

**PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM:
ECONOMIC IMPACTS TO THE STATE OF NEBRASKA**

October 2006

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Platte River Recovery Implementation Program Implementation, Economic Impacts to the State of Nebraska

1.0 Introduction

The Platte River originates in the mountains of Colorado and Wyoming and flows through Nebraska to its confluence with the Missouri River. The Platte provides habitat for four species that have been declared threatened and endangered under the Endangered Species Act (ESA) – the whooping crane, piping plover, interior least tern, and pallid sturgeon. Fifty-four miles of the river and adjacent lands in central Nebraska have been designated as critical habitat for the whooping crane. In an effort to address issues associated with these endangered species, the Department of Interior and the states of Colorado, Wyoming, and Nebraska entered into the Three States Cooperative Agreement in 1997 (DOI, 1997)¹ to pursue a basin-wide, cooperative effort to improve and maintain habitat for the target species. The plan developed through this effort is embodied in the Platte River Recovery Implementation Program (Program) (DOI, 2006)². The Secretary of Interior and the Governors of the three states must sign this document before the Program can be initiated. Whether the Program is signed or not signed has economic and other consequences. The purpose of this study was to investigate the potential economic impacts of the Program to the State of Nebraska.

HDR was retained by the Central Platte Natural Resources District of Grand Island, Nebraska to provide an analysis of the economic impacts of the implementation of the Program. HDR enlisted the expertise of Honey Creek Resources and the Flatwater Group to assist in this effort.

The extent of the analysis was expanded and clarified in the initial project workshop to specifically include the following four analyses:

- 1) The economic impact of the first increment of the Program
- 2) The economic impact beyond the first increment of the Program
- 3) The economic impact of not signing the Program
- 4) The implementation costs of the Program.

Because a limited time frame was available to perform the analyses, extensive use of information available in previous documents and economic analyses was essential for timely completion of the assignment. The information used was reviewed and confirmed to the degree possible before being incorporated in this analysis.

A substantial amount of uncertainty is associated with many aspects of Nebraska's implementation responsibilities under the first increment of the Program, and even greater uncertainty is associated with potential subsequent increments or the consequences of not signing the Program. Consequently,

¹ DOI (U.S. Department of the Interior). 1997. Cooperative Agreement for Platte River Research and Other Efforts Relating to the Endangered Species Habitats along the Central Platte River, Nebraska, Signed July 1, 1997, by the Governors of Wyoming, Colorado, and Nebraska, and the Secretary of the Interior.

² DOI (U.S. Department of the Interior). 2006. Platte River Recovery Implementation Program, Final Environmental Impact Statement. Bureau of Reclamation, and U.S. Fish and Wildlife Service, U.S. Department of the Interior. April 2006

a number of assumptions have been made which have varying degrees of significance to the results. The key assumptions and the potential sensitivity of the results are discussed at relevant points in this document. Methodologies and assumptions specific to calculating the results are included in Appendices A through C.

This document provides background on the Program and Nebraska's LB962 that is relevant to these analyses, describes the tool used to link irrigated acres to depletions to the river, describes the methodology used to perform the economic analyses, presents the results of the economic impacts analyses of the four alternatives examined, and discusses implementation costs.

2.0 Cooperative Agreement, Program and Nebraska's New Depletion Plan

The states of Nebraska, Colorado, Wyoming, and the United States Department of the Interior entered into a Cooperative Agreement partnership in July 1997 to address threatened and endangered species issues affecting the Platte River Basin. The two major purposes of the initiative are:

- 1) To develop and implement a Program to improve and conserve habitat for the four endangered species that use the Platte River in Nebraska.
- 2) To enable new and existing water users in the Platte River Basin to proceed without individual separate reviews that would otherwise be required for the four species under the ESA.

The first increment of the proposed Program would span 13 years, and would require cash expenditures through the U.S. Congress and the states of Wyoming and Colorado. Nebraska's participation during the first increment would be limited to in-kind contributions, including land and water, and additional costs associated with offsets to new depletions to target flows initiated since 1997.

A key objective of the Program is the improvement and maintenance of habitat for the target species and other wildlife in the Central and Lower Platte River in Nebraska. Maintaining adequate stream flows is viewed by the U.S. Fish and Wildlife Service (USFWS) as critical to habitat conditions. The USFWS developed recommendations for flows that it believes are needed in the central Platte at different times over the year to support the target species and other wildlife. The primary water goal of the first increment of the Program is to reduce shortages to the USFWS target flows by an average of 130,000 to 150,000 acre-feet per year (AF/yr) over the next 10 to 13 years.

Total shortages to target flows at Grand Island, Nebraska for average and wet years have been estimated by the USFWS to be 417,000 AF/yr using historical data from 1943 to 1992. At other times of the year, excesses to the target flows at Grand Island also exist, and have been estimated by Boyle³ (1999) to be greater than the shortages for wet, average, and dry years for the period 1975 to 1994 (460,000 AF/yr excess versus 351,000 AF/yr shortage). By retiming these excess flows, some portion of the shortage estimate might be mitigated without having to add flows on an annual basis. If target flows were to change during or at the end of the first increment, however, the effectiveness of these retiming flows could be impacted.

³ Boyle Engineering Corporation. 1999. Water Conservation/Supply Reconnaissance Study: Platte River Research Cooperative Agreement, Final Report. Prepared for Governance Committee of the Cooperative Agreement for Platte River Research, by Boyle Engineering Corporation, in association with BBC Research & Consulting, Anderson Consulting Engineers, Lakewood, CO. December 1999.

A portion of this first increment of flow (80,000 AF/yr on an annual average basis) will come from an initial set of water projects from each participating state. These projects are the Pathfinder Modification Project Environmental Account in Wyoming, the Tamarack Project Phase I in Colorado, and the Lake McConaughy Environmental Account in Nebraska.

In addition to these three state projects, a Water Action Plan has been developed for the Program that contains 13 water supply and conservation projects and activities that are intended to supply the remaining 50,000 to 70,000 AF/yr improvement to target flows. In Nebraska, these projects include an off-stream reservoir in the Central Platte region, groundwater management in the Central Platte Groundwater Mound, Dry Creek/Fort Kearney Cutoffs, Dawson and Gothenburg Canal groundwater recharge, and others. Most of the flow improvements associated with these alternatives result from retiming stream flows rather than changing the annual volume in the river.

Further, the Program seeks to ensure that other water-related actions do not limit achievement of target flows. Each state and Federal agencies have developed plans to mitigate or avoid future depletions to the target flows. For Nebraska, the New Depletion Plan (NDP) would be implemented by the Nebraska Department of Natural Resources (NDNR) and up to seven Natural Resource Districts (NRDs) that may have land subject to the plan. Depletions to target flows and “state-protected flows” created by uses of water begun or expanded between July 1, 1997 and December 31, 2005 will be offset in quantity, time, and location. The deadline by which Nebraska should have in place measures to offset depletions would be December 31, 2008⁴. Any additional offset measures that are needed after 2008 because of the lag effect of new groundwater uses begun in that same time period would be put into place by the time the depletions from those new uses occur. The NDP, if approved as part of the Program, would establish methods for reducing or offsetting stream flow depletions created by these new or expanded uses.

Beyond the first increment of the Program, subsequent increments must be agreed to by the Secretary of the Interior and the Governors of the three states, and would be implemented for such periods of time as may be set forth in a replacement or extended Program. The process for evaluation of the first increment and development of a subsequent increment would begin three years prior to the end of the first increment and involve an evaluation of the effectiveness of the first increment, review of goals, objectives, activities, and criteria in addition to the possible development of the second increment.

3.0 LB962

The Program and associated NDP are not the only considerations with respect to reducing stream flow depletions on the Platte River. LB962, enacted in 2004, includes directives to address stream flow depletions to surface water appropriations and water wells constructed in aquifers dependent on recharge from stream flow; to the extent those depletions are due to water use initiated after July 1, 1997. The depletion language in LB962 pertains only to the over appropriated river reaches in Nebraska, defined as the Platte, North Platte, and South Platte surface water basins upstream of the Kearney Canal Diversion near Elm Creek. For the purposes of the OA designation, DNR also established the hydrologically connected area which is defined by a 28/40 line that demarks the boundary within which at least 28 percent of the water pumped and consumptively used becomes a depletion to a stream over a 40-year pumping period. The hydrologically connected area for the over appropriated basin stretches from the borders with Wyoming and Colorado, where the North and South Platte Rivers, respectively, enter Nebraska, to near Elm Creek. The over appropriated area also

⁴ This date could be renegotiated on agreement of the states and the Department of Interior.

includes portions of the Lodgepole Creek and Pumpkin Creek drainage basins (see blue regions in Figure 1).

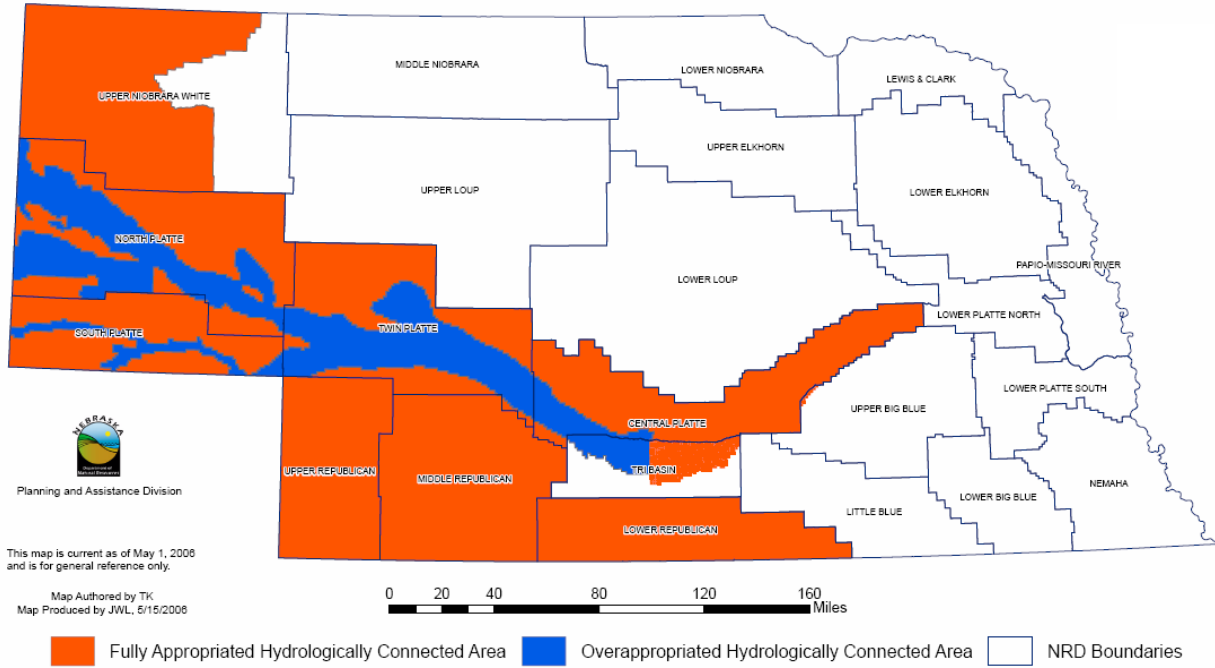


Figure 1: Fully and Over Appropriated Areas in Nebraska

Depending on whether the Program is implemented, Nebraska may either have to comply with the directives of LB962 and the Program (including the NDP), or LB962 and unknown responsibilities established through individual ESA Section 7 consultations with federal agencies. Under the Program, depletions to stream flows from all new uses inside the Platte River Cooperative Hydrology Study (COHYST) modeled area are considered. For the hydrologically connected portion of the over appropriated regions under LB962, total depletions are still a factor, but management activities may be focused within the 28/40 boundaries. It is in part because of this difference in geographical extent that costs may be different depending on whether or not the Program is implemented, despite the overlap in objectives. Actions under the Program will likely require an additional increment of depletion offset beyond those called for under LB962 for the hydrologically connected area.

4.0 Irrigated Acres and Stream Flow Depletions

Throughout evaluations of the Program, the COHYST (Cooperative Hydrology Study) model is used nearly exclusively in determining the magnitude of streamflow depletions and the related irrigated

acres. The model focuses on determining the “when and where new streamflow depletions would occur” by analyzing a 40-year period starting in 1998 (Luckey, 2006).⁵

The Program addresses the needs for the Platte River basin as of 1997, with a first increment recommendation of 10,000 acres of habitat restoration and 130,000 to 150,000 AF of additional annual flow. The Program outlined in the 2006 FEIS includes alternatives to meet these requirements, of which several are discussed above. However, as discussed subsequently, between 1997 and 2006 the total irrigated lands have continued to increase. The application of the COHYST model documented to date has been for addressing the new depletions since 1997 associated with the new irrigated land.

The COHYST model subdivides the basin into six sub areas: Wyoming line to Kingsley Dam, Kingsley Dam to Tri-County Supply Channel diversion, Tri-County Supply Canal diversion to Lexington, Lexington to U.S. Highway 183, U.S. Highway 183 to Chapman, and Chapman to Columbus. These sub areas, shown in Figure 2 below (Luckey, 2006), represent where the analysis evaluated different parameters including the 28/40 line, the 10/50 line, fully appropriated sections, and differing average irrigation requirements.

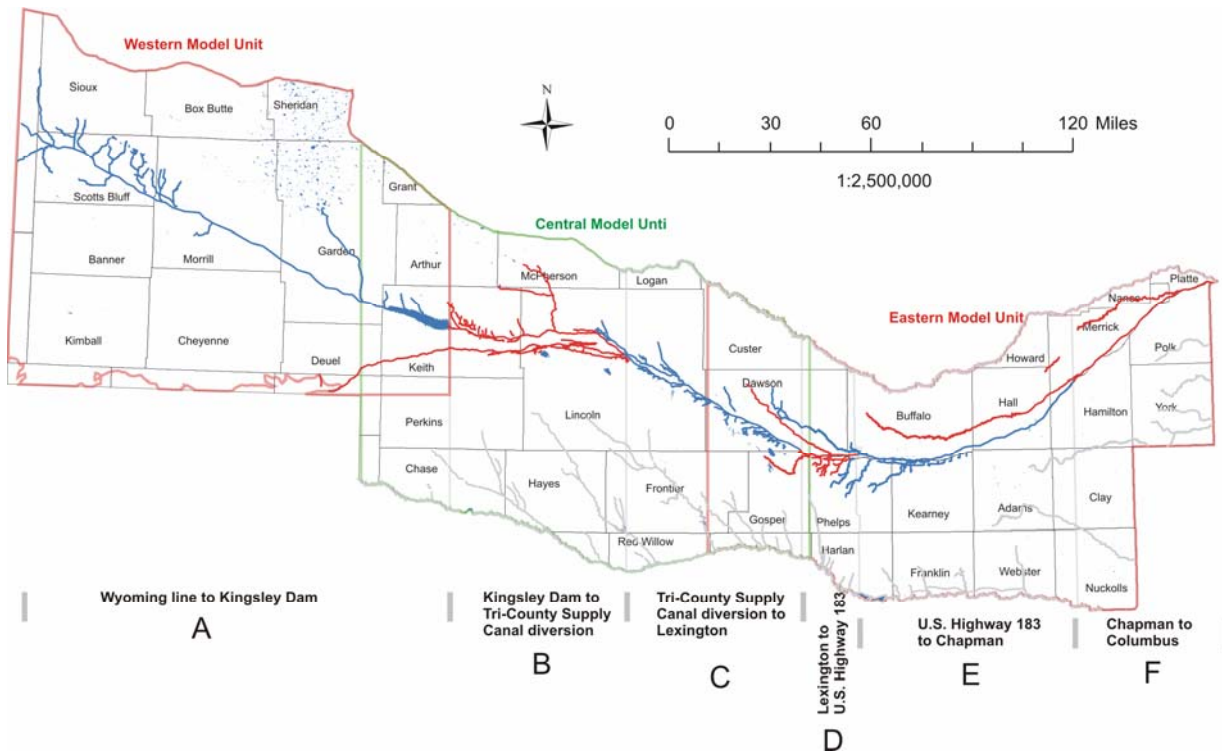


Figure 2: COHYST Model Units

⁵ Luckey, Woodward, and Carney. October, 2006. Estimated Stream Depletion in the Nebraska Platte Basin Due to New Irrigated Land Developed after July 1, 1997. Prepared as a Draft, not for public release, by Richard R. Luckey (High Plains Hydrology, LLC), Duane Woodward (Central Platte Natural Resources District), and Clint P. Carney, (Nebraska Public Power District)

Impacted acreages were determined by translating land-use maps from 1997, 2001, and 2005 (Dappen and Tooze, 2001, 2003, and 2006) into polygons showing irrigated lands, and subtracting between two time periods to determine changes in irrigation application. Between the years where the land use maps were available, the registered well database from Nebraska DNR was used to scale the gained or lost irrigated land. Surface-water irrigation districts were removed from the model, thus refining the model to represent changes in groundwater irrigated lands only. New irrigated acres were classified into three categories (Independently calculated from GIS land-use coverages provided by Central Platte NRD, 2006):

- 508,000 of new irrigated acres throughout the entire COHYST model region
- 415,000 of new irrigated acres within the COHYST model area above Chapman
- 72,000 of new irrigated acres within the combined 28/40 and 10/50 LB962 areas above Chapman.

For the economic impact analyses of the first increment of the Program and the implementation of LB962 in the absence of the Program, the number of acres used was 72,000 acres. This represents the net new lands brought under irrigation since 1997 within the 28/40 and 10/50 lines. The depletions to stream flow resulting from the irrigation of these new lands are the focus of the NDP and LB962. While there are subtle differences between the depletion mitigation requirements of the Program and LB962, the acreages required for each are sufficiently close to justify simply using 72,000 acres for both. The selection of the location of the lands in reality would not have to be exactly that of the newly irrigated lands, allowing the potential that lands closer to the river be selected to stop further depletions and compensate for depletions already incurred.

For the economic impact analyses of the second increment, the objective of the Program would be to provide additional flow to the river to reduce the deficit to target flows. Assuming the total deficit to target flows remains at the estimated 417,000 AF/yr and the first increment of the Program has supplied 150,000 AF/yr, the remaining flow requirement would be 267,000 AF/yr. Assuming that these flows would be provided by retiring land from irrigation to dryland production and a stream flow yield of 0.75 AF for each acre of land retired from irrigation, then approximately 356,000 acres are needed. Not all of the additional flow may need to be provided by Nebraska, and some of the water may be provided by retiming of excesses, rather than adding new flow. Consequently, the required acres were reduced by 5% to approximately 340,000 acres. While LB962 may also have additional depletion mitigation requirements for lands beyond the 28/40 and 10/50 lines, the requirements are highly uncertain at this time, and no further acreage reductions to satisfy LB962 were included.

The approach used in this analysis takes the geographic location of the new irrigated acres as an indicator of the location of acres which could be removed from irrigation. It is assumed that with implementation of the Program, acres may be managed in a way that provides sufficient remedy to mitigate previously incurred as well as on-going depletions.

5.0 Approach to Economic Impact Analysis

Three areas of concern are examined in the economic impact analysis:

1. The near-term adverse economic impacts to groundwater irrigators (on-farm impacts) and the State of Nebraska (off-farm) from converting approximately 72,000 acres of irrigated cropland to dryland crop production. In addition, consideration is given to the impacts of future increments of the Program converting as many as 340,000 additional acres during the period

- 2021 through 2056. These acreages correspond to net increases in irrigated cropland during the period 1997 to 2005 in areas with hydrologic connection to the Platte River.
2. The economic trade-offs associated with either signing or not signing the Program. This analysis involves both quantitative and qualitative components in the estimates not signing.
 3. The implementation cost to the State of Nebraska associated with irrigation land retirement over the period 2007 through 2056.

With modifications to assumptions, the methods used to conduct the analysis and develop initial dollar estimates of economic impacts are similar to those used in related studies by the University of Nebraska and the Bureau of Reclamation. However, this analysis further extends these methods by explicitly incorporating the large uncertainties behind previous estimates.

6.0 Economic Impact of the Program

The estimated impact of the first increment of the Program is the sum of the estimated on-farm impacts plus the estimated off-farm impacts. On-farm impacts are based on the impacts to net farm revenue resulting from converting irrigated production to dryland production. Though forming the basis for on-farm impacts, net revenue changes may not reflect the entire economic loss at the farm level, so additional impacts reflecting premiums to irrigated farmland values and their potential loss are considered in the analysis.

Three regions considered for purposes of estimating on-farm impacts:

- The region from the Wyoming line to Kingsley Dam
- The region from Kingsley Dam to Lexington
- The region from Lexington to Chapman

Off-farm impacts are those indirect and induced multiplier effects that occur as a result of fewer farm inputs being purchased and used, and how these effects work through the economy. The off-farm impacts are assumed to apply to the entire State, although the majority would be felt at the local community level.

There are several modifications in the assumptions used in this analysis versus those used in previous analyses:

- This analysis allows for the possibility that the difference in the value of irrigated farmland and non-irrigated farmland is larger than that assumed in previous studies, and that the difference in value is relatively greater than the water supply's contribution to farm profit.
- This analysis allows for the possibility that indirect and induced impacts of the Program, the off-farm impacts, may be substantially greater than previously indicated. Although there is evidence that off-farm impacts may be minimal "at the margin," there appears to be equal, if not more, evidence that the economic models historically used to measure these impacts and the variables considered to draw these conclusions will understate the actual impact.

A technique called Monte Carlo simulation is used to assess how the uncertainties surrounding the on-farm and off-farm impact estimates may combine to affect the ultimate estimate of total economic impact. Monte Carlo simulation is an increasingly common technique used by resource planning agencies, including the Corps of Engineers, to incorporate the inherent uncertainties in planning for the future. It involves the difficult task of describing the statistical distributions underlying various

critical variables and then using this information, and a large number of sample trials, to look at how various combinations of each affect the result.

Appendix A further describes the assumptions used in this analysis and further discusses the methods used, including the Monte Carlo analysis.

Table 1 presents the expected value of the total economic impact resulting from converting irrigated cropland to dryland production for the first increment of depletion off-sets and beyond. These estimates are termed “expected values,” because they are based on the most probable values for all uncertain variables.

Table 1. Economic Impact of Converting Irrigated Cropland to Non-Irrigated

	Total acreage reduction	Present value of total economic impact, (\$1 mil)
First increment, 2007-56	72,000	\$ 261.06
Additional acres beyond First Increment, 2021-2056	340,000	\$ 295.58
Total impact	412,000	\$ 556.64
Annual equivalent impact		\$ 21.63

The expected value of the first increment’s present value impact is approximately \$261 million in 2006 dollars. For increments beyond the first, the impacts are estimated to be an additional \$296 million, also expressed in 2006 dollars. These two components result in a total present value of \$557 million, with an annual equivalent impact of \$22 million per year.

The Monte Carlo analysis, which incorporates the possibility that several important variables including the difference between irrigated and non-irrigated land values, and off-farm impacts are understated, indicates there is high probability that the total impact estimate of \$557 million is too conservative (i.e. not large enough). Specifically, the Monte Carlo analysis indicates that of all the possible combinations of variables considered:

- There is a 90 percent probability that the actual impact will exceed \$560 million.
- There is a 50 percent probability, a 50-50 chance, that the impact will exceed \$600 million.
- There is a 10 percent probability that the impact will exceed \$660 million.

The total impact estimate is quite sensitive to how much water will be required in increments past the first and when these subsequent programs will be implemented. To test this sensitivity, several alternative assumptions were made regarding how increments past the first will be implemented. The impacts of these alternatives are shown in Table 2.

The timing of increments past the first is critical in determining impacts. The more and the sooner the subsequent increments are implemented, the greater the impact. If the entire second increment and beyond is packed into the single year 2021, impacts would easily exceed \$1 billion.

Table 2. Impact of Alternative Assumptions for Subsequent Increments, 2021-56

	<u>First Increment impact (million)</u>	<u>Second Increment impact (million)</u>	<u>Total potential impact (million)</u>
No Second Increment			
Present value of economic impact	\$261.06	\$0.00	\$261.06
Annual equivalent impact	\$10.15	\$0.00	\$10.15
Approximately 340,000 additional acres are converted to dryland in three equal increments, 2021, 2035, and 2050			
Present value of economic impact	\$261.06	\$295.58	\$556.64
Annual equivalent impact	\$10.15	\$11.49	\$21.63
Approximately 200,000 additional acres are converted to dryland during the period 2021-2056 in a uniform manner			
Present value of economic impact	\$261.06	\$135.99	\$397.05
Annual equivalent impact	\$10.15	\$5.29	\$15.43
Approximately 340,000 additional acres are converted to dryland during period 2021-2056, in a uniform manner			
Present value of economic impact	\$261.06	\$233.20	\$494.26
Annual equivalent impact	\$10.15	\$9.06	\$19.21
Approximately 340,000 additional acres are converted to dryland during the period 2021-2040			
Present value of economic impact	\$261.06	\$351.25	\$612.31
Annual equivalent impact	\$10.15	\$13.65	\$23.80
Approximately 340,000 additional acres are converted to dryland during the period 2021-2030			
Present value of economic impact	\$261.06	\$466.60	\$727.66
Annual equivalent impact	\$10.15	\$18.13	\$28.28

7.0 Economic Impacts of Not Signing the Program

In order to quantitatively and qualitatively describe the impacts of not signing the Program, it is assumed that the following results can be expected:

1. **Agriculture Impacts:** The Panhandle Irrigation District will be required to reduce depletions by 165,000 AF, which will convert approximately 48,000 surface water irrigated acres of cropland to dry cropland.⁶
2. **Federal Energy Regulatory Commission (FERC) Relicensing:** Central Nebraska Public Power and Irrigation District (Central) and Nebraska Public Power District (NPPD) will be required to reopen ESA Section 7 consultation regarding the relicensing of their hydropower plants on the Platte River.
3. **LB962 Compliance:** NRDs will still be responsible for complying with LB962.

⁶ Economic Impact of the Endangered Species Act on the North Platte Valley, prepared by Paul Burgener and Chuck Hibberd. Impacted acres for this analysis was assumed to be 48,000 acres due to a discrepancy in the above mentioned report.

Of the results that can be quantified, as described below, the total present value costs may range from approximately \$420 to \$600 million.

7.1 Agriculture Impacts

Impacts to North Platte Basin agriculture and surface water irrigators if the Program is not signed will be similar in kind as impacts to groundwater irrigators in the Central Platte Basin if the Program is signed. For purposes of this analysis, it is assumed that impacts to surface water irrigators will accrue similarly as those to groundwater impacts; however, there could, in reality, be slight differences in the scale and types of impacts that accrue to surface water irrigators from converting irrigated cropland to dry cropland.

Scotts Bluff and Morrill Counties can expect a first year impact of just over \$294 per acre. After year 10 the impacts diminish to just over \$104 per acre annually. The total present value of on-farm and off-farm impacts is approximately \$179 million, which has an annual equivalent of \$6.95 million.

There are additional off-farm impacts that should be considered resulting from the conversion of irrigated cropland to dry cropland. These considerations include underestimating off-farm impacts resulting from using the IMPLAN model, population losses, employment losses, impacts to communities, impacts to rural financial institutions, and others. Although these impacts are very important and could potentially be detrimental to the local and State economies, they have not been quantitatively estimated in this analysis due to their complexity and the multitude of uncertainties.

7.1.1 Property Tax Impacts

There will be property tax implications from converting irrigated cropland to dry cropland due to the loss of land value (which is caused by the loss in production capacity). There is an estimated average difference in value of \$571 for irrigated cropland over dry cropland, and the average property tax rate for Scotts Bluff and Morrill Counties is 1.8901 percent. By multiplying the number of converted acres (48,000) by the difference in value by the assessment rate (80 percent) and the average tax rate, the annual loss in property taxes can be calculated to be approximately \$414,000.

7.2 FERC Relicensing

If the Program is not signed, Central and NPPD will have to undergo the process of reinitiation of ESA Section 7 consultation related to their hydroelectric plants with the FERC. The costs associated with such reinitiation of consultation between the USFWS and FERC are additionally highly dependent upon the costs associated with the National Environmental Policy Act (NEPA) process, mitigation costs, and other consultation costs to complete the relicensing process. Because there are so many uncertainties surrounding the potential costs of relicensing, a range of potential costs were used for this analysis.

For this analysis, it is assumed that NPPD will include the costs of FERC relicensing with their production costs and that the costs associated with relicensing will be spread over 40 years, the assumed term of the license. For comparison purposes, it is assumed that current production costs remain steady over the next 40 years. The total present value impacts (additional production costs over current production costs) of relicensing range from \$31 million to \$172 million. The potential increase in rates ranges from just over 0.5 percent to about three percent and remain below most of the surrounding states.

7.3 LB962 Compliance

If the Program is not signed, NRDs will still be required to comply with LB962. The economic impacts of complying with LB962 will be similar to those associated with the first increment of the Program, with the exception that LB962 allows for ten years to comply. The acreage affected by the first increment of the Cooperative Agreement are assumed to be the same acres that will be impacted by LB962, consisting of irrigated acres located within the 28/40 and 10/50 lines. The economic impacts associated with LB962 compliance are estimated to be \$173 million, less than that estimated for the Cooperative Agreement because there is a longer period to comply. See Appendix A that describes the methodology and assumptions used to calculate the economic impacts of the first increment of the Program for the methodology and assumptions used.

This analysis assumes that there are no future increments of LB962. LB962 language for over appropriated areas, like the proposed Program, follows an incremental approach. Over appropriated areas will develop goals for the first increment, which will span 10 years. An analysis will be done during the first increment to determine if subsequent increments are needed to achieve fully appropriated conditions. As a result, new goals and new increments for over appropriated areas may be constructed in the future under LB962 beyond the first 10 years to achieve “balanced” conditions in the basin.

7.4 Comparison of Impacts

A comparison of the economic impacts of signing or not signing the Program under the assumptions that LB962 remains in place or is absent is presented the following Tables 3 and 4.

The primary beneficiaries in Nebraska of participating in the Program that are currently identified are the Panhandle irrigators receiving water from Federal water projects and the power interests, CNPPID and NPPD, all benefiting from relief from Section 7 consultation. Without mitigation, costs to offset these benefits primarily accrue to groundwater irrigators in the Platte Basin and connected communities. Groundwater irrigators will still be subject to restrictions from LB962 over the next 10 years whether the Program is implemented or not. The State may opt to fully or partially reimburse the affected groundwater irrigators in order to mitigate these impacts; however, some costs, collectively known as off-farm impacts, cannot be reimbursed.

Table 3. Comparison of Impacts of Signing the Program against Not Signing, Assuming LB962 Remains in Place

	Impacts of Signing	Impacts of Not Signing
First increment (2007-2020)		
Potential impacts to Platte basin groundwater irrigators and secondary impacts to remainder of State of Nebraska	\$261 million, with a high probability of exceeding this	See compliance with LB962
Potential impacts to Panhandle irrigators reflecting loss in acres due to Section 7 consultation	None	Estimated to \$179 million, but likely to be much higher; a 50% probability that it will be at least \$192 million
Potential increases in process and mitigation costs to CNPPID and NPPD associated with re-initiation of Section 7 consultation related to FERC re-licensing.	None	Uncertain, but estimated to range from \$30 million to \$175 million; midrange of approximately \$68 million
Compliance with LB962	Consistent with signature	\$173 million; same acreage as first increment but with 10-year implementation period.
Additional costs associated with other Federal programs		Unknown and highly speculative
Subtotal of potential impacts, 2007-2020	\$261 million, although likely to be higher	\$420 million with high likelihood of impacts being higher
Subsequent increments (2021-2056)		
Potential impacts to Platte basin groundwater irrigators and secondary impacts to remainder of State of Nebraska	Due to additional need for depletion off-sets, additional impact is estimated to be \$296 million, but could vary from \$136 to \$467 million, depending on time frame of implementation	
Total (2007-2056)		
Total potential impacts	\$557 million, but will likely be higher	\$420 million, but will likely be higher

Table 4. Comparison of Impacts of Signing the Program Against Not Signing, Assuming the Absence of LB962

	Impacts of Signing	Impacts of Not Signing
First increment (2007-2020)		
Potential impacts to Platte basin groundwater irrigators and secondary impacts to remainder of State of Nebraska	\$261 million with a high probability of exceeding this level	
Potential impacts to Panhandle irrigators reflecting loss in acres due to Section 7 consultation	None	Estimated to \$179 million, but likely to be much higher; a 50% probability that it will be at least \$192 million
Potential increases in process and mitigation costs to CNPPID and NPPD associated with re-opening FERC re-licensing.	None	Uncertain, but estimated to range from \$30 million to \$175 million; midrange of approximately \$68 million
Compliance with LB962	Consistent with signature	Assumed to be absent
Additional costs associated with other Federal programs		Unknown and highly speculative
Subtotal of potential impacts, 2007-2020	\$261 million, although likely to be higher	\$247 million with high likelihood of impacts being higher
Subsequent increments (2021-2056)		
Potential impacts to Platte basin groundwater irrigators and secondary impacts to remainder of State of Nebraska	Due to additional need for depletion off-sets, additional impact is estimated to be \$296 million, but could vary from \$136 to \$467 million, depending on time frame of implementation	
Total (2007-2056)		
Total potential impacts	\$557 million, but with high probability it will exceed this amount	\$247 million, but with a high probability it will exceed this amount

8.0 Implementation Costs

This section develops a range of potential costs to implement a plan to convert groundwater irrigated acreage to dryland production. It is important to note the difference between implementation cost and economic impact. Economic impacts are estimates of welfare changes to participants which include both on-farm and off-farm impacts. Implementation costs are the estimated expenses borne by the regulatory agency in making the plan operational. Although there is an intuitive link between impacts and costs, they are not equal. For this analysis, economic impacts will be higher because off-farm impacts are not considered in implementation costs.

A program to reduce irrigated acreage can be mandatory or voluntary. A mandatory program will likely be less expensive to administer than a voluntary program because the regulatory agency can set the terms. A voluntary program will tend to be more expensive to administer because participants may seek a premium above foregone income or current market value to participate. Further, the longer-term the voluntary program, the more likely irrigators will be required to forego irrigation.

The right to irrigate can either be leased or purchased. It is assumed that a lease would involve annual payments to landowners over the course of the analysis period, 2007-56. A purchase would involve an up-front payment to the landowner.

Despite being potentially less expensive, a mandatory program would likely meet resistance from targeted participants. A voluntary program, with willing sellers, would be favored because there is potential for participants to get better terms. Therefore, from a regulators' perspective, there is a likely trade-off between a less expensive, unpopular program and a considerably more expensive, more acceptable program.

8.1 Mandatory Program

For purposes of this analysis, it is assumed that compensation for a mandatory program will be on the basis of foregone net income, in the case of an annual lease, or on the basis of the difference in the market value between irrigated land and dryland cropland, in the case of an up-front payment.

8.2 Voluntary Program

Compensation under a voluntary program is based on market forces and "whatever price it takes" to meet the depletion offset goals. Exactly how much more than a mandatory program this may cost is uncertain and would depend on the term length, irrigators' expectations about future returns to irrigation, how the leases or purchases are distributed through the basin, and a range of other uncertainties.

For purposes of this analysis, it is assumed that a premium of 50 percent will be required on a voluntary lease option and a premium of 100 percent of market value will be required for an upfront purchase of the right to irrigate. The premium estimate for leased acreage is taken from the Supalla study,⁷ but the premium for the purchase of the irrigation right is based on recent experiences in New Mexico's Pecos River basin, discussed below.

⁷ Supalla, Ray, Tom Buell, and Brian McMullen, "Economic and State Budget Cost of Reducing the Consumptive Use of Irrigation Water in the Platte and Republican Basin." Department of Agricultural Economics, University of Nebraska, Lincoln. August 7, 2006.

8.3 The Pecos River Experience

A recent example of reducing stream depletions through retirement of irrigated land and conversion to dryland is in the Pecos River basin of New Mexico. Due to interstate compact obligation to Texas, New Mexico is required to restore flows in the Pecos River to levels experienced in the late 1930's. It was concluded that a reduction in irrigated acreage would be one of the measures needed to achieve this. The amount of acreage needed is 18,000 acres or approximately 12 percent of the total irrigated acreage in the affected portion of the basin. The State of New Mexico is currently implementing a voluntary purchase of land and water rights there over a period of 2 to 3 years, currently ongoing. Approximately one-half of the purchases were targeted at appropriate surface water irrigators and the other half at groundwater irrigators.

Due to much higher than anticipated administrative costs associated with acquiring the land and appropriate water rights, and significant impacts to local irrigated land values attributable to the State's presence in the market, the anticipated costs of program implementation will exceed \$100 million, an order of magnitude greater than originally estimated⁸. Irrigated land prices have more than doubled over the last 2 years in the basin, mostly attributable to the program.

New Mexico's situation is not fully comparable to the issue here due to more complex appropriate water rights and land purchases than may be involved in Nebraska, and the amount of land needed is a much smaller percentage of the total irrigated land base. However, the large, unanticipated increase in implementation costs and the warnings offered by individuals involved in the actual implementation cannot be ignored.

8.4 Potential Implementation Costs of the First Increment of Offsets

Four scenarios were examined to bracket the range of possible implementation costs of converting approximately 72,000 acres of cropland from irrigated to dryland. This involved mandatory v. voluntary participation, and whether the right to irrigate would be acquired through lease or up-front purchase. Initial costs and annual costs are considered. Under the lease scenarios, these costs are the same. With the up-front purchase scenarios, it is assumed that the entity financing the purchase would have to use debt financing to cover the initial cost.

Table 5 summarizes the first year and subsequent annual costs for each of these scenarios. Based on the assumptions above, annual cost for implementation will likely be in the range of \$5 million to \$10 million per year.

As previously indicated, and by assumption, a mandatory program is less expensive to administer. It is also apparent that a lease program is more expensive than a purchase program because the annual payments continue in perpetuity. However, a lease program does not have as great of impact on cash flow since the large up-front payment is not required. Whether an entity would use debt financing to purchase these irrigation rights is uncertain, possibly preferring to self-finance for the purchase by paying irrigators in periodic installments over a period.

⁸ Personal communication with James Brockmann, October 19, 2006 and Len Stokes, October 20, 2006. Mr. Brockmann and Mr. Stokes are with the firm Stein & Brockman, working in the interest of the State of New Mexico in implementing the voluntary program.

8.5 Potential Implementation Costs of a Second Increment

It is assumed that the second increment will involve withdrawing approximately 340,000 acres from irrigation in three equal blocks, implemented in years 2021, 2035, and 2050. The same four implementation scenarios are considered, summarized in Table 5. The costs are discounted to 2020 to reflect the “bill” the State may be faced with in this year.⁹

Although involving about four times the acreage as the first increment, the costs do not increase proportionately because the expenditures are relatively far into the future and subsequently discounted to account for the time value of money. However, it should be noted that if the assumed second increment is implemented before 2021, or if the purchaser delays dealing with this cost for a period, cash outlays for the water rights purchase options would be far greater. Overall, the implementation costs for the second increment range from \$10 million per year to about \$23 million per year.

The sum of costs to implement the first increment and second increment together, in 2006 dollars, is estimated to range from \$25 million to \$65 million per year.

Table 5. Range of Potential Implementation Costs

	Mandatory program		Voluntary program	
	Annual lease program	Permanent buy-out of irrigation right	Annual lease program	Permanent buy-out of irrigation right
	Compensation is based upon on-farm impacts (million) /1	Compensation is based on difference in market value between irrigated cropland and non-irrigated cropland (million)	Compensation is based upon "whatever it takes" to meet depletion offset goals (million)	Compensation is based upon "whatever it takes" to meet depletion offset goals (million)
First increment				
Upfront costs	\$ 5.48	\$ 63.23	\$ 8.22	\$ 126.46
Annual cost	\$ 5.48	\$ 5.07 /2	\$ 8.22	\$ 10.15
Subsequent increments, potential costs faced in 2020 /3				
Upfront costs	\$ 19.81	\$ 343.00	\$ 29.71	\$ 686.00
Annual cost	\$ 19.81	\$ 27.52	\$ 29.71	\$ 55.05

/1 All costs are expressed in 2006 dollars.

/2 Annual cost for the up-front options assumes the amount will be financed over 20 years at 5.0% interest.

/3 It is assumed that 340,000 acres will be converted to dryland production in 3 equal installments in 2020, 2035, and 2050.

⁹ It should be noted that, in the economic impact analysis, the impacts of subsequent increments are discounted to 2006 to account for the time value of money and to provide a consistent basis for evaluating alternatives. In reality, and unless the State takes immediate steps to set aside funds for subsequent increments, the costs will be much higher than implied in the impact analysis. Table 5 shows the cost the State would likely face in 2020.

9.0 Summary

To adhere to the ESA, the USFWS will work toward improving and maintaining the Platte River habitat either through the Program or through individual Section 7 consultations. Under LB962, the State of Nebraska has committed to addressing new stream flow depletions incurred after 1997. Consequently, the State of Nebraska will experience economic impacts associated with stream flows in the Platte River whether or not the Program is implemented. There is a significant degree of uncertainty associated with the impacts and consequences of either future. The impacts associated with the first increment of the Program, while not well defined, are better defined than the impacts associated with potential subsequent increments of the Program or the impacts associated with not signing the Program.

The analysis performed in this study has led to the following estimates:

- If the Program is signed, the economic impact to the State of Nebraska will be approximately \$260 million for the first increment primarily associated with conversion of irrigated lands to dryland production under the New Depletion Plan.
- The economic impact of subsequent increments is highly uncertain and could range from an additional \$136 million to an additional \$470 million.
- If the Program is signed and later incorporates subsequent increments, the economic impact to the State of Nebraska are estimated to be an additional \$296 million for a total of \$557 million.
- If the Program is not signed, the economic impacts to the State of Nebraska are highly uncertain. The primary impacts that can be quantified would include dealing with essentially the same depletions dealt with by the Program only under the auspices of LB962, conversion of irrigated surface acres in the panhandle to dryland, and reopening the FERC relicensing for CNPPID and NPPD. The quantifiable impact associated with not signing the Program is estimated to be on the order of \$420 million.
- The implementation costs associated with the first and second increment of the Program are highly dependent on whether a voluntary or mandatory program is undertaken and whether an annual lease or permanent buyout approach is followed. The annual cost of implementation for the first increment will likely be in the range of \$5 to \$10 million per year, and for the second increment of \$20 to \$55 million per year. Beyond year 2020, the total annual costs could range from \$25 to \$65 million per year.

Reduced to their essence, the results of these analyses are stated below.

- If LB962 is implemented, then it appears that the economic consequences of not signing would far greater than that of signing for the first increment of the Program.
- If subsequent increments of the Program are implemented it appears that the economic consequences of not signing would be far less than that of signing.
- In the absence of LB962, the quantified impacts of not signing the agreement are comparable to the impact of signing for the first increment.

- When considering a possible second increment of the Program, it is difficult to quantify the economic impacts, but the State gains a measure of control of how, or if, a second increment is implemented. However, the potential economic impacts of a second increment could range from less than to more than double that of the first increment.
- In all scenarios, there are economic impacts that have not been calculated and are surrounded by high levels of uncertainty. The unknowns and uncertainties are greater for the second increment and for not signing the Program, than those associated with signing the first increment.
- The primary beneficiaries in Nebraska of participating in the Program that can be identified currently are the Panhandle irrigators receiving water from Federal water projects and the power interests, CNPPID and NPPD, all benefiting from relief from Section 7 consultation. Without mitigation, costs to offset these benefits primarily accrue to groundwater irrigators in the Platte Basin and connected communities. Groundwater irrigators will still be subject to restrictions from LB962 over the next 10 years whether or not the Program is implemented. The State may opt to fully or partially reimburse the affected groundwater irrigators to mitigate these impacts; however, some costs, collectively known as off-farm impacts, cannot be reimbursed.