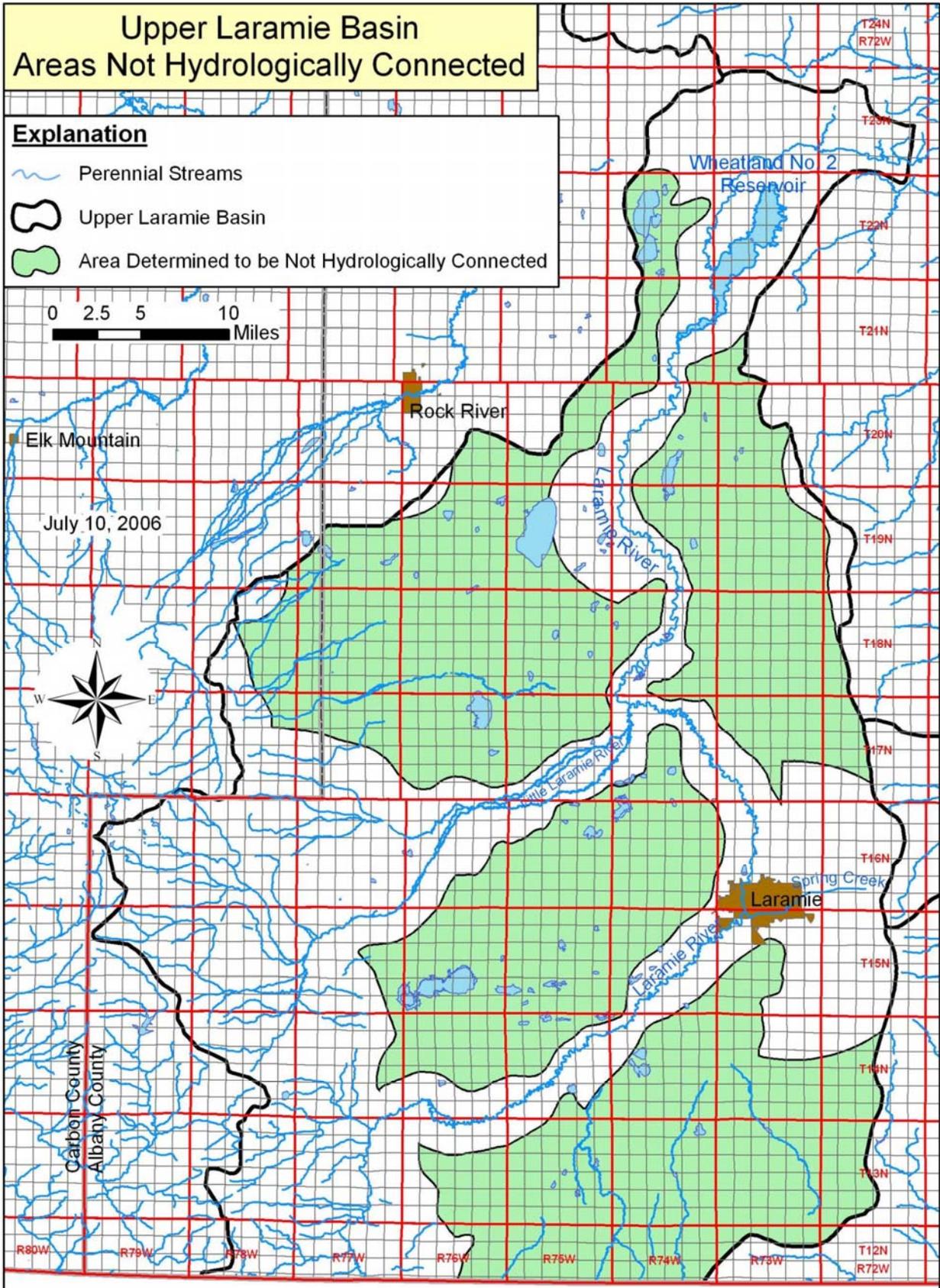


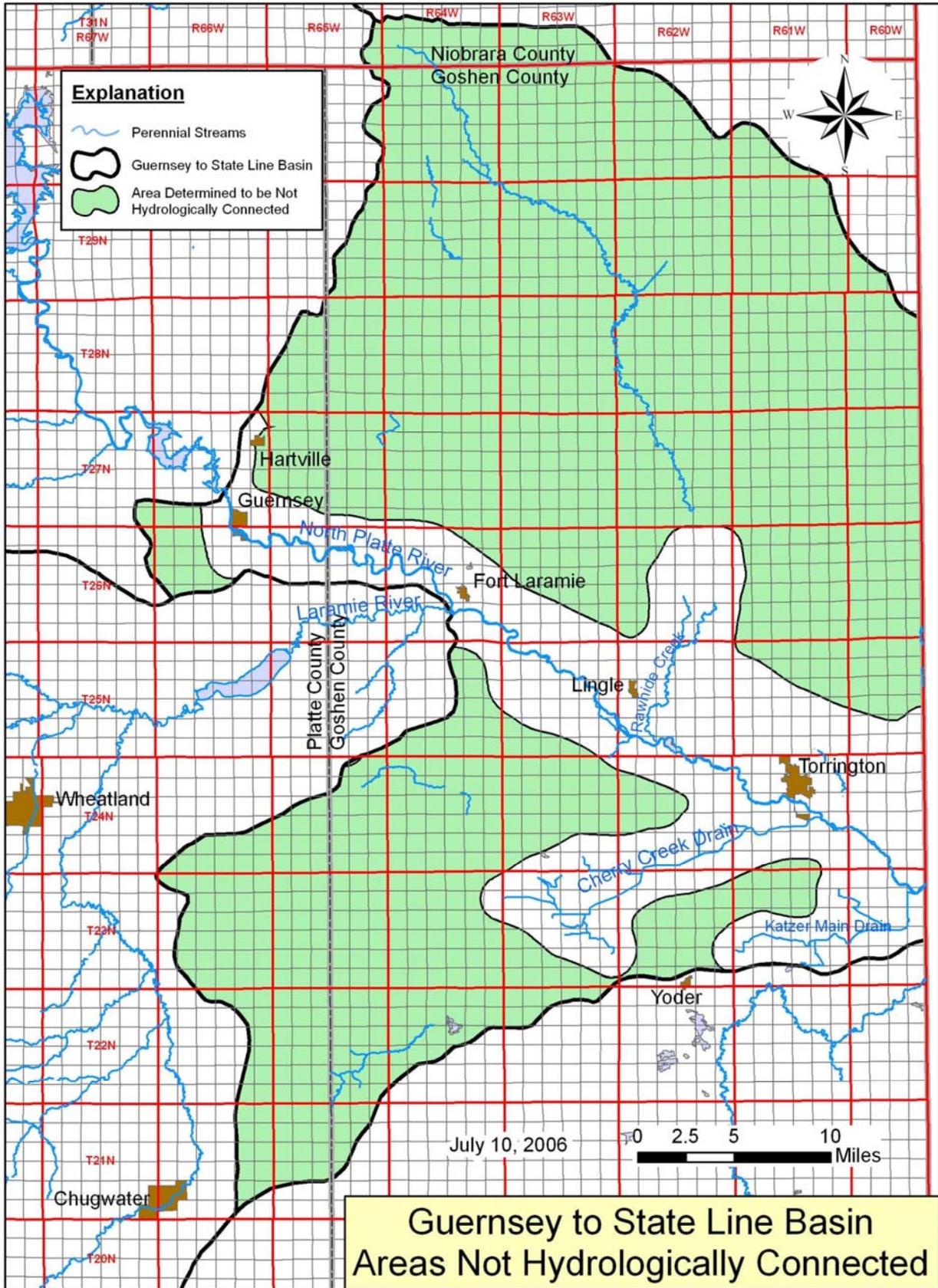
Figure 4 - Stream Setbacks for Determination of Areas Not Hydrologically Connected Guernsey to State Line Basin

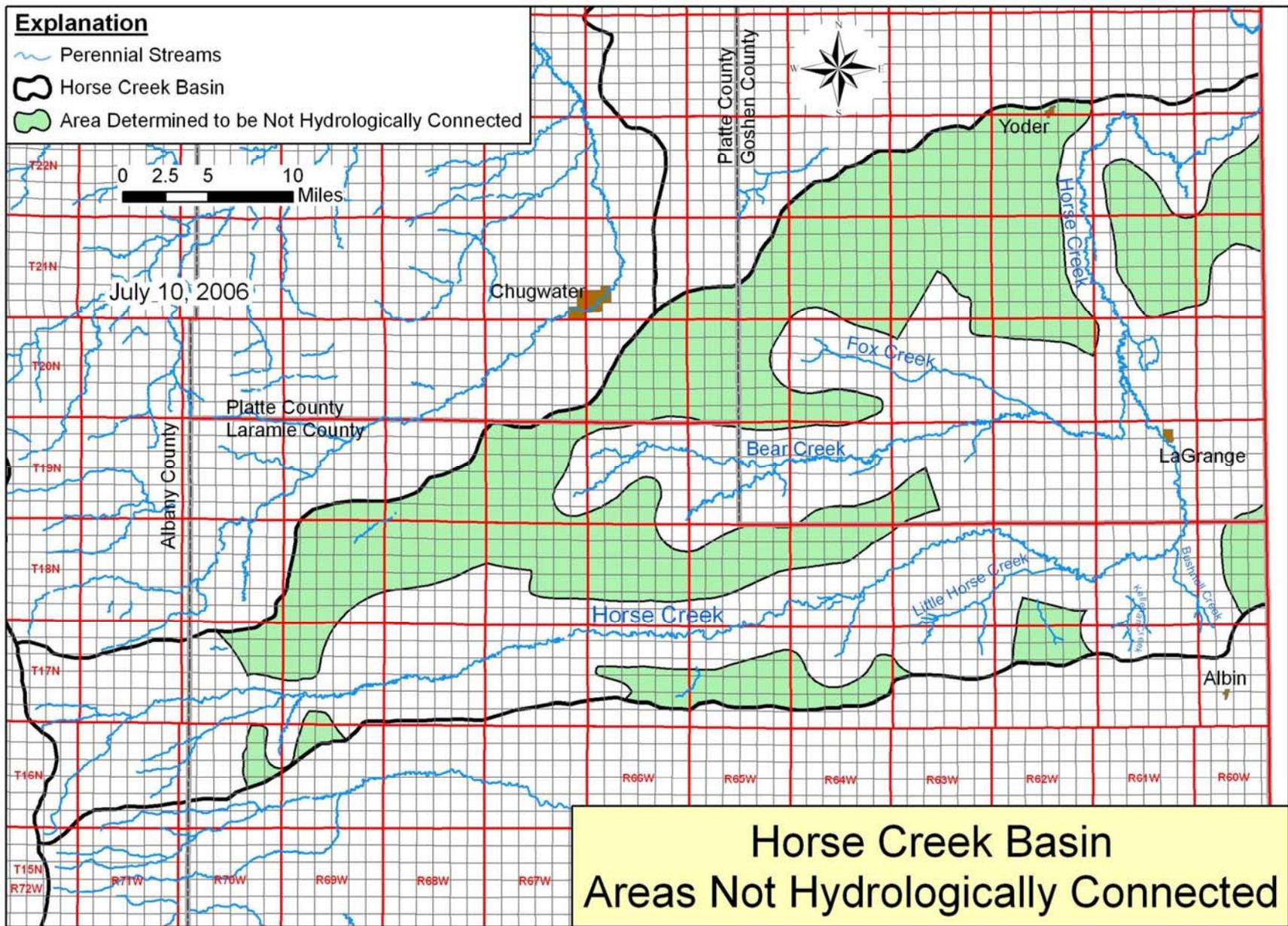












Attachment No. III
Wyoming's Depletions Plan
Streamlined ESA Consultation Process

On June 16, 2006, the U.S. Fish and Wildlife Service (FWS) issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program. The PBO established a two-tiered consultation process for future federal actions on existing and new water related activities subject to section 7(a)(2) of the ESA. The PBO, dated June 16, 2006, is the Tier 1 BO and it evaluated the effects of the PRRIP, which includes Wyoming's Depletions Plan.

The Tier 2 BO will determine if the flow related effects of future federal actions are consistent with the scope and determination of effects addressed in the Tier 1 BO. The federal review will determine if: 1) the proposed activities comply with the definition of existing water related activities and/or 2) proposed new water related activities are covered by Wyoming's Depletions Plan.

The Tier 2 BO will be completed under the streamlined ESA consultation process discussed in this attachment and the template documents provided herein. Please note that this streamlined ESA consultation process will only be necessary for future federal actions on water related activities. Water related activities that are not federal actions will be addressed by the State Coordinator in the manner outlined in Wyoming's Depletions Plan.

The following is a summary addressing the template documents included in this attachment that would be used to develop the Tier 2 BO.

Template No. 1-Wyoming Platte River Recovery Agreement

This agreement between the State of Wyoming and the water user would be used to document any action required of the water user to comply with Wyoming's Depletions Plan. If the water users proposed water related activity complies with the depletions plan without additional actions by the water user, the State Coordinator would simply advise the Federal Action Agency and FWS of this fact through correspondence and this agreement would not be necessary. However, if applicable, this agreement would be drafted by the State Coordinator in consultation with the water user. The draft agreement would be offered to the Federal Action Agency and the FWS for review and comment. Upon concurrence of the federal agencies, the Wyoming Platte River Recovery Agreement will be finalized.

Template No. 2-Platte River Recovery Agreement

This agreement is between the water user and the FWS. The agreement will be drafted by the Federal Action Agency using this template and may include the Wyoming Platte River Recovery Agreement as an attachment. The Platte River Recovery Agreement will be initially executed by the water user. The FWS will execute the agreement upon completion of the Tier 2 Biological Opinion.

Template No. 3-Biological Assessment & Request for Formal Section 7 Consultation

The Federal Action Agency will complete the biological assessment using this template. Please note that the biological assessment will address site specific effects on listed species within

Wyoming not covered by the PRRIP and the PBO. The biological assessment, along with the Platte River Recovery Agreement executed by the water user, will be submitted to the FWS.

Template No. 4-Platte River Tier 2 Biological Opinion

The streamlined consultation process will be completed when the FWS issues the Tier 2 Biological Opinion and executes the Platte River Recovery Agreement.

TEMPLATE NO. 1
WYOMING PLATTE RIVER RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this ____ day of _____, [Year], by and between the Wyoming State Engineer (State Engineer), acting on behalf of the State of Wyoming and **name of Water User** (“Water User”).

WHEREAS, in 2006, the Secretary of the Interior and the Governors of Wyoming, Nebraska and Colorado signed a Cooperative Agreement to implement the Platte River Recovery Implementation Program (“Program”); and

WHEREAS, the Program implements certain aspects of the Service’s recovery plans for four species (interior least tern, whooping crane, piping plover and pallid sturgeon) (collectively the “target species”) listed as threatened or endangered pursuant to the Endangered Species Act (“ESA”). The Program is intended to provide defined benefits for the target species and their associated habitats while providing for water development in the Platte River Basin to proceed in compliance with state law, interstate compacts and decrees, and the ESA; and

WHEREAS, on June 16, 2006, the Service issued a programmatic biological opinion (PBO) concluding that implementation of the Program, along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the target species or destroy or adversely modify their designated critical habitat in Nebraska. The Service also concluded that implementation is not likely to jeopardize the threatened bald eagle or western prairie fringed orchid in Nebraska; and

WHEREAS, Water User is the **choose one: owner/operator/contractor** of **name of water project or projects** (Water Project), which causes or will cause depletions to the Platte River system within Wyoming; and

WHEREAS, the State of Wyoming has prepared and the Governance Committee of the Program has approved the Depletions Plan, Platte River, Wyoming (Wyoming’s Depletions Plan), which defines the existing water related activities and certain specific new water related activities that are covered
by the Program and the PBO;

WHEREAS, Water User’s Water Project is covered by the PBO; and

WHEREAS, Water User desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the ESA and therefore its Biological Opinion through participation in the Program; and

WHEREAS, the existing water related activity will be operated on behalf of Wyoming water users.

NOW THEREFORE, Water User and the State Engineer agree as follows:

(Example Situations)

If the State Coordinator has determined that the activity will qualify as an existing water related activity without terms and conditions, **this agreement may not be necessary**. For example, if the water user is rehabilitating an existing water supply system that will not increase depletions or the water user is proposing a project that will rely on a change of use approved by the Wyoming Board of Control, then the State Engineer would simply document such findings in a letter to the Federal Action Agency.

OR

If the State Coordinator has determined that the activity will qualify as an existing water related activity subject to certain terms and conditions, this agreement can be used to document those terms and conditions. For example, a water user seeking a replacement well may be required to cement

the old well and/or voluntarily abandon an existing water right. (Note: This could also be documented with conditions on the permit for the replacement well.) Another example, the water user could acquire and retire depletions from an existing water related activities as defined in Wyoming's Depletions Plan and thereby ensure the activity can be completed without exceeding an existing water related activity benchmark or baseline.

OR

If the water user is proposing a new water related activity, the agreement would be used to document the terms and conditions for coverage by Wyoming's Depletions Plan and the Program. For example, the water user could acquire replacement water to offset the new depletions. Another example, the water user could seek and receive replacement water from the Wyoming Water Bank through the Director of the Wyoming Water Development Office. (Any agreements for water from the water bank should be attached to this agreement.)

OR

If the water user is proposing a project that includes both existing and new water related activities, the agreement could be used to document the quantification of the two activities, and perhaps, place conditions on each to ensure there is proper mitigation.

The following general conditions will apply to this agreement:

1. The Wyoming State Engineer, his employees, and the State of Wyoming do not waive their sovereign immunity by entering into this agreement and specifically retain immunity and all defenses available to them as sovereigns pursuant to W.S. 1-39-104(a) and all other laws.

2. The construction, interpretation and enforcement of this agreement shall be governed by the laws of the State of Wyoming. Venue for any court action shall be in the First Judicial District, Laramie County, Wyoming.

3. Water user shall indemnify, defend and hold harmless the State of Wyoming, the State Engineer, and its officers, agents, employees, successors and assignees from any and all claims, lawsuits, losses and liability arising out of the Water User's failure to perform any of Water User's duties and obligations hereunder or in connection with the negligent performance of Water User's duties or obligations or participation in the Program.

Water User Representative	Date
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Wyoming State Engineer	Date
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Approved by: _____

Wyoming Attorney General's Office	Date
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TEMPLATE NO. 2
PLATTE RIVER RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this ____ day of _____, (Year), by and between the United States Fish and Wildlife Service (“Service”) and **name of Water User** (“Water User”).

WHEREAS, in 2006, the Secretary of the Interior and the Governors of Wyoming, Nebraska and Colorado signed a Cooperative Agreement to implement the Platte River Recovery Implementation Program (“Program”); and

WHEREAS, the Program implements certain aspects of the Service’s recovery plans for four species (interior least tern, whooping crane, piping plover and pallid sturgeon) (collectively the “target species”) listed as threatened or endangered pursuant to the Endangered Species Act (“ESA”). The Program is intended to provide defined benefits for the target species and their associated habitats while providing for water development in the Platte River Basin to proceed in compliance with state law, interstate compacts and decrees, and the ESA; and

WHEREAS, on June 16, 2006, the Service issued a programmatic biological opinion (PBO) concluding that implementation of the Program, along with existing and specified new depletions, is not likely to jeopardize the continued existence of the target species or destroy or adversely modify their designated critical habitat in Nebraska. The Service also concluded that implementation is not likely to jeopardize the threatened western prairie-fringed orchid or the bald eagle in the central and lower Platte River; and

WHEREAS, Water User is the **choose one: owner/operator/contractor** of **name of water project or projects** (Water Project), which causes or will cause depletions to the Platte River system within Wyoming; and

WHEREAS, Water User’s Water Project is covered by the PBO to the extent described within the scope of that document; and

WHEREAS, Water User desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the ESA.

NOW THEREFORE, Water User and the Service agree as follows:

1. The PBO concluded that implementation of the Program will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA for depletion impacts caused by projects consistent with the Depletions Plan, Platte River, Wyoming (Wyoming’s Depletions Plan) under the Program. Water User’s Water Project is provided regulatory certainty under ESA to the extent described in the PBO. Thus, any consultations under Section 7 regarding the Water Project’s depletions and other effects are to be governed by the scope and provisions of the PBO and actions of the Program. The Service agrees that no other measure or action shall be

required of the Water Project to comply with Section 7 or Section 9 of the ESA to offset or minimize the Water Project's depletion impacts or other impacts covered by the PBO. Water User is entitled to rely on this Agreement in making the commitments described in paragraph 2.

2. To the extent implementing this Recovery Agreement requires participation by the Water User in Wyoming's Depletions Plan, the Water User agrees to fulfill those responsibilities as provided in the attached Wyoming Recovery Agreement. Water User will not be required to take any action that would violate its decrees or the statutory authorization for the Water Project, or any applicable limits on Water User's legal authority.

3. If the Service believes that the Water User has violated this Recovery Agreement, the Service shall notify the Water User, the State Coordinator for Wyoming's Depletions Plan (State Coordinator), and the Governance Committee. Water User, State Coordinator, and Governance Committee shall have a reasonable opportunity to comment to the Service regarding the existence of a violation and to recommend remedies, if appropriate. The Service will consider the comments of the Water User, and the comments and recommendations of the State Coordinator and Governance Committee but retains the authority to determine the existence of a violation. If the Service reasonably determines that a violation has occurred and will not be remedied by the Water User despite an opportunity to do so, the Service may request reinitiation of consultation of the Water Project without reinitiating other consultations as would otherwise be required by reinitiation provisions in the Program and PBO. In that event, the Water Project's depletions would be excluded from the depletions covered by the PBO and the protection provided by the PBO Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of the Water User's Water Project or the Service's statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by the Water User regarding the application of the ESA to the depletions of the Water User's Water Project or regarding the validity of the facts or analyses relied upon by the Service or by the Program. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the Service's flow recommendations in the PBO are biologically or hydrologically necessary to recover the target species or meet the needs of designated critical habitat in Nebraska.

6. This Recovery Agreement, along with any attachments, shall be in effect until one of the following occurs:

A. The Service removes the target species in the Platte River Basin from the endangered or threatened species list and determines that the Program is no longer needed to prevent the species from being re-listed under the ESA; or

B. The Service determines that the Program is no longer needed to recover or offset the likelihood of jeopardy to the target species in the Platte River Basin; or

C. The Service declares that the target species in the Platte River Basin are extinct; or

D. Federal legislation is passed or federal regulatory action is taken that negates the need for (or eliminates) the Program.

E. The Program is terminated in accordance with the Program Agreement.

7. Water User may withdraw from this Recovery Agreement upon written notice to the Service. If the Water User withdraws, the Service may request reinitiation of consultation on the Water Project without reinitiating other consultations as would otherwise be required by the reinitiation provisions in the Program and PBO.

8. In the event the Service reinitiates consultation on the Water User's Water Project for any reason, the Water User shall not be precluded from asserting in any future proceeding any claim, defense or challenge to the legal, scientific or technical basis for the imposition of any reasonable and prudent alternatives based on the signing of this Recovery Agreement, nor based on the fact that the Service had previously issued one or more biological opinions containing the facts, analyses, opinions or conclusions on which the Service then seeks to rely.

Water User Representative

Date

U.S. Fish and Wildlife Service

Date

Note: The Wyoming Platte Recovery Agreement may be attached to this agreement.

**TEMPLATE NO. 3
BIOLOGICAL ASSESSMENT
& REQUEST FOR FORMAL SECTION 7 CONSULTATION**

[DATE]

[FROM FEDERAL ACTION AGENCY
TO U.S. FISH & WILDLIFE SERVICE]

This letter contains the Biological Assessment addressing potential impacts from operation of the [Project] on federally-listed species and designated critical habitats. With this submission, we are requesting initiation of Formal Consultation under Section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (“ESA”), concerning the whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), northern Great Plains population of the piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*) (collectively referred to as the “target species”), and designated critical habitat of the whooping crane. We further request initiation of Formal Consultation for the bald eagle (*Haliaeetus leucocephalus*) and western prairie fringed orchid (*Platanthera praeclara*), [include other non-target listed species or critical habitats, as needed]. We have determined that the Project is not likely to adversely affect the American burying beetle (*Nicrophorus americanus*) and will have no effect on the Eskimo curlew (*Numenius borealis*).

[Briefly describe: (1) Project; (2) Applicant; (3) Project location; and (4) Federal action (e.g., permit or authorization) associated with the Project.]

Operation of this Project will result in ___ acre-feet of [choose: existing, new, or a combination of both existing and new] depletions to the North Platte River, at the Wyoming/Nebraska state line, on an average annual basis. The source of water for the Project is [specify water rights, water uses, and source of supply].

The Platte River Recovery Implementation Program (PRRIP), established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Wyoming, Nebraska, and Colorado and the U.S. Department of the Interior [Program, I.A.1.]. The Program addresses the adverse impacts of existing and certain new water related activities on the Platte River target species and associated habitats, and provides ESA compliance¹ for effects to the target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species. [Program, I.A.2 & footnote 2.]. The State of Wyoming is in compliance with its obligations under the Program.

¹ “ESA Compliance” means: (1) serving as the reasonable and prudent alternative to offset the effects of water-related activities that FWS found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat before the Program was in place; (2) providing offsetting measures to avoid the likelihood of jeopardy to one or more of the target species or adverse modification of critical habitat in the Platte River basin for new or existing water-related activities evaluated under the ESA after the Program was in place; and (3) avoiding any prohibited take of target species in the Platte River basin.

For Federal actions and projects participating in the Program, the Platte River Recovery Implementation Program Final Environmental Impact Statement (FEIS) and the June 16, 2006 programmatic biological opinion (PBO) serve as the description of the environmental baseline and environmental consequences for the effects of the Federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO. These documents are hereby incorporated into this Biological Assessment by this reference.

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service's determination of the effects of the Federal action analyzed in the PBO. The Service determined in the PBO that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior least tern, and pallid sturgeon, or the threatened northern Great Plains population of the piping plover. Further, the Service found that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the threatened bald eagle and western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska, and was not likely to destroy or adversely modify designated critical habitat for the whooping crane.

The Service also determined that the PBO Federal Action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

[Insert applicable BA text describing potential affects to non-target listed species, their critical habitats, if any, and/or site-specific affects to any listed species/critical habitat]

INSERT APPLICABLE LANGUAGE BELOW:

The above-described Project operations qualify as an "existing water related activity" because they are surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997, within the intent and coverage of the Program. [Program, I.A. footnote 3]. The existing water related activity conforms to the criteria in Section III of Chapters 2 or 3 of the Depletions Plan, Platte River Basin, Wyoming (Wyoming's Depletions Plan [Program, Attachment 5, Section 7]) and:

1. The existing water related activity is operated on behalf of Wyoming water users;
2. The State Coordinator has determined that the activity qualifies as an existing water related activity; and
3. If required by the State Coordinator, the Applicant has signed a Wyoming Recovery Agreement to document any mitigation requirements need to qualify as an existing water activity.

-AND/OR-

The above-described Project operations qualify as a “new water related activity” because such operations constitute new surface water or hydrologically connected groundwater activities which may affect the quantity or timing of water reaching the associated habitats of the target species implemented after July 1, 1997. [Program, I.A. footnote 3]. The new water related activity conforms to the criteria in Section II of Chapters 2 or 3 of Wyoming’s Depletions Plan and:

1. The new water related activity is operated on behalf of Wyoming water users;
2. The new water related activity can be completed without exceeding an existing water related baseline or benchmark as described in Wyoming’s Depletions Plan or the Applicant has requested, and the State of Wyoming has agreed, that the depletions resulting from the new water related activity will be mitigated with water from the Wyoming Water Bank; and
3. The Applicant has signed a Wyoming Recovery Agreement with the Wyoming State Coordinator to document the requirements to qualify for the status described in 2. above.

[Note: It is understood that a Project may include existing and new water related activities. In these situations, the activities within the Project must be categorized as “existing” or “new” and biological assessment will address both categories.]

Accordingly, the impacts of this activity to the target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO are covered and offset by operation of Wyoming’s Depletions Plan as part of the PRRIP.

The Applicant intends to rely on the provisions of the Program to provide ESA compliance for potential impacts to the target species and whooping crane critical habitat. Toward this end, the [Federal Agency] is forwarding with this letter a Platte River Recovery Agreement signed by the Applicant for signature by the Service. [Template Recovery Agreement is attached]. The [Federal Agency] intends to require, as a condition of any approval, that the Applicant fulfill the responsibilities required of Program participants in Wyoming. The [Federal Agency] also intends to retain discretionary Federal authority for the Project, consistent with applicable regulations and Program provisions, in case reinitiation of Section 7 consultation is required.

This letter addresses consultation on all listed species and designated critical habitat, including the referenced Platte River target species and whooping crane critical habitat. Potential impacts from construction and operation of the Project to any other federally-listed threatened or endangered species and designated critical habitats will be addressed within the applicable biological opinion prepared by the Service, in accordance with the ESA.

/FROM FEDERAL ACTION AGENCY/

TEMPLATE NO. 4
PLATTE RIVER TIER 2 BIOLOGICAL OPINION

This biological opinion is provided in response to your [Date] request to initiate formal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA). Your Biological Assessment describes the potential effects of the [Project Name] on federally listed species and designated critical habitat.

The Federal Action reviewed in this biological opinion is the [provide the Project Name, Location, and a Short Description].

I. Background

On June 16, 2006, the U.S. Fish and Wildlife Service (Service) issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program (PRRIP) and water-related activities⁸ affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The action area for the PBO included the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

The Federal Action addressed by the PBO included the following:

- 1) funding and implementation of the PRRIP for 13 years, the anticipated first stage of the PRRIP; and
- 2) continued operation of existing and certain new water-related activities⁹ including, but not limited to, Reclamation and Service projects that are (or may become) dependent on the PRRIP for ESA compliance during the first 13-year stage of the PRRIP for their effects on the target species¹⁰, whooping crane critical habitat, and other federally listed species¹¹ that rely on central and lower Platte River habitats.

⁸ The term “water-related activities” means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a “water related activity” to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of “water related activities” do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

⁹ “Existing water related activities” include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. “New water-related activities” include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

¹⁰ The “target species” are the endangered whooping crane (*Grus americana*), the interior least tern (*Sternula antillarum*), the pallid sturgeon (*Scaphirynchus albus*), and the threatened northern Great Plains population of the piping plover (*Charadrius melodus*).

¹¹ Other listed species present in the central and lower Platte River include the threatened bald eagle (*Haliaeetus leucocephalus*), western prairie fringed orchid (*Platanthera praeclara*) American burying beetle (*Nicrophorus americanus*) and Eskimo curlew (*Numenius borealis*).

The PBO established a two-tiered consultation process for future federal actions on existing and new water-related activities subject to section 7(a)(2) of the ESA, with issuance of the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered by the PBO. Under this tiered consultation process, the Service will produce tiered biological opinions when it is determined that future federal actions are “likely to adversely affect” federally listed species and/or designated critical habitat in the PRRIP action area and the project is covered by the PBO. If necessary, the biological opinions will also consider potential effects to other listed species and critical habitat affected by the federal action that were not within the scope of the Tier 1 PBO (e.g., direct or indirect effects to listed species occurring outside of the PRRIP action area).

Although the water depletive effects of this Federal Action to central and lower Platte River species have been addressed in the PBO, when “no effect”, or “may affect but not likely to adversely affect” determinations are made on a site-specific basis, the Service will review these determinations and provide written concurrence where appropriate. Upon receipt of written concurrence, section 7(a)(2) consultation will be considered completed for those federal actions.

Water-related activities requiring federal approval will be reviewed by the Service to determine if: (1) those activities comply with the definition of existing water-related activities and/or (2) proposed new water-related activities are covered by the applicable state’s or the federal depletions plan. The Service has determined that the [Project Name] meets the above criteria and, therefore, this Tier 2 biological opinion regarding the effects of [Project Name] on the target species, whooping crane critical habitat, western prairie fringed orchid, and bald eagle in the central and lower Platte River can tier from the June 16, 2006 PBO.

II. Consultation History

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service’s determination of the effects of the Federal Action analyzed in the PBO.

The Service determined in the Tier 1 PBO that the Federal Action, including the continued operation of existing and certain new water-related activities, may adversely affect but would not likely jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, and bald eagle in the central and lower Platte River. Further, the Service determined that the Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to destroy or adversely modify designated critical habitat for the whooping crane.

The Service also determined that the PBO Federal Action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

The effects of the continued operation of existing and certain new water-related activities on the remaining species and critical habitats listed in Table II-1 of the PBO were beyond the scope of the PBO and were not considered.

The Service has reviewed the information contained in the Biological Assessment submitted by your office on [Date].

We concur with your determinations of “likely to adversely affect” for the endangered whooping crane, interior least tern, pallid sturgeon, and the threatened northern Great Plains population of the piping plover, the western prairie fringed orchid, and the bald eagle in the central and lower Platte River. We also concur with your determination of “likely to adversely affect” for designated whooping crane critical habitat.

We concur with your determinations of “not likely to adversely affect” for the endangered American burying beetle, and of “no effect” to the endangered Eskimo curlew.

We concur with your determinations of “not likely to adversely affect” [for species, species, and “no adverse modification of critical habitat” for species].

We concur with your determinations of “no effect” [for species, species, and critical habitat].

III. Scope of the Tier 2 Biological Opinion

The [Project Name] is a component of “the continued operation of existing and certain new water-related activities” needing a federal action evaluated in the Tier 1 PBO, and flow-related effects of the Federal Action are consistent with the scope and the determination of effects in the June 16, 2006 PBO. Because [the project proponent] has elected to participate in the PRRIP, ESA compliance for flow-related effects to federally listed endangered and threatened species and designated critical habitat from [Project Name] is provided to the extent described in the Tier 1 PBO.

This biological opinion applies to the [Project Name] effects to listed endangered and threatened species and designated critical habitat as described in the PBO for the first thirteen years of the PRRIP (i.e., the anticipated duration of the first PRRIP increment).

IV. Description of the Federal Action

[Describe the Federal Action and any Interdependent and Interrelated Actions– use text from the Biological Assessment]

V. Status of the Species/Critical Habitat

Species descriptions, life histories, population dynamics, status and distributions are fully described in the PBO on pages 76-156 for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle and western prairie fringed orchid, and whooping crane critical habitat and are hereby incorporated by reference. Since issuance of the Service’s PBO, [Discuss

changes in status of target species/critical habitat since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since the PBO was issued].

VI. Environmental Baseline

The Environmental Baseline sections for the Platte River and for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle and western prairie fringed orchid, and whooping crane critical habitat are described on pages 157 to 219 of the Tier 1 PBO, and are hereby incorporated by reference. Since issuance of the Tier 1 PBO, [Discuss changes in status of target species/critical habitat in the action area since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since that time].

VII. Effects of the Action

Based on our analysis of the information provided in your Biological Assessment for the [Project Name], the Service concludes that the proposed Federal Action will result in [a/an existing depletion, new depletion, or a combination of existing and new depletions] to the Platte River system above the Loup River confluence. These depletions are associated with [briefly describe here, or by reference, the specific water supply sources, water uses, and associated water rights or permits].

[Select and/or delete from the following 2 paragraph(s) below as needed]

As an existing water-related activity, we have determined that the flow-related adverse effects of the [Project Name] are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle, western prairie fringed orchid, and whooping crane critical habitat.

As a new water-related activity, we have determined that the flow-related adverse effects of the [Project Name] are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle, western prairie fringed orchid, and whooping crane critical habitat, and these effects on flows are being addressed in conformance with the Wyoming's Depletions Plan in the PRRIP.

[If the site-specific project/activity may affect listed species/critical habitat addressed in the PBO, include those site-specific effects here. In that instance, the Incidental Take Statement section below may need additional text.]

VIII. Cumulative Effects

Cumulative effects include the effects of future State, local, or private (non-federal) actions that are reasonably certain to occur in the action area considered in this biological opinion. A non-federal action is "reasonably certain" to occur if the action requires the approval of a State or local resource or land-control agency, such agencies have approved the action, and the project is ready to proceed. Other indicators which may also support such a "reasonably certain to occur" determination include whether: a) the project sponsors provide assurance that the action will

proceed; b) contracting has been initiated; c) State or local planning agencies indicate that grant of authority for the action is imminent; or d) where historic data have demonstrated an established trend, that trend may be forecast into the future as reasonably certain to occur. These indicators must show more than the possibility that the non-federal project will occur; they must demonstrate with reasonable certainty that it will occur. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act and would be consulted on at a later time.

Cumulative effects are described on pages 194 to 300 of the Tier 1 PBO, and are hereby incorporated by reference. [\[Discuss any changes in cumulative effects, if any, since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since that time\].](#)

IX. Conclusions

The Service concludes that the proposed [\[Project Name\]](#) is consistent with the Tier 1 PBO for effects to listed species and critical habitat addressed in the Tier 1 PBO. After reviewing site specific information, including: 1) the scope of the Federal Action, 2) the environmental baseline, 3) the status of the whooping crane, interior least tern, piping plover, pallid sturgeon, western prairie fringed orchid, and the bald eagle in the central and lower Platte River and their potential occurrence within the project area, as well as whooping crane critical habitat, 4) the effects of the [\[Project Name\]](#), and 5) any cumulative effects, it is the Service's biological opinion that the [\[Project Name\]](#), as described, is not likely to jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, or bald eagle in the central and lower Platte River. The Federal Action is also not likely to destroy or adversely modify designated critical habitat for the whooping crane.

X. Incidental Take Statement

Section 9 of ESA and federal regulations pursuant to section 4(d) of ESA 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.

Sections 7(b)(4) and 7(o)(2) of ESA do not apply to the incidental take of federally listed plant species (e.g., Colorado butterfly plant, Ute ladies' tresses orchid, and western prairie fringed orchid). However, limited protection of listed plants from take is provided to the extent that ESA prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on non-federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law. Such laws vary from state to state.

The Department of the Interior, acting through the Service and Bureau of Reclamation, is implementing all pertinent Reasonable and Prudent Measures and implementing Terms and Conditions stipulated in the Tier 1 PBO Incidental Take Statement (pages 309-326 of the PBO) which will minimize the anticipated incidental take of federally listed species. In instances where the amount or extent of incidental take outlined in the Tier 1 PBO is exceeded, or the amount or extent of incidental take for other listed species is exceeded, the specific PRRIP action(s) causing such take shall be subject to reinitiation expeditiously.

[\[If the site-specific project/activity may affect listed species/critical habitat addressed in the PBO, include any site-specific Reasonable and Prudent Measures and Terms and Conditions here. See the format in the PBO Incidental Take Section\].](#)

XI. Closing Statement

Any person or entity undertaking a water-related activity that receives federal funding or a federal authorization and which relies on the PRRIP as a component of its ESA compliance in section 7 consultation must agree: (1) to the inclusion in its federal funding or authorization documents of reopening authority, including reopening authority to accommodate reinitiation upon the circumstances described in Section IV.E. of the Program document; and (2) to request appropriate amendments from the federal action agency as needed to conform its funding or authorization to any PRRIP adjustments negotiated among the three states and the Department of the Interior, including specifically new requirements, if any, at the end of the first PRRIP increment and any subsequent PRRIP increments. The Service believes that the PRRIP should not provide ESA compliance for any water-related activity for which the funding or authorization document does not conform to any PRRIP adjustments (Program Document, section VI).

Reinitiation of consultation over [\[Project name\]](#) will not be required at the end of the first 13-years of the PRRIP provided a subsequent Program increment or first increment Program extension is adopted pursuant to appropriate ESA and NEPA compliance procedures, and, for a subsequent increment, the effects of the [\[Project name\]](#) are covered under a Tier 1 PBO for that increment addressing continued operation of previously consulted-on water-related activities.

This concludes formal consultation on the actions outlined in the [\[Date\]](#) request from [\[federal action agency\]](#). 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 specific action(s) causing such take shall be subject to reinitiation expeditiously.

Requests for reinitiation, or questions regarding reinitiation should be directed to the appropriate Field Office below:

Field Supervisor
Wyoming Ecological Services Field Office
U.S. Fish and Wildlife Service
5353 Yellowstone Road
Cheyenne, WY 82003

XII. Conservation Recommendations

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (pages 328-329) and are hereby incorporated by reference.

XIII. Literature Cited

Platte River Recovery Implementation Program document. 2006.

U.S. Department of the Interior. 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2006. Biological opinion on the Platte River Recovery Implementation Program.

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 8

Nebraska New Depletion Plan
For the Platte River Recovery Implementation Program

December 7, 2005

I. Extent of Obligation Relative to New and Expanded Uses of Water

This draft plan describes the actions Nebraska proposes to take to prevent or mitigate for new depletions to United States Fish and Wildlife Service (USFWS) target flows (target flows) to the extent those new depletions are caused by new and expanded uses of water, i.e. those begun or expanded on or after July 1, 1997. Implementation of this plan would serve the following purposes of the Platte River Recovery Implementation Program as described in subsection I.A.4 of the Program Document:

“mitigating the adverse impacts of new water related activities on (1) the occurrence of FWS target flows (as described in Section III.E.1.a) and (2) the effectiveness of the Program in reducing shortages to those flows, such mitigation to occur in the manner and to the extent described in Section III.E.3 and in the approved depletions plans.”

Water related activities that were begun prior to July 1, 1997 and are not expanded after that date are not subject to this plan, but will have Endangered Species Act (ESA) coverage under the Platte River Recovery Implementation Program as long as such a Program continues to exist.

Implementation of this plan will occur primarily through actions taken by the Nebraska Department of Natural Resources (NDNR) and by the up to seven natural resources districts (NRDs) that have land area subject to this plan. The dates in this plan are based on an assumption that either (1) decisions to implement a Platte River Recovery Implementation Program will be made by the Department of the Interior and by the Governors of Nebraska, Colorado and Wyoming by January 1, 2006 or (2) all of the geographic area for which new surface water and ground water uses would be subject to this plan after December 31, 2005 will be under a stay or moratorium on new uses by January 10, 2006. If neither assumption proves to be correct, changes may be needed in the implementation dates for this plan. Such changes will be subject to Governance Committee approval. Implementation is also subject to the authorities granted by and limitations of Nebraska statutory and case law and to sufficient funds being appropriated by the Nebraska legislature and/or raised by the natural resources districts involved.

The details of how this plan will be implemented depend on the time of initiation of a new use that causes a depletion to the Platte River or tributary thereof. Depletions to USFWS “target flows” and to “state-protected flows” (both terms are defined later in this document) because of groundwater and surface water uses begun or expanded between July 1, 1997 and December 31, 2005, regardless of where located, will be estimated and will be offset in quantity, time and location according to the schedule set forth in Part IV of this plan. The responsibility for

implementing such offsets will rest with the state except to the extent such offsets are required because (a) the new use causing the depletion is subject to the Federal Depletions Plan or (b) a person or entity other than the state has assumed responsibility for offset for specific new depletions.

Beginning on January 1, 2006, the responsibility for implementing this plan will be shared between the state and the NRDs involved. To the extent that new uses of groundwater require permits from NRDs (presently includes all new wells with pumping capacities greater than 50 gpm), the following new and expanded groundwater uses begun on or after January 1, 2006 (including any for which the purpose is to increase the water supply in a river basin other than the Platte River Basin) will not be allowed **unless** the adverse effects of those uses on state-protected flows and on target flows will be offset: uses that (a) are located within the North Platte, South Platte or the Platte River watershed in Nebraska and (b) are so located and constructed that if water were intentionally withdrawn for 40 years, the cumulative stream depletion to the North Platte, the South Platte, the Platte River or a base flow tributary thereto upstream of Chapman, NE would be greater than or equal to 28% of the total groundwater consumed as a result of the withdrawals from those wells. The relative responsibilities for providing offsets for uses that are initiated will vary depending on the nature of the use and the extent to which it causes new depletions to state-protected flows and/or to target flows. For new or expanded uses of groundwater that are not subject to the Federal Depletions Plan, are within the geographic area described in (a) and (b) above, but do not require permits from NRDs (e.g. less than 50 gpm wells), the cumulative impact of all such uses and of any offsetting decreases in uses of the same type will be estimated and the adverse net effects on state-protected flows and on target flows will be offset by the state.

To the extent that the Department of Natural Resources (DNR) has jurisdiction over new uses of surface water (presently includes all diversions from natural streams except those for instream livestock watering and all on-stream storage reservoirs greater than 15AF), new uses to be begun on or after January 1, 2006 (including any for which the purpose is to increase the water supply in any river basin other than the Platte River Basin) will not be allowed by the department unless any adverse effects on state-protected flows and target flows are either prevented or are offset. The extent to which the new surface water appropriator or the state is responsible for the offset will depend on the nature of the use and the extent to which it causes new depletions to state-protected flows and/or to target flows. For new or expanded sandpits and other surface water bodies that do not require permits from DNR (e.g. some new reservoirs with less than 15AF storage capacity), the cumulative impact of all such uses will be estimated and adverse effects on state-protected flows and on target flows will be estimated and will be offset by the state. Nebraska has not permitted any new surface water storage reservoirs in the Platte River Basin upstream of the confluence of the Platte River with the Loup River since July 1, 1997 and currently has a moratorium on the issuance of any new surface water appropriations in that area. If that moratorium were to be lifted or modified during the term of the Program, the ESA compliance coverage provided for new surface water storage reservoirs through implementation of the Program (including this depletions plan) will include compliance coverage for (1) the depletions to target flows that are caused by all such Nebraska reservoirs constructed after that date, regardless of storage capacity; (2) the impacts to FWS peak flows that are caused by Program-approved reservoirs, regardless of storage capacity, that are implemented after that date

in accordance with the Water Action Plan; and (3) as long as the storage capacities of all other Nebraska reservoirs constructed or permitted for construction in that part of the basin after Program initiation do not collectively exceed 10,000 acre feet, the impacts to FWS peak flows that are caused by any such other reservoir. Any need to mitigate separately for adverse peak flow impacts caused by a new Nebraska reservoir that is subject to ESA Section 7 consultation (other than a reservoir that is to be implemented in accordance with the Water Action Plan) after that collective storage capacity has been exceeded shall be determined during that Section 7 consultation.

Nebraska's Cooperative Hydrology Study models and other tools will be used by the state and the NRDs to determine the amount, timing and location of depletions to state-protected flows and target flows and also to evaluate the effectiveness of proposed offset projects. In all cases, the offset objective will be to replace the water depleted in the amounts needed and at the times and locations needed to prevent harm to the water uses and/or the target flows for which such flow protection is required. All offset measures shall be constructed and operated or implemented so that they do not cause additional shortages to either target flows or state-protected flows.

II. Definitions

- A. **Base Flow Tributary**—Any stream or drain that, for purposes of Nebraska's Cooperative Hydrology Study (COHYST) models, is considered to have contributed base flow to the Platte River under 1997 development conditions. A map showing the streams, stream reaches and drains that are considered to be base flow tributaries is attached as Attachment 1.
- B. **State-Protected Flows**—The rates of flow in specified reaches of the North Platte, South Platte, and Platte Rivers and their base flow tributaries at or above Chapman, NE that would be available under July 1, 1997 surface water and groundwater development conditions and that are needed to: (1) satisfy Nebraska natural flow and storage appropriations above Chapman and in effect when a new use is proposed; (2) satisfy Nebraska instream flow appropriations above Chapman and in effect when a new use is proposed; (3) recharge aquifers above Chapman, but only to the extent needed to prevent loss of available water supply, as opposed to reductions in water levels, for then existing Nebraska groundwater users; and (4) implement the Platte River Recovery Implementation Program's Water Action Plan, the objective of which is to reduce target flow shortages.
- C. **Target Flows**—The following flows, unless and until modified by the Program's Governance Committee, are the target flows for the reach of the Platte River from Lexington to Chapman, NE, that will be used to determine when and to what extent depletions caused by uses subject to this plan must be offset.

<i>Time Period</i>	Target Flow (cfs)	
	<i>Wet and Normal Periods</i>	<i>Dry Periods</i>
Jan. 1 to Jan. 31	1,000	600
Feb. 1 to Feb. 14	1,800	1,200
Feb. 15 to March 15	3,350	2,250
March 16 to March 22	1,800	1,200
March 23 to May 10	2,400	1,700
May 11 to May 19	1,200	800
May 20 to June 20	3,700(wet) 3,400(normal)	800
June 21 to July 31	1,200	800
August 1 to Sept. 15	1,200	800
Sept. 16 to Sept. 30	1,000	600
Oct. 1 to Nov. 15	2,400(wet) 1,800(normal)	1,300
Nov. 16 to Dec. 31	1,000	600

For the purpose of determining whether a specific time period is wet, normal or dry, the methodologies approved by the Governance Committee for the Platte River Recovery Implementation Program will be utilized (Attachment 5, Section 4, III B-F).

III. Sources of Offset Water

The following water sources may be used to offset depletions for which mitigation is required by this plan:

- The portions of the yields from the following Reconnaissance-Level Water Action Plan projects reserved by Nebraska for offset purposes: the CNPPID reregulating reservoir, groundwater mound management, the Dawson/Gothenburg Canal recharge project, and power interference.
- Water leasing and water right transfers
- Water management incentives including but not limited to: irrigation system conversions, changes in tillage practices, changes in cropping mix, and deficit irrigation
- Retirement of or reduction in consumption by existing surface water and groundwater uses
- Other groundwater recharge/retiming projects
- Construction of new surface water storage projects
- Purchase of storage water from existing surface water storage projects
- Pumping groundwater directly into a stream
- Converting from surface water to groundwater to eliminate a portion of the depletion or to change the timing of the depletion

- Relocating the point of groundwater withdrawal so that the depletion is reduced and/or the timing is changed
- New controlled drainage projects
- Other offset projects as feasible and appropriate

Specific offset projects will not be selected for implementation until the amount, timing and location of depletions that must be offset has been determined.

IV. Schedule and Reporting

- By January 1, 2007, the state will report the amount of new and expanded water use in the COHYST modeled area begun between July 1, 1997 and December 31, 2005 and the amount, timing, and location of any depletions to target flows because of such new uses.
- By December 31, 2008, the state (or other responsible person or entity when applicable) will (a) put into place the measures necessary to offset in amount, timing and location then existing depletions to target flows and to state-protected flows caused by new water uses that are not subject to the Federal Depletions Plan and are begun between July 1, 1997 and December 31, 2005 and/or (b) will indicate the extent to which it intends to rely on water from one or more Program water projects that have not yet been completed but for which yields are reserved by Nebraska for the purpose of providing such offsets. To the extent that option (b) is utilized, the state shall at the same time demonstrate its preparedness to assume its proportionate share of the responsibility to complete that Program project. In the event that it is determined by the Governance Committee that a Program water project relied upon by Nebraska under option (b) either will not be implemented at all or that the operational date for such project will be delayed by more than two years past the operational date projected by the Governance Committee at the end of Year 3 of the First Increment, Nebraska will, no later than two years after such originally projected operational date, implement such other interim or permanent offset measures as are necessary to fulfill its extant offset obligation. Offset measures for depletions that are caused by such new (7-1-97 to 12-31-05) water uses but that do not occur until after December 31, 2008 will be put into place as necessary to offset such new depletions in amount, timing and location by the time they occur, or the state will indicate the extent to which it intends to utilize option (b) above for that purpose. Reliance on option (b) as the means for achieving such offsets will be subject to the same conditions as described above.
- Each year, commencing in 2007 and continuing as long as the First Increment of the Program remains in effect, the state will provide the Governance Committee with a report containing the following information for the preceding year: (1) any permitted new and expanded uses of surface water subject to this plan; (2) any permitted new and expanded uses of groundwater subject to this plan; (3) the collective amount, timing, and locations of the depletions to target flows because of those new and expanded uses; (4) the collective amount, timing, and locations of all mitigation required by the NRDs or otherwise documented (e.g. reductions in other water uses) or to be provided; and (5) the collective amount, timing, and locations of any additional measures to be implemented by

the state to satisfy all mitigation elements required because of new depletions to target flows. To the extent that the NRD required offsets, i.e. those needed because of depletions to state-protected flows, collectively fail to provide sufficient offset of depletions to target flows to cover the mitigation required because of new and expanded uses begun on or after January 1, 2006, additional offset measures will be implemented within two years after the date those new and expanded uses are initiated or will be implemented by the time the depletions to the flows actually occur, whichever is later.

- Starting in 2010 and every five years thereafter, the state also will begin to conduct a new land use inventory and will collect such other information as is necessary to assess the sufficiency of the combined NRD required and state offset measures implemented because of new and expanded uses of surface water and groundwater subject to this plan. Such assessment shall be completed by December 31 of the year following the year the assessment was begun. If that assessment indicates that more offset measures have been put in place than this plan requires to fully mitigate for the new depletions to target flows since the last such assessment, the amount of the excess shall be available to offset future new depletions. If the assessment indicates that additional offset measures need to be put in place, the state will identify the amount, timing, and location of the offset water to be provided by such additional measures. Within two years after the completion of the assessment, the state will put in place any such required additional offset measures. All such offset measures shall be constructed and operated or implemented so that they do not cause additional shortages to either target flows or state-protected flows.

While new and expanded uses of groundwater that are begun on or after January 1, 2006 and are outside the watershed boundaries of the North Platte, South Platte and Platte Rivers and/or the 28% in 40 year lines are not subject to this plan and therefore do not require mitigation for any adverse effects on state-protected flows or target flows, the state, as part of its assessment every five years, will use well registration records and other available information to determine the extent and distribution of such new groundwater uses. Following such assessments, the state will report the following additional information to the Governance Committee:

- By January 1, 2012 and every five years thereafter through the end of the First Increment of the Program, the state will report on the results of its most recent assessment as outlined above.
- By December 31, 2013 and every five years thereafter through the end of the First Increment of the Program, the state will report, as applicable, the amount, timing and location of any excess offsets that are available to offset future new depletions or the amount, timing, and locations of water being provided because of any additional offset measures taken to make up for any offset shortages identified in the previous assessment and which result from new and expanded uses subject to this plan.

If it is determined prior to the end of a Program increment that the aggregate new depletions to target flows associated with all Nebraska uses that are initiated or expanded after January 1, 2006 and are outside the watershed boundaries of the North Platte, South Platte and Platte Rivers

and/or outside the 28% in 40 year lines will exceed an average of 2,000 AF per year by the end of the next Program increment, Nebraska understands that, for such subsequent increment, the depletion plan exemption for any such additional new or expanded uses may not be acceptable to the Governance Committee.

V. Tasks Remaining to be Completed as Implementation Occurs

For this plan to be fully implemented, the following additional tasks need to be completed:

- a. Refine the COHYST models as needed following the completion of peer review;
- b. Determine the extent of any increase in irrigated acreage in the COHYST modeled area between 1997 and 2005;
- c. Determine the extent of any increase in average annual consumptive water use by municipalities, industries, rural domestic and other new water related activities in the COHYST modeled area between 1997 and 2005;
- d. Determine the amount, timing and location of any depletions to the Platte River or a base flow tributary because of any increase described in b. or c. above;
- e. Determine by stream reach and time period the flows that will serve as state-protected flows for purposes of this plan;
- f. Develop a tracking system to route depletions described in d. above downstream to locations where those depletions adversely affect state-protected flows and/or target flows;
- g. Quantify by stream reach and time period the extent to which the increases described in b. and c. above cause depletions to state-protected flows and/or target flows;
- h. Determine what measures will be utilized to offset, in amount, timing and location, the depletions quantified as per g. above;
- i. Secure funding for and implement the measures identified in h. above.
- j. Establish 12-31-05 baselines for irrigated acreage within the Platte River Basin and inside the 28% in 40 year lines;
- k. Establish 12-31-05 baselines for municipal, industrial, rural domestic and other water related activities within the Platte River Basin and inside the 28% in 40 year lines and determine methods to be used to measure increases and decreases in consumptive water use thereafter;
- l. Determine methods to be used to measure post 2005 changes in water consumption for municipal, industrial and other water related activities inside the COHYST modeled area but outside the Platte River Basin and/or the 28% in 40 year lines; and
- m. Adopt and implement, in at least six natural resources districts, integrated management plans governing the initiation of new water related activities and the expansion of water related activities that have been initiated through 2005; such plans will encompass at least the geographic area that is within the Platte River Basin and inside the 28% in 40 year lines for the Platte and base flow tributaries.

Nebraska will brief the Governance Committee as these tasks are completed. Any resulting work products may be reviewed by the Governance Committee and any such products that are comparable to Governance Committee approved elements of the other states' depletion plans will be subject to Governance Committee approval. The work products that are subject to approval will include, but are not necessarily limited to: use of the COHYST models in the implementation of the new depletion plan (including establishment of the 28% in 40 years lines);

the tracking system used to route depletions; and the baselines for irrigated acreage and for municipal, industrial, rural domestic and other water related activities.

VI. Section 7 ESA Consultations for New Water Related Activities with a Federal Nexus

This section, including the flow chart that follows, is intended to explain and illustrate: (1) how consultations between FWS and federal action agencies will proceed when Section 7 ESA consultations are required on proposed new water related activities in Nebraska; (2) the function of this plan relative to such consultations; and (3) how the role of the State and any other party with responsibility for implementing any depletion offsets or other required reasonable and prudent alternatives will be formalized when such consultations are required. The term “new water related activity” is defined in footnote 3 to item I.A.2 of the Program Document, but for purposes of this section of the Nebraska plan, it applies only to new water related activities for which consultation occurs after the initiation of the PRRIP.

The following narrative corresponds with the box numbers and brief descriptions displayed in the flow chart which follows:

Box 1: Platte River Basin New Water Related Activity (NWRA)

Is the proposed activity a new water related activity as defined above? If no, the remainder of the flow chart does not apply. If yes, go to Box 2.

Box 2: Is there a federal nexus?

Is this new water related activity one for which Section 7 ESA consultation between the federal action agency and FWS is required? If no, go to Box 3. If yes, go to Box 4.

Box 3: Use Nebraska’s Depletion Plan, if applicable.

Whether or not offset or other mitigation for the activity will be required will be governed by this plan. No further agency action is needed and no recovery agreement needs to be signed.

Box 4: Federal Consultation Initiated.

The federal action agency and the FWS begin consultation and the proponent of the new water related activity is asked to provide such information as is required by FWS to do the consultation.

Box 5: Depletion Analysis.

The federal action agency, consulting with the FWS and using information obtained from the proponent of the new water related activity, provides a project description of the proposed federal action, including an estimate of the amount, timing and location of the depletions to the Platte River that will be caused by the proposed activity.

Box 6: Is the NWRA one for which DNR or an NRD requires permits?

The Nebraska Department of Natural Resources will keep FWS informed as to what kinds of new surface water and ground water activities require DNR permits and, for each NRD with land area subject to this plan, what kind of new ground water related activities require permits from that NRD. FWS will coordinate with DNR in the event of questions about answers to this

question for particular types of new water related activities. If the answer to the question is yes, go to Box 8. If the answer is no, go to Box 7.

Box 7: Is the NWRA of another type for which offsets are provided by the NE Depletion Plan?

This depletion plan provides for state offset of some new water related activities for which permits are not required from either DNR or an NRD. If the answer to the question is yes, go to Box 8. If the answer is no, go to Box 9.

Box 8: FWS and federal action agency have streamlined consultation regarding depletions covered by the NE Depletions Plan; NDP to serve as RPA for NWRA to that extent.

This depletion plan provides ESA coverage for all depletions caused by new ground water activities and such coverage for most depletions caused by new surface water activities (see other portions of the plan for details). Except for any depletions that are caused by a new surface water activity but are not covered by this plan, the measures required by this plan will serve as the reasonable and prudent alternative for depletions caused by a proposed new water related activity.

Box 9: NE Depletion Plan modified to provide offsets (GC approval required).

If the answer to the question in Box 7 is no, the Program Document allows for GC approval of changes in any state's depletion plan for the purpose of broadening ESA coverage under that plan. FWS and state concurrence on any such proposed amendment to this plan will be required before GC action is requested. If this plan is not modified to allow ESA coverage of the new water related activity involved, go to Box 10. If such modification is approved by the GC, go to Box 8.

Box 10: FWS and federal action agency develop RPA for NWRA.

This box will apply only when the Nebraska new depletion plan will play no role in the development of reasonable and prudent alternatives for the proposed new water related activity. When the RPA has been developed in that situation, go to Box 13.

Box 11: FWS and federal action agency develop RPA for any depletions not covered by the NDP and for other ESA issues concerning the NWRA.

If there are water depletion issues that are not covered by this plan, those issues will be addressed separately by the FWS and the federal action agency. The same is true concerning ESA issues related to the proposed activity, but not involving water depletions. When any issues addressed at this stage have been resolved, go to Box 12.

Box 12: Recovery Agreement executed, if applicable.

In some cases, recovery agreements may need to be signed by the project proponent and perhaps by the State of Nebraska and/or any other party that is responsible for any portion of the reasonable and prudent alternative related to the project. If such a recovery agreement is not needed, skip Box 12 and go directly to Box 13 and, when applicable, Box 14. If such a recovery agreement is needed, go to Box 13 and, when applicable, Box 14 when that agreement has been executed.

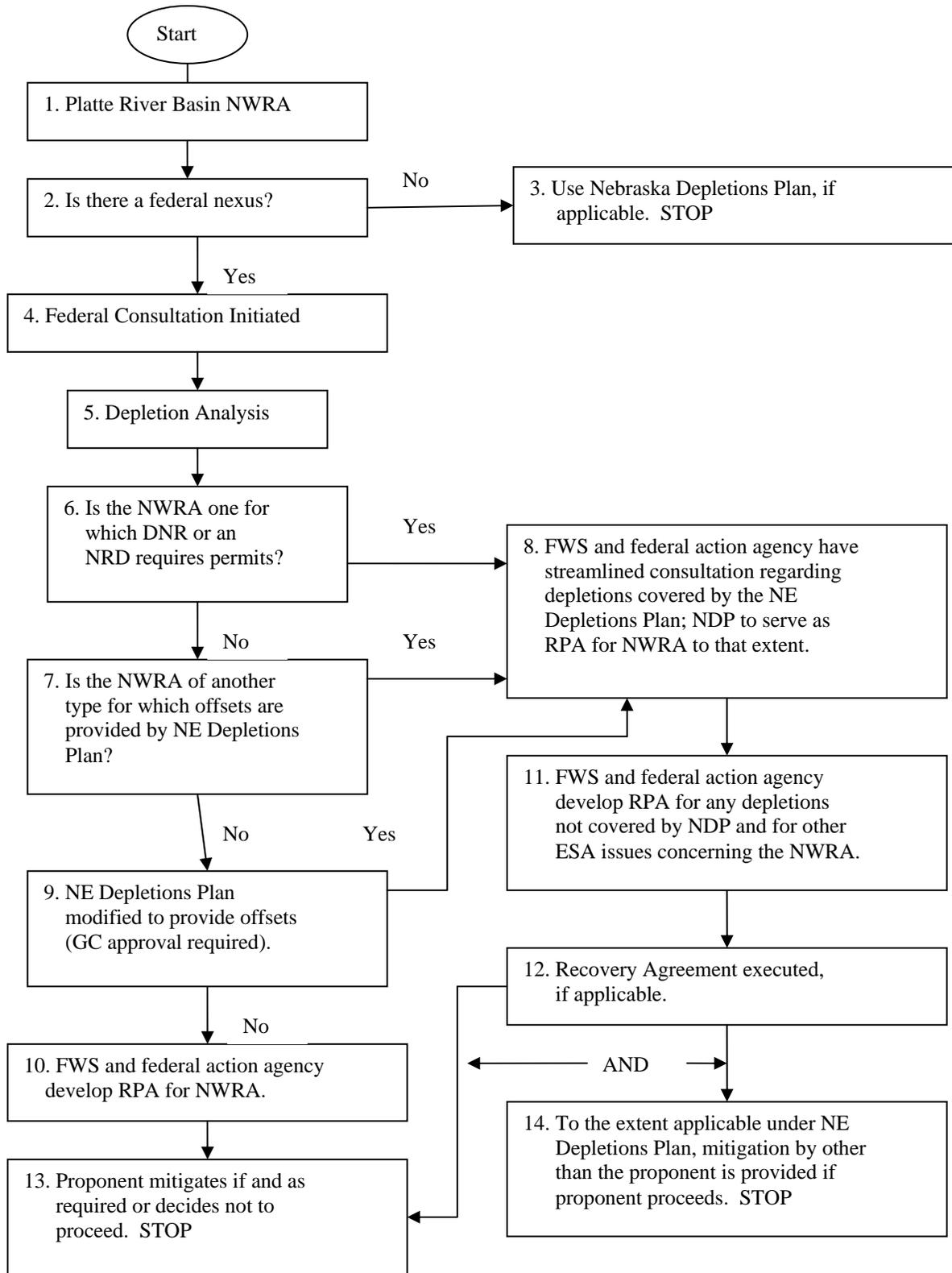
Box 13: Proponent mitigates if and as required or decides not to proceed.

Obviously, the proponent of the new water related activity may decide not to proceed. If the decision is to proceed, any mitigation required of the proponent as a result of actions taken under Box 10 or under Boxes 8, 9, 11 and 12 will be provided in the amounts and at the times and locations required.

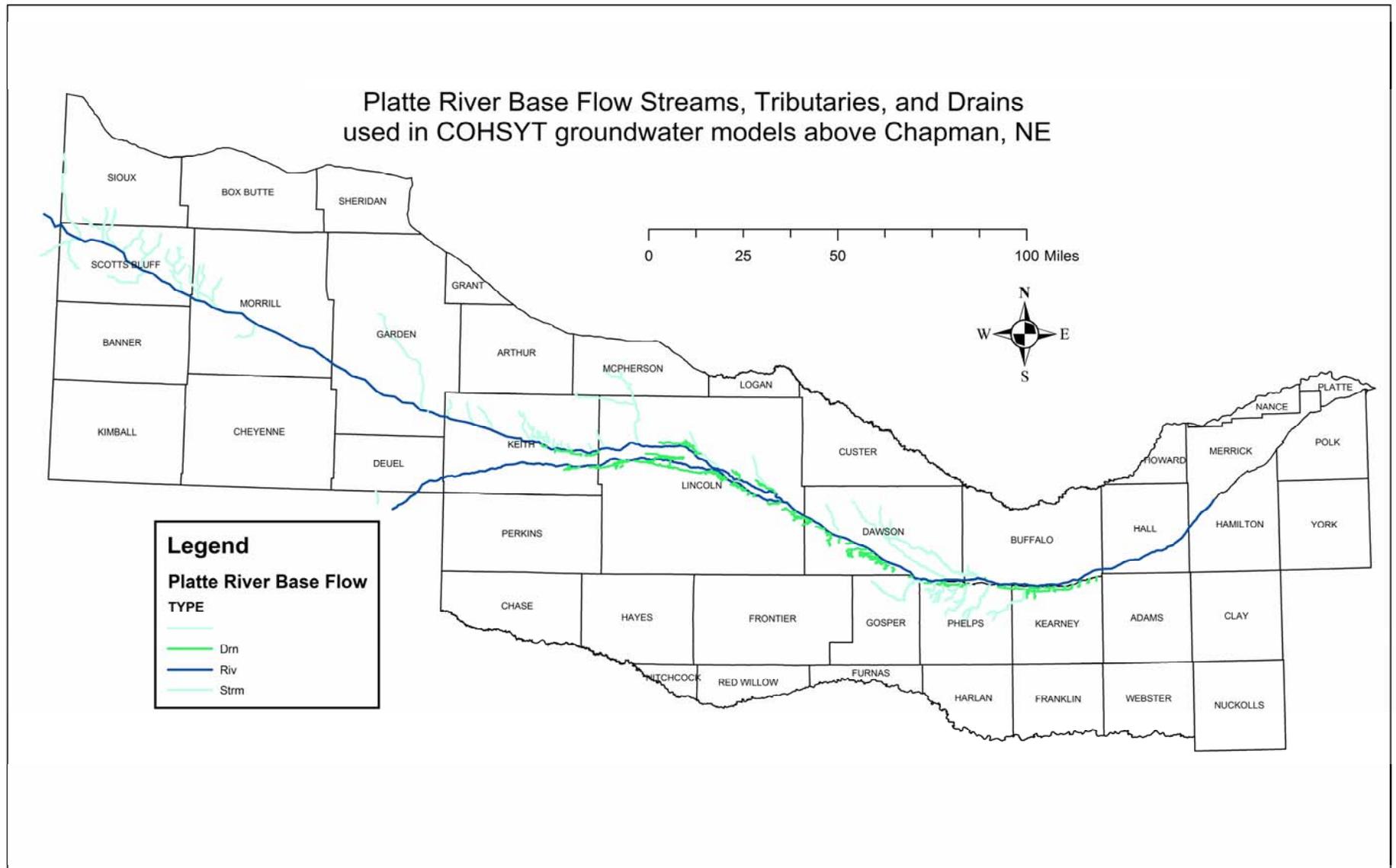
Box 14: To the extent applicable under NE Depletion Plan, mitigation by other than the proponent is provided if proponent proceeds.

Under this depletion plan, the state is responsible for offsetting depletions to FWS target flows that are not otherwise offset by the project proponent or some other party on behalf of the project proponent. The state alone is also responsible for depletion offsets for some new water related activities (see Box 7). Depending upon how offsets are to be actually developed and implemented, other parties, such as NRDs who plan to own and operate offset projects, might also be responsible for some or all of the depletion mitigation required for a given new water related activity.

Nebraska New Depletion Plan—Flow Chart for Section 7 Consultations



Attachment 1



PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

Attachment 5

Section 9

COLORADO'S PLAN FOR FUTURE DEPLETIONS¹

October 24, 2006

Colorado will be responsible for mitigating the impacts of new water related activities in Colorado on the associated habitats, in the manner described below.² As part of the proposed Program, the mitigation described below shall constitute the means for mitigating new water related activities in Colorado, except for water related activities pursued by entities electing not to participate in the Program. Subject to the planned NEPA and ESA reviews, the Department of the Interior ("DOI") agrees that Colorado's Future Depletions Proposal is a sufficient contribution by Colorado to offset the impacts of new water related activities in the South Platte River Basin in Colorado. If Colorado implements the mitigation program described below, new water related activities in Colorado will not adversely affect the "Current Regime of the River," as that term is used in the document entitled "An Environmental Account for Storage Reservoirs in the Platte River System in Nebraska," (Program Attachment 5, Section 5). For purposes of this document, "new water related activities" shall be used as that term is defined in the Platte River Recovery Implementation Program (Program Document), footnote 3. New water related activities shall not include augmentation for wells existing pre-June 30 1997, provided the augmented wells do not increase irrigated acreage beyond that irrigated on June 30, 1997.³

¹ In the Cooperative Agreement and the Program Draft EIS, the Colorado Plan for Future Depletions was referred to as Tamarack II.

² Colorado offers this agreement as part of its efforts to resolve endangered species conflicts through a negotiated and mutually agreed upon basin-wide cooperative agreement and recovery program. Nothing in this agreement constitutes an admission by Colorado that any depletion to the North or South Platte Rivers or their tributaries in Colorado that have occurred or may in the future occur adversely affect or reduce state line flows. Similarly, Colorado does not admit that any changes in the amount or timing of flows at the Colorado-Nebraska or Colorado-Wyoming state lines that have occurred or may in the future occur reach or adversely affect endangered species habitat in Nebraska. This agreement is not intended, and should not be construed, to amend or modify the South Platte River Compact or any interstate decree, or to waive any rights thereunder.

³ Prior to 2003, ground water users in the South Platte River Basin augmented their out-of-priority depletions with administratively approved annual substitute water supply plans. In 2003, the Colorado General Assembly required these ground water users to transition to a system of court-approved plans for augmentation. The applications for approval of the court-approved plans for augmentation must be filed with the water court no later than December 31, 2005. The courts may need a number of years to approve the proposed plans, during the interim the ground water users will continue to operate pursuant to administratively approved substitute water supply plans. Because the court-approved plans are permanent, the replacement obligations contained in those plans may be more stringent than those included in the administratively approved plans. In order to resolve a potential controversy concerning whether the use of ground water under more stringent terms constitutes an expansion of an existing project, the parties to the Cooperative Agreement, based on the assumption that the court approved augmentation plans will not result in increased consumptive use in Colorado, have agreed that wells in existence prior to June 30, 1997 and the augmentation sources for those wells included in any court-approved plans for augmentation will be deemed existing uses of water and not new water-related activities as long as the augmented wells do not increase irrigated acreage beyond that irrigated on June 30, 1997.

I. SOUTH PLATTE RIVER BASIN

A. Population Estimates.

The 1997 "Population Baseline" for Colorado's Future Depletions Plan is:

1. Northern Region -- Boulder, Weld, Larimer, Washington, Morgan, Sedgewick, Logan, Phillips (701,470)
2. Central Region -- Denver, Jefferson, Adams, Clear Creek, Gilpin, Park (1,766,207)
3. Southern Region -- Arapahoe, Douglas, Elbert (194,602)

Within 90 days after the inception of the Program, the Colorado State Demographer shall report the amount by which the population of each region is expected to increase over the Population Baseline by the end of the initial reporting period ("projected Population Increase"). At the end of each reporting period, Colorado will provide the Governance Committee an estimate by the Colorado State Demographer of the actual population in each region (which shall be the Population Baseline for the next succeeding reporting period), and an estimate of the projected Population Increase for the next succeeding reporting period.

B. Water Use and Effect Assumptions.

Assumptions concerning per capita water use, supply source mix by region, and accretive/depletive effects of each supply source (including monthly distributions of said effects), set forth in this paragraph and the table below, represent reasonable estimates at the outset of the program, and may be modified by the Governance Committee based on information made available to that Committee by Colorado or others. The gross per capita water requirement in the South Platte River Basin in Colorado will be assumed to be 0.27 af/yr, with 35% consumptive use assumed for all municipal purposes, and 45% consumptive use assumed for agricultural irrigation purposes. It is anticipated that new water related activities within the three regions will be from six sources of supply to serve the Population Increase, each with a different depletive or accretive effect on flows in the South Platte River. The three regions will develop the six sources of supply in different combinations. It will be initially assumed that the sources of supply for new water related activities will be developed in the combinations and will have the accretive or depletive effect shown below:

Source	Northern Region	Central Region	Southern Region	Accretive (or Depletive) Effect
New Transbasin Imports	40%	30%	20%	64%
Nontributary Groundwater	0%	10%	50%	68%
Ag. to Urban Conversion	35%	5%	0%	10%
Conservation	5%	15%	10%	0%
Wastewater	10%	25%	10%	(41%)
Exchange/Reuse				
Native South Platte Flows	10%	15%	10%	(27%)

The Governance Committee has adopted assumptions concerning the monthly distribution of the accretive/depletive effect of the development of each source of supply, taking into consideration the accretive/depletive effect shown above, the weighted contribution to meeting total water demand, and the anticipated monthly return flow pattern based on municipal water use patterns. The assumptions shown herein or as may be modified by the Governance Committee shall be as measured at or near the point of use.

C. Transit Loss Assumptions.

Colorado's commitment to offset the cumulative accretive/depletive effect of new water related activities in the three regions (hereinafter referred to as "Cumulative Effect") will be as measured at or reasonably near the Colorado-Nebraska state line. The Cumulative Effect will be influenced by natural river gains and losses, and water uses and return flows downstream from the points of use. The three states have studied transit losses in a study entitled "Tracking/Accounting Procedure for Determining Depletion/Accretion Impacts for the Three Program Water Projects and New Water Related Activities, Including Water Conservation/Supply Projects." This study considered the routing of both accretions and depletions from the Kersey gauge to a point at or reasonably near the Colorado-Nebraska state line. This study indicated much higher transit losses than those set forth in the table below, but until the three states are able to more fully study transit loss issues as they exist in all states for both protected and unprotected flows, Colorado will temporarily use the monthly transit loss per-mile factors set forth in the table below. The transit loss assumptions will be updated when the final study and negotiations are concluded.

jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
.02%	.02%	.05%	.1%	.3%	.45%	.5%	.5%	.5%	.4%	.1%	.02%

D. Reporting Periods.

The Initial Reporting Period will be two years from the initiation of a Program. Subsequent Reporting Periods will be each five years thereafter, for so long as the Program is in effect. At the close of each reporting period, Colorado will report:

1. an estimate of the actual population in each region (which shall be the Population Baseline for the next succeeding reporting period);
2. any new information relevant to the continued use or modification of assumptions set forth herein for:
 - a) gross per capita water requirements, including assumptions regarding the relationship among municipal, industrial and agricultural use of water,
 - b) the accretive/depletive effect of each source of supply, and
 - c) the cumulative effect at the state line;

3. the operations and effects of projects to mitigate new depletive effects;
4. an estimate of the projected Population Increase for the next succeeding reporting period;
5. estimates of the net accretive/depletive effects and Cumulative Effect for the next reporting period; and
6. net changes in irrigated agricultural acreage, using readily available data.

Colorado will also submit annual information reports to the Governance Committee estimating population increase in each of the three regions, and describing water sources used to supply new water related activities including type of water source, works used and water quantities supplied. Colorado will promptly report to the Governance Committee any new information that significantly affects assumptions relied upon in this Program.

E. Determination of Cumulative Effect -- Initial Reporting Period.

Within 90 days after the inception of the Program, Colorado will provide to the Governance Committee a calculation of the average monthly distribution of the Cumulative Effect for anticipated water related activities in the South Platte River Basin in Colorado for the Initial Reporting Period. The calculation will be based on the projected Population Increase for that period, and the water use and transit loss assumptions described above or as may be modified by the Governance Committee. The Cumulative Effect as approved by the Governance Committee will determine the mitigation measures that will be undertaken by Colorado during the Initial Reporting Period.

F. Determination of Cumulative Effect -- Subsequent Reporting Periods.

Colorado will monitor actual water use and development in the South Platte River Basin in Colorado beginning July 1, 1997. At the end of the Initial Reporting Period, and at the end of each Subsequent Reporting Period, Colorado will report to the Governance Committee for its review and approval any adjustments in the Population Increase and in the Cumulative Effect for that period. Such adjustments will serve as the basis for calculations for the next succeeding Reporting Period. Any resulting increase or decrease in Cumulative Effect will be added to or subtracted from the Cumulative Effect to be mitigated in the next succeeding Reporting Period.

G. Mitigation of Cumulative Effect.

The signatories assume that the Cumulative Effect for any annual period is expected to be a mix of net accretions during the fall, winter and spring period, and net depletions in the late-spring to mid-summer period, resulting in an estimated total seasonal net depletive effect on an order of magnitude of less than 1,800 af/yr for each 100,000 additional people in the South Platte River Basin in Colorado. Based on these assumptions, Colorado will, in each Reporting Period, undertake such re-regulation projects within Colorado as are necessary to shift water flows at a point upstream from the Colorado-Nebraska state line and downstream from the last diversion in Colorado, from periods of net accretion to periods of net depletion. The re-regulation projects divert water in priority through existing ditch head gates or wells downstream of Colorado's

Washington County line. After diversion, this water recharges the alluvial aquifer of the South Platte River. Colorado will locate the recharge areas the distance necessary from the South Platte or its tributaries to result in accretions at locations downstream of the last river diversion in Colorado in periods of net depletion Colorado's commitment to re-regulate flows in any Reporting Period shall equal the total depletive effect by month for those months in which a net depletive effect will occur. To the extent that Colorado constructs projects or obtains the ability to re-regulate water in excess of the total depletive effect for those months in which a net depletive effect will occur, such capacity will be available for use in the next succeeding Reporting Period. Should total annual net depletive effects exceed the assumptions set forth above, Colorado reserves the option of reconsidering different measures to mitigate those effects under the Program.

H. ESA Compliance.

ESA compliance for South Platte Basin future depletions in Colorado will conform to the Program document. Except as described below, qualifying new water related activities that are in the South Platte Basin and are operated on behalf of Colorado water users are covered by the Colorado plan for future depletions. Exhibit A to this plan for future depletions is a draft schematic and explanation of how Colorado water users may qualify to use this plan in any ESA Section 7 consultation process for water projects in Colorado. Exhibit B is the template Biological Assessment and request for formal section 7 consultation (including template recovery agreement) that program participants may use to address potential impacts from operation of their new water activity on federally-listed species in Nebraska. Exhibit C is the template biological opinion the United States Fish and Wildlife Service will issue in response to the template Biological Assessment and request for formal section 7 consultation.

1. New water related activities would not be covered by this plan after the average annual water supply to serve Colorado's population increase from "Wastewater Exchange/Reuse" and "Native South Platte Flows" exceeds 98,010 acre feet during the February-July period described below. The 98,010 acre-foot figure represents gross water deliveries (supplies) to meet new demands for an average hydrologic year, and is not a consumptive use or diversion limitation. In analyzing proposed new water related activities that have supplies derived from the storage of native South Platte flows, only those supplies resulting from diversions to storage or wastewater exchange and reuse during the period from February through July will be counted toward the 98,010 acre-feet. In the event that a new water related activity is not covered by Colorado's plan pursuant to this Section I.H.1, Colorado and the activity's proponent can propose, as provided in Section E of the Program document, amendments that will allow Colorado's Plan to provide ESA compliance for that new water related activity.

2. The Colorado plan for future depletions does not cover the construction of a major on-stream reservoir located on the main stem of the South Platte River anywhere downstream of Denver, Colorado. In addition, the Colorado plan for future depletions does not cover hydropower diversion/return projects that divert water including sediments from the main stem of the South Platte River anywhere downstream of Denver, Colorado and return clear water to the South Platte River.

3. Colorado's plan for future depletions will provide ESA coverage for new water related activities related to existing U.S. Bureau of Reclamation water supply projects that currently provide water for Colorado water users. At Colorado's discretion, new federal water related activities in Colorado that provide water to Colorado water users may be provided ESA coverage by the Colorado plan for future depletions. Nothing in the Colorado plan for future depletions shall be construed as changing the water rights, or ownership, of any federal water project.

The ESA compliance covered by this plan only concerns consultation on the target species. To the extent that a federal nexus activity has potential impact on "non-target" listed species, then impacts to those species must be addressed in that federal project's Biological Opinion (BO) required by ESA.

For the purposes of this section H. the following definitions apply:

Covered means in compliance with the Endangered Species Act with regard to potential impacts to the least tern, piping plover, whooping crane and pallid sturgeon in and along the central and lower Platte River in Nebraska, for the duration of the First Increment.

Average means the average estimated or modeled effect over a multi-decadal period of time including a mix of wet, normal and dry hydrologic conditions. Initially, this will be the 1947-1994 period used in the current version of the Central Platte Op Study Model and the Platte Programmatic EIS. However, this time period may be adjusted if the Governance Committee concurs.

Major On-Stream Reservoir means a reservoir of more than 2,000 acre-feet. It does not include new diversion facilities that may impound a small amount of water. Reservoirs, including gravel pit reservoirs, adjacent to the main stem of the South Platte River and reservoirs on tributaries to the South Platte River are not considered to be located on the "mainstem" for purposes of this paragraph.

I. No Power to Limit Colorado Water Rights.

Prior to the inception of this Program there was not legal authority to deny the appropriation of un-appropriated water of the State or prevent the diversion and re-diversion of legally re-usable water. Nothing in this Plan for Future Depletions shall be construed to authorize the Program to deny the appropriation of unappropriated water or prevent the diversion and re-diversion of legally re-usable water to achieve Program goals, objectives or Milestones.

J. Commitment to Revise.

This Plan for Future Depletions is premised on the assumptions contained herein. In the event that the assumptions underlying this plan are not realized, the State of Colorado commits to revise its Plan for Future Depletions accordingly.

II. NORTH PLATTE RIVER BASIN

A. Background Information.

This document sets forth Colorado's Plan to address new water related activities in the North Platte River Basin, Jackson County, Colorado. Subject to ongoing NEPA and ESA reviews, and verification of certain assumptions, the parties to the Program Cooperative Agreement have agreed that Colorado's Depletions Plan is a sufficient contribution to offset alleged effects on endangered species habitats in Nebraska of new water related activities in the North and South Platte River Basin in Colorado. Colorado's Depletions Plan for the South Platte is also summarized in this subsection of the Program Water Plan.

Colorado proposes to include new water related activities in the North Platte River Basin in the Platte River Recovery Implementation Program (Program) and to offset alleged effects on endangered species habitats in Nebraska in accordance with this agreement. The following summary provides an outline of the procedures and methods Colorado will use to monitor existing and new water related activities for the North Platte Basin and how mitigation measures for endangered species issues might be implemented.

B. North Platte Decree.

The decree in *Nebraska v. Wyoming*, 325 U.S. 589 (1945), *modified*, 345 U.S. 981 (1953) (the Decree), and modified by the Final Settlement Stipulation, March 13, 2001 enjoins Colorado from diverting water from the North Platte River and its tributaries for the irrigation of more than a total of 145,000 acres in Jackson county during any one irrigation season. The Decree also enjoins Colorado from storing more than 17,000 acre-feet of water for irrigation purposes from the North Platte River and its tributaries in Jackson County between October 1 of any year and September 30 of the following year. Finally, the Decree enjoins Colorado from exporting out of the basin of the North Platte River and its tributaries in Jackson County more than 60,000 acre-feet of water in any period of ten consecutive years. The Decree requires Colorado to prepare and maintain complete and accurate records of the total area of land irrigated and the storage and exportation of water and to make such records available for inspection.

C. Existing Water Related Activities.

In its 1945 opinion, the U.S. Supreme Court found that 131,800 acres were presently under irrigation in Jackson County in Colorado. Since then the number of acres being irrigated in any one year has been as high as 134,467. The Decree allows Colorado to irrigate up to 145,000 acres. For purposes of this Program, the parties to the Cooperative Agreement agree that depletion associated with the irrigation of up to 134,467 acres constitute existing uses and that depletions associated with the irrigation of between 134,468 and 145,000 acres in Jackson County constitute new water related activities. The irrigation storage and export limits in the Decree also represent existing uses as of 1945, and reflect the Supreme Court's recognition that transbasin diversions in some years exceeded 6,000 acre-feet. Since the limitations in the Decree represent historical uses in Jackson County, any depletions within those limits constitute existing water uses. Storing more than 17,000 acre-feet of water for irrigation purposes between October 1 of any year and September 30 of

the following year and exporting more than 60,000 acre-feet of water in any period of ten consecutive years are not permitted under the Decree, and, therefore, no new water related activities of these types are contemplated.

In addition to existing uses in accordance with the Decree, Jackson County's small population and limited industry consume a small quantity of water under prior existing rights. Colorado does not anticipate significant population growth in Jackson County during the term of the Cooperative Agreement or the First Increment of the program. The population baseline for Jackson County is 2022 people. Colorado estimates that the 2004 population for Jackson County is 1,554 people. The State demographer does not predict the Jackson County population to exceed 2022 people by the end of the First Increment.

Piscatorial, wildlife, and other environmental uses implemented on or before July 1, 1997 will constitute existing uses. Any water diverted for new uses for these purposes implemented after July 1, 1997 will constitute new water related activities.

D. New Water Related Activities.

For purposes of the Program Cooperative Agreement, the parties agree to the following:

1. *Agricultural Water Use:* Irrigation of more than 134,468 will constitute new water related activities. The parties agree that net depletions (diversions less return flows) associated with irrigating additional acres as measured at the Colorado - Wyoming state line equal .83 acre-feet per acre during the irrigation season. Colorado does not expect to have any new depletions during the first increment.
2. *Municipal and industrial use (M&I):* Colorado does not expect the Jackson County population to exceed 2022 in the First Increment. When population in Jackson County reaches 1900, Colorado will present a municipal and industrial new depletion plan to the Governance Committee for approval. Similar to the methodology adopted for the South Platte new depletion plan, new municipal and industrial water uses are assumed to be .27 acre-feet per capita per year. Consumptive use is 35% of gross water use, unless otherwise reported to the Governance Committee by the State of Colorado. The parties agree that the monthly distribution of the depletive effect of this municipal and industrial water use is the same as that defined for the South Platte Basin, unless otherwise reported to the Governance Committee by the State of Colorado.
3. *Piscatorial, wildlife, and other environmental uses:* To the extent that these uses are not incidental to an existing or new irrigation use, such uses implemented after July 1, 1997 will constitute new water related activities. Net depletions associated with such uses will be determined from Colorado Division of Water Resources information on actual annual net depletions. It is expected that all piscatorial, wildlife, and other environmental uses will have a federal nexus, but Colorado will monitor these uses through the Division of Water Resources and the water court resumes for Water Division No. 6. If there are significant piscatorial, wildlife, and other environmental uses occurring, which are not incidental to irrigation uses, and that do not have a federal nexus, then Colorado will present new depletion plan (to address these depletions) to the Governance Committee for approval. Colorado does not expect to have any new piscatorial, wildlife, or other environmental uses (which are not incidental to irrigation uses) in the first increment

E. Monitoring and Reporting.

During the first increment, Colorado does not foresee any: projected increases in: 1) irrigated acreage in Jackson County over 134,467 acres; 2) population over the 2022 person "population baseline"; or 3) significant non-nexus piscatorial, wildlife, or other environmental uses (which are not incidental to irrigation uses). Similar projections will be made at the beginning of each subsequent reporting period. At the end of the first reporting period, and at the end of each subsequent reporting period, Colorado will report to the Governance Committee: the irrigated acreage, irrigation storage, transbasin diversions, and population in Jackson County. Colorado will also report on any non-nexus piscatorial, wildlife, and other environmental uses (which are not incidental to irrigation uses) and any new industrial uses occurring since 1997.

These South Platte River Basin derived assumptions probably significantly overstate actual M&I water use in Jackson County. The gross M&I consumptive use assumption of .27 acre-feet per year is probably high because lawn irrigation is less prevalent in Jackson County than in the South Platte River Basin. The actual monthly distribution of the depletive effects associated with M&I use in Jackson County is probably different than that of the South Platte Basin, since Jackson County's higher elevation and shorter, cooler summers limit lawn irrigation to a shorter time period than occurs in the South Platte Basin. Thus, M&I uses in Jackson County are likely to produce fewer depletions during the months of shortage to target flows at Grand Island in comparison with M&I uses in the South Platte Basin. However, in the absence of specific data, Colorado agrees to apply South Platte Basin assumptions to M&I use in Jackson County as of July of the year that begins the increment (e.g., July 2003, July 2008 etc.). If any new industrial uses occur beyond the 1997 level, or if the population appears that it will exceed the population baseline of 2022 people, or there are significant non-nexus piscatorial, wildlife, or environmental uses that are not incidental to irrigation uses, these would be considered new water related activities. New water related activities will be replaced on a one-to-one basis in the North Platte basin, if necessary, after consideration of timing and location and shortages to U.S. Fish and Wildlife target flows in Nebraska, in a manner consistent with the Decree.

F. ESA Compliance.

Colorado commits to offset the net cumulative effects of depletions associated with new water related activities in the manner described within this depletion plan. It is the intent of Colorado that new depletions will be offset in accordance with Section I.A.4 and Section III.E.3 of the Program Document and this depletion plan. Because it is unlikely that new depletions will occur in the First Increment, Colorado will not propose a specific plan for mitigation at this time. ESA compliance for North Platte Basin future depletions in Colorado will conform to the Program Document.

Exhibit A
12-05-05

Platte River Recovery Implementation Program

Schematic and Explanation of Endangered Species Act Section 7 Consultation Process in Colorado

This document illustrates how, with a Program in place, water related activities subject to Section 7(a)(2) consultation of the Endangered Species Act (ESA) will proceed through the consultation process and how Colorado's Future Depletions Plan relates to that process. Projects involving both "new" and "existing" water related activities will proceed on dual procedural pathways during the streamlined consultation process.

The bold text for each box as explained below corresponds to the wording in the schematic for that box. If nothing other than the wording in the schematic appears in this document, the wording in the schematic is considered to be self-explanatory. The various steps, or boxes, have been numbered to aid the discussion. However, the numeric order does not imply any sequence of steps. The steps in the schematic are:

Box 1) **Platte River Basin Water-Related Activity.** A Platte River basin water-related activity upstream of Chapman, NE.

Box 2) **Is there a federal-nexus?** If so, Section 7 consultation is required.

Box 3) **Activity is covered by the Program.**

Box 4) **Colorado and FWS notify each other of Federal Action subject to Section 7 consultation.** Colorado is under no affirmative duty to search for projects in the state that may be subject to Section 7 consultation, but if it becomes aware of one, this box highlights Colorado's agreement that it will pass the information along to the FWS. FWS agrees to notify Colorado after FWS is notified by a project proponent or a federal agency of an action subject to Section 7 consultation within the State.

Box 5) **Is it a New or Existing water related activity?** Colorado's Plan for Future Depletions specifies the means by which new water related activities, both those subject to and those not subject to Section 7(a)(2) of the ESA, will be addressed under the plan.

Box 6) **Existing water related activity covered by Program.** Federal action agency consults with FWS. Federal Action Agency to use Template Biological Assessment and secure signed Recovery Agreement by project proponent.

Box 7) **Federal Agency, applicant & State notified that Program covers the project. Platte River Section 7 obligations are known. If Colorado requirements for Program participation are met, including membership in the South Platte Water Related Activities**

Program, Inc. (SPWRAP), streamlined consultation completed pursuant to Template Biological Opinion.

Box 8) **Is it a "Federal" New water related activity?** Is the new water related activity addressed by the federal depletions plan (and not covered by the State plan)? Most of the time the answer to this question would be obvious, but if there were any question as to its status, Colorado and the FWS would decide on a case-by-case basis before proceeding. If it were a “federal” depletion then the Federal Depletions Plan would be used to address the depletion (Box 9). If that were not possible, the activity would be subject to a separate consultation “outside” of the Program (Box 11).

Box 9) **Use Federal Depletions Plan if possible.** (e.g., the federal agency is the “applicant”).

Box 10) **Do Applicant & Colorado desire the Project to be covered by the State's Depletions Plan?** Because the Program is voluntary, the applicant and Colorado must elect for the project depletion to be addressed by the State’s depletions plan. If the applicant or Colorado elects for the project not to participate in the Program then the project would be subject to a separate consultation “outside” of the Program (Box 11).

Box 11) **Section 7 Consultation conducted “outside of the Program”.**

Box 12) **Federal Agency provides depletion analysis to FWS and Colorado.** The federal agency consulting with the Service is responsible for providing a project description of the proposed federal action, including information describing the proposed depletions. The necessary information is identified in the Template Biological Assessment. Meetings and discussions to define the project depletions will generally include the federal agency, applicant, Service, and the State. For new water related activities, the Service will consider the latest updates provided by the state pursuant to the terms of its depletions plan.

Box 13) **Colorado reviews the depletion analysis and makes a determination: Is the Project addressed by the State Depletions Plan?** Upon request of the FWS, Colorado will certify whether a federal nexus project has met State requirements for Program participation and is covered by the State’s depletions plan. Proponent will sign Template Recovery Agreement.

Box 14) **Can State Depletions Plan be modified to include project depletion?** If the State does not certify a project as being within its plan, the State, subject to the amendment process set forth in the Program Document, Section E, may amend its plan.

Box 15) **Does the Governance Committee agree with modification of State Depletions Plan?** If amendment of the State depletions plan is proposed, the State will follow the amendment process set forth in the Water Section (Program Document, Section E).

Box 16) **Federal Action Agency and applicant are notified by Colorado that Program / State Depletions Plan covers the project.** Platte River obligations are known. If State requirements for Program participation are met, including membership in the South Platte Water Related Activities Program, Inc. (SPWRAP), streamlined consultation completed pursuant to

Template Biological Opinion. If the proposed project depletions are covered by a State's depletions plan and if State requirements for Program participation are met, then the consulting federal agency, the applicant and the State would be notified by the FWS that the proposed project's effects to the target species are "covered" by the State's depletions plan. Annual reporting of all section 7 formal consultations will be provided to the Governance Committee.

Attachments: Template Biological Assessment
Template Recovery Agreement
Template Biological Opinion

Schematic of ESA Section 7 Consultation Process in Colorado
December 5, 2005

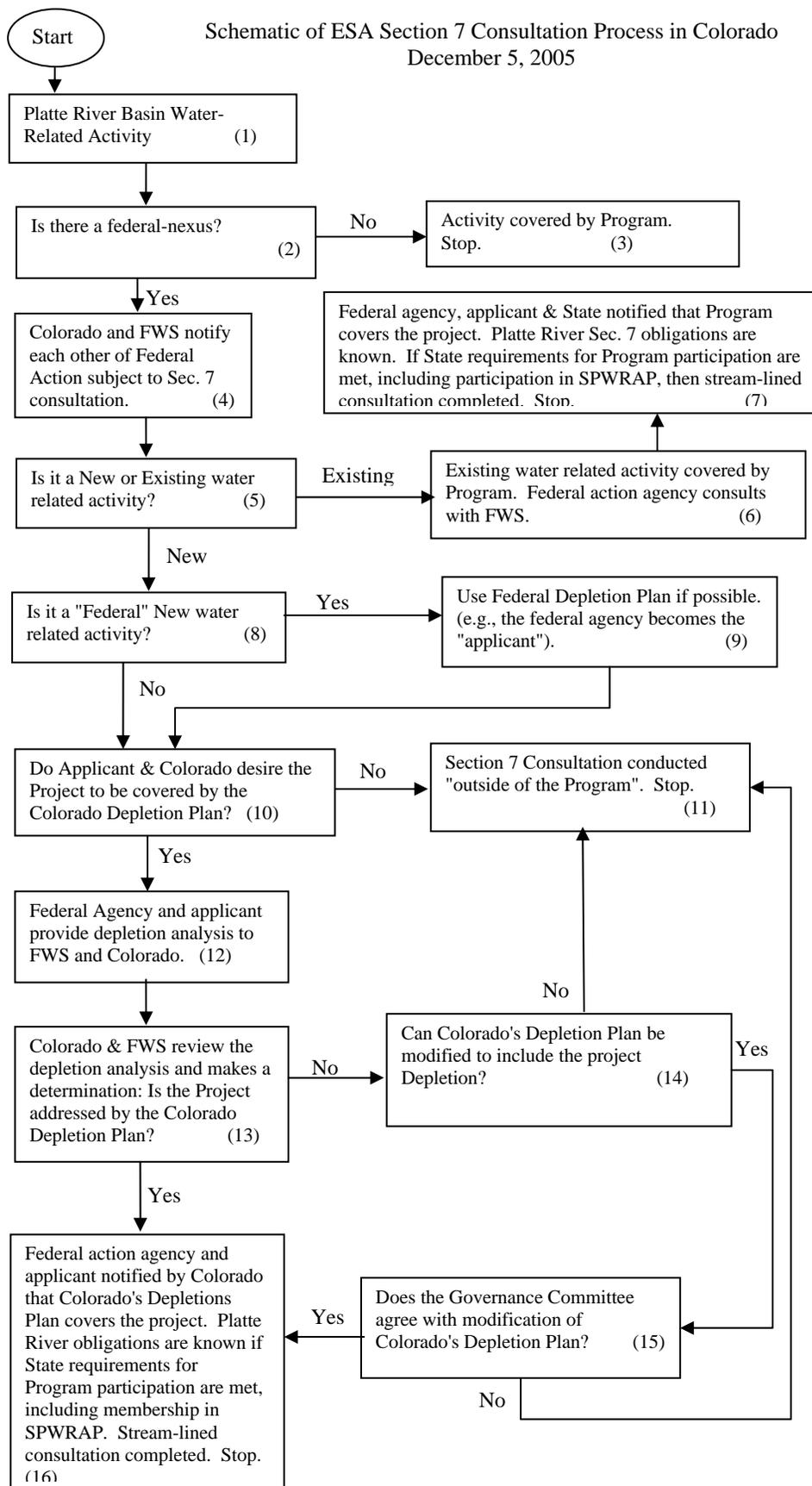


Exhibit B
Oct. 20, 2006

**TEMPLATE BIOLOGICAL ASSESSMENT
& REQUEST FOR FORMAL SECTION 7 CONSULTATION**

[DATE]

[FROM FEDERAL ACTION AGENCY
TO U.S. FISH & WILDLIFE SERVICE]

This letter contains the Biological Assessment addressing potential impacts from operation of the [Project] on federally-listed species in Nebraska. With this submission, we are requesting initiation of Formal Consultation under Section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)("ESA"), concerning the whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), northern Great Plains population of the piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*) (collectively referred to as the "target species"), and designated critical habitat of the whooping crane. We further request initiation of Formal Consultation for the bald eagle (*Haliaeetus leucocephalus*) and western prairie fringed orchid (*Platanthera praeclara*) [include other non-target listed species or critical habitats, as needed]. We have determined that the Project is not likely to adversely affect the American burying beetle (*Nicrophorus americanus*) and will have no effect on the Eskimo curlew (*Numenius borealis*).

[Briefly describe: (1) Project; (2) Applicant; (3) Project location; and (4) Federal action (e.g., permit or authorization) associated the Project.]

Operation of this Project will result in approximately ___ acre-feet of [choose: existing, new, or a combination of both existing and new] depletions to the South Platte River on an average annual basis. The source of water for the Project is [specify water rights, water uses, and source of supply].

The Platte River Recovery Implementation Program (PRRIP), established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Colorado, Nebraska, and Wyoming and the U.S. Department of the Interior [Program, I.A.1.]. The Program addresses the adverse impacts of existing and certain new water related activities on the Platte target species and associated habitats, and provides ESA compliance¹⁵ for effects to the target species and

¹⁵ "ESA Compliance" means: (1) serving as the reasonable and prudent alternative to offset the effects of water-related activities that FWS found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat before the Program was in place; (2) providing offsetting measures to avoid the likelihood of jeopardy to one or more of the target species or adverse modification of critical habitat in the Platte River basin for new or existing water-related activities evaluated under the ESA after the Program was in place; and (3) avoiding any prohibited take of target species in the Platte River basin.

whooping crane critical habitat from such activities including avoidance of any prohibited take of such species. [Program, I.A.2 & footnote 2.]. The State of Colorado is in compliance with its obligations under the Program.

For Federal actions and projects participating in the Program, the Platte River Recovery Implementation Program Final Environmental Impact Statement (FEIS) and the June 16, 2006 programmatic biological opinion (PBO) serve as the description of the environmental baseline and environmental consequences for the effects of the Federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO. These documents are hereby incorporated into this Biological Assessment by this reference.

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service's determination of the effects of the Federal action analyzed in the PBO. The Service determined in the PBO that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior least tern, and pallid sturgeon, or the threatened northern Great Plains population of the piping plover. Further, the Service found that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the threatened bald eagle and western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska, and was not likely to destroy or adversely modify designated critical habitat for the whooping crane.

The Service also determined that the PBO Federal Action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

INSERT APPLICABLE LANGUAGE BELOW:

The above-described Project operations qualify as an "existing water related activity" because they reflect the effects of a surface water or hydrologically connected groundwater activity implemented on or before July 1, 1997, within the intent and coverage of the Program. [Program, I.A. footnote 3].

-OR-

The above-described Project operations qualify as a "new water related activity" because such operations constitute a new surface water or hydrologically connected groundwater activity which may affect the quantity or timing of water reaching the associated habitats of the target species implemented after July 1, 1997. [Program, I.A. footnote 3]. The Project conforms to the following criteria in Section H of Colorado's Plan for Future Depletions [Program, Attachment 5, Section 9]:

1. The Project is operated on behalf of Colorado water users;

2. The Project does not involve construction of a major on-stream reservoir located on the mainstem of the South Platte River anywhere downstream of Denver, Colorado;
3. The Project is not a hydropower diversion/return project diverting water including sediments from the mainstem of the South Platte River anywhere downstream of Denver and returning clear water to the South Platte River.
4. The Project does not cause the average annual water supply to serve Colorado's population increase from "Wastewater Exchange/Reuse" and "Native South Platte Flows" to exceed 98,010 acre feet during the February-July period.

Accordingly, the impacts of this activity to the target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO are covered and offset by operation of Colorado's Future Depletions Plan as part of the PRRIP.

The Applicant intends to rely on the provisions of the Program to provide ESA compliance for potential impacts to the target species and whooping crane critical habitat. Toward this end, the [Federal Agency] is forwarding with this letter a Recovery Agreement signed by the Applicant. [Template Recovery Agreement is attached]. The [Federal Agency] intends to require, as a condition of any approval, that the Applicant fulfill the responsibilities required of Program participants in Colorado, which includes participation in the South Platte Water Related Activities Program, Inc. (SPWRAP). The [Federal Agency] also intends to retain discretionary Federal authority for the Project, consistent with applicable regulations and Program provisions, in case reinitiation of Section 7 consultation is required.

This letter addresses consultation on all listed species and designated critical habitat, including the referenced Platte River target species and whooping crane critical habitat. Potential impacts from construction and operation of the Project to any other federally-listed threatened or endangered species and designated critical habitats will be addressed within the applicable biological opinion prepared by the Service, in accordance with the ESA.

/FROM FEDERAL ACTION AGENCY/

10-17-06

PLATTE RIVER RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this ____ day of _____, 2006, by and between the United States Fish and Wildlife Service (“Service”) and **name of Water User** (“Water User”).

WHEREAS, in 2006, the Secretary of the Interior and the Governors of Colorado, Nebraska and Wyoming signed a Cooperative Agreement to implement the Platte River Recovery Implementation Program (“Program”); and

WHEREAS, the Program implements certain aspects of the Service’s recovery plans for four species (interior least tern, whooping crane, piping plover and pallid sturgeon) (collectively the “target species”) listed as threatened or endangered pursuant to the Endangered Species Act (“ESA”). The Program is intended to provide defined benefits for the target species and their associated habitats while providing for water development in the Platte River Basin to proceed in compliance with state law, interstate compacts and decrees, and the ESA; and

WHEREAS, on June 16, 2006, the Service issued a programmatic biological opinion (PBO) concluding that implementation of the Program, along with existing and a specified amount of new depletions, is not likely to jeopardize the continued existence of the target species or adversely modify their designated critical habitat in Nebraska. The Service also concluded that implementation is not likely to jeopardize the threatened western prairie-fringed orchid or the bald eagle in the central and lower Platte River; and

WHEREAS, Water User is the **choose one: owner/operator/contractor** of **name of water project or projects** (Water Project), which causes or will cause depletions to the Platte River system within Colorado; and

WHEREAS, Water User’s Water Project is covered by the PBO to the extent described within the scope of that document; and

WHEREAS, Water User desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the ESA.

NOW THEREFORE, Water User and the Service agree as follows:¹

1. The PBO concluded that implementation of the Program will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA for depletion impacts caused by projects consistent with Colorado’s water plan under the Program. Water User’s Water

¹ Individual Recovery Agreement may be changed to fit specific circumstances.

Project is provided regulatory certainty under the ESA to the extent described in the PBO. Thus, any consultations under Section 7 regarding Water Project's depletions and other effects are to be governed by the scope and provisions of the PBO and actions of the Program. The Service agrees that no other measure or action shall be required or imposed on Water Project to comply with Section 7 or Section 9 of the ESA with regard to Water Project's depletion impacts or other impacts covered by the PBO. Water User is entitled to rely on this Agreement in making the commitment described in paragraph 2.

2. To the extent implementing this Recovery Agreement requires participation by Water User, including membership in the South Platte Water Related Activities Program, Inc. (SPWRAP), Water User agrees to fulfill those responsibilities required of Program participants in Colorado. Water User will not be required to take any action that would violate its decrees or the statutory authorization for Water Project, or any applicable limits on Water User's legal authority.

3. If the Service believes that Water User has violated paragraph 2 of this Recovery Agreement, the Service shall notify both Water User, the State of Colorado, and the Governance Committee. Water User and the Governance Committee shall have a reasonable opportunity to comment to the Service regarding the existence of a violation and to recommend remedies, if appropriate. The Service will consider the comments of Water User, Colorado, and the comments and recommendation of the Governance Committee, but retains the authority to determine the existence of a violation. If the Service reasonably determines that a violation has occurred and will not be remedied by Water User despite an opportunity to do so, the Service may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the reinitiation provisions in the Program and PBO. In that event, the Water Project's depletions would be excluded from the depletions covered by the PBO and the protection provided by the PBO Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Water User's Water Project or the Service's statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by Water User regarding the application of the ESA to the depletions of Water User's Water Project or regarding the validity of the facts or analyses relied upon by the Service or by the Program. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the Service's flow recommendations in the PBO are biologically or hydrologically necessary to recover the target species or meet the needs of designated critical habitat in Nebraska.

6. This Recovery Agreement shall be in effect until one of the following occurs:

- A. The Service removes the target species in the Platte River Basin from the endangered or threatened species list and determines that the Program is no longer needed to prevent the species from being relisted under the ESA; or

- B. The Service determines that the Program is no longer needed to recover or offset the likelihood of jeopardy to the target species in the Platte River Basin; or
- C. The Service declares that the target species in the Platte River Basin are extinct; or
- D. Federal legislation is passed or federal regulatory action is taken that negates the need for (or eliminates) the Program.
- E. The Program is terminated in accordance with the Program Agreement.

7. Water User may withdraw from this Recovery Agreement upon written notice to the Service. If Water User withdraws, the Service may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the reinitiation provisions in the Program and PBO.

8. In the event the Service reinitiates consultation on Water User's Water Project for any reason, Water User shall not be precluded from asserting in any future proceeding any claim, defense or challenge to the legal, scientific or technical basis for the imposition of any reasonable and prudent alternatives based on the signing of this Recovery Agreement, nor based on the fact that the Service had previously issued one or more biological opinions containing the facts, analyses, opinions or conclusions on which the Service then seeks to rely.

Water User Representative

Date

U.S. Fish and Wildlife Service

Date

Exhibit C

Platte River Tier 2 Biological Opinion Template
For
Water-Related Activities and Central/Lower Platte Species Addressed by the Platte
River Recovery Implementation Program's Programmatic Biological Opinion

October 17, 2006

This biological opinion is provided in response to your [Date] request to initiate formal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA). Your Biological Assessment describes the potential effects of the [Project Name] on federally listed species and designated critical habitat.

The Federal Action reviewed in this biological opinion is the [provide the Project Name, Location, and a Short Description].

I. Background

On June 16, 2006, the U.S. Fish and Wildlife Service (Service) issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program (PRRIP) and water-related activities² affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The action area for the PBO included the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

The Federal Action addressed by the PBO included the following:

- 1) funding and implementation of the PRRIP for 13 years, the anticipated first stage of the PRRIP; and
- 2) continued operation of existing and certain new water-related activities³ including, but not limited to, Reclamation and Service projects that are (or may become) dependent on the PRRIP for ESA compliance during the first 13-year stage of the PRRIP for their effects on the target species⁴, whooping crane critical habitat, and other federally listed species⁵ that rely on central and lower Platte River habitats.

The PBO established a two-tiered consultation process for future federal actions on existing and new water-related activities subject to section 7(a)(2) of the ESA, with issuance of the PBO

² The term “water-related activities” means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a “water related activity” to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of “water related activities” do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing.

³ “Existing water related activities” include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. “New water-related activities” include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

⁴ The “target species” are the endangered whooping crane (*Grus americana*), the interior least tern (*Sternula antillarum*), the pallid sturgeon (*Scaphirynchus albus*), and the threatened northern Great Plains population of the piping plover (*Charadrius melodus*).

⁵ Other listed species present in the central and lower Platte River include the threatened bald eagle (*Haliaeetus leucocephalus*), western prairie fringed orchid (*Platanthera praeclara*) American burying beetle (*Nicrophorus americanus*) and Eskimo curlew (*Numenius borealis*).

being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered by the PBO. Under this tiered consultation process, the Service will produce tiered biological opinions when it is determined that future federal actions are “likely to adversely affect” federally listed species and/or designated critical habitat in the PRRIP action area and the project is covered by the PBO. If necessary, the biological opinions will also consider potential effects to other listed species and critical habitat affected by the federal action that were not within the scope of the Tier 1 PBO (e.g., direct or indirect effects to listed species occurring outside of the PRRIP action area).

Although the water depletive effects of this Federal Action to central and lower Platte River species have been addressed in the PBO, when “no effect”, or “may affect” but “not likely to adversely affect” determinations are made on a site-specific basis, the Service will review these determinations and provide written concurrence where appropriate. Upon receipt of written concurrence, section 7(a)(2) consultation will be considered completed for those federal actions.

Water-related activities requiring federal approval will be reviewed by the Service to determine if: (1) those activities comply with the definition of existing water-related activities and/or (2) proposed new water-related activities are covered by the applicable state’s or the federal depletions plan. The Service has determined that the [Project Name] meets the above criteria and, therefore, this Tier 2 biological opinion regarding the effects of [Project Name] on the target species, whooping crane critical habitat, western prairie fringed orchid, and bald eagle in the central and lower Platte River can tier from the June 16, 2006 PBO.

II. Consultation History

Table II-1 of the PBO (pages 21-23) contains a list of species and critical habitat in the action area, their status, and the Service’s determination of the effects of the Federal Action analyzed in the PBO.

The Service determined in the Tier 1 PBO that the Federal Action, including the continued operation of existing and certain new water-related activities, may adversely affect but would not likely jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, and bald eagle in the central and lower Platte River. Further, the Service determined that the Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to destroy or adversely modify designated critical habitat for the whooping crane.

The Service also determined that the PBO Federal Action would have no effect to the endangered Eskimo curlew. There has not been a confirmed sighting since 1926 and this species is believed to be extirpated in Nebraska. Lastly, the Service determined that the PBO Federal Action, including the continued operation of existing and certain new water-related activities, was not likely to adversely affect the endangered American burying beetle.

The effects of the continued operation of existing and certain new water-related activities on the remaining species and critical habitats listed in Table II-1 of the PBO were beyond the scope of

the PBO and were not considered.

The Service has reviewed the information contained in the Biological Assessment submitted by your office on [Date].

We concur with your determinations of “likely to adversely affect” for the endangered whooping crane, interior least tern, pallid sturgeon, and the threatened northern Great Plains population of the piping plover, the western prairie fringed orchid, and the bald eagle in the central and lower Platte River. We also concur with your determination of “likely to adversely affect” for designated whooping crane critical habitat.

We concur with your determinations of “not likely to adversely affect” for the endangered American burying beetle, and of “no effect” to the endangered Eskimo curlew.

We concur with your determinations of “not likely to adversely affect” [for species, species, and “no adverse modification of critical habitat” for species].

We concur with your determinations of “no effect” [for species, species, and critical habitat].

III. Scope of the Tier 2 Biological Opinion

The [Project Name] is a component of “the continued operation of existing and certain new water-related activities” needing a federal action evaluated in the Tier 1 PBO, and flow-related effects of the Federal Action are consistent with the scope and the determination of effects in the June 16, 2006 PBO. Because [the project proponent] has elected to participate in the PRRIP, ESA compliance for flow-related effects to federally listed endangered and threatened species and designated critical habitat from [Project Name] is provided to the extent described in the Tier 1 PBO.

This biological opinion applies to the [Project Name] effects to listed endangered and threatened species and designated critical habitat as described in the PBO for the first thirteen years of the PRRIP (i.e., the anticipated duration of the first PRRIP increment).

IV. Description of the Federal Action

[Describe the Federal Action and any Interdependent and Interrelated Actions– use text from the Biological Assessment]

V. Status of the Species/Critical Habitat

Species descriptions, life histories, population dynamics, status and distributions are fully described in the PBO on pages 76-156 for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle and western prairie fringed orchid, and whooping crane critical habitat and are hereby incorporated by reference. Since issuance of the Service’s PBO, [Discuss changes in status of target species/critical habitat since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since the PBO was issued].

VI. Environmental Baseline

The Environmental Baseline sections for the Platte River and for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle and western prairie fringed orchid, and whooping crane critical habitat are described on pages 157 to 219 of the Tier 1 PBO, and are hereby incorporated by reference. Since issuance of the Tier 1 PBO, [\[Discuss changes in status of target species/critical habitat in the action area since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since that time\].](#)

VII. Effects of the Action

Based on our analysis of the information provided in your Biological Assessment for the [\[Project Name\]](#), the Service concludes that the proposed Federal Action will result in [\[a/an existing depletion, new depletion, or a combination of existing and new depletions\]](#) to the Platte River system above the Loup River confluence. These depletions are associated with [\[briefly describe here, or by reference, the specific water supply sources, water uses, and associated water rights or permits\].](#)

[\[Select and/or delete from the following 2 paragraph\(s\) below as needed\]](#)

As an existing water-related activity, we have determined that the flow-related adverse effects of the [\[Project Name\]](#) are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle, western prairie fringed orchid, and whooping crane critical habitat.

As a new water-related activity, we have determined that the flow-related adverse effects of the [\[Project Name\]](#) are consistent with those evaluated in the Tier 1 PBO for the whooping crane, interior least tern, piping plover, pallid sturgeon, bald eagle, western prairie fringed orchid, and whooping crane critical habitat, and these effects on flows are being addressed in conformance with the [\[Select the applicable depletion plan: Wyoming Depletion Plan, Nebraska New Depletion Plan, Colorado Plan for Future Depletions, Federal Depletions Plan\]](#) of the PRRIP.

[\[If the site-specific project/activity may affect listed species/critical habitat addressed in the PBO, include those site-specific effects here. In that instance, the Incidental Take Statement section below may need additional text.\]](#)

VIII. Cumulative Effects

Cumulative effects include the effects of future State, local, or private (non-federal) actions that are reasonably certain to occur in the action area considered in this biological opinion. A non-federal action is “reasonably certain” to occur if the action requires the approval of a State or local resource or land-control agency, such agencies have approved the action, and the project is ready to proceed. Other indicators which may also support such a “reasonably certain to occur” determination include whether: a) the project sponsors provide assurance that the action will proceed; b) contracting has been initiated; c) State or local planning agencies indicate that grant of authority for the action is imminent; or d) where historic data have demonstrated an established trend, that trend may be forecast into the future as reasonably certain to occur. These

indicators must show more than the possibility that the non-federal project will occur; they must demonstrate with reasonable certainty that it will occur. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act and would be consulted on at a later time.

Cumulative effects are described on pages 194 to 300 of the Tier 1 PBO, and are hereby incorporated by reference. [\[Discuss any changes in cumulative effects, if any, since the Tier 1 PBO was issued, or include a statement saying there are no substantial changes in status since that time\].](#)

IX. Conclusions

The Service concludes that the proposed [\[Project Name\]](#) is consistent with the Tier 1 PBO for effects to listed species and critical habitat addressed in the Tier 1 PBO. After reviewing site specific information, including: 1) the scope of the Federal Action, 2) the environmental baseline, 3) the status of the whooping crane, interior least tern, piping plover, pallid sturgeon, western prairie fringed orchid, and the bald eagle in the central and lower Platte River and their potential occurrence within the project area, as well as whooping crane critical habitat, 4) the effects of the [\[Project Name\]](#), and 5) any cumulative effects, it is the Service's biological opinion that the [\[Project Name\]](#), as described, is not likely to jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, western prairie fringed orchid, or bald eagle in the central and lower Platte River. The Federal Action is also not likely to destroy or adversely modify designated critical habitat for the whooping crane.

X. Incidental Take Statement

Section 9 of ESA and federal regulations pursuant to section 4(d) of ESA 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.

Sections 7(b)(4) and 7(o)(2) of ESA do not apply to the incidental take of federally listed plant species (e.g., Colorado butterfly plant, Ute ladies' tresses orchid, and western prairie fringed orchid). However, limited protection of listed plants from take is provided to the extent that ESA prohibits the removal and reduction to possession of federally listed endangered plants or the

malicious damage of such plants on non-federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law. Such laws vary from state to state.

The Department of the Interior, acting through the Service and Bureau of Reclamation, is implementing all pertinent Reasonable and Prudent Measures and implementing Terms and Conditions stipulated in the Tier 1 PBO Incidental Take Statement (pages 309-326 of the PBO) which will minimize the anticipated incidental take of federally listed species. In instances where the amount or extent of incidental take outlined in the Tier 1 PBO is exceeded, or the amount or extent of incidental take for other listed species is exceeded, the specific PRRIP action(s) causing such take shall be subject to reinitiation expeditiously.

[\[If the site-specific project/activity may affect listed species/critical habitat addressed in the PBO, include any site-specific Reasonable and Prudent Measures and Terms and Conditions here. See the format in the PBO Incidental Take Section\].](#)

XI. Closing Statement

Any person or entity undertaking a water-related activity that receives federal funding or a federal authorization and which relies on the PRRIP as a component of its ESA compliance in section 7 consultation must agree: (1) to the inclusion in its federal funding or authorization documents of reopening authority, including reopening authority to accommodate reinitiation upon the circumstances described in Section IV.E. of the Program document; and (2) to request appropriate amendments from the federal action agency as needed to conform its funding or authorization to any PRRIP adjustments negotiated among the three states and the Department of the Interior, including specifically new requirements, if any, at the end of the first PRRIP increment and any subsequent PRRIP increments. The Service believes that the PRRIP should not provide ESA compliance for any water-related activity for which the funding or authorization document does not conform to any PRRIP adjustments (Program Document, section VI).

Reinitiation of consultation over [\[Project name\]](#) will not be required at the end of the first 13-years of the PRRIP provided a subsequent Program increment or first increment Program extension is adopted pursuant to appropriate ESA and NEPA compliance procedures, and, for a subsequent increment, the effects of the [\[Project name\]](#) are covered under a Tier 1 PBO for that increment addressing continued operation of previously consulted-on water-related activities.

This concludes formal consultation on the actions outlined in the [\[Date\]](#) request from [\[federal action agency\]](#). 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 specific action(s) causing such take shall be subject to reinitiation expeditiously.

Requests for reinitiation, or questions regarding reinitiation should be directed to the appropriate Field Office below.

[Depending on the State the project is located in, select the appropriate field office below and delete the other two]

Field Supervisor
Nebraska Ecological Services Field Office
U.S. Fish and Wildlife Service
Federal Building, Second Floor
203 West 2nd Street
Grand Island, NE 68801

Field Supervisor
Colorado Ecological Services Field Office
U.S. Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225-0486

Field Supervisor
Wyoming Ecological Services Field Office
U.S. Fish and Wildlife Service
5353 Yellowstone Road
Cheyenne, WY 82003

XII. Conservation Recommendations

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (pages 328-329) and are hereby incorporated by reference.

XIII. Literature Cited

Platte River Recovery Implementation Program document. 2006.

U.S. Department of the Interior. 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2006. Biological opinion on the Platte River Recovery Implementation Program.

12-05-05

PLATTE RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this ____ day of _____, 2006, by and between the United States Fish and Wildlife Service (“Service”) and **name of Water User** (“Water User”).

WHEREAS, in 2006, the Secretary of Interior and the Governors of Colorado, Nebraska and Wyoming signed a Cooperative Agreement to implement the Platte River Recovery Implementation Program (“Program”); and

WHEREAS, the Program implements certain aspects of the Service’s recovery plans for four species (interior least tern, whooping crane, piping plover and pallid sturgeon) (collectively the “target species”) listed as threatened or endangered pursuant to the Endangered Species Act (“ESA”). The Program is intended to provide defined benefits for the target species and their associated habitats while providing for water development in the Platte River Basin to proceed in compliance with state law, interstate compacts and decrees, and the ESA; and

WHEREAS, on _____, 2006, the Service issued a programmatic Biological Opinion concluding that implementation of the Program, along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the target species or adversely modify their designated critical habitat in Nebraska; and

WHEREAS, Water User is the **choose one: owner/operator/contractor of name of water project or projects** (Water Project), which causes or will cause depletions to the Platte River system within Colorado; and

WHEREAS, Water User’s Water Project is covered by the Biological Opinion; and

WHEREAS, Water User desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the ESA.

NOW THEREFORE, Water User and the Service agree as follows:

1. The Biological Opinion concluded that implementation of the Program will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA for depletion impacts caused by projects consistent with Colorado’s water plan under the Program. Water User’s Water Project is a covered activity. Thus, any consultations under Section 7 regarding Water Project’s depletions are to be governed by the provisions of the 2006 Biological Opinion and actions of the Program. The Service agrees that no other measure or action shall be required or imposed on Water Project to comply with Section 7 or Section 9 of the ESA with regard to Water Project’s depletion impacts or other impacts covered by the Biological Opinion. Water User is entitled to rely on this Agreement in making the commitment described in paragraph 2.

2. Water User agrees not to take any action which would probably prevent the implementation of the Program. To the extent implementing the Program requires active cooperation by Water User, including membership in the South Platte Water Related Activities Program, Inc. (SPWRAP), Water User agrees to fulfill those responsibilities required of Program participants in Colorado. Water User will not be required to take any action that would violate its decrees or the statutory authorization for Water Project, or any applicable limits on Water User's legal authority.

3. If the Service believes that Water User has violated paragraph 2 of this Recovery Agreement, the Service shall notify both Water User and the Governance Committee. Water User and the Governance Committee shall have a reasonable opportunity to comment to the Service regarding the existence of a violation and to recommend remedies, if appropriate. The Service will consider the comments of Water User and the comments and recommendation of the Governance Committee, but retains the authority to determine the existence of a violation. If the Service reasonably determines that a violation has occurred and will not be remedied by Water User despite an opportunity to do so, the Service may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the reinitiation provisions in the Program and 2006 Biological Opinion. In that event, the Water Project's depletions would be excluded from the depletions covered by the Biological Opinion and the protection provided by the Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Water User's Water Project or the Service's statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by Water User regarding the application of the ESA to the depletions of Water User's Water Project or regarding the validity of the facts or analyses relied upon by the Service or by the Program. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the Service's flow recommendations in the Biological Opinion are biologically or hydrologically necessary to recover the target species or meet the needs of designated critical habitat in Nebraska.

6. This Recovery Agreement shall be in effect until one of the following occurs:

A. The Service removes the target species in the Platte River Basin from the endangered or threatened species list and determines that the Program is no longer needed to prevent the species from being relisted under the ESA; or

B. The Service determines that the Program is no longer needed to recover or offset the likelihood of jeopardy to the target species in the Platte River Basin; or

C. The Service declares that the target species in the Platte River Basin are extinct; or

D. Federal legislation is passed or federal regulatory action is taken that negates the need for (or eliminates) the Program.

7. Water User may withdraw from this Recovery Agreement upon written notice to the Service. If Water User withdraws, the Service may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the reinitiation provisions in the Program and Biological Opinion.

8. In the event the Service reinitiates consultation on Water User's Water Project for any reason, Water User shall not be precluded from asserting in any future proceeding any claim, defense or challenge to the legal, scientific or technical basis for the imposition of any reasonable and prudent alternatives based on the signing of this Recovery Agreement, nor based on the fact that the Service had previously issued one or more biological opinions containing the facts, analyses, opinions or conclusions on which the Service then seeks to rely.

Water User Representative

Date

U.S. Fish and Wildlife Service

Date

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 10

Federal Depletions Plan
for the Platte River Recovery Implementation Program

December 7, 2005

1. Purpose

The purpose of the Federal Depletions Plan is to describe the approach for offsetting or preventing the impacts of new water related activities on the occurrence of target flows and on the effectiveness of the Program in reducing shortages to target flows for certain new water related activities which are a federal agency responsibility to offset.

2. Background

Key elements of the Program include depletion plans to ensure that new depletions to target flows (species and annual pulse flows) in the central Platte River (i.e., those resulting from new or expanded uses begun on or after July 1, 1997) will be offset, replaced, or prevented. Plans intended to help achieve this objective have been developed by the states of Nebraska, Wyoming, and Colorado. However, for certain types of federal activities the states' depletion plans do not provide water to replace the new depletion. This means that some new federal projects, specifically, those providing primarily a "national benefit" as opposed to benefits accruing primarily to local water users within a state, will not be covered in full or in part by the states' new depletion plans. Therefore, this Federal Depletions Plan will address some of the new depletions that will be deemed a federal agency responsibility.

The Federal Depletions Plan was developed by the DOI in coordination with other federal agencies involved in land and water management activities in the Platte River basin. Discussions with a number of these agencies and solicitation of relevant information was initiated on October 17, 2001, in a meeting at the FWS regional office in Lakewood, Colorado. In January 2004, a draft of this Plan was distributed to the federal agencies listed in Table 1, and their comments on this Plan were requested and are reflected in the table.

3. Definitions

Federal Depletion

An existing or new water related activity (as defined in the Program Document) implemented by federal agencies that primarily provide a "national benefit" to the general public as opposed to benefits accruing primarily to local water users within a state. In cases where an environmental project of "national benefit" is implemented by a state agency with some federal participation (e.g., federal cost-sharing), any new depletions resulting from that project will be a federal

responsibility in proportion to the extent to which the cost of establishing and maintaining that project is provided by federal funds and personnel.

New Depletion

A depletion to target flows (FWS species and annual pulse flows) in the Platte River caused by new water related activities (as defined in the Program Document) begun after July 1, 1997.

New Federal Depletion

A new depletion which is partially or solely a federal agency responsibility to address. Typically, these are water-related activities for which the associated water rights are held by a federal government agency for a national benefit.

4. Categories of Known or Anticipated New Federal Depletions

General categories of known or anticipated New Federal Depletions likely to be provided ESA compliance under this plan have been identified to the extent possible (Table 1). Examples of new water related activities that would be considered primarily a national benefit in scope include, but are not necessarily limited to, the following:

- New water storage facilities, impoundments, and consumptive water uses at National Wildlife Refuges, Waterfowl Production Areas, and National Fish Hatcheries;
- New consumptive water uses at National Forests, Parks, Monuments, and Historic Sites, including recreational, habitat improvement, administrative, and emergency uses; and
- New depletions associated with activities at federal facilities which provide benefits that are primarily national in scope, such as national defense, national security, or national research and development activities (e.g., Rocky Mountain Arsenal; National Renewable Energy Laboratory; Rocky Flats).

There may be other future projects where the classification of the new depletion (“federal” or “non-federal” responsibility) is not obvious. In such cases, final classification of the project will be made by the FWS in coordination with the Platte River Governance Committee. However, each state retains the right to determine whether the activity may be covered by that state’s plan.

5. Scope of the Federal Depletions Plan

The scope of the Federal Depletions Plan is to cover relatively small new federal depletions associated with the operation, management, and improvement of federal lands and federal facilities providing primarily national benefits to the general public.

6. Water Related Activities Outside the Scope of the Federal Depletions Plan

This Plan does not address “the impacts, including channel stability, of past and future vegetation management” by the U.S. Forest Service (USFS) in the Platte River basin.¹ Such impacts will be

¹ It is the position of the Forest Service that changes to water yield from forested landscapes resulting from the natural variability of the forest condition are not federal actions and do not constitute depletions that require

the subject of further research and analysis during the First Increment of the Program as described in Attachment B of this plan (December 2, 2005 letter from Rick D. Cables, Regional Forester to Dale Strickland, Executive Director, Platte River Endangered Species Partnership).

This Plan is not intended to cover large new federal depletions (e.g., federal depletions measured in thousands of acre-feet per year) that could be associated with new or enlarged reservoirs, large well fields, large surface water diversions, or other large-scale activities. Those will be covered through measures developed under separate ESA Section 7 consultation.

This Plan is not intended to address water conservation activities implemented on privately-owned agricultural lands in the Platte River basin that may result in new depletions. It will remain the responsibility of federal agencies to initiate Section 7 ESA consultation with FWS for such federal actions that are likely to result in new depletions to the Platte River, including water and land conservation activities.

7. Procedure for Addressing New Federal Depletions

7.1 ESA Section 7 Consultation Requirements

Section 7 (a)(2) of the ESA requires federal agencies to consult with the Secretary of the Interior to ensure their actions are not likely to jeopardize federally-listed (threatened or endangered) species or adversely modify or destroy designated critical habitat. Consultation is required if a federal action may affect federally listed species or designated critical habitat. Adoption of a Platte River Recovery Implementation Program does not change this legal requirement.

New federal depletions may be covered by the Program's Federal Depletions Plan when the federal agency consults under Section 7 of the ESA, quantifies the new federal depletion, and agrees to participate in the Program. Attachment A of this plan describes the consultation process for water related activities and Federal Depletions.

If a federal agency chooses to not participate in the Program/Federal Depletions Plan then the FWS will request the agency to replace the new federal depletion to the extent necessary to (1) be consistent with the Program Agreement, and (2) mitigate the impacts of the new federal depletion on the occurrence of target flows and on the effectiveness of the Program in reducing shortages to target flows, consistent with Section III.E.3 of the Program Document. Such replacements shall occur in the same state in which the new federal depletion occurs, or the responsible agency shall use other acceptable methods as agreed to by the FWS and the Governance Committee.

consultation under Section 7(a)(2) or any other provisions of the Endangered Species Act. Several entities represented on the Governance Committee do not agree with this position taken by the Forest Service.

7.2 Extent of New Federal Depletions Addressed by the Federal Depletion Plan

This Plan may serve as a mechanism for providing ESA coverage for a maximum 1,050 acre-foot/year of new federal depletions after July 1, 1997 and the end of the First Increment, measured in terms of average annual reductions in target flows. These reductions will be quantified at the Colorado-Nebraska state line (if the project is in the South Platte basin above this line), at the Colorado-Wyoming state line (if the project is in the North Platte basin above this line), at the Wyoming-Nebraska state line (if the project is in the North Platte Basin in Wyoming above this line), or at the uppermost point in the South Platte, North Platte, or mainstem Platte River above Chapman where the project's aggregate impact on flows can be quantified (if the project is in Nebraska). For purposes of quantifying flow reductions, water tracking and accounting procedures adopted for the corresponding state plans will be applied.

Each state has agreed to work with the DOI and cooperating federal agencies in the process of securing up to 350 acre-feet of water annually, if needed, to offset new federal depletions within the state in a manner consistent with the respective state's Depletion Plan. Such assistance could include making water that is available for offset purposes to non federal parties under that state's Depletion Plan also available to federal agencies that are responsible for new federal depletions. If such water is made available and if the federal agency initiating the new federal depletion decides to offset its new federal depletion in that manner, the federal agency is to reimburse the appropriate parties the proportionate cost of the project providing the offset water or is to do whatever else is required of other parties using water from the same offset source. Replacement timing and location will be consistent with state plans, and the replacement responsibility is to be commensurate with the new federal depletion occurring.

At such time that a proposed activity is determined to result in new federal depletions that cumulatively exceed the 1,050 acre-foot/year threshold, this Plan will not be available for purposes of ESA compliance for new federal depletions in excess of this total. In such an instance FWS and the activity's proponent can consider amendments that will allow this Plan to provide ESA compliance for the activity, as provided in Section III.E of the Program Document. The development of any such amendments will include an evaluation of impacts (if any) to peak flows in the central and lower Platte River.

7.3 Method of Determining Responsibilities for Offsetting, Replacing, or Preventing New Federal Depletions

Requirements for the replacement of new federal depletions using the Federal Depletions Plan are as follows:

1. New federal depletions will be replaced in the same state in which they occur, or use other acceptable replacement locations as agreed to by the Governance Committee.
2. New federal depletions will be quantified as follows:

a) In general, the same tools, methods, and procedures used to determine new depletions and the required offsets according to the states' plans, including timing of replacements, will apply in determining and replacing new federal depletions.

b) The extent to which the proposed activity creates or increases shortages to the occurrence of target flows and on the effectiveness of the Program in reducing shortages to target flows relative to pre-July 1,1997 conditions will be determined and the quantity, timing, and location of the new federal depletion to target flows will be offset.

c) Lag times and conveyance loss between the site of the new depletion and the state line (if in Colorado or Wyoming) or the Platte River at Grand Island, Nebraska (if in Nebraska) will be estimated using the same tools and methods adopted for the corresponding state's depletions plan.

For example, for new federal depletions associated with activities in **Colorado**, the transit loss factors utilized in Colorado's New Depletions Plan would be applied to estimate the effects at the Colorado-Nebraska state line. For activities in **Nebraska**, the Cooperative Hydrology Study (COHYST) models and other tools used to implement Nebraska's New Depletions Plan will be used to estimate depletive impacts and to determine the required offsets. For activities in **Wyoming**, depletions will be routed to the Wyoming-Nebraska state line using the methods identified in Wyoming's Depletions Plan.

7.4 Options for Mitigating, Offsetting or Preventing New Federal Depletions

If the federal agency elects to participate in the Program and rely of the Federal Depletions Plan, they will have several options for addressing the new federal depletions for which the agency is responsible, as listed below.

1. **Replace the new federal depletion by permanently retiring an equivalent federal depletive activity.**

For example, if the creation or expansion of ponds on a national wildlife refuge in the Platte basin results in new federal depletions, FWS would have the option of ceasing activities at the same or a different site to partially or fully fulfill its obligation to offset the federal depletive impacts. Documentation sufficient to demonstrate the quantity, timing, and location of the proposed offsetting activity would be an essential requirement.

2. **Provide funding to the appropriate parties to ensure that offsetting measures will be implemented consistent with the applicable state depletion plan, as necessary to offset the new federal depletion.**

Provided there is concurrence on the part of the state in which the new federal depletion will occur, the federal agency would have the option of providing annual funding in the amount necessary to ensure replacement of this water or offsetting of its depletive effects consistent with the corresponding state's new depletion plan. Federal agency reimbursements would be proportionate to their share of offsetting water from the corresponding state project. For example, should Wyoming choose to establish a "water

bank” as part of its program for offsetting Platte depletions, the federal agency may be given the option, at Wyoming’s discretion, of paying Wyoming or the Program to offset the new federal depletion by means of this water bank strategy.

3. Replace the new federal depletion through other means.

If the federal agency is unable or elects not to replace the depletion through cessation of another consumptive water use or through coordination with a state depletion plan, other means of replacing the depletion may be acceptable. For example, a commitment to lease the requisite quantity of augmentation water from a private entity in the same state may be an acceptable alternative, provided that (1) this activity is determined to satisfactorily offset new depletions to Program target flows in quantity, timing, and location, (2) it is determined to satisfactorily offset new depletions in accordance with Section III.E.3 of the Program Document.

7.5 Monitoring of Section 7 Consultations and Federal-Nexus Depletions

The accurate and timely identification, accounting, and tracking of new federal-nexus projects that cause depletions is an integral component of the Program. This includes identifying and accounting for new federal depletions. The FWS will develop a system to monitor the status of federal-nexus depletions throughout the Platte River basin as Section 7 consultation is conducted. For each federal-nexus depletion, this system will include information on:

- The responsible federal agency (*i.e.*, the agency consulting with FWS);
- The project name, operator, and cooperators if applicable;
- The date of the action;
- The amount of the depletion at the project site;
- The offsetting obligation (*i.e.*, lagged depletion at the replacement site after transit losses are taken into account);
- The category of depletion (new, existing, federal, state, private non-Program, etc.)
- The location and starting date of the depletion;
- The method used to offset the new depletion, and the status of the action taken (for example, if a “fair share” payment is being made under the state depletion plan, when was the requisite fee last paid?).

A summary report will be derived from this project tracking and accounting system and provided to the Governance Committee on an annual basis.

8. Impacts to Peak Flows

The Program requires full offset of any anticipated increases in shortages to Program target flows, as Program target flows are defined in Attachment 5, Section 11 of the Program Document. With regard to the larger and less frequent peak flows identified by the FWS as desirable for maintenance of habitat conditions in the central and lower Platte River (see also Attachment 5, Section 11), it is the position of the FWS to minimize reductions in the magnitude and frequency of these flows due to new activities in the basin, while recognizing that some

reductions may be necessary in order to implement the re-regulation or other activities necessary to achieve Program goals.

It is assumed that new projects having the potential to significantly affect peak flows in the central and lower Platte River will necessarily include a storage component, and it is reasonable to assume that such projects therefore will have a federal nexus (*e.g.*, require a Section 404 permit). Thus, future ESA section 7 consultation with the FWS is highly probable in cases where significant impacts to peak flows may occur, whether they result in a new federal depletion or a new non-federal depletion.

No major new storage facilities (*e.g.*, with storage capacities measured in hundreds of acre-feet or more) to serve national benefit/federal uses are anticipated in the Platte River basin during the First Increment. However, federal facilities storing relatively modest quantities of water (for example, new ponds on national wildlife refuges) are likely during the First Increment.

9. Known and Anticipated New Federal Depletions Occurring After July 1, 1997

Table 1 identifies known and anticipated New Federal Depletions occurring since July 1, 1997. This matrix was developed by the Department of the Interior by soliciting information about known and anticipated water-use activities in the Platte River basin from the identified federal agencies.

While an attempt has been made to identify all possible new federal depletions of significance, this summary is necessarily limited by currently available information and by imperfect knowledge of future activities. Moreover, it is possible that federal agencies not included in Table 1 (for example, the Department of Defense) may create depletions that would be a federal responsibility to address. Nevertheless, the information gathered to date and summarized in Table 1 suggests that the anticipated magnitude of cumulative new federal depletions in the Platte River basin from July 1, 1997 through the end of the First Increment of the Program will likely be in the range of a few hundred acre-feet or less.

Table 1. Estimated New Federal Depletions

Agency	Example Activities of “Federal Scope”	Example Activities Not Considered to be of “Federal Scope”	Estimated New Federal Depletions Since 1997	Planned/Reasonably Foreseeable Additional New Federal Depletions	Background/Baseline Information Provided by/ Available from Agency
<p>U.S. Army Corps of Engineers</p>	<p>None identified.</p>	<ul style="list-style-type: none"> - Flood control & water supply - Environmental restoration - Section 404 permitting 	<p>None.</p>	<p>None anticipated.</p> <p>“We do not believe we have any planned or foreseeable activities that could be defined as Federal depletions for strictly Federal needs.”</p>	<ul style="list-style-type: none"> - Booklet describing Corps assistance activities: <i>Civil Works: Technical Assistance, Project Implementation, and Emergency Management Programs</i> - Omaha District Home Page: www.nwo.usace.army.mil/html/pdp/CivWeb.htm - Contact: Bob Nebel, (402) 221-4621.
<p>U.S. Bureau of Land Management</p>	<p>Spring developments, Wells, and Small reservoirs/ ponds, including stock ponds and tanks, to the extent that the above activities involve water rights held by BLM.</p> <p>- Creating new wetlands or enhancing existing wetlands</p>	<p>Externally-initiated authorized user activities. For example, oil and gas development (drilling and related land reclamation activity)</p> <p>- Restoring historic wetlands</p>	<p><u>In Colorado:</u> 31.6 AF/yr associated with new reservoirs at the Hebron Slough Wildlife Area. 6.0 AF/yr associated with 9 spring developments and 15 wells.</p> <p><u>In Wyoming:</u> 5.6 AF/yr associated with stock watering ponds and 1 well (estimated; this number not yet confirmed)</p>	<p><u>In Colorado:</u> 15 to 100 AF/yr by the end of 13 years related to livestock and wildlife water development activities, primarily in the North Platte basin.</p> <p><u>In Wyoming:</u> 107 AF total (8.2 AF/yr) by the end of 13 years associated with “strictly federal” spring developments, wells, and small reservoirs and ponds. 2.3 AF total (0.2 AF/yr) by the end of 13 years associated with resolution of a trespass violation. 13 AF total (1.0 AF/yr) by the end of 13 years associated with oil and gas well drilling and land reclamation.</p>	<p><u>In Colorado:</u> 1997, 1998, 1999, and 2000 Depletion Reports.</p> <p>Contact: Jay Thompson, (303) 239-3724.</p> <p><u>In Wyoming:</u> May 2002 memorandum from Wyoming Deputy State Director.</p> <p>Contact: Mark Gorges, (307) 775-6100.</p>
<p>U.S. Bureau of Reclamation</p>	<p>Some environmental restoration activities.</p>	<ul style="list-style-type: none"> - Water service contracts - Water conservation activities - Most environmental restoration activities (e.g., establishment 	<p>None.</p>	<p>None.</p> <p>“We have not identified any specific future Federal depletions associated with Reclamation activities in the Platte River basin that are strictly Federal in scope”.</p>	<p>Contact: Gary Davis, (406) 247-7717.</p>

		and restoration of wetland & riparian habitats).			
U.S. Department of Veteran's Affairs	Operation of National Cemeteries, including lawn irrigation, ponds, etc.		None identified.	None identified to date.	John Reiker, National Cemetery Administration, (303) 914-5711.
USDA Natural Resources Conservation Service	None identified.	- Farm impoundments - Grade stabilization - On-farm conservation programs	None identified.	"The NRCS does not anticipate any Federal projects that will have a significant impact on flows in the Platte River" ... "we will consult with USFWS on any individual planned projects that may result in depletions of greater than 25 acre feet. However ... [we] are not aware of any planned NRCS-assisted projects that would exceed 25 acre-feet depletion per year." [FWS note: all applicable activities resulting in new depletions, whether less than or greater than 25 AF/year, will be subject to ESA consultation]	Contact: Richard Van Klaveren, Regional Conservationist, Lincoln, Nebraska. (402) 437-5315.
U.S. Department of Energy	Decommissioning & closure of Rocky Flats Environmental Technology site.	None identified.	None identified.	To be determined for Rocky Flats using the Site-wide Water Balance (SWWB) Model. Anticipated to be less than 25 AF/yr by the end of 13 years, and possibly zero. [FWS note: all applicable activities resulting in new depletions, whether less than or greater than 25 AF/year, will be subject to ESA consultation]	- <i>SWWB Model Report for the Rocky Flats Environmental Technology Site</i> , May 2002 - Contact: John Stover, (303)966-9735
U.S. Environmental Protection Agency	None identified.	None identified.	None identified.	"We ... have made the determination that the Environmental Protection Agency Region 8 does not have any water-related depletion activities in our programs."	Contact: Carol Campbell, (303) 312-6340.
U.S. Fish & Wildlife Service	- Water storage and use at national wildlife refuges, waterfowl	- Federal Aid programs which primarily benefit local	10.2 AF/year	To be determined as they occur. Total federal new depletions during the First Increment are anticipated to total less	"Inventory of USFWS Water-Related Operations in the Platte River Basin and Documentation of

	production areas, and fish hatcheries	communities (e.g., ponds at city parks) - Partners for Fish & Wildlife-funded activities or other similar activities implemented on private lands (e.g., stream rehabilitation and wetland restoration on private lands)	associated with new wells at the Funk Waterfowl Production Area (Nebraska), at the Saratoga Fish Hatchery (Wyoming), and at the Black-Footed Ferret Facility (Colorado) 5.0 AF/year associated with new ponds at the Arapaho National Wildlife Refuge (Colorado).	than 200 AF/yr , including the following locations and activities: - Arapaho National Wildlife Refuge (NWR) , Colorado: new ponds with approximately 12 acre-feet of storage capacity and approximately 14 AF/yr of net new depletions are anticipated. - Rainwater Basin Waterfowl Production Area (WPA) , Nebraska: Additional well drilling and/or water impoundments for wetland maintenance may occur in the next 13 years. - Rocky Mountain Arsenal NWR , Colorado: New supply wells, ponds or wetland impoundments may be established on this site. - Wetland Habitat Improvement Program Projects : No new major depletions (>25 AF/yr) are anticipated. Since July 1997, minor new depletions associated with these projects have accrued at a rate of about 10 AF/year. <i>No</i> new water-depleting activities are anticipated at the following facilities: - Bamforth NWR (Wyoming) - Black-Footed Ferret Facility (Colorado) - Crescent Lake NWR (Nebraska) - Hutton Lake NWR (Wyoming) - Mortenson Lake NWR (Wyoming) - North Platte NWR (Nebraska) - Pathfinder NWR (Wyoming) - Saratoga National Fish Hatchery (Wyoming) - Two Ponds NWR (Colorado)	Pre-1997 Conditions”, October 2001. (This document identifies the pre-1997 “baseline” information available for each wildlife refuge and WPA, against which future water consumption comparisons may be made). Contact: Don Anderson, (303) 236-4484.
U.S. Forest Service	Forest-Service-initiated water uses, including: -	Externally-initiated authorized user activities. For	In process of tabulating. Estimated less than	To be determined as they occur. Because the rate of new depletions associated with the identified “federal	Pre-1995 “historic” federal-scope USFS minor depletions documented in the <i>Programmatic</i>

	Recreation/campground uses - Species habitat improvement projects - Administrative sites - Emergency actions (wildfire, etc.)	example: - Permitted pipelines and ditches - Permitted reservoirs - Permitted recreational activities	1 AF/yr total since 1997.	scope” activities in recent decades have occurred at the rate of less than 0.2 AF/yr annually, total federal new depletions during the First Increment of the Program are likely to be less than 3 AF/yr at the end of 13 years. Presumes that there will be no new Forest Service-initiated reservoirs established during this period.	<i>Biological Assessment for Minor Water Depletions</i> (9/25/95) and supplement document. Since that date, individual forests have been documenting new depletions, and the USFWS has been tracking totals. Contact: Director Physical Resources or Director, Renewable Resources (303) 275-5350.
U.S. National Park Service	- Water use at National Parks, National Monuments, and National Historic Sites.	None identified.	None.	To be determined as they occur. Total federal new depletions during the First Increment are anticipated to total less than 10 AF/yr , including the following locations and activities: Fort Laramie National Historic Site (Wyoming): Up to 6 AF/yr associated with construction of a new maintenance facility and new well. Rocky Mountain National Park (Colorado): No new depletions anticipated. There are no plans to modify existing dams nor construct new campgrounds or other facilities requiring new depletions. Scotts Bluff National Monument (Nebraska): No new depletions anticipated.	Letters provided by: <ul style="list-style-type: none"> • Valery Naylor (Superintendent, Scotts Bluff National Monument) • George Helfrich (Superintendent, Fort Laramie National Site), and • Anthony Schetzle (Acting Superintendent, Rocky Mountain National Park). Contact: Karl Cordova, 970-586-1258.

NOTE: The above summary represents USFWS interpretation of information provided by these federal agencies. These agencies may or may not concur with the summary information as presented here. The nature and quantity of new depletions and potential coverage under this Plan ultimately will be determined at the time that ESA Section 7 consultations occur.

Attachment A
General Schematic of ESA Section 7 Consultation Process
for Water Related Activities and Federal Depletions

This document illustrates how, with a Program in place, water related activities subject to Section 7(a)(2) consultation will proceed through the consultation process and how the Federal Depletions Plan relates to that process. Projects involving both “new” and “existing” water related activities will proceed on dual pathways during the consultation process. The streamlined process outlined in the schematic may be used to address effects to the target species if the applicant elects to participate in the Program. Effects to other (non-target) listed species also will be separately addressed, as needed, during consultation on that activity.

The bold text for each box as explained below corresponds to the wording in the schematic for that box. If nothing other than the wording in the schematic appears in this document, the wording in the schematic is considered to be self-explanatory. The various steps, or boxes, have been numbered to aid the discussion. However, the numeric order does not imply any sequence of steps. The steps in the schematic are:

Box 1) **Platte River Basin Water-Related Activity.** A Platte River basin water-related activity. Proceed to box 2.

Box 2) **Is Section 7 Consultation Required?** If so, proceed to box 4. Otherwise, proceed to box 3 (stop).

Box 3) **Stop.** Section 7 consultation is not required.

Box 4) **FWS notifies applicable State of Federal Action subject to Section 7 consultation.** FWS will notify each State as federal agencies initiate actions subject to Section 7 consultation within a State, and provide annual reports to the Governance Committee on completed consultations. (See section 7.5 Monitoring of Section 7 Consultations and Federal-Nexus Depletions in the Federal Depletions Plan.) Proceed to box 5.

Box 5) **Is it a New or Existing water related activity?** If it is an existing activity, proceed to box 6. If it is a new activity, proceed to box 8.

Box 6) **If applicant elects to participate in the Program, the existing water related activity can be covered by the Program. Otherwise, consultation is completed without relying on the Program.** Once section 7 consultation for an activity’s effects to listed species is initiated with the FWS, effects to the target species by existing activities can be offset by participating in the Program. Effects to other (non-target) listed species are also addressed, as needed, during consultation on that activity. Proceed to box 7 (participate in Program), otherwise, proceed to box 13 (complete consultation outside of Program).

Box 7) **Federal agency and Governance Committee notified that Program covers the project. FWS completes a streamlined consultation for effects to target species. Stop.** A

"streamlined" consultation is one where: a) the federal action agency determines a project may affect listed species and initiates ESA consultation with the Service, b) the effects to the target species and their critical habitats had been analyzed in the programmatic EIS and programmatic biological opinion, and c) the Program's actions or Depletion Plans can be used as ESA compliance measures for that project's effects to the target species in the Platte River basin and their critical habitats in Nebraska. Other listed species, if any, must also be addressed during consultation.

Box 8) **Is a State Depletion Plan Applicable?** If so, see the applicable schematic for the applicable State Depletion Plan. Otherwise, proceed to box 9.

Box 9) **Can the Federal Depletions Plan be used?** The depletions covered by the Federal Depletions Plan are those associated with new water related activities (as defined in the Program Document) implemented by federal agencies that primarily provide a “national benefit” to the general public as opposed to benefits accruing primarily to local water users within a state. The Federal Depletions Plan can be used to address some or all of the new depletions that will be deemed a federal agency responsibility to offset. The scope of the Federal Depletion Plan is to cover relatively small new federal depletions associated with the operation, management, and improvement of federal lands and federal facilities providing primarily national benefits to the general public. The scope of the programmatic biological opinion includes approximately 350 acre-feet of federal depletions within each of the three states. If the Federal plan can be used, proceed to box 10. If the project is beyond the scope of the Federal Plan, then determine whether an amendment of the plan to include the new water related activity can be done, which would be subject to Governance Committee approval of the modified plan (box 11).

Box 10) **Federal Agency provides depletion analysis to FWS and State.** The federal agency consulting with the Service is responsible for providing a project description of the proposed federal action, including information describing the proposed depletions to waters (surface and ground) that supply flow to the Platte River. The necessary information is identified in a Biological Assessment. Meetings and discussions to define the project depletions will generally include the federal agency, Service, and the State. Proceed to box 12.

Box 11) **Can the Federal Depletions Plan be amended to cover the Federal Depletion, including concurrence by the Governance Committee?** If yes, proceed to box 10 (Depletion Analysis), otherwise, section 7 consultation is conducted outside of the Program (box 13). Stop.

Box 12) **Can replacement water for the Federal Depletion be obtained with State's assistance?** Each state has agreed to work with the DOI and cooperating federal agencies in the process of securing up to 350 acre-feet of water annually, if needed, to offset new federal depletions within the state in a manner consistent with the respective state's Depletion Plan. See section 7.2 Extent of New Federal Depletions Addressed by the Federal Depletion Plan. If State assistance is possible, proceed to box 14. Otherwise, the federal agency may still participate in the Program by finding replacement water on its own (box 15)

Box 13) **Section 7 consultation completed outside of the Program. Stop.** If the Federal Depletion is outside of the scope of the Federal Depletions Plan (box 9), and the Federal plan cannot be amended to address the depletion (box 11), then consultation is completed outside of the Program. Stop.

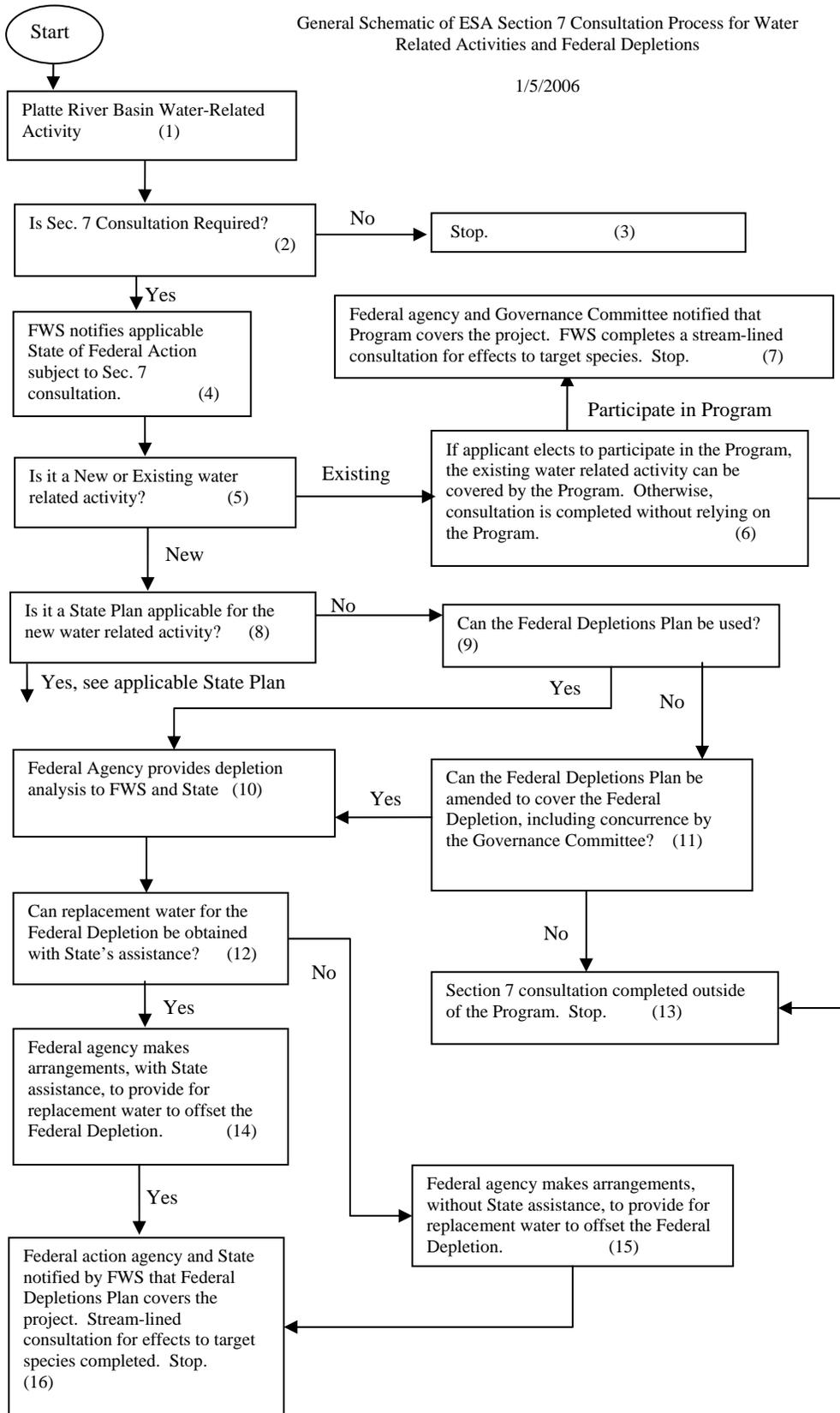
Box 14) **Federal agency makes arrangements, with State assistance, to provide for replacement water to offset the Federal Depletion.** Proceed to box 16.

Box 15) **Federal agency makes arrangements, without State assistance, to provide for replacement water to offset the Federal Depletion.** Proceed to box 16.

Box 16) **Federal action agency and State notified by FWS that Federal Depletions Plan covers the project. Stream-lined consultation for effects to target species completed.** Effects to other (non-target) listed species are also addressed, as needed, during consultation on that activity.

General Schematic of ESA Section 7 Consultation Process for Water Related Activities and Federal Depletions

1/5/2006





United States
Department of
Agriculture

Forest
Service

Rocky
Mountain
Region

ATTACHMENT B

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File Code: 2500/2670

Date: December 2, 2005

Dale Strickland
Executive Director
Platte River Endangered Species Partnership
2003 Central Avenue
Cheyenne, WY 82001

Dear Mr. Strickland and Members of the Governance Committee:

I understand that after many years of hard work under the framework of the July 1997 Cooperative Agreement, a Recovery Program for endangered species on the central Platte River may soon be in place.

One issue that was investigated as part of the development of the Recovery Program is the relationship between forest condition and water yield on forested lands in the Platte River Basin. The Forest Service was able to make substantial contributions to understanding this issue in the Platte River Basin, and provided data and funding towards the completion of two reports that were used in the NEPA analysis for the development of the Recovery Program.

It is clear that the relationship between forest condition and water yield will continue to be important to understanding and evaluating the effectiveness of the Recovery Program as the first increment is implemented. As the manager for a significant proportion of the forested lands in the Platte River Basin, the Forest Service will continue to manage National Forest System lands to include support for goals of the Recovery Program. We will continue to aggressively manage for healthy forest conditions, consistent with the National Forest Management Act, and using tools available under the Healthy Forest Restoration Act, the Healthy Forest Initiative, and other Forest Service programs and authorities. We will also continue to provide data and analysis towards a more complete understanding of the relationships between forested landscapes and water yield.

In addition to being responsive to questions and concerns as they arise during the implementation and evaluation of the first increment of the Recovery Program, the Forest Service will be moving forward with the following specific contributions:

1. Actively participate in the implementation of the Federal Depletions Plan, and consult separately on any depletions which are not covered by the Federal Depletions Plan.
2. Track Forest Service vegetation management activities (timber harvest and fuels treatment) in the Platte River Basin on an annual basis. Analyze changes to water





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ATTACHMENT B

yield from these activities on a five-year basis, or more frequently if needed to evaluate the effectiveness of the first increment of the Recovery Program.

3. Conduct an analysis for the South Platte Basin parallel to the May 2003 report: "Impact of Forest Service Activities on the Stream Flow Regime in the Platte River" (Troendle, Nankervis, and Porth). This study is anticipated to be completed by September, 2006.
4. Work with the Governance Committee to conduct a renewed basin-wide analysis of water yield from National Forests in the Platte River Basin, using the most currently available vegetation data, at least once in twenty years or one year prior the end of the first increment, whichever occurs first, or as may be agreed to in writing by the Forest Service and the Governance Committee. In addition, this analysis will include a comparison with the 1997 basin-wide water yields modeled in the May 2003 report by Troendle, Nankervis, and Porth, and in the report from item #3 (above), and a projection into the future for at least one program increment.
5. Analyze the predicted changes in water yield from the 2003 North Platte study and the planned 2006 South Platte study to determine when the simulated effects of the forest regrowth, if actualized, would be reflected in stream gage data, using the reference gages identified in Troendle et al (2003). This analysis is anticipated to be completed by December, 2006.
6. Work with the Governance Committee, the USGS, and the NRCS to ensure that the reference stream flow and precipitation monitoring sites identified in Troendle et al, 2003, remain in operation.
7. Provide support to the National Academy of Sciences study titled: "The Hydrologic Impacts of Forest Management", which has been contracted by the Department of the Interior.
8. Work on an ongoing basis with the Water Management Committee to determine what additional studies may be needed to inform these issues, and develop appropriate timeframes for funding, contracting, and completing any needed studies.

The development of the Platte River Recovery Program is an important achievement. The Forest Service is committed to contributing to the successful implementation of the first increment of the Program.

Sincerely,

/s/ Rick D. Cables



RICK D. CABLES
Regional Forester

cc:

Russell George
Executive Director
Colorado Department of Natural Resources
Ann Bleed
Acting Director
Nebraska Department of Natural Resources
Mike Besson
Director
Wyoming Water Development Commission
Ralph Morgenweck
Regional Director
U.S. Fish and Wildlife Service
Maryanne Bach
Director Research and Development
Bureau of Reclamation



PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Attachment 5
Section 11

Water Plan Reference Materials
December 7, 2005

Unlike all other attachments to the Program Document, Attachment 5, Section 11 has not been made a part of the Platte River Recovery Implementation Program (Program) by the Governance Committee. This attachment is provided for information only. Section 11 contains three types of informational material:

(1) U.S. Fish and Wildlife Service (FWS) Definitions and Recommendations Regarding Instream Flows and Opstudy Model

Appendix A was prepared by the FWS, not the Governance Committee. It documents the opinions and positions of FWS during the negotiations that led to the Program and it describes the FWS Instream Flow Recommendations referenced in the Program, which will be subject to adaptive management (See Section III.E of the Program Document). The Governance Committee members reserve the right to object to the FWS conclusions reflected herein.

Appendix B was also prepared by the FWS, not the Governance Committee. It describes the various uses of the Opstudy model by the FWS in evaluating Program water projects.

(2) Opstudy Assumptions Regarding Water Operations for Diversions at the Keystone Diversion Dam and Central District Supply Canal

Appendix C was developed by the Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD) (the Districts) and the Platte River EIS Team to provide reasonable assumptions for hydrologic modeling and analysis of diversions at the Keystone Diversion Dam and Central District Supply Canal for analysis in the EIS and Biological Opinion.

(3) Water Management Committee Subgroup Products

Appendices D, E, and F reflect the work of the July 1997 Cooperative Agreement Water Management Committee (WMC) subgroup and are intended to serve as initial guidelines for implementing Program activities when such activities are approved by the Governance Committee. The assessments and methods described therein are subject to review and revision by the Governance Committee throughout the First Increment as experience is gained during Program implementation.

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1. Background

The purpose of this Section is to:

- (1) Define the terminology used by the U.S. Fish and Wildlife Service (FWS) for its instream flow recommendations during implementation of the Platte River Recovery Implementation Program (Program) and future Section 7 consultations;
- (2) Clarify how these flow recommendations have been (and will continue to be) used in the context of Program-related activities; and
- (3) Provide historical context to the origin and use of these terms.

2. Definition of Terms

This document provides definitions for these six terms in the context of the Program:

- (FWS) Instream flow recommendations
- Species flows
- Annual pulse flows
- Peak flows
- Target flows
- Short-duration high flows

Figure 1 illustrates the relationship between these terms. The figure is followed by definitions.

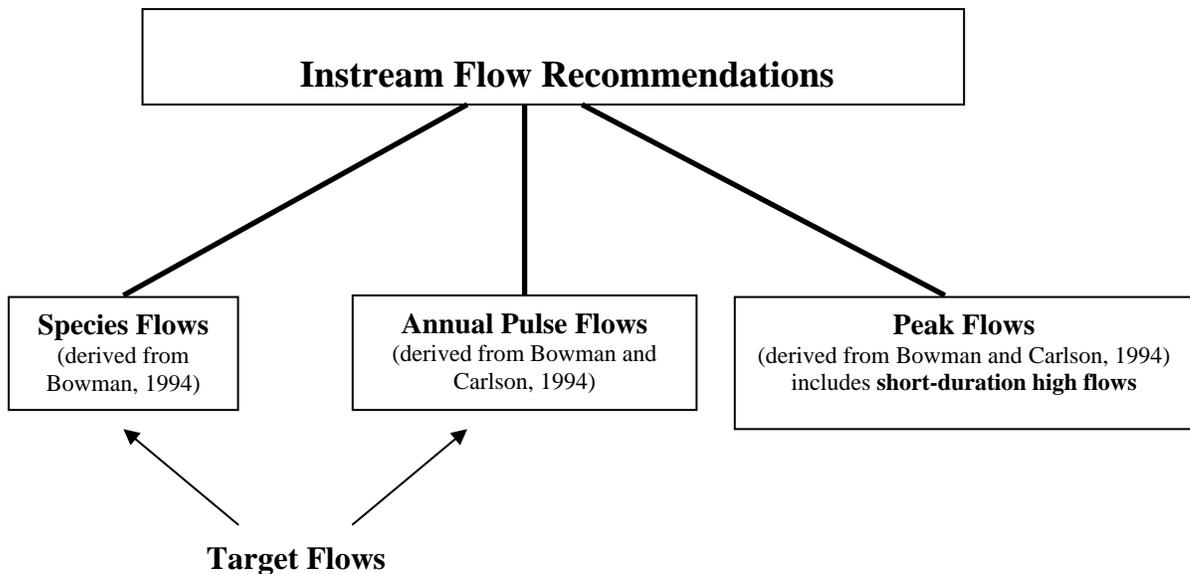


Figure 1. Schematic showing relationships between FWS-recommended flows

Instream Flow Recommendations

Defined as the entire suite of flow recommendations for the central Platte River articulated in two FWS documents: *Instream Flow Recommendations for the Central Platte River* (Bowman, May 23, 1994), and *Pulse Flow Requirements for the Central Platte River* (Bowman and Carlson, August 3,

1994). Collectively, these recommendations are intended to achieve the flow-dependent goal of “rehabilitating and maintaining the structure and function, patterns and processes, and habitat of the central Platte River Valley ecosystem”. Subsets of these recommendations have since been categorized as “species flows”, “annual pulse flows”, and “peak flows” by FWS, as illustrated conceptually in **Figure 1**.

A strategy recommended by FWS, subject to adaptive management during the First Increment of the Program, includes the creation or augmentation of flows in the central Platte River to discourage seedling establishment in the active river channel and to promote sandbar creation/mobilization (Murphy et al., 2003). These are termed “short-duration high flows”. FWS considers these to be encompassed under the peak flow recommendations.

Species Flows

Defined as all flow recommendations quantified in the document *Instream Flow Recommendations for the Central Platte River, Nebraska* (Bowman, 1994). These were established as recommended “wet year”, “dry year” and “normal year” minimum flows for various periods of the year (for example, from February 1 through March 22) for the purpose of meeting the habitat needs of native biotic components of the ecosystem. They are presented in Table 1 of Bowman, 1994 (**Appendix A-1** to this document) and summarized as follows:

SPECIES FLOWS			
Period	Wet year ¹	Normal year ¹	Dry year ¹
Jan 1 – Jan 31	1000 cfs	1000 cfs	600 cfs
Feb 1 – Mar 22	1800	1800	1200
Mar 23 – May 10	2400	2400	1700
May 11 – Sep 15	1200	1200	800
Sep 16 – Sep 30	1000	1000	600
Oct 1 – Nov 15	2400	1800	1300
Nov 16 – Dec 31	1000	1000	600

¹ “Wet years are defined as the wettest 33%, “dry” years as the driest 25%, and “normal” years all others. A method for declaring type-of-conditions in the central Platte in real time is provided in **Appendix D**.

Annual Pulse Flows

Defined as the recommended flows in excess of species flows which

- Occur in most (75%) or all years;
- Have a duration of 7 to 30 days;
- Are in the range of at least 2,000 to 3,600 cfs (varying with frequency-of-exceedance and time of year); and
- May be augmented or created by the Program.

Annual pulse flows are a subset of the flows quantified in Table 2 and Table 3 of Bowman and Carlson (1994; see **Appedices A-2 and A-3** to this document). They were identified as being important to maintaining the physical structure and other characteristics of the river for biological benefits. The annual pulse flows may be summarized as follows:

ANNUAL PULSE FLOWS		
Exceedance probability (recurrence interval)	Recommended Flow In Cfs	Notes
75% (3 of 4 years)	3,100 to 3,600 (Feb-Mar) 3,000 (May-Jun) 3,400 (May-Jun)	<ul style="list-style-type: none"> • 30-day duration for Feb-Mar • 7- to 30-day duration for May-Jun • 10-year running mean of 30-consecutive-day exceedance
100% (all years)	2,000 to 2,500 (Feb-Mar)	<ul style="list-style-type: none"> • 30-day duration for Feb-Mar

Annual pulse flows do not include the “peak flows” defined below, except in the sense that pulse flows may encompass the peak flow in years when the timing of the two coincide. In those years, Program-augmented annual pulse flows are likely to improve the peak flow 10-year running average, improving conditions relative to FWS running-average recommendations.

Peak Flows

In the context of the Program, “peak flows” refer to the highest flows maintained for five consecutive days in any given year. FWS peak flow recommendations were presented in Bowman and Carlson, 1994 (see **Appendices A-2 and A-3**). These are summarized as follows:

PEAK FLOWS		
Exceedance probability (recurrence interval)	Recommended Flow In Cfs	Notes
20% (1 in 5 years)	16,000 (Feb-Jun)	<ul style="list-style-type: none"> • 5-day duration • At least 50% of these flows should occur between May 20 to June 20 • May-June preferred for habitat benefits • Feb-June OK for channel maintenance
40% (2 in 5 years)	12,000 (Feb-Jun)	<ul style="list-style-type: none"> • 5-day duration
10-year running average of 5-consecutive-day exceedance	8,300 to 10,800 (Feb-Jun)	

As described by Bowman and Carlson, the recommended peaks in excess of 12,000 cfs “will be natural occurrences beyond the control of water resources managers in the Platte River basin”. The Program will not create nor augment flows of this magnitude. However, the FWS recommends that efforts be made to protect the frequency and magnitude of these naturally-occurring peak flows as new water-related activities occur in the Platte River basin. Because the Program is likely to augment the annual peak flow in many lower-flow years, for example by augmenting short-duration high flows, it is anticipated that the Program will improve the 10-year running average peak flow relative to existing conditions.

Target Flows

Defined as the “species flow” plus the “annual pulse flow” recommendations, as described above. The Target flows are the flow levels that the Program actively seeks to establish through provision of Program water and re-timing of river flows. Target flows are used as the basis for “scoring” the water-related benefits of Program activities relative to the 130,000 - 150,000 acre-foot/year First-Increment goal for reductions in shortages to targets (see discussion in Section 3).¹

Short-duration High Flows

In the context of the Program, these are defined as flows of approximately three to five days duration with magnitudes approaching but not exceeding bankfull channel capacity in the habitat reach. These flows are desired on an annual or near-annual basis to help scour vegetation encroaching on channel habitat areas and to mobilize sand and build ephemeral sandbars to benefit the target species.

The following applies to short-duration high flows:

- To the extent that Program water is used to create or augment these flows, they will be counted toward the Program score.
- Program water will not be used to achieve these flows when it may cause flows to rise above flood stage as defined by the National Weather Service.
- These are not included in target flows. That is, they will *not* be used as a basis for calculating shortages relative to the 130,000 to 150,000 acre-foot/year First Increment objective.
- To the extent that FWS uses Program water to produce such flows, such use shall not decrease the target flow shortage reduction credited to the Program’s initial three water projects or to any subsequently approved Program water project.
- Should the FWS EA Manager request that a Program water project avoid diverting or storing water for the sake of augmenting/protecting a short-duration high flow, that project will not be penalized for failing to achieve reductions in shortages to target flows that it otherwise would have achieved had no such request been made.

3. Application of Instream Flow Recommendations in the Context of the Proposed Program

¹ “Scoring” refers to quantifying (in thousands of acre-feet) the extent to which a water project results (or is anticipated to result) in reductions in stream flow shortages to target flows, as compared to the present condition. Scoring provides one tool for evaluating and comparing the potential benefits of water projects in the context of the Program, however it is not the only means of assessing potential benefits and adverse impacts.

The following table summarizes how FWS instream flow recommendations, as defined above, have been and will continue to be applied in the context of various Program-related activities:

	Instream flow recommendations used as basis for evaluation		
	Species	Annual Pulse	Peak
(1) FWS estimate of historic shortages to targets (417,000 af/year)	X	X	
(2) "Scoring" of the Program relative to the 130,000 - 150,000 af/year First Increment goal	X	X	
(3) Water Conservation/Supply Reconnaissance Study, Final Report and Reconnaissance-Level Water Action Plan: "scoring" of potential projects	X	X	
(4) FWS consideration/approval of any proposed Water Plan projects (new or substitutional) as an element of the Program	X	X	X
(5) Replacement obligations under state and federal depletions plans, for projects covered by the plans	X	X	Depends on commitments in Plans
(6) EIS and BO evaluation of the Program	X	X	X
(7) Future evaluations of Program benefits (for example, at the end of the First Increment)	X	X	X
(8) Operation of approved Water Plan projects relative to target flows	X	X	

The following discussion elaborates on this summary:

(1) Calculation of historic shortages to target flows.

In 1994, FWS estimated "Instream Flow Shortages" at Grand Island, Nebraska, by comparing 1943-1992 historic daily flows against the recommended daily instream flow over each of ten periods of the year (October 1 through November 15, etc.). The daily instream flows used for this comparison were the **species flows** and the **annual pulse flows** only (*i.e.*, the "Target flows"). Peak flows (as

defined above) were not incorporated into the analysis, and thus do not factor into the estimated 417,000 af/year historic shortage (**Appendix A-4**).

(2) “Scoring” the Proposed Program and alternatives relative to FWS instream flow recommendations.

The impacts that various alternatives (including the Program) would have on flows in the central Platte River are “scored” for comparative purposes in the EIS on the basis of the extent to which they reduce shortages to **target flows**. This is consistent with the basis for calculation of historic shortages to targets (item #1).

Because scoring is typically calculated on a monthly shortage (not daily shortage) basis using the Opstudy model, “weighted monthly” Target flows (as total acre-feet/month) are used for scoring comparison purposes (**Appendix A-5**). The weighted-monthly technique follows an approach recommended by the Platte River Technical Group (Altenhofen, 1996). To fully recognize the benefits of all Program flows, flows that are greater than the weighted monthly average minimum targets and that are created or augmented by the Program are also counted as contributing to the score.

Appendix B describes in greater detail how FWS anticipates the Program score will be calculated, using OpStudy and/or other tools.

This is not intended to imply that evaluations of the Program will not also include the evaluation of impacts to **peak flows**. Because peak flows are identified as an essential component of the suite of recommended flows established in the 1994 FWS documents, impacts on peak flows must be evaluated, along with impacts relative to other flow recommendations, as the FWS believes peak flows are critical to the maintenance of river-associated habitat for the target species (see item 7).

(3) Water Conservation/Supply Reconnaissance Study, Final Report (Boyle Report).

The Water Conservation/Supply Reconnaissance Study, Final Report, undertaken by Boyle Engineering Corporation (1999), pursuant to the Cooperative Agreement (1997), evaluated alternatives on the basis of their ability to “reduce target flow shortages”. For their analysis, Boyle used what they term “FWS (July 1997) weighted-average monthly species instream flow recommendations” (Table 2.1 of their report). The target flows they used for their analysis were the same weighted-averages of **species flows and annual pulse flows** that are used to “score” Program alternatives (item #2). See Appendix A-5.

(4) FWS Consideration/Approval of any Proposed Water Plan Projects (New or Substitutional) as an element of the Program.

While the water-related benefits provided by the operation of any Program water conservation/supply project will be measured on the basis of reductions in shortages to species flows and annual pulse flows, the *evaluation* of any new or substitutional proposed project for inclusion in the Program must also include an evaluation of impacts to **peak flows** before being approved by the FWS. Presumably, the project will be approved only if its positive effects relative to meeting Target flows (species + annual pulse flows) outweigh any negative effects relative to maintaining peak flows. Projects that are included in the Water Plan at the time the Program is adopted will not be

subject to further evaluation for impacts on peak flows, provided that the scope, location, and scale of the finalized project is consistent with its reconnaissance level description in the Water Plan.

(5) Replacement Obligations under State and Federal Depletions Plans, for Projects Covered by Plan

Because many flow re-regulation activities of benefit to target species in the central Platte River may have some negative effect on the frequency and/or magnitude of peak flows, FWS has agreed that water replacement obligations for projects covered by a corresponding state or federal depletions plan will be determined on the basis of the extent to which they create or increase shortages to **species flows and annual pulse flows** only, on average, relative to pre-1997 conditions. There are no replacement obligations relative to peak flows for projects covered by depletions plans, beyond those described within the corresponding plan and within the Program Document, Section E.

(6) EIS and Biological Opinion (BO) evaluations of the Program.

The environmental impacts of the Program are analyzed in an Environmental Impact Statement (EIS), and compliance of the Program with the requirements of the Endangered Species Act is evaluated separately in a Biological Opinion (BO).

EIS evaluations consider the effects of the Program (and other alternatives) on **all flows** in the central Platte River. For comparative “scoring” purposes, the EIS evaluation also estimates reductions in shortages to **target flows** (species flows and annual pulse flows) associated with each of the water alternatives.

Similarly, the BO considers the effects of the Program on **all flows**. This includes consideration of the Program’s effects relative to the FWS’s **species flows, annual pulse flows, and peak flow** recommendations, as the FWS considers *all* of these flow recommendations important to the structure and function, patterns and processes, and habitat of the central Platte River ecosystem.

(7) Future evaluations of Program benefits.

As noted above, only Target flows (**species flows and annual pulse flows**) have been used as the basis for:

- Calculating “historic shortages to target flows”;
- Establishing replacement obligations for projects covered by state and federal future depletions plans;
- Reconnaissance-level evaluations of potential Program flow augmentation projects (Boyle’s “Water Conservation/Supply Reconnaissance Study, Final Report”); and
- “Scoring” the Program and alternatives relative to FWS goals.

Nevertheless, **peak flow** recommendations are identified as an essential component of the suite of flow recommendations established by FWS for the central Platte River because of their importance for the maintenance of river-associated habitat. Thus they also will be evaluated in terms of Program benefits for the target species. It remains an objective of the FWS to (1) minimize reductions in the frequency and magnitude of the highest peak flows and (2) improve the long-term running average annual peak flow magnitudes in the central Platte River, because the FWS considers peak flows an essential factor in conserving the ecosystems upon which the listed species and other

species depend. Future evaluations of the Program will require a balanced assessment of the positive effects on species and annual pulse flows versus the negative effects on peak flows.

(8) Operation of approved Water Plan projects relative to target flows.

Implementation of many water conservation and reregulation projects under the Program requires that they operate, to the extent practicable, with respect to target flows. The applicable target flows may be expressed in terms of **weighted-monthly averages**, **fixed daily values** or **flexible daily values**, depending upon the Program element. For any approved Program Water Plan project, the applicable Target flows will be decided upon as part of the project approval process. To apply these target flows, it will be necessary to determine whether the operations (past or projected) occur under “wet”, “normal”, or “dry” flow conditions.

Criteria that will be used to determine in real-time whether “wet”, “normal”, or “dry” hydrologic conditions exist are described in **Appendix D**.

For Program water activities operating against **weighted-monthly averages**, the monthly target flows will be quantified as shown in the final column of the tables in **Appendix A-5** for the corresponding “wet”, “average”, and “dry” conditions. As already discussed, these weighted-monthly averages are derived from the FWS’s recommendations for species flows and annual pulse flows.

For Program water activities operating against **fixed daily values**, the daily target flows will be determined as shown in **Appendix E**. These values are based on FWS recommendations for both species flow targets and annual pulse flow targets. These values reflect the daily values used to calculate the weighted-monthly averages as shown in Appendix A-5.

For Program water activities operating against **flexible daily values**, the daily target flows in May and June will be determined as shown in **Appendix F**, or by some similar method agreed upon by the Governance Committee. These values also are based on FWS recommendations for both species flows and annual pulse flows. The methodology shown in Appendix F is intended to address the full suite of annual pulse flow timing, magnitude, and duration recommendations of FWS, while taking into account antecedent flows.

A Brief History of Instream Flow Recommendations Terminology and Usage

- Early 1994** FWS identifies the need for a workshop to develop instream flow recommendations for the central Platte River. This resulted from the need to provide flow recommendations to the Federal Energy Regulatory Commission (FERC), and from comments received from representatives of the three Platte River basin states during discussions about establishing a cooperative Platte River Recovery Implementation Program.
- May 23, 1994** *Instream Flow Recommendations for the Central Platte River* is prepared by David Bowman, FWS, presenting the results of a workshop held March 8-10, 1994, at the National Ecology Research Center of the National Biological Survey in Fort Collins, Colorado. The purposes of this workshop included (1) “to formulate the instream flow targets the Service will use in fulfilling its legislated responsibilities in the central Platte River Valley ecosystem”, and (2) “to prioritize these instream flow targets by season and by normal, wet, and dry years”. This document includes Table 1 quantifying instream flow recommendations (“targets”) for average, wet, and dry years for the central Platte River, excluding pulse flows.
- June 10, 1994** Memorandum of Agreement for the Central Platte River Basin Endangered Species Recovery Implementation Program is entered into by the Department of the Interior and the States of Colorado, Nebraska, and Wyoming, “to initiate the development of a mutually acceptable Program that would help conserve and recover federally listed species associated with the Platte River Basin in Nebraska upstream of the confluence with the Loup River; help protect designated critical habitat for such species; and help prevent the need to list more basin associated species pursuant to the Endangered Species Act.”
- August 3, 1994** *Pulse Flow Requirements for the Central Platte River* is prepared by David Bowman and Dave Carlson, FWS, presenting the results of a workshop held May 16-20, 1994, at the Midcontinent Ecological Science Center of the National Biological Survey in Fort Collins, Colorado. The purpose of the workshop was to “determine the pulse, or peak, flows needed to achieve the Service’s flow-dependent goal for the central Platte River Valley ecosystem.” “Pulse flow recommendations” are presented in Tables 2 and 3 of this document. These include both high flow events (above 12,000 cfs and 16,000 cfs) that last about five days and aren’t expected to occur in the average year (“peak flows” as defined here); more moderate flows of 2,000 to 3,600 cfs lasting a week to a month and recommended in February/March or May/June most years (“annual pulse flows” as defined here); and 10-year running mean recommendations for five-consecutive day exceedance (8,300 to 10,800 cfs) and 30-consecutive-day exceedance (3,400 cfs).
- October 1994** FWS estimates an average of 417,000 af/year of historic instream flow shortages relative to the FWS instream flow recommendations (document dated October 17, 1994). This estimate was based on an analysis of daily flows at Grand Island from 1943 to 1992 relative to recommended **species flows and annual pulse flows**.

- March 1996** Jon Altenhofen (Northern Colorado Water Conservancy District) proposes a method for “more specifically quantifying the duration, magnitude, and frequency” of the FWS instream flow recommendations for the May-June period (memo to the Platte River Technical Group, March 4, 1996). These flow values were adopted by FWS to “score” the Program and alternatives in the EIS in terms of their ability to reduce shortages to **target flows** on a monthly weighted-average basis (Appendix A-5). These are used in subsequent proposed project evaluations and consultations, including the Kingsley Dam Biological Opinion (1997).
- July 1997** Platte River Cooperative Agreement is signed by the three state governors and the Secretary of the Interior. A specific objective articulated in the Cooperative Agreement is to improve “the occurrence of Platte River flows in the associated habitats relative to the present occurrence of target flows (hereinafter referred to as ‘reducing shortages to the target flows’) by an average of 130,000 to 150,000 acre-feet per year”. The term “target flows” is footnoted with a reference to the May 23, 1994 and August 3, 1994 FWS documents.
- December 1999** Boyle Engineering Corporation delivers their *Water Conservation/Supply Reconnaissance Study, Final Report* to the Water Management Committee. In determining the hydrological effects of a specific project, Boyle assumed that diversion to recharge or storage are made “only during periods of target flow excesses at the critical habitat” and that releases for the benefit of the critical habitat are “only made during periods of target flow shortages”. The “target flows” used by Boyle for this assessment were the same monthly weighted-average **species flow and annual pulse flow** recommendations used by the FWS and the Program since 1996.
- January 2001** The U.S. Bureau of Reclamation (Murphy and Randle) release a report (“*Platte River Channel: History and Restoration*”) that describes anticipated continued erosion of medium-sized sand and channel narrowing downstream toward Grand Island, Nebraska over the next several decades without changes in management of the river, and recommends **short-duration high flows** as one component of a strategy to “restore a small but significant portion” of the historic Platte River channel.
- April 2001** FWS provides a table to the Water Management Committee summarizing all FWS instream flow recommendations, and introducing the conceptual categories of “**species flows**”, “**annual pulse flows**”, and “**peak flows**” as defined in this document.
- February 2005** The National Research Council of the National Academies publishes their report *Endangered and Threatened Species of the Platte River* (2005). Among the questions reviewed by the NRC was: “*Were the processes and methodologies used by the USFWS in developing its central Platte River Instream Flow Recommendations (i.e., species, annual pulse flows, and peak flows) scientifically valid?*”

The NRC report included these conclusions:

- “The proposed instream flows that resulted from the DOI agencies’ analysis and that are summarized in Table 4-3, 4-4, and 4-5 appear to the committee to be in the correct magnitude and timing to achieve the desired results of using river processes to foster habitat for the threatened and endangered species”. (p 142)
- “USFWS has developed instream-flow recommendations through literature reviews, field observations, data collection and analysis, numerical modeling, workshops, and other approaches. Those processes and methods are scientifically valid, and the techniques applied in the Platte River continue to be used for many other rivers. DOI-recommended flow values appear reasonable, but their effects on this river system require further analysis based on empirical data collection and field observations ...” (p. 151)
- “Although the Instream Flow Incremental Methodology (IFIM) and Physical Habitat Simulation System (PHABSIM) were the best available science when DOI agencies reached their recommendations regarding instream flows, there are newer developments and approaches, and they should be internalized in DOI’s decision processes for determining instream flows. The new approaches, centered on the river as an ecosystem rather than focused on individual species, are embodied in the concepts of the normative flow regime. Continued credibility of DOI instream flow recommendations will depend on including the new approach.” (p. 11)

References

- Altenhofen, J. 1996. "Proposed specifics for May/June instream flow targets". Memo to the Platte River Cooperative Agreement Technical Group. March 4, 1996. 2 pp. plus attached table.
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- Boyle Engineering Corporation (Boyle), 1999. Water Conservation/Supply Reconnaissance Study, Final Report. Prepared for the Governance Committee of the Cooperative Agreement for Platte River Research, December 1999. 12 chapters plus appendices.
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- U.S. Fish and Wildlife Service (USFWS), 1994. Untitled document quantifying instream flow shortages relative to the Service's 1994 instream flow recommendations, including pulse flows. October 17, 1994. 6 pp. plus attachments.

Appendix A

FWS Mountain-Prairie Region Instream Flow Recommendations and Proposed Usage for the Platte River Recovery Implementation Program

APPENDIX A-1 (From Bowman, 1994)

Table 1. Instream flow targets by seasonal priorities (ranking) for normal (average), wet, and dry years for the central Platte River, Nebraska. Normal (average) year flows will be equaled or exceeded 3 out of 4 years. Normal and wet year target flows will be met 3 out of 4 years, and in the driest 25 percent of the years, the dry year targets will be met.

<u>Season</u>	<u>Normal year Ranking & Flow (cfs)</u>	<u>Wet year Ranking & Flow (cfs)</u>	<u>Dry year Ranking & Flow (cfs)</u>
May and June*	*	#1 *	*
Feb. and March*	*	#2 *	*
May 11-Sept. 15	#1 @ 1,200	#3 @ 1,200	#1 @ 800
March 23-May 10	#2 @ 2,400	#4 @ 2,400	#2 @ 1,700 ¹
Feb. 1-March 22	#3 @ 1,800	#5 @ 1,800	#3 @ 1,200 ²
Sept. 16-30	#4 @ 1,000	#6 @ 1,000	#6(tie) @ 600
Oct. 1-Nov. 15	#5 @ 1,800	#7 @ 2,400	#6(tie) @ 1,300 ³
Nov. 16-Dec. 31	#6 @ 1,000	#8 @ 1,000	#5 @ 600
Jan. 1-31	#7 @ 1,000	#9 @ 1,000	#4 @ 600

* These specific flow recommendations were not provided in this 1994 document. They were developed in a subsequent workshop as described in Bowman and Carlson, 1994 (see Appendices A-2 and A-3).

¹ Includes 650 cfs for fish community.

² Includes 650 cfs for fish community.

³ Includes 600 cfs for fish community.

APPENDIX A-2
(From Bowman and Carlson, 1994)

Table 2. Peak and annual pulse flow recommendations for the central Platte River Valley ecosystem during May and June.¹

Flow	Period	(cfs)	Duration (days)	Frequency (yrs) Exceedence (%)
very wet	May 1 - June 30*	≥ 16,000	5**	1 in 5 (20%)
wet	May 1 - June 30*	≥ 12,000	5**	1 in 2.5 (40%)
normal	May 20 - June 20	≥ 3,000	7-30***	3 in 4 (75%)
dry	May 11 - June 30	none****		all remaining (100%)

* At least 50% of these peak flows should occur during May 20 to June 20, with May 1 to June 30 as the timeframe for broadest benefit for channel maintenance, and instream and wet meadow habitats. Occurrence between February 1 and June 30 would accomplish the necessary effects for channel maintenance. The 10-year running average for the mean annual peak flow targets should range from approximately 8,300 cfs to 10,800 cfs.

** The duration of these peak flows should emulate the historic, natural pattern: (a) ascended over approximately 10 days, (b) cresting for approximately 5 days, and (c) descending over approximately 12 days.

*** The target is for a 10-year running average for the 30-day exceedence flow (i.e., 10-year running average of the annual level exceeded for 30 consecutive days) of at least 3,400 cfs. A flow of 3,000 cfs should be exceeded for 7-30 days in at least 75% of years. Annual pulse flows should be followed by descending flows approximating a rate of 800 cfs/day.

**** No annual pulse flows during May and June in driest years; target flows identified in the March 1994 workshop (Bowman 1994), apply under dry year conditions.

¹ The original Bowman and Carlson document collectively referred to these as “pulse” flows. Here the language has been changed to “peak” and “annual pulse” flows to maintain consistency with the terminology since developed in the context of the Platte River Recovery Implementation Program.

APPENDIX A-3
(From Bowman and Carlson, 1994)

Table 3. Peak and annual pulse flow recommendations for the central Platte River Valley ecosystem during February and March.¹

Flow	Period	(cfs)	Duration (days)	Recurrence(yrs) Exceedence (%)
very wet	Feb 1 - March 31	≥ 16,000*	5**	1 in 5 (20%)
wet	Feb 15 - March 15	≥ 12,000*	5**	1 in 2.5 (40%)
normal	Feb 15 - March 15	3,100-3,600	30	3 in 4 (75%)
dry	Feb 15 - March 15	2,000-2,500	30	all remaining (100%)

* At least 50% of these peak flows should occur during May 20 to June 20, with May 1 to June 30 as the time frame for broadest benefit for channel maintenance, and instream and wet meadow habitats. Occurrence between February 1 and June 30 would accomplish the necessary effects for channel maintenance. The 10-year running average for the mean annual pulse flow targets should range from approximately 8,300 cfs to 10,800 cfs.

** The duration of these peak flows should emulate the historic, natural pattern: (a) ascended over approximately 10 days, (b) cresting for approximately 5 days, and (c) descending over approximately 12 days.

¹ The original Bowman and Carlson document collectively referred to these as “pulse” flows. Here the language has been changed to “peak” and “annual pulse” flows to maintain consistency with the terminology since developed in the context of the Platte River Recovery Implementation Program.

APPENDIX A-4

INSTREAM FLOW SHORTAGES AT GRAND ISLAND, NE (Thousands of Acre-Feet, Sorted from highest to lowest) Water Years 1943-1992

10/11/94

Wet and Average Years

Period	10/1 - 11/15	11/16 - 1/31	2/1 - 2/14	2/15 - 3/15	3/16 - 3/22	3/23 - 5/10	5/11 - 5/19	5/20 - 6/20	6/21 - 9/15	9/16 - 9/30	Total
AVG IFR, CFS	1,800	1,000	1,800	3,350	1,800	2,400	1,200	3,000	1,200	1,000	Annual
Total KAF	164.2	152.7	50.0	192.7	25.0	233.3	21.4	190.4	207.1	29.8	1266.5
1978	80.6	27.7	23.8	103.8	0.0	71.5	4.4	159.6	187.5	16.7	675.6
1976	91.0	3.8	9.5	92.0	0.2	75.0	7.5	149.5	191.1	11.5	631.1
1943	119.4	25.2	0.4	98.6	18.2	56.7	0.9	97.7	172.3	29.2	618.6
1944	129.5	23.5	19.2	84.1	5.8	42.9	0.0	100.6	180.5	25.9	612.1
1948	87.2	9.8	20.4	72.8	0.0	67.7	8.4	175.2	139.0	22.6	603.0
1968	48.8	12.7	9.8	97.3	7.5	126.8	5.3	154.1	129.9	5.9	598.0
1965	101.3	33.1	18.4	115.5	7.1	129.5	13.5	84.3	86.0	0.4	589.1
1982	88.4	5.2	8.9	73.8	0.0	125.3	7.4	132.9	139.7	3.9	585.6
1967	75.9	18.7	8.1	119.8	11.3	174.2	12.5	75.1	81.4	2.8	579.8
1989	78.2	3.1	12.7	70.7	0.5	154.4	15.2	169.9	73.4	1.1	579.2
1979	108.2	27.2	28.6	87.9	0.0	56.6	1.4	144.1	95.6	18.5	568.1
1960	75.4	20.4	1.7	118.2	1.9	44.0	0.3	111.9	159.0	29.8	562.5
1975	82.9	15.8	18.5	102.1	0.1	87.4	5.2	131.0	112.2	0.9	556.1
1945	94.4	12.3	12.7	84.3	9.6	132.4	3.2	63.9	127.3	13.0	553.0
1977	94.9	22.6	16.0	116.9	1.2	46.0	0.6	95.0	140.9	8.6	542.6
1990	81.9	22.6	7.1	84.9	1.2	36.2	0.7	125.2	153.3	19.3	532.4
1966	0.0	1.9	4.5	59.4	0.0	42.7	11.8	169.6	181.1	17.5	488.6
1950	43.7	16.5	6.0	78.2	1.9	64.3	0.2	114.7	128.2	12.8	466.4
1962	54.3	15.5	0.1	98.6	0.0	102.5	16.6	69.0	93.2	10.7	460.4
1969	53.7	14.9	8.8	72.3	0.0	83.1	4.9	127.4	83.8	1.9	450.8
1947	34.0	14.7	20.2	88.4	0.0	83.9	6.0	114.7	78.2	10.7	450.7
1958	78.8	6.2	20.4	96.5	2.1	27.5	0.0	36.0	136.5	27.2	431.2
1949	100.0	18.2	22.2	44.2	1.0	19.3	0.0	43.0	95.9	7.8	351.6
1972	19.5	2.3	0.7	14.5	0.0	42.6	0.0	112.5	127.5	11.1	330.8
1970	24.6	1.3	0.0	52.7	0.0	11.8	0.0	114.6	124.1	0.2	329.3
1974	0.0	0.0	0.0	0.0	0.0	0.0	0.0	109.2	173.0	14.0	296.2
1988	13.5	0.9	0.0	19.4	0.0	36.1	0.0	120.8	104.7	0.0	295.3
1951	46.2	13.7	15.4	63.1	0.3	66.7	3.5	45.6	35.2	0.0	289.7
1980	120.4	6.8	2.2	9.1	0.0	0.3	0.0	0.0	131.2	9.8	279.9
1952	13.8	1.4	0.0	20.3	0.0	8.6	0.0	74.7	131.4	26.0	276.3
1971	27.9	3.8	2.1	46.2	0.0	18.8	0.0	0.0	100.6	7.4	206.8
1985	0.0	0.0	0.0	3.2	0.0	20.7	0.0	86.6	80.6	0.0	191.1
1986	8.7	2.0	5.1	25.2	0.0	0.1	0.0	67.7	8.8	0.0	117.6
1987	0.0	0.0	0.0	57.0	0.0	0.2	0.0	1.5	47.5	0.0	106.2
1983	71.5	0.0	0.0	17.1	0.0	0.1	0.0	0.0	0.0	0.0	88.7
1984	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.6	0.0	83.5
1973	13.9	0.6	0.0	12.0	0.0	0.0	0.0	0.0	26.2	0.0	52.6
Mean Shortage	59.2	10.9	8.7	64.9	1.9	55.6	3.5	91.3	111.2	9.9	417.0

Wet and Average years measured against Average Instream Flow Recommendation

Dry Years

Period	10/1 - 11/15	11/16 - 1/31	2/1 - 2/14	2/15 - 3/15	3/16 - 3/22	3/23 - 5/10	5/11 - 9/15	9/16 - 9/30	Total
Dry IFR, CFS	1,300	600	1,200	2,250	1,200	1,700	800	600	Annual
Total KAF	118.6	91.6	33.3	129.4	16.7	165.2	203.1	17.9	775.8
1956	99.6	17.3	10.7	65.9	1.3	98.2	199.2	17.9	510.1
1957	117.5	55.9	14.3	91.1	6.4	74.9	100.5	2.2	462.9
1955	79.2	4.0	7.0	42.2	3.2	92.9	167.8	17.9	414.1
1954	86.7	4.0	0.0	37.6	0.9	67.1	151.6	17.9	365.8
1961	68.1	5.5	2.5	61.0	0.0	71.4	113.0	10.4	331.8
1991	64.2	6.9	1.1	48.2	0.6	82.8	113.4	6.9	324.3
1964	47.2	3.1	3.2	65.0	0.3	41.7	150.1	8.4	319.0
1981	66.7	0.4	19.0	33.4	1.5	86.1	86.3	3.8	297.3
1959	65.8	13.9	4.7	24.5	0.0	1.8	150.6	11.5	272.7
1946	23.4	5.7	1.5	38.0	0.0	86.1	117.1	0.1	271.9
1953	44.0	0.6	0.0	33.1	0.0	31.8	141.6	17.9	269.0
1992	74.6	0.2	0.0	29.8	0.0	51.6	85.1	13.8	255.1
1963	14.7	0.7	0.0	16.7	0.0	43.8	159.3	1.2	236.4
Mean Shortage	65.5	9.1	4.9	45.1	1.1	63.9	133.5	10.0	333.1

Years were classified as being wet, average, or dry based on annual volume at the Grand Island gage for water years 1943-1992 (33% Wet, 42% Average, and 25% Dry). Each daily flow was compared against the daily flow target, and the sum of calculated shortages is shown for each time period. The only difference between wet and average year Instream Flow Recommendations is the 10/1-11/15 time period. For simplicity, the Wet and Average years are compared against the Average Instream Flow Recommendation.

APPENDIX A-5 (PAGE 1)

"Wet" Instream Flow Recommendation Hydrograph

Month	Begin	End	cfs	# Days	Kaf	Total Kaf	Average cfs
Jan	1	31	1,000	31	61.5		
Jan						61.5	1,000
Feb	1	14	1,800	14	50.0		
Feb	15	28	3,350	14	93.0	143.0	2,575
Mar	1	15	3,350	15	99.7		
Mar	16	22	1,800	7	25.0		
Mar	23	31	2,400	9	42.8	167.5	2,724
Apr	1	30	2,400	30	142.8		
Apr						142.8	2,400
May	1	10	2,400	10	47.6		
May	11	19	1,200	9	21.4		
May	20	26	4,900	7	68.0		
May	27	31	3,400	5	33.7	170.8	2,777
Jun	1	20	3,400	20	134.9		
Jun	21	30	1,200	10	23.8	158.7	2,667
Jul	1	31	1,200	31	73.8		
Jul						73.8	1,200
Aug	1	31	1,200	31	73.8		
Aug						73.8	1,200
Sep	1	15	1,200	15	35.7		
Sep	16	30	1,000	15	29.8	65.5	1,100
Oct	1	31	2,400	31	147.6		
Oct						147.6	2,400
Nov	1	15	2,400	15	71.4		
Nov	16	30	1,000	15	29.8	101.2	1,700
Dec	1	31	1,000	31	61.5		
Dec						61.5	1,000
Total Kaf						1,367.5	

"Average" Instream Flow Recommendation Hydrograph

Month	Begin	End	cfs	# Days	Kaf	Total Kaf	Average cfs
Jan	1	31	1,000	31	61.5		
Jan						61.5	1,000
Feb	1	14	1,800	14	50.0		
Feb	15	28	3,350	14	93.0	143.0	2,575
Mar	1	15	3,350	15	99.7		
Mar	16	22	1,800	7	25.0		
Mar	23	31	2,400	9	42.8	167.5	2,724
Apr	1	30	2,400	30	142.8		
Apr						142.8	2,400
May	1	10	2,400	10	47.6		
May	11	19	1,200	9	21.4		
May	20	31	3,400	12	80.9	150.0	2,439
Jun	1	20	3,400	20	134.9		
Jun	21	30	1,200	10	23.8	158.7	2,667
Jul	1	31	1,200	31	73.8		
Jul						73.8	1,200
Aug	1	31	1,200	31	73.8		
Aug						73.8	1,200
Sep	1	15	1,200	15	35.7		
Sep	16	30	1,000	15	29.8	65.5	1,100
Oct	1	31	1,800	31	110.7		
Oct						110.7	1,800
Nov	1	15	1,800	15	53.6		
Nov	16	30	1,000	15	29.8	83.3	1,400
Dec	1	31	1,000	31	61.5		
Dec						61.5	1,000
Total Kaf						1,291.9	

APPENDIX A-5 (PAGE 2)

"Dry" Instream Flow Recommendation Hydrograph

Month	Begin	End	cfs	# Days	Kaf	Total Kaf	Average cfs
Jan	1	31	600	31	36.9		
Jan						36.9	600
Feb	1	14	1,200	14	33.3		
Feb	15	28	2,250	14	62.5	95.8	1,725
Mar	1	15	2,250	15	66.9		
Mar	16	22	1,200	7	16.7		
Mar	23	31	1,700	9	30.3	114.0	1,853
Apr	1	30	1,700	30	101.2		
Apr						101.2	1,700
May	1	10	1,700	10	33.7		
May	11	31	800	21	33.3	67.0	1,090
Jun	1	30	800	30	47.6		
Jun						47.6	800
Jul	1	31	800	31	49.2		
Jul						49.2	800
Aug	1	31	800	31	49.2		
Aug						49.2	800
Sep	1	15	800	15	23.8		
Sep	16	30	600	15	17.9	41.7	700
Oct	1	31	1,300	31	79.9		
Oct						79.9	1,300
Nov	1	15	1,300	15	38.7		
Nov	16	30	600	15	17.9	56.5	950
Dec	1	31	600	31	36.9		
Dec						36.9	600
Total Kaf						775.8	

APPENDIX B

8-10-2005

FWS' Use of the Central Platte Opstudy Model in Computing Reductions in Shortages to Target Flows

1. Purpose

This document describes the Central Platte River OPSTUDY Model and its use by FWS in evaluating Program water projects during:

- 1.1) NEPA and ESA evaluations of planned First Increment Program Water Plan projects and the calculated reductions in shortage to target flows prior to Program implementation,
- 1.2) Evaluations during the First Increment of substituted, altered, or new Program Water Plan projects to assess the credit towards the Program's First Increment objective of 130,000 to 150,000 af/yr of average shortage reduction to target flows,
- 1.3) Annual review of Program water project operations relative to project descriptions and operating plans during the first Program increment, and
- 1.4) Evaluation of completed Program Water Plan projects near the end of the First Increment and calculating the reductions in shortage to target flows achieved during the First Increment.

ESA compliance is discussed in the Milestones Document, and steps 1.1-1.3 above are applicable to using Opstudy for purposes of measuring whether First Increment objectives are being attained. Step 1.4 is not ESA compliance, but a NEPA/ESA activity for a second Program increment.

2. Central Platte River OPSTUDY Model

The Central Platte River OPSTUDY Model (CPR Model) was developed by the U.S. Bureau of Reclamation (BOR) and the U.S. Fish and Wildlife Service (FWS) as a tool for evaluating management alternatives affecting flows in the central Platte River in Nebraska. The model provides an accounting of water in the river system beginning around Lewellen, Nebraska (on the North Platte River) and at Julesburg, Colorado (on the South Platte River), continuing downstream to Duncan, Nebraska. The modeled region includes the entire "Big Bend" reach of the Platte River and also estimates flow changes at Louisville, Nebraska. Other models used for the South Platte River and North Platte River systems upstream of the CPR Model are described in BOR, 1997 and Hydrosphere, 2001. Program water provided by projects located upstream of the CPR Model is supplied as one of the input items to the CPR Model.

The CPR Model is a water accounting model for tracking gains, losses, diversions from and accretions to the central Platte River system. The model allows assessment of a wide variety of water management scenarios on a monthly time step and simulates river conditions based on inflows to, outflows from, and demands on the river system. For example, various strategies for the storage and release of water by reservoirs, recharge to and return flow from alluvial aquifers, and the use, conservation, and routing of irrigation waters diverted from the Platte River system may be assessed. The CPR Model allows alternatives to be compared in terms of estimated river flows, power generation, irrigation diversions, reservoir storage and release, return flows, losses associated with evaporation and seepage, and other measures. Model comparisons are made by simulating the effects of the proposed alternative(s) on stream flows and diversions in the central Platte River

system assuming that the climatic conditions occurring in 1947 through 1994 are replicated for the modeled scenario.

The CPR model, in its current form, is *not* designed to:

- Forecast flows or river operations for any specific period in the future; nor
- Function as a detailed water rights model.

2.1 Calibration and Validation of the CPR Model

Calibration and validation of the CPR Model was performed by comparing monthly time-step model output to a recent historical period of record. The time period of 1975 through 1994 was chosen because few major water resource development activities nor significant changes in management procedures occurred in the Platte River basin upstream of Grand Island, Nebraska, during this time. This twenty-year period was further broken down into a 1985-1994 calibration period and a 1975-1984 validation period. A detailed discussion of the calibration/validation assumptions, procedures, and results are provided in a report generated by the Platte River EIS Office (2002a).

2.2 Present Conditions

A “Present Condition” or “Reference Condition” modeling scenario was defined for purposes of comparing the results of various model runs against a standardized baseline. The Present Condition scenario is intended to reflect present-day (pre-Program) operating criteria and demands on the central Platte River system, applied as if those same demands and projects had existed throughout the 1947-1994 modeling period. For example, the Present Condition scenario assumes that the NPPD and CNPPID facilities on the river system are operated during the 1947 - 1994 model period in a similar manner as practiced prior to the 1998 FERC relicensing (PREISO, 2003).

Ideally, July 1, 1997 is considered the “baseline date” for Present Conditions. However, because many river system facilities and operations are implemented gradually over a long period of time, it may be more realistic to think of the “baseline date” as being the general time frame of the mid- to late-1990s, and prior to establishment of the Environmental Account and the 1998 FERC license conditions for projects 1417 and 1835 (CNPPID and NPPD, respectively).

2.3 Program Water Operations

The Program, and other EIS alternatives, are included in the CPR Model based primarily on project descriptions provided in Program documents and by project proponents during the NEPA and ESA reviews. A description of Program Water Plan projects operations and Environmental Account releases is found in the Program Document, and in particular the Water Plan (Program Attachment 5). Examples of project description materials include Tamarack I descriptions and spreadsheets (Program Attachment 5, Section 3), discretionary power release descriptions from CNPPID/NPPD (Program Attachment 5, Section 11 Appendix C), and Wyoming’s description of Pathfinder Modification Project (Program Attachment 5, Section 4).

2.4 CPR Model Documentation

Documentation of the Central Platte OPSTUDY Model may be found in Central Platte River OPSTUDY8 Model, Technical Documentation and Users Guide, Platte River EIS Office, Working Document: latest draft dated February 6, 2002.

3. Calculating Reductions in Shortage to Target Flows

For Program purposes, various river management alternatives are evaluated and compared, in part, by determining the extent to which they contribute toward reductions in shortages to target flows in the central Platte River. The same application of the CPR Model is used for calculating shortage reductions in both future projections (modeling proposed/anticipated activities) and for past activities (evaluating projects implemented). Because the CPR Model is a monthly hydrologic model, any daily flow targets used must be expressed on a monthly basis. Appendix A-5 of Program Attachment 5, Section 11 shows the wet, average, and dry target flows expressed on a weighted monthly basis for purposes of calculating reductions in shortage to target flows using the CPR Model.

Analysis of reductions in shortage to target flows uses monthly modeled water project operations over a long term period of record (such as 1947 - 1994) and compares the resulting frequency of target flows relative to the “Present Condition” model run. The basic steps include:

- 3.1) CPR Model flow values at Grand Island for each month are sorted from highest to lowest,
- 3.2) The respective weighted monthly target flow values are subtracted from the model flows (the highest 33 percent of model flows compared against the weighted monthly wet target flow, the lowest 25 percent of model flows compared against the weighted monthly dry target flow, and the remaining 42 percent compared against the weighted monthly normal target flow),
- 3.3) producing either a monthly value of “shortage” or “excess”.
- 3.4) The shortage values for each month are averaged, resulting in 12 average monthly shortage values.
- 3.5) The 12 monthly average shortage values are summed, resulting in one long term average annual reduction in shortage value. The magnitude, frequency, and distribution of flows that are in “excess” of the weighted monthly averages may be calculated in the same manner.

For modeled months when Program-controlled water releases occurred for other Program purposes (such as within channel capacity, short-term channel management “pulses” which may or may not be in excess of the weighted monthly average target flow used in the CPR Model), these are included in the shortage reduction calculations in the CPR Model supporting spreadsheets. Shortage reduction calculations in the CPR Model and supporting spreadsheets are consistent with the Program Document, Section E. Water, which discusses shortage reduction “credit”, environmental account releases, and management of Program water.

The final average annual value of shortage reduction is often referred to as the “score” for the model run, and expresses the total amount (in thousands of acre-feet) by which the modeled scenario reduces the estimated shortage to target flows at Grand Island, Nebraska relative to the estimated “Present Conditions” shortage to target flows on an average annual basis. For example, a score of 50.0 kaf indicates that the modeled scenario reduces the annual average estimated shortage to target flows at Grand Island by 50,000 acre-feet.

4. Milestones Document: ESA Compliance during the First Increment

The Milestones Document (Program Attachment 2) describes how progress toward Program objectives for ESA compliance purposes will be measured during the first Program increment. For

example, Milestone #4 discusses the Water Plan goal of at least 50,000 acre-feet of shortage reduction by the end of the First Increment:

“The combined three state water projects (Pathfinder Modification, Tamarack I, and the Nebraska Environmental Account) were evaluated and determined to provide an average reduction in shortage of 80,000 acre-feet per year. The combined effect of the original three projects and the Reconnaissance-Level Water Action Plan is intended to achieve the Program objective of “improving the occurrence of Platte River flows in the central Platte River associated habitats relative to the present occurrence of species and annual pulse target flows.... by an average of 130,000 to 150,000 acre-feet per year at Grand Island....” (Platte River Recovery Implementation Program, III.A.3.b.(1)). Therefore, the Reconnaissance-Level Water Action Plan is intended to provide an average of at least 50,000 acre-feet per year reduction in shortage in addition to the three state water projects.

As Reconnaissance-Level Water Action Plan projects move forward from the reconnaissance level, to feasibility, to project implementation, the reduction in shortage associated with an individual project will remain as evaluated and agreed upon by the Governance Committee prior to project implementation, so long as the project is implemented in general and reasonable conformance with the project description, and be capable of providing the level of benefit as determined by the Governance Committee. That amount of reduction in shortage for the Reconnaissance-Level Water Action Plan project will be credited towards the completion of Milestone 4, and is not dependent upon annual or day-to-day management decisions made by the Environmental Account Manager or future variations in hydrologic conditions during the First Increment.”

Concepts embodied in the explanatory material above which are relevant to calculating reductions in shortage and reviewing project operations (items 1 through 4 below) include:

- 4.1) Daily project descriptions are incorporated in the monthly CPR Model.
- 4.2) Project credit towards shortage reduction uses the CPR Model and project descriptions simulated over a long term hydrologic record (e.g., 1947-1994 or longer).
- 4.3) The CPR Model does not determine what daily project operations should be, but only reflects the reduction in shortage associated with observed project operations and operating practices implemented over a long term hydrologic record.

5. NEPA and ESA Evaluations of Planned First Increment Program Water Plan Projects and the Calculated Reductions in Shortage to Target Flows Prior to Program Implementation

NEPA and ESA evaluations prior to a Program generally includes the following steps:

- 5.1) Use the calibrated/validated Present Condition CPR OPSTUDY Model run for the 1947-1994 time period, and
- 5.2) Incorporate proposed system changes and proposed project operations based on project descriptions into the CPR Model run, then
- 5.3) Compare flow changes and assess habitat conditions between the proposed alternative and Present Conditions over the long term period (1947-1994).
- 5.4) Estimate the reduction in shortage associated with proposed projects and their operating plans and supporting project descriptions.

5.5) Results may be used as appropriate during NEPA and ESA evaluations, Program negotiations, Governance Committee discussions and approvals, adaptive management, etc.

Project descriptions for the three initial Program projects are primarily contained in Program Attachment 5, Sections 3, 4, and 5 and Section 11 Appendix C. The operations described were included in the CPR Model and the average annual reduction in shortage determined for the 1947-1994 time period.

Based on the project descriptions, the initial Program projects (Pathfinder Modification, Tamarack I, and the Nebraska Environmental Account) were evaluated and determined using the CPR Model during NEPA review to provide an average reduction in shortage of 80,000 acre-feet per year. The shortage reduction assigned to each project individually has not been determined (at this time), and CPR Model results and sensitivity analysis (due to project interactions) may be considered during “fair share” negotiations of the Governance Committee.

Project descriptions for the Reconnaissance-Level Water Action Plan (WAP) projects are contained in Program Attachment 5, Section 6. Project details are also provided in various documents used for analysis during NEPA review. Based on the project descriptions, the combined Reconnaissance-Level Water Action Plan projects were evaluated and determined using the CPR Model during NEPA review to provide an average reduction in shortage of more than 60,000 acre-feet per year. The shortage reduction assigned to each Reconnaissance-Level Water Action Plan Project was initially presented for Governance Committee consideration in September 2000 (EIS Team memo, WAP pages 93-97). The final amount of shortage reduction credited to an implemented Reconnaissance-Level Water Action Plan project is discussed below in item 6.

6. Evaluations During the First Increment of Substituted, Altered, or New Program Water Plan Projects to Assess the Credit Towards the Program’s First Increment Objective of 130,000 to 150,000 af/yr of Average Shortage Reduction to Target Flows.

As Program Water Plan projects move from reconnaissance level to implementation, the determination of reduction in shortage credit generally includes the following steps:

- 6.1) Use the calibrated/validated Present Condition CPR OPSTUDY Model run for the 1947-1994 time period, and
- 6.2) Incorporate proposed system changes and proposed Water Plan project operations based on project descriptions into the CPR Model run, then
- 6.3) Compare flow changes and assess habitat conditions between the Water Plan project (with other Program projects included) and Present Conditions over a long term period (e.g., 1947-1994).
- 6.4) Estimate the reduction in shortage associated with the Water Plan project and the proposed operating plans and supporting project description.
- 6.5) Results may be used as appropriate during Governance Committee discussions and approval of Program projects, “fair share” negotiations, adaptive management decisions, etc.

The final amount of shortage reduction credited to an implemented Water Plan project by the Governance Committee will be determined based on the final scope, scale, operating practices, and modeled shortage reduction at Grand Island using the CPR Model, and may be considered during “fair share” negotiations of the Governance Committee. CPR Model results and other relevant

information may be considered by the Governance Committee in evaluating the acceptability of altered, changed, or substituted Water Plan projects.

7. Annual Review of Program Water Project Operations Relative to Project Descriptions and Operating Plans During the Program First Increment.

The following steps are generally used when evaluating actual Program Water Plan project operations relative to project descriptions upon which the reduction in shortage credit is based:

- 7.1) Use relevant project operation data, stream gage data, and the Program's water tracking and accounting reports and compare with
- 7.2) Project description and operation information subsequently included within the CPR Model to calculate the reduction in shortage credited towards the Program's First Increment objective of 130,000 - 150,000 af of shortage reduction.

Because the modeling assumptions include very simplified representations of ranges of District operations, actual annual operating data are not expected to "match up" with the modeling assumptions. If, however, data on actual operations indicates over time that the "operating assumptions" in the model are unrealistic, the operating assumptions in the model can be updated and the resulting change in scoring of shortage reduction towards the First Increment objective determined. Significant differences between actual operating data over time and operating assumptions which suggest to FWS that the operating assumptions are unrealistic must first be brought to the Governance Committee.

8. Evaluation of Completed Program Plan Projects Near the End of the First Increment and Calculating the Reductions in Shortage to Target Flows Achieved During the First Increment.

The initial three Program water projects are anticipated to be fully implemented by the end of year four of the First Increment (Milestones 1, 2, and 3, Program Attachment 2) and Reconnaissance-Level Water Action Plan projects will be implemented cumulatively throughout the First Increment. The CPR Model can be used to estimate the reduction in shortage associated with a) those Program projects currently in operation only, and b) for the total Program projects (currently operating and planned).

ESA compliance requires that certain reductions in shortages to target flows be achieved, and these will be quantified in terms of the modeled effects of the Program. ESA compliance does not require that these reductions in shortages actually occur under the specific conditions prevailing during the 13-year First Increment. Actual average annual reductions in shortages to target flows during the 13-year period may be greater or lesser than the modeled long-term reductions because of prevailing climatic and hydrologic conditions. During the First Increment, the modeled effects over the long term of 1947-1994 will be used for Program purposes of computing reductions in shortages to target flows.

References

Bureau of Reclamation (BOR), 1997. North Platte River Water Utilization Model Documentation. Bureau of Reclamation Wyoming Area Office, Mills, Wyoming, June 1997.

Hydrosphere Resource Consultants (Hydrosphere), 2001. Technical Appendix: Documentation for the South Platte River EIS Model (SPREISM), April 18, 2001.

Platte River EIS Office (PREISO), 2002a. Calibration/validation of the OpStudy Model.
Lakewood, Colorado, 57 pp.

PREISO, 2003. Hydrology Appendix to the Platte River Recovery Program Draft Environmental
Impact Statement, December 2003.

APPENDIX C

OPSTUDY Assumptions Regarding Water Operations for Diversions at the Keystone Diversion Dam and Central District Supply Canal

The following information was developed by Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD) (collectively the Districts) and the EIS Team to provide reasonable assumptions for hydrologic modeling and analysis of diversions at the Keystone Diversion Dam and Central Diversion Dam to be used for analysis in the EIS and BO.

This attachment describes how the procedures and priorities for storing and releasing water from Lake McConaughy (operations) are simulated for the Program. For the Program, the Districts suggested that the assumptions described below could be used by the EIS Team in the Central Platte OPSTUDY model to represent the range of future diversions at the facilities as part of a Program (Personal Communications, Mike Drain, CNPPID, and Frank Kwapnioski, NPPD, August 1999).

The licenses issued by the Federal Energy Regulatory Commission to the Districts in 1998 provide that certain flows are to be available at diversion structures owned by the Districts (see a description of non-irrigation season releases from Lake McConaughy for diversion at the Keystone Diversion Dam and the Central Diversion Dam, is in Program Attachment 5, Section 5, An Environmental Account for Storage Reservoirs on the Platte River System in Nebraska (EA Document)). In most instances, however, the Districts expect flows at the Central Diversion Dam will be greater than those required in the EA Document. In 1999, in order to make the OPSTUDY modeling more realistic than assuming only the required flows, the Districts assisted the EIS team in developing “Operational Assumptions” for use in OPSTUDY to evaluate the Program. The Districts believe those assumptions are still reasonable for the purpose of modeling, assuming water supply received from the North and South Platte Rivers and other conditions are similar to those in the 48 year study period in OPSTUDY (1947-1994). The Districts’ actual operations, however, will be in accordance with the Districts’ Annual Operating Plan (AOP), and will take into consideration many more factors than could be reflected in the “Operational Assumptions”. Actual flows likely will be greater or lesser than the flows in the “Operational Assumptions” used in OPSTUDY. For example, although specific diversion quantities are specified for modeling purposes for each storage condition, actual flows may be substantially less in years of extreme drought, and substantially greater in years that are closer to the transition between the “dry” and “very dry” ranges². In addition, the severe drought conditions experienced from 2000 to 2005 may result in water supplies and diversions smaller than those assumed in the 1947 to 1994 period of analysis.

Appendix B (FWS’ Use of The Central Platte OPSTUDY Model in Computing Reductions in Shortages to target Flows) describes how Program water project operations are compared to project descriptions in annual reviews during the first Program increment. Because the modeling assumptions are very simplified representations of ranges of District operations, actual annual operating data is not expected to “match up” with the modeling assumptions. If, however, data on actual operations indicates over time that the “operating assumptions” in the model are unrealistic, the operating assumptions in the model can be updated and the resulting change in scoring of

²Note: Storage conditions defined in Attachment 5, Section 5, use classifications of “Very Wet”, “Wet”, “Transitional”, “Dry” and “Very Dry”. Storage Conditions defined in this document use classifications of “Very High”, “High”, “Normal”, “Low”, and “Very Low”. All storage conditions are included in the OPSTUDY model.

shortage reduction towards the First Increment objective determined. Significant differences between actual operating data over time and operating assumptions which suggest to FWS that the operating assumptions are unrealistic must first be brought to the Governance Committee.

OPSTUDY Modeling of Proposed Program Reservoir Operations

Water is often released from Lake McConaughy in excess of the volume needed to satisfy the downstream operating flows described in the EA Document. The size of the release depends on the amount of water requested by a water user holding rights to the water, how much water is available in Lake McConaughy, natural flow availability, system operational requirements, weather and drought conditions to the point of delivery, other demands on the river, the ability to produce power with the water, the need for power, and other factors.

In the Central Platte OPSTUDY model, the amount of water to release depends on the end of September and the end of March storage in Lake McConaughy. The model, beginning in October, determines a release level for the non-irrigation season based on the end of September Lake McConaughy storage. The model then reevaluates the release level based on the end of March Lake McConaughy storage plus the April through July inflow into Lake McConaughy. The model determines whether conditions are very high, high, normal, low, or very low, and also determines whether conditions are very wet, wet, transitional, dry, or very dry. The levels of estimated Lake McConaughy storage and inflow that trigger the various classifications are shown in the table below (see Attachment 5, Section 5, for classifications of “Very Wet”, “Wet”, “Transitional”, “Dry” and “Very Dry”):

Condition	October Estimate (acre-feet).	April Estimate (acre-feet)
Very High	>1,400,000	>2,000,000
High	1,300,000 to 1,400,000	1,600,000 to 2,000,000
Normal	1,000,000 to 1,300,000	1,200,000 to 1,600,000
Low	800,000 to 1,000,000	800,000 to 1,200,000
Very Low	< 800,000	< 800,000

For each of the above conditions, the following modeling assumptions guide releases and deliveries.

Very high conditions

1. Meet the following diversion to Tri-County.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	1600.	2000.	2000.	2200.	2200.	2200.	2200.	2200.	2000.	2000.	2000.	1600.

2. Also, ensure that the flow out of Lake McConaughy never goes below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	0.	0.	0.	2000.	2000.	2000.	2000.	0.	0.	0.	0.	0.

3. Also, ensure that the diversion to the Sutherland Canal never goes below.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	0.	0.	0.	1000.	1000.	1000.	0.	0.	0.	0.	0.	0.

High conditions

1. Meet the following diversion to Tri-County.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	1400.	1800.	1800.	2000.	2000.	2000.	2000.	2000.	2000.	1800.	1800.	1400.

Normal conditions

1. Meet the following diversion to Tri-County.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	1200.	1400.	1400.	1600.	1600.	1600.	1600.	1600.	1600.	1400.	1400.	1200.

Low conditions

1. Meet the following diversion to Tri-County.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	800.	900.	900.	900.	900.	900.	900.	900.	900.	900.	900.	800.

Very low conditions

1. Meet the following diversion to Tri-County.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	700.	700.	700.	700.	700.	700.	700.	700.	700.	700.	700.	700.

APPENDIX D

Determining Real-Time Hydrologic Conditions

The following criteria will define hydrologic conditions in the central Platte River (“wet” vs. “normal” vs. “dry”) for the sake of setting real-time target flows, as the use of these targets is described in other Program documents. These criteria will serve as initial guidelines subject to modification during the First Increment, provided changes are approved by the Governance Committee.

Variables and Weightings to determine the Hydrologic Condition

Characterization Period	Variables and weightings *								Thresholds **	
	Q @ GI	PDSI* **	Mac EOMC	NPlatte Res	Upper SPlatte Res	Q @ Julesburg	NPlatte Snow	Constant Adjustment	Normal	Wet
Dec-Jan-Feb	0.579		0.138	0.317	0.236			- 0.129	0.25	N/A
Mar-Apr	0.120	0.662		0.198				- 0.011	0.25	N/A
May	0.601		0.271		0.031		0.252	- 0.065	0.30	0.70
June	0.648	0.121				0.023	0.082	+ 0.097	0.30	0.70
July	0.237	0.441	0.109	0.105		0.218		- 0.071	0.31	N/A
Aug-Sep			0.404					+ 0.061	0.29	N/A
Oct-Nov	0.658	0.342						- 0.048	0.25	0.67

0.464

* These weightings are applied to these variables expressed as *frequency of non-exceedance* values between 0 and 1. The frequency of non-exceedance is based on the 1947-1994 period of record for the Platte Basin.

** Resulting values of the weighting formula (the range of possible weighted values is approximately 0 to 1) above which basin conditions will be defined as “normal” or “wet”, respectively. Thresholds are somewhat higher in May through September to account

for the censoring of unusually high local precipitation years when developing the weightings. “N/A” indicates that this is not a relevant threshold for this period.

*** The PDSI considered was the average for the preceding month of 4 zones in northeastern Colorado, southeastern Wyoming, and western Nebraska EXCEPT for the Aug-Sep characterization period, for which the PDSI considered was the average for the preceding month of 2 zones in central Nebraska.

Key to Variables

Q @ GI	Previous-month mean streamflow in the Platte River at Grand Island, Nebraska
PDSI	Previous-month mean Palmer Drought Severity Index for four “divisions”: NE #1 and #7, CO #4, and WY #8
Mac	Previous-month EOM content (as percent capacity) at Lake McConaughy
NPlatte Res	Previous-month EOM content of seven upper North Platte Reservoirs (above McConaughy). These reservoirs are: Seminoe, Pathfinder, Glendo, Alcova, Grey Reef, Guernsey, and Kortez
Upper SPlatte Res	Previous-month EOM content of three upper South Platte Reservoirs (above Denver). These reservoirs are: Antero, Eleven-Mile, and Cheesman.
Q @ Jules	Previous-month mean streamflow in the South Platte River at Julesburg, Colorado
NPlatte Snow	April 1 percent-of-normal snowpack as defined by NRCS, North Platte basin in Wyoming

Example Application:

To set the “hydrologic condition” for Oct/Nov, September streamflow and PDSI data are acquired:

1. Streamflow at Grand Island in September was at the 10-percentile level of the 1947-94 September flows (i.e., 0.10 frequency of non-exceedance)
2. The basin-averaged PDSI value in September was at the 20-percentile level of the 1947-1994 distribution of values (i.e., 0.20 frequency of non-exceedance)

Using the weightings in the above table, our equation would be:

$$0.658(0.10) + 0.342(0.20) - 0.048 = 0.086$$

The "thresholds" value defines whether 0.086 corresponds to “dry”, “normal”, or “wet”. Because 0.086 is less than 0.25, conditions would be classified as “dry”.

If both the Grand Island streamflow and the PDSI values in September had been at the 80-percentile level, the equation would be:

$$0.658(0.80) + 0.342(0.80) - 0.048 = 0.752.$$

Because 0.752 is greater than the threshold of 0.67, conditions would be classified as “wet”.

APPENDIX E

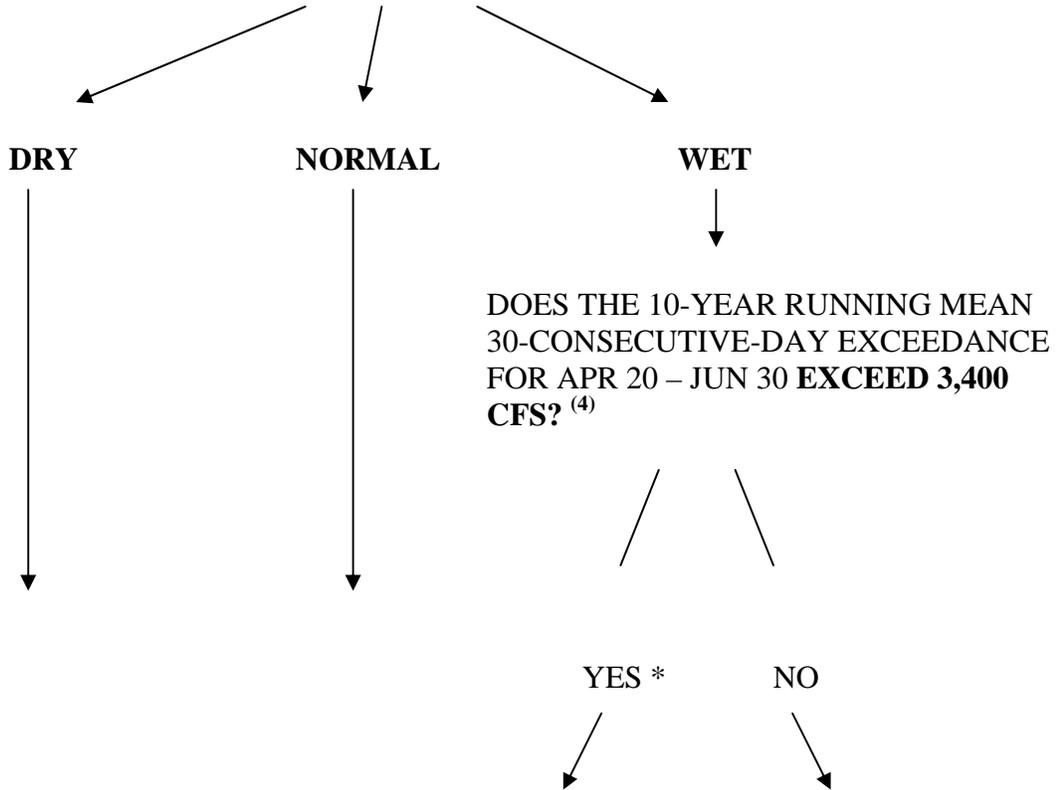
Fixed Daily Target Flows

Period	Condition		
	Wet	Normal	Dry
Jan 1 – Jan 31	1,000	1,000	600
Feb 1 – Feb 14	1,800	1,800	1,200
Feb 15 – Mar 15	3,350	3,350	2,250
Mar 16 – Mar 22	1,800	1,800	1,200
Mar 23 – May 10	2,400	2,400	1,700
May 11 – May 19	1,200	1,200	800
May 20 – June 20	3,700	3,400	800
June 21 – Sept 15	1,200	1,200	800
Sept 16 – Sept 30	1,000	1,000	600
Oct 1 – Nov 15	2,400	1,800	1,300
Nov 16 – Dec 31	1,000	1,000	600

APPENDIX F

“Flexible Daily Values” for May and June ⁽¹⁾

WHAT TYPE-OF-CONDITION IS DECLARED IN APRIL?



Dry-condition species flow targets only apply.
No “annual pulse” targets for this season.

Normal-condition species flow targets + 3,000 cfs “flexible daily values” apply beginning May 1 ⁽²⁾

Wet-condition species flow targets + 3,400 cfs 30-day-mean target apply beginning May 1 ⁽³⁾

1. This scheme assumes that Water Plan projects operating against daily values will not collectively divert/store at a rate greater than currently anticipated in the Plan. If or when Water Plan projects would divert at a greater rate, this scheme might need to be re-visited. This scheme also assumes that EA releases are not included in the total flow basis for the Platte River at Grand Island.

If a Program water element avoids diverting water due to a request from the EA Manager, under conditions when it would otherwise have the opportunity to divert relative to these values, neither that water element nor the Program will be penalized for shortage-to-target-flow reductions that are not achieved because of that request.

2. From May 1 through June 20, the daily target flow will be **3,000 cfs** until this flow has been exceeded for at least **7 out of any 14 consecutive days** (beginning April 20). This means no diversions will be made to Program projects operating against “flexible daily values” if the projected flow at Grand Island is less than 3,000 cfs (with or without diversions), until this flow exceedance is achieved, or until June 21, whichever comes first.
3. From May 1 through June 20, the daily target flow will be **3,400 cfs** until the **30-day running mean** exceeds 3,400 cfs (counting back 30 days beginning May 20). This means no diversions will be made to Program projects operating against “flexible daily values” if the projected flow at Grand Island is less than 3,400 cfs (with or without diversions), until this running mean is achieved, or until June 21, whichever comes first.
4. Calculated by determining the mean daily flow that was exceeded for 30 consecutive days in each of the previous 10 years, beginning on April 20 and ending on June 30. For the period of 1947-1994, this 3,400 cfs 10-year running mean was exceeded going into four years: 1986, 1987, 1988, and 1989.