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## Final Report

# The Economic Impact of the South Platte NRD's Integrated Management Plan and Districtwide Ground Water Management Area Rules and Regulations

Prepared for the South Platte Natural Resources District

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## **Executive Summary**

The South Platte Natural Resources District recently adopted an Integrated Management Plan and revised its Districtwide Ground Water Management Area Rules and Regulations. These steps were taken in response to a requirement by the State of Nebraska to address areas within the South Platte NRD (and throughout the state) in overappropriated status and to help the State of Nebraska to stay in compliance with relevant interstate compacts. The Integrated Management Plan and changes to Districtwide Ground Water Management Area Rules and Regulations include plans to reduce allocations for water use and voluntary, incentive based programs to convert irrigated acres to dryland, grassland, or wildlife habitat acres. The plans will impact agricultural production in the region. These steps naturally also have implications for the larger District economy.

In our analysis, we focus on efforts in the first 10 year increment to mitigate stream depletions due to additions to ground water irrigated acres after July 1997. We do not go further and consider other potential steps that may be required in order to bring and maintain overappropriated areas within the South Platte NRD back to fully appropriated levels. This is because there is still substantial uncertainty about the additional requirements to meet fully appropriated status. Further, the reduced ground water allocations in changes to the Districtwide Ground Water Management Area Rules and Regulations could significantly aid in efforts to move areas back to fully appropriated status.

This report specifically assesses the economic impact of 1) steps required to offset an average annual depletion rate of 150 acre-feet to the North Platte River, 400 acre-feet to the South Platte River and 150 acre-feet to the Lodgepole Creek for the period 2043-2048 by reversing additions to irrigated acres in overappropriated areas of the South Platte NRD after July 1997 and 2) plans in the revised Districtwide Ground Water Management Area Rules and Regulation to reduce the allocation in selected subareas of the District. The estimated gross economic impact both on-farm and off-farm in the District is a \$1,710,000 reduction in annual economic activity (business receipts). This impact includes a \$349,000 loss in annual labor income, and a loss of 19 jobs. Such

economic losses also imply a modest reduction in current agricultural property values in the District.

These impacts, however, are only a modest portion of the District economy. Further, factors such as improved stream flow can preserve and improve recreation opportunities in the District. Such recreation opportunities also have a significant positive economic impact on the District economy. The Oliver Reservoir State Recreation Area is an example of an important recreation amenity that could be impacted by water usage in the District.

## Table of Contents

Executive Summary .....	i
I. Introduction.....	1
II. Gross Economic Impact from the Integrated Management Plan and Changes to Districtwide Ground Water Management Area Rules and Regulations.....	2
A. Forward Linkages.....	8
B. Change in Property Values.....	10
C. Overall Economic Impact and Discussion.....	12
III. Recreation Activity: The Example of Oliver Reservoir State Recreation Area.....	14
IV. Summary.....	15
References.....	16

## List of Tables and Figures

### Tables

Table 1: Irrigated and Non-Irrigated Acres in 2008 in the South Platte NRD .....	3
Table 2: Irrigated Annual Change in Crop Production and Sales.....	5
Table 3: Range of Cumulative Inches Pumped 2007 to 2009.....	6
Table 4: Annual Change in Crop Sales and the Resulting Economic Impact.....	8
Table 5: Change in Property Value and Annual Tax Revenue .....	10
Table 6: Annual Economic Impact from Change in Property Tax Revenue and Forward Linked Industries.....	12
Table 7: Overall Gross Annual Economic Impact with Plan, Rules, and Regulations...	12
Table 8: Percentage Loss in the South Platte NRD.....	13

### Figures

Figure 1: Backward and Forward Linked Industries for Corn Production.....	9
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## **I. Introduction**

The South Platte Natural Resources District recently adopted an Integrated Management Plan and revised its Districtwide Ground Water Management Area Rules and Regulations. The changes include metering irrigation water use for allocations and voluntary, incentive based programs to convert irrigated acres to dryland, grassland or wildlife habitat acres. The plans will impact agricultural production in the region. Further, due to the link between agriculture and the rest of the District economy, businesses and citizens of all kinds may be interested in the impact of the plan, rules, and regulations on the economy. Such concerns can be particularly large in regions that have experienced slow growth or an outright loss of population, particularly given recent research showing substantial potential for growth in both the agriculture and tourism sectors in rural Nebraska (Thompson et al, 2007).<sup>1</sup>

In light of these potential impacts, the South Platte NRD asked the University of Nebraska-Lincoln Bureau of Business Research (BBR) to develop an estimate of the economic impact of the Integrated Management Plan and Districtwide Ground Water Management Area Rules and Regulations.

The Integrated Management Plan meets District goals to comply with requirements to reduce consumptive use of water to 1997 levels. Revisions to the Districtwide Ground Water Management Area Rules and Regulations include requirements to reduce irrigation allocations in sub-areas within the South Platte NRD. This study estimates the impact of these reductions in irrigation on agricultural output, the economy and property values in the District. However, we also note that the Integrated Management Plan and Districtwide Ground Water Management Area Rules and Regulations also benefit the District economy. The plan, rules, and regulations provide a gradual and cost effective way to comply with state mandated targets for reducing water use. Without a plan, mandated targets might be met in a less cost effective or carefully considered manner. We further note that the Integrated Management Plan also discusses monitoring and potential future steps to move overappropriated areas of

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<sup>1</sup> Thompson, Eric, Ernie Goss, Chris Decker, Cheryl Burkhart-Kriesel, Bruce Johnson, Mariana Saenz, Ben Schmitz, Julian Neira, and Pavel Jeutang, 2007. *Pillars of Growth in the Non-Metropolitan Nebraska Economy*. University of Nebraska Rural Initiative.

the District back to fully appropriated levels. We do not consider the economic impact of potential future steps to meet these longer term goals.

This report is organized as follows. In Section II of the report, we estimate the change in economic activity resulting from the conversion of irrigated acres under the Integrated Management Plan and reduction in irrigation allocations included in the revised Districtwide Ground Water Management Area Rules and Regulations. We consider the reduction in farm yields, sales, income, and jobs, and estimate the overall economic impact in the South Platte Natural Resources District. Section III of the report considers a related issue of economic impact of water-based recreation opportunities in the District. Specifically, reduction in ground water usage will help preserve recreation opportunities in the District. We consider the example of Oliver Reservoir. The key findings of the study are summarized in Section IV, which concludes the study.

## **II. Gross Economic Impact from the Integrated Management Plan and Changes to Districtwide Ground Water Management Area Rules and Regulations**

The South Platte NRD's Integrated Management Plan and changes to the District Wide Ground Water Management Area Rules and Regulations provide a careful, balanced approach to meet goals for limiting irrigation water usage in the District while maintaining agricultural production. The plan, rules, and regulations would reduce the level of irrigation in agriculture compared to the status quo, but offer a gradual and cost effective way to comply with state mandated targets for reducing water use.

In this section of the report, we simulate the reduction in agriculture production and total economic activity in the District resulting from the Integrated Management Plan and changes to the Districtwide Ground Water Management Area Rules and Regulations. Those changes to the rules and regulations include a reduction in the irrigation ground water allocation in areas of the South Platte Natural Resources District. The Integrated Management Plan proposes to meet any additional need for reduced ground water usage by enrolling additional acres in incentive programs (such as EQIP or PBHEP) or pursuing supply improvement projects. Work by Luckey (2008) estimated that there were 2,600 additional net ground water acres added in the overappropriated areas of the South Platte NRD after July 1997. Further, discussions with the NRD staff indicate that 914 acres

have already been converted. We therefore simulate a further reduction of 1,686 acres, the remaining balance of the 2,600 acres. Our economic impact estimates reflect the movement of 90% of these 1,686 acres into non-irrigated crop production, and 10% out of agricultural production. The economic impact estimates also will reflect a decline in agricultural production due to the reduced irrigation ground water allocations called for in revisions to the Districtwide Ground Water Management Area Rules and Regulations.

The reduction in allocations and the enrollment of acres in such incentive programs will lead to a reduction in agricultural production, income, and land values in the District. Given changes in agricultural production, we estimate the economy-wide impacts. These are estimated in terms of district-wide businesses activity, and also in terms of secondary measures of economic impact such as employment and labor income.

Table 1 shows the irrigated and non-irrigated acres for 5 major crops in the South Platte Natural Resources District for the year 2008 according to the United States Department of Agriculture’s National Agricultural Statistics Service (NASS).<sup>2</sup>

**Table 1  
Irrigated and Non-Irrigated Acres in 2008 in the South Platte NRD**

<u>Crop</u>	<u>Irrigated Acres</u>	<u>Non-irrigated Acres</u>
Corn	47,500	15,900
Wheat	20,000	364,500
Dry Beans	7,600	0
Alfalfa	15,200	1,800
Sugar Beets	5,500	0

Source: USDA National Agricultural Statistical Service

Note that there are many more non-irrigated acres in production than irrigated acres. Wheat production accounts for the largest number of acres, but the largest number

<sup>2</sup> The South Platte NRD is comprised of Cheyenne, Deuel, and Kimball County.

of irrigated acres is in corn production. These are the principal types of crop production reported in the NASS data.

Our economic impact estimates will reflect the reduced allocation in sub-areas of the Lodgepole Creek Valley and the South Platte Valley as well as a conversion of 1,686 acres of irrigated production primarily to non-irrigated production, but also in some cases out of agriculture. For acres moved out of irrigation, we assume this would occur by a proportional reduction the number of acres of irrigated crop production in corn, small grains, dry beans, alfalfa, and sugar beets leading to a total reduction of 1,686 acres. It is assumed that all of the new acres of non-irrigated production would produce wheat, and that these non-irrigated wheat fields would be fallow every other year. We utilized the average yield for each crop (either irrigated or non-irrigated yield) to estimate the resulting change in crop production.

For acres that faced a reduced allocation limit for irrigation, we utilized 2007 to 2009 flow meter reports generated by the South Platte Natural Resources District for sub-areas of the Lodgepole Creek Valley and 2009 flow meter reports for the South Platte Valley. The South Platte NRD also provided data on the number of certified, active acres of irrigated production in each crop in the Lodgepole Creek Valley and the South Platte Valley. Data on cumulative inches pumped 2007 to 2009 in the Lodgepole Creek Valley are shown in Table 2. We utilize these data to determine the percentage of irrigators who irrigated above the new allocation goals (either 42” or 48” over 3 years) in the revised Districtwide Ground Water Management Area Rules and Regulations. These are the irrigators most likely to be impacted by the reduction in allocations. Percentages were calculated for a weighted average of the 4 impacted allocation sub-areas (i.e., Oliver Reservoir to Buffalo Bend, Buffalo Bend to Sidney, etc) of the Lodgepole Creek Valley. Flow meter reports were used to estimate that 8.4% of irrigators in the Lodgepole Creek Valley were above the new irrigation goals in the 2007 to 2009 period. Using 2009 data, we observed that 11% of irrigators in the South Platte Valley were above one-quarter of the cumulative 2009-2012 allocations. Weighting these two results by irrigated production, we estimate that there will be a reduction in irrigation on 8.9% of the irrigated crop land in overappropriated areas in the Lodgepole Creek Valley and South Platte Valley.

**Table 2**  
**Range of Cumulative Inches Pumped 2007 to 2009**

Inches Pumped	Pine Bluffs to Oliver Reservoir	Oliver Reservoir to Buffalo Bend	Buffalo Bend to Sidney	Sidney to Colorado
0" – 12"	10%	9%	32%	19%
12.01"-24"	16%	9%	32%	20%
24.01"-36"	45%	33%	25%	34%
36.01"-48"	26%	39%	10%	19%
48.01"-60"	3%	7%	0%	6%
60+"	0%	2%	0%	2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Note: Percentages may not sum to total due to rounding.

Source: South Platte Natural Resources District

Supalla and Nedved (2004) predicts that some agricultural producers will respond to reduced allocations by changing crops rather than reducing irrigation on existing crops. Further, discussions with personnel at the South Platte NRD and the UNL Extension Station in Scotts Bluff suggest that agricultural producers would respond to a reduced allocation through crop rotation, in particular, continuing to raise the same crops in certain years but then switching to other crops that require less irrigation water in other years. UNL Extension personnel in part based their arguments on observed producer behavior in the Pumpkin Creek area, where water allocations were recently dropped to 14". The observation was that many Pumpkin Creek area agricultural producers who grew irrigated alfalfa switched to a three year rotation of irrigated alfalfa, irrigated dry beans, and irrigated wheat. Similarly, agricultural producers raising irrigated sugar beets put fewer acres each year into sugar beet production, also substituting into irrigated dry beans and wheat. Irrigated corn producers facing a reduced allocation would rotate in

irrigated wheat production one out of every 3 years. Such changes could yield substantial savings in consumptive water use in the impacted areas. For example, 2007 through 2009 flow meter report data provided by the South Platte NRD indicated average irrigation of 15.0 inches per acre for sugar beets, an average of 12.2 inches per acre for corn, and 10.9 inches for alfalfa versus an average of just 9.8 inches for beans and 5.6 inches for small grains.

These crop rotation patterns were used to predict how producers in the South Platte NRD would react to a reduction in allocations. In particular, we assume that they would utilize crop rotation rather than reducing irrigation of existing crops.

Table 3 shows the resulting change in production in the District for each of these 5 crops. The largest absolute decline in production is anticipated for corn, with smaller declines in the production of alfalfa and sugar beets. There is an increase in wheat and dry-bean production. Wheat is by far the primary type of non-irrigated crop production, and we assume that acres switching from irrigated to non-irrigated production would switch into wheat production.

**Table 3**  
**Annual Change in Crop Production and Sales**

<u>Crop</u>	<u>Annual Change in Crop Production</u>	<u>Annual Change in Crop Sales and Incentive Payments</u>
Corn	-316,800 bu	-\$1,238,000
Wheat	97,800 bu	\$540,000
Dry Beans	8,300 hdwt	\$215,000
Alfalfa	-3,900 tons	-\$301,000
Sugar Beets	-6,100 tons	-\$208,000
<u>Total</u>	-	<u>-\$992,000</u>

Source: BBR calculations

The changes in crop sales for each crop are shown on the right-hand side of Table 3. The resulting change in sales can be determined by multiplying the change in crop yields by the expected price. Our crop price assumptions were based on current prices and forecasts for the next few years published in *2009 Agricultural Outlook* of the Food and Agricultural Policy Research Institute (FAPRI) of the University of Missouri and Iowa State University.<sup>3</sup> As seen in Table 3, we find an estimated \$992,000 decrease in annual crop sales. As would be expected, there is an increase in wheat and dry bean sales as agricultural producers rotate into production of these crops.

Changes in production and sales of corn and other crops are what drive the estimate of the change in local economic activity. The relationship between the change in crop sales and employment, income, and output (business receipts) throughout the community is captured through “economic multipliers.” Economic multipliers show the change in total economic activity in the District for each \$1 of sales in the 5 crops that we study such as corn or wheat.

The IMPLAN software developed by the Minnesota Implan Group, Inc. was used to estimate relevant economic multipliers for corn, wheat, dry beans, alfalfa, and sugar beets in the South Platte Natural Resources District. This was possible because the IMPLAN model can be used to examine the economic impact of a change in activity in over 500 industry sectors in every county, or combination of counties, in the United States. Economic multipliers from IMPLAN are applied to estimates of the change in future crop sales to estimate the total change in economic activity throughout the economy.

The total change in crop sales from Table 3 is presented again in Table 4, which also shows the resulting economic impact. The total estimated annual loss in economic activity (business receipts) in the South Platte NRD both on and off of the farm is \$1,237,000 per year. The multiplier is small, but this reflects the relatively high share of input purchases from businesses outside of the region.

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<sup>3</sup> Corn (\$3.92/bu) and Wheat (\$5.52/bu) were based on the average outlook price from FAPRI for the 2010 to 2015 period. Alfalfa prices vary significantly by geography so we utilized a price of \$77.50 per ton reported in recent editions of the University of Nebraska-Lincoln publication *Cornhusker Economics*. Dry Bean (\$26.00) and Sugar Beet price estimates (34.00/bu) were based on data from the U.S. Department of Agriculture.

**Table 4**  
**Annual Change in Crop Sales and the Resulting Economic Impact**

<u>Economic Measure</u>	<u>Annual Change in Amount (\$)</u>
Crop Sales	-\$992,000
Economic Impact (Business Receipts)	-\$1,237,000
Labor Income	-\$259,000
Employment	-14

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Source: BBR calculations

This reduction in business receipts implies that business will change the number of workers and labor income (wages and benefits). Economic multipliers also capture these impacts on the labor market. Table 4 also shows these labor market impacts. The expected income loss is \$259,000 per year. Note that this labor income is a component of business receipts. It would not be appropriate to add the reduction in annual labor income to the reduction in annual business receipts.

Table 4 also shows the loss of employment. We assume that there is no change in jobs among agricultural producers (just a change in hours worked), so these job changes occur at businesses throughout the community. There would be a loss of 14 jobs associated with the \$259,000 decline in income.

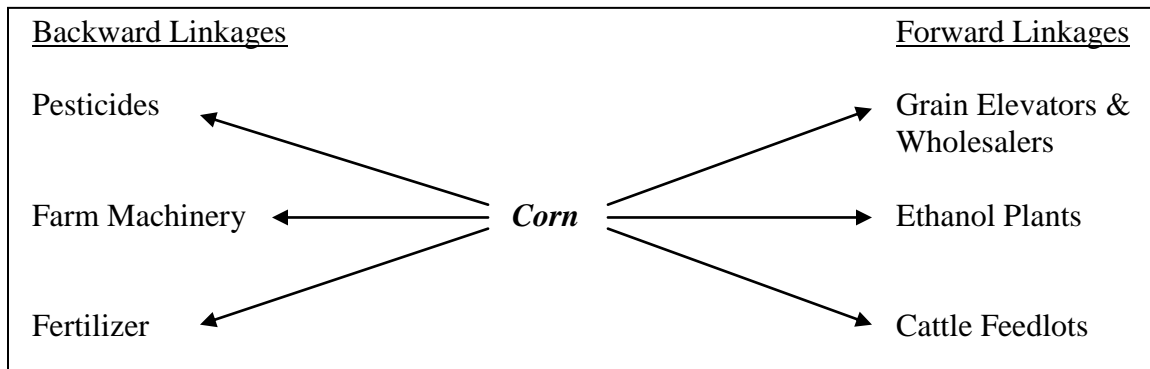
*A. Forward Linkages*

Economic impact analysis of the kind reported in Table 4 reflects the change in economic activity in the directly affected industry (agriculture, in this case), and in supplier industries, due to the multiplier effect. Business receipts change in the supplier industries due to a change in purchases of supplies by agricultural producers. These

purchases of supplies reflect “backward” linkages in the economy. Backward linked industries are the suppliers. As seen in the example in Figure 1, some of the backward linked industries for corn production would be pesticides, fertilizer, and farm machinery. The multiplier effect in an economic impact analysis captures how activity in these backward linked industries changes in response to a change in a directly effected industry.

There are, however, also “forward” linkages in the economy. “Forward” linked industries are the customers of the directly affected industry (agriculture, in this case). Figure 1 shows some forward linked industries for the example of corn production. These industries also may change their activity if corn production changes. In particular, the large supply of grain produced each year by agricultural producers is the basis for a number of grain processing businesses in the South Platte NRD. Grain elevators and wholesalers are key examples of such “forward” linked industries.

**Figure 1**  
**Backward and Forward Linked Industries for Corn Production**



Businesses in these forward linked industries would decline if corn production declines. Unfortunately, the economic changes in such forward linked industries are not captured by standard economic multiplier models, such as the IMPLAN model used in this report. As a consequence, the potential economic impact from agricultural production due to forward linkages is not reflected in the estimates in Table 4. Yet, these types of economic impacts also should be considered.

It is more difficult to develop an estimate of the magnitude of any changes in employment in such forward linked industries. For illustration, we do estimate the potential change in employment among grain elevators and wholesalers due to a lower local supply of corn. The estimated loss of agricultural production would reduce corn production by 3.7% in the South Platte NRD. We assume a proportional change in employment in the corn wholesaling and elevator business. This would mean a loss of 3 jobs in this forward linked industry. These corn industry impacts are included in the impact estimates in Table 6.

*B. Change in Property Value*

While improved water management in the South Platte NRD may support property values in future years, in the near-term agricultural property values will decline due to the shift of irrigated acres to non-irrigated production and due to the declining profits that result from reduced allocations. The University of Nebraska-Lincoln through its publication *Cornhusker Economics* (Johnson and Lukassen, 2009) produces an annual report on farmland values in regions of Nebraska. That report suggests that there is a \$1,000/acre difference in the value of irrigated farmland versus non-irrigated farmland. To estimate the change in property value, 90% of the change in farm income due to the sale of irrigation rights or reduced allocations was multiplied by the 2008 ratio of irrigated land values to cash rents in Western Nebraska (\$1,400 to \$140).

**Table 5**  
**Change in Property Value and Annual Tax Revenue**

<u>Economic Measure</u>	<u>Change in Amount (\$)</u>
Property Values	-\$3,982,000
Annual Property Taxes	-\$58,000

Source: BBR calculations

As seen in Table 5, there is an estimated \$3.98 million decline in property values in the South Platte NRD. The loss in property value of \$3.98 million leads to annual decline in property taxes of \$58,000, given that the property tax rate averages 1.95% across the 3-county South Platte NRD.

This loss in agricultural property values has important implications for local economies. One implication is tax revenue for local governments and school districts. This loss in revenue is not available for funding government jobs and government services. A loss in government employment and activity results<sup>4</sup>, and there is also a multiplier effect from the change in local government activity.<sup>5</sup>

The IMPLAN model, despite all of its advantages, does not directly estimate tax revenue impacts. As a result, economic impacts due to a change in property values are not represented in Table 4, and must be estimated separately.<sup>6</sup>

In Table 6 we estimate the economic impact of the change in property values in the South Platte NRD. We focus on the total change in local property tax revenue, including both education, municipal and county taxes, and miscellaneous taxes. This change in revenue leads to a change in government activity. Estimates in Table 6 include an estimate of the economic impact of that change in government activity. The estimates in Table 6 also reflect the change in employment for grain wholesalers and elevators due to forward linkages. The impacts are presented in terms of the overall economic impact (business receipts), labor income component, and employment.

The total annual economic impact from the resulting loss in government expenditures (and reduced activity in forward linked industries) is a loss of \$473,000 in business receipts. The labor market impact in terms of labor income and jobs is also presented in Table 6. The labor market impact is a loss of \$90,000. There would be 5 jobs lost in conjunction with the decline in labor income.

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<sup>4</sup> If it is assumed that tax rates would change to compensate for a change in property value, then this also would cause a change in economic impact due to lower after-tax incomes.

<sup>5</sup> To see this, note that agricultural property values are based on income earned from exporting agricultural products around the nation and the world. The ultimate source for government employment supported by agricultural property is from outside of the local region.

<sup>6</sup> This was confirmed in an email with IMPLAN staff.

**Table 6**  
**Annual Economic Impact from Change in Property Tax Revenue and Forward Linked Industries**

<u>Economic Measure</u>	<u>Annual Change in Amount (\$)</u>
Economic Impact (Business Receipts)	-\$473,000
Labor Income	-\$90,000
Employment	-5

Source: BBR calculations

*C. Overall Economic Impact and Discussion*

The total change in economic impact from crop sales, forward linkages, and property taxes is the sum of the economic impact estimates reported in Tables 4 and 6. These overall economic impacts are reported in Table 7 below. The total annual impact is a loss of \$1,710,000 in economic impact, \$349,000 in labor income, and 19 jobs.

**Table 7**  
**Overall Gross Annual Economic Impact with Plan, Rules, and Regulations**

<u>Economic Measure</u>	<u>Annual Change in Amount (\$)</u>
Economic Impact (Business Receipts)	-\$1,710,000
Labor Income	-\$349,000
Employment	-19

Source: BBR calculations

These impact estimates in Tables 7 are interesting by themselves, but it is always helpful to consider impacts in the context of the overall economy. What share of the local economy does the economic impact represent? The natural approach to answer these questions is to look at the impacts in Table 7 relative to the overall economy of the South Platte NRD. Results are presented in Table 8. The economic impact is 0.09% of District output (business receipts). There also would be a 0.08% loss in labor income and a 0.16% loss in employment. These results show that the losses are small relative to the overall District economy.

**Table 8**  
**Percentage Loss in the South Platte NRD**

<u>Economic Measure</u>	<u>Percent Change in South Platte NRD</u>
Output (Business Receipts)	-0.09%
Labor Income	-0.08%
<u>Employment</u>	<u>-0.16%</u>

Source: BBR Calculations

There also is a demographic component associated with these income losses. Research by Bartik (1991) in the context of manufacturing employment, shows that when new factories enter a community, approximately 80% of new jobs in the community are filled by new residents and only the remaining 20% are filled by existing residents as they enter the labor force, or by formerly unemployed workers. This is a different context than we are considering in the current study but if the same principal applies, there would be a modest population loss in response to the employment impact. And, as is typically the case, losses would likely be concentrated among younger workers.

There is also one factor that could mitigate the long-run economic impact of the plan, rules, and regulations. In particular, many agricultural producers utilize much less ground water for irrigation than is allowed by the allocation. With improved ground

water management, these producers may face lower pumping costs and may be able to raise their irrigation activity and crop output, mitigating the modest negative economic impacts discussed above. The size and timing of this mitigating effect, however, is unknown.

### **III. Recreation Activity: The Example of Oliver Reservoir State Recreation Area**

Adoption of the Integrated Management Plan and changes to the Districtwide Ground Water Management Area Rules and Regulations will allow continued, if reduced, use of ground water for crop irrigation while maintaining water for other key uses in the South Platte Natural Resources District. In particular, the plan, rules, and regulations will have a beneficial impact on the District economy through preserving and improving recreation opportunities in the area. Generally speaking, maintaining and improving stream flow over time will preserve recreation opportunities that otherwise may have been lost. Oliver Reservoir State Recreation Area is an important example of a recreation amenity that is impacted by water usage in the District.

In this section, we consider the water-based recreation opportunities in the District through the example of the Oliver Reservoir State Recreation Area. The Reservoir is a significant attraction, so it can illustrate the magnitude of the economic impact resulting from recreation and tourism in the District. Thus, while the Oliver Reservoir is certainly not the only example of how surface water attracts and retains recreation activity within the District, it is an important example.

The Oliver Reservoir State Recreation Area offers a variety of recreation opportunities, including water skiing, power boating, fishing, swimming, and camping. These recreation opportunities attract visitors from elsewhere in Nebraska and from other states. While many visitors to the Reservoir do not spending money while in the area, some out-of-state visitors to Oliver Reservoir State Recreation Area do spend money at Nebraska businesses. The Reservoir also retains local spending by providing a local location for boating, fishing and other water-based recreation so that District residents do not have to travel elsewhere to enjoy these interests. Money that would have been spent on a boating trip out of the area is retained within the District to be spent on other

entertainment and recreation activities. This net increase in spending is the source of a local economic impact within the District economy on an annual basis. The size of the impact is uncertain but is meaningful.

#### **IV. Summary**

The South Platte Natural Resources District faces a requirement to reduce consumptive use of water back to 1997 levels, and ultimately, move overappropriated areas within the District back to fully appropriated levels. To meet those goals in a way that limits impacts on agricultural production and the economy, the South Platte NRD developed an Integrated Management Plan and changes to its Districtwide Ground Water Management Area Rules and Regulations. This report assesses the economic impact of those changes. We estimate the gross economic impact associated with steps outlined in the plan, rules, and regulations.

The estimated gross economic impact both on-farm and off-farm in the District is a \$1,710,000 reduction in annual economic activity (business receipts). This impact includes a \$349,000 loss in annual labor income, and a loss of 19 jobs. Such economic losses also imply a reduction in current agricultural property values in the District. However, these economic impacts are only a modest portion of the District economy. The economic impact is 0.09% of output (business receipts) in the District economy, 0.08% loss in labor income and 0.16% of District employment. Such modest impacts should be expected given the careful approach that the South Platte NRD has adopted to meet state requirements to curtail consumptive use of water.

Finally, adoption of the Integrated Management Plan and changes to the Districtwide Ground Water Management Area Rules and Regulations will maintain water resources for other key uses in the South Platte Natural Resources District, such as recreation opportunities. The Oliver Reservoir State Recreation Area is an example of an important recreation amenity that could be impacted by water usage in the District.

## References

- Bartik, Timothy J. *Who Benefits From State and Local Economic Development Policies?* Kalamazoo, MI: W. E. Upjohn Institute for Employment Research, 1991.
- Johnson, Bruce, and Brian Lukassen, 2009. "Nebraska Farmland Markets Plateau," *Cornhusker Economics*. March 25.
- Luckey, Richard R. 2008. *Estimated Stream Baseflow Depletion by Natural Resources District in the Nebraska Platte Basin due to Gained and Lost Groundwater Irrigated Land after July 1, 1997*. High Plains Hydrology, LLC.
- Supalla, Raymond and Scott Nedved, 2004. *Potential Economic Impacts from Groundwater Regulation in the Republican Valley*. Department of Agricultural Economics, University of Nebraska-Lincoln
- Thompson, Eric, Ernie Goss, Chris Decker, Cheryl Burkhart-Kriesel, Bruce Johnson, Mariana Saenz, Ben Schmitz, Julian Neira, and Pavel Jeutang, 2007. *Pillars of Growth in the Non-Metropolitan Nebraska Economy*. University of Nebraska Rural Initiative.