

Potential Economic Impacts from Groundwater Regulation in the Republican Valley

By
Ray Supalla and Scott Noyes
Department of Agricultural Economics

With funding from a consortium of public utilities, bankers and farm supply firms

Important Inputs and Assumptions

Purpose

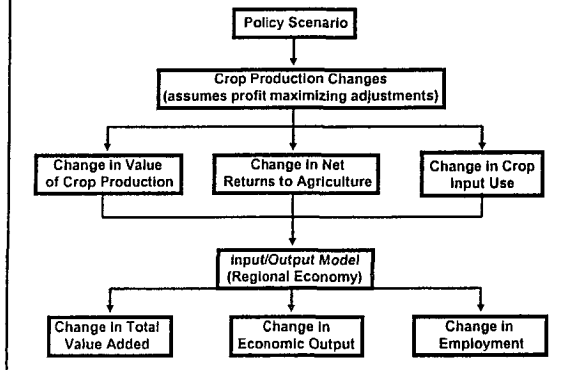
To analyze the on-farm and off-farm consequences of reduced irrigation in the Republican Valley.

To provide economic information for water policy decision making and for general economic planning.

Irrigated Acres Estimates Used in Analysis

Upper Republican	Certified Acres
Upland Sprinkler	368,970
Quick Response – Sprinkler	51,301
Quick Response – Gravity	28,446
Middle Republican	
Upland Sprinkler	135,169
Upland Gravity	64,243
Quick Response – Gravity	112,588
Lower Republican	
Upland Sprinkler	132,185
Upland Gravity	36,562
Quick Response – Gravity	161,253

Methodology



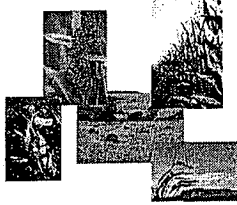
Baseline Pumpage

	Acre-Feet	Inches/Acre
Upper Republican		
Upland – Sprinkler	428,896	13.95
Quick Response – Sprinkler	66,537	15.56
Quick Response – Gravity	37,190	15.69
Middle Republican		
Upland – Sprinkler	134,816	11.97
Upland – Gravity	64,074	11.97
Quick Response – Gravity	139,045	14.82
Lower Republican		
Upland – Sprinkler	101,713	9.23
Upland – Gravity	28,133	9.23
Quick Response – Gravity	131,502	9.79

Crops Considered

Irrigated

Corn
Soybeans
Alfalfa
Wheat
Grain Sorghum








Dryland (on former irrigated land)

Corn - Fallow - Wheat Rotation

Irrigation Costs

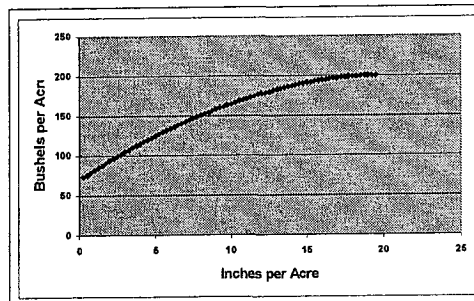
	Feet of Head (Lift & Pressure)	\$/Acre-Inch
Upper NRD		
Upland Sprinkler	193.5	6.11
Quick Sprinkler	75.9	5.00
Quick Gravity	75.9	3.02
Middle NRD		
Upland Sprinkler	241.7	6.57
Upland Gravity	241.7	4.58
Quick Gravity	112.2	2.92
Lower NRD		
Upland Sprinkler	176.8	5.96
Upland Gravity	176.8	3.97
Quick Gravity	72.1	2.98

Crop Prices*

Corn	\$2.60	
Wheat	\$3.75	
Grain Sorghum	\$2.52	
Alfalfa	\$74.14	
Soybeans	\$5.50	

* Based on short-term forecast by FAPRI, University of Missouri and Iowa State University.

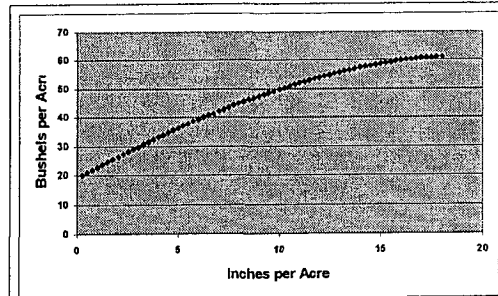
Corn, Middle NRD, Gravity Irrigated



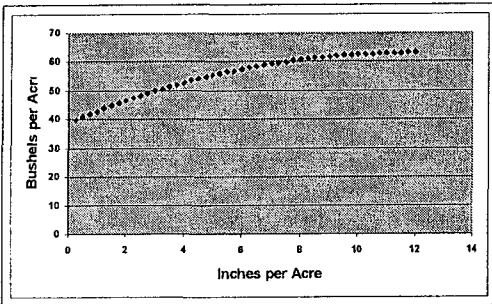
Crop Production and Irrigation Costs

- Based on University of Nebraska Coop Extension Service Budget calculator.
- Costs considered include only items that will be impacted by regulations. Items such as overhead and management charges, land costs and some depreciation is not estimated.
- Irrigation costs based on electric pumps, average lift and pressure requirements.

Soybeans, Middle NRD, Gravity Irrigated

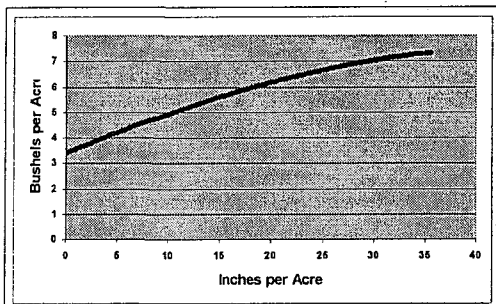


Wheat, Middle NRD, Gravity Irrigated



Description of the Regional Economy

Alfalfa, Middle NRD Gravity Irrigated

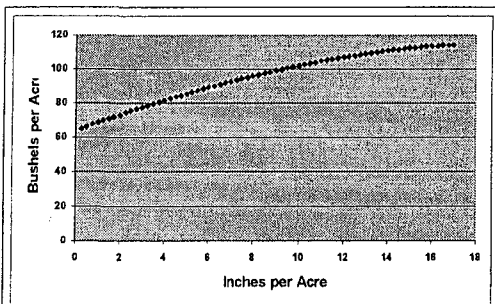


Republican Valley Economy (Counties Included)

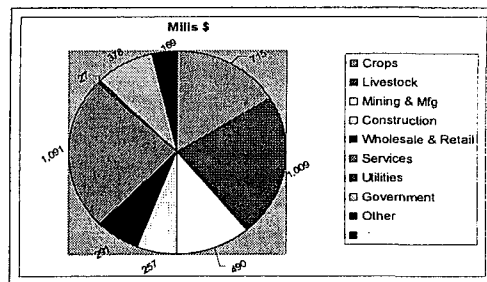
**Chase
Frontier
Franklin
Dundy
Furnas
Hitchcock
Hayes
Harlan**

**Gosper
Red Willow
Phelps
Nuckolls
Lincoln
Kearney
Webster**

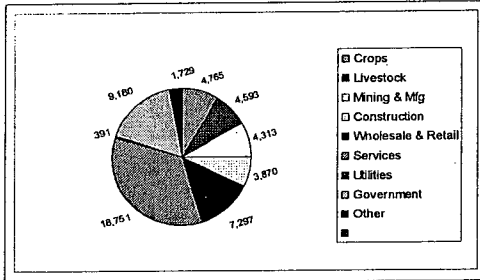
Grain Sorghum, Middle NRD, Gravity Irrigated



Republican Valley Industry Output



Republican Valley Employment



Regulation Levels

	Inches Per Acre			
	Baseline Average	10%	20%	Drought
Upper NRD				
Upland-Spk	13.95	13.83	11.43	12.92
QRW-Spk	15.56	15.24	12.87	5.38
QRW-Grv	15.69	15.53	13.07	5.97
Middle NRD				
Upland-Spk	11.97	13.17	10.80	12.41
Upland-Grv	11.97	13.12	10.78	13.12
QRW-Grv	14.82	17.77	14.08	9.58
Lower NRD				
Upland-Spk	9.23	10.42	8.28	9.50
Upland-Grv	9.23	10.12	8.36	9.50
QRW-Grv	9.79	11.41	9.30	6.40

Regulatory Scenarios

I. 10% reduction in pumping, all situations

II. 20% reduction in pumping, all situations

Major Assumptions:

- Administered on 3 to 5 year average to account for rainfall variability.
- Separate allocations for upland and quick response wells.
- Little if any pooling within an ownership for Lower and Middle NRD's. Upper continues current policy practices.

Acres Impacted by Regulations

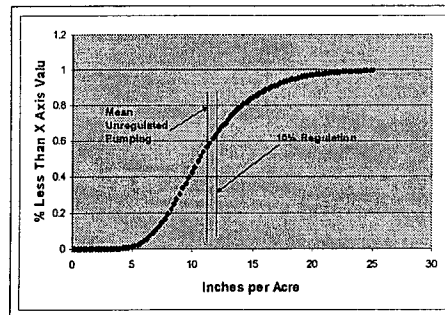
	Percent of Total Irrigated Acres		
	10%	20%	Drought
Upper NRD			
Upland-Spk	59	78	66
QRW-Spk	60	78	100
QRW-Grv	60	78	100
Middle NRD			
Upland-Spk	49	62	53
Upland-Grv	49	62	53
QRW-Grv	52	68	91
Lower NRD			
Upland-Spk	48	63	54
Upland-Grv	47	59	52
QRW-Grv	53	67	88

Regulatory Scenarios

III. Drought Case

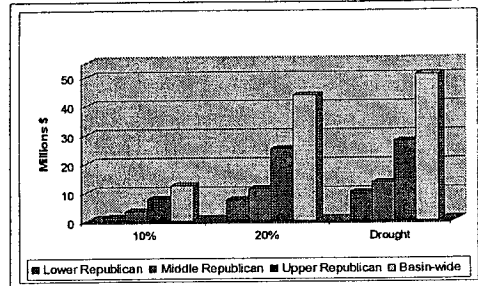
Upper NRD	
Upland-Sprinkler	13% reduction
QRW-Sprinkler	13% reduction + 34,000 acre-feet
QRW-Gravity	13% reduction + 18,800 acre-feet
Middle NRD	
UL-Sprinkler	13% reduction
UL-Gravity	13% reduction
QRW-Gravity	13% + 36,000 acre-feet
Lower NRD	
UL-Sprinkler	13% reduction
UL-Gravity	13% reduction
QRW-Gravity	13% + 31,200 acre-feet

Pump Distribution, Middle NRD, Uplands

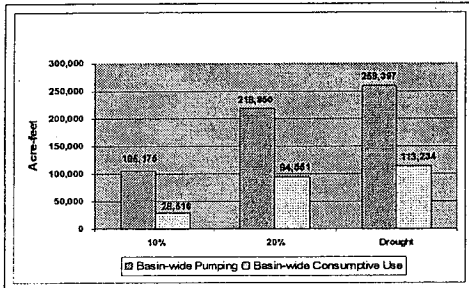


Results

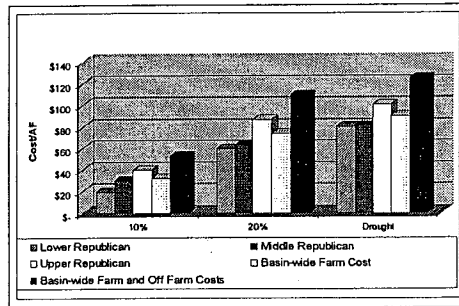
Change in Crop Value of Production



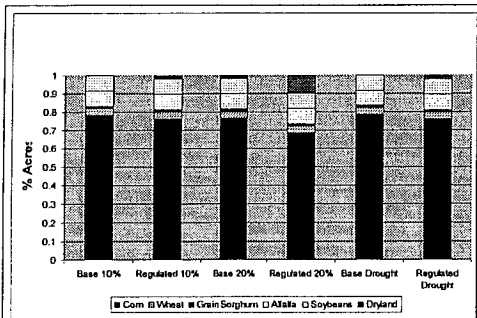
Change in Volume Pumped and Consumptive Use



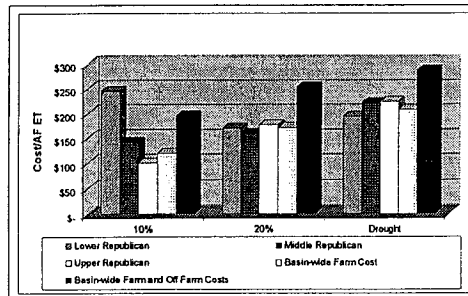
Costs Per Acre-Foot Change in Pumping



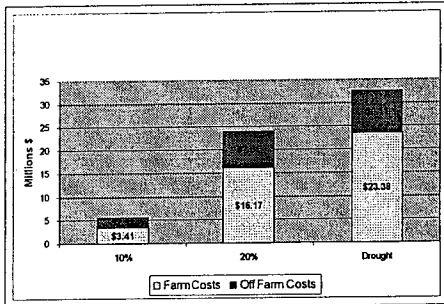
Percent Change in Cropping Pattern of Affected Acres For Middle Republican Upland Sprinkler Area



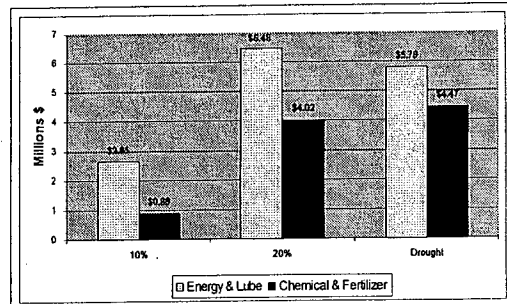
Costs Per Acre-Foot Change in Consumptive Use



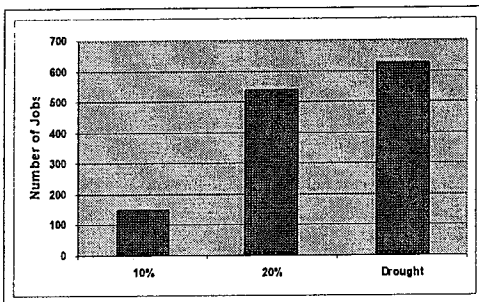
Change in Value Added in Republican Valley Economy



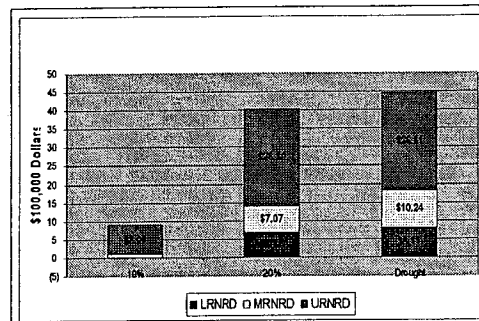
Change in Farm Input Use in Republican Valley



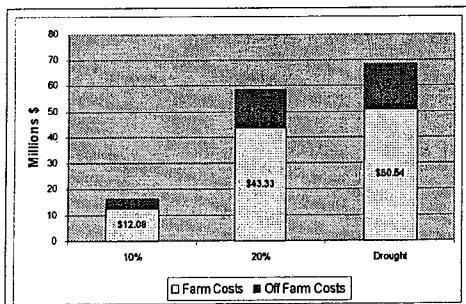
Employment Impacts



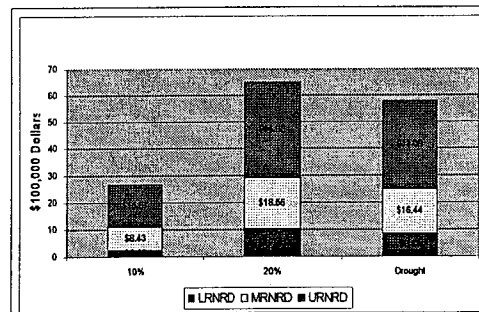
Change in Chemical & Fertilizer Costs Per NRD



Change in Economic Output in Republican Valley Economy

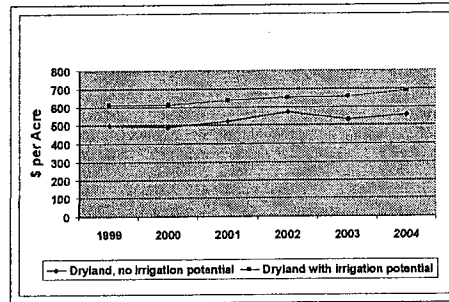


Change in Energy & Lube Costs Per NRD



Land Value Impacts

Land Value Trends, Southwest Nebraska



Impact on Land Values

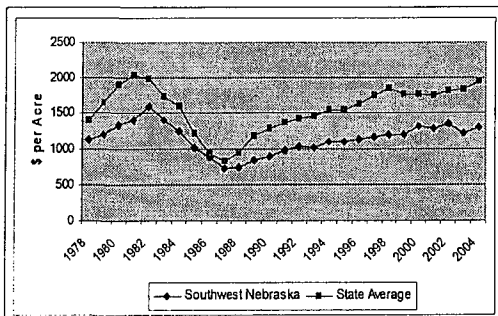
Factors to Consider:

1. Changes in net returns to irrigated land.
2. Limits on new well development.
3. Inflation and productivity trends.
4. Market psychology.

Most Likely Land Value Impacts

- **Dryland with Irrigation Potential:**
 - Likely to decrease by 10 to 15%, but much of this impact may already be reflected in market. (From 1995-2004, value of dryland with irrigation potential in the SW increased by 19%, whereas state average increase was 42%).

Irrigated Land Value Trends



Most Likely Land Value Impacts

- **Irrigated land values:** The 10% scenario implies an average long-term land value effect of \$75 per acre. A 20% scenario implies \$375 per acre.
- Absolute land values may not go down – simply increase at a slower rate.
- Much depends on community expectations and on the severity and frequency of drought.

Summary of Results

- The 10% Scenario Will:
 - Reduce pumping by 105,000 AF and consumptive use by 28,500 AF.
 - Cost farmers \$6 per affected acre.
 - Cost farmers \$3 per certified acre.
 - Cost the Republican Valley \$5.6M, which is equal to \$53 per AF change in pumping and \$196 per AF change in consumptive use.

Summary of Results

- Basin-wide impacts from the drought (most severe) scenario would reduce regional output by 1.5% and employment by 1.1%.
- Discussions with state officials suggest that the required normal year cutbacks in pumping are likely to be closer to 10 than to 20 percent.

Summary of Results

- The 20% scenario will:
 - Reduce pumping by 219,000 AF and consumptive use by 94,500 AF.
 - Cost farmers \$21 per affected acre.
 - Cost farmers \$15 per certified acre.
 - Cost the Republican Valley \$24.0M, which is equal to \$110 per AF change in pumping and \$254 per AF change in consumptive use.

Conclusions

- Long-term normal year reduction in pumping of 10 to 15% will significantly affect individual producers, but will not have devastating effect on the regional economy.
- Adjustments to meet drought conditions will clearly be painful at the regional level, especially if continued for multiple years.

Summary of Results

- The drought scenario will:
 - Reduce pumping by 260,000 AF and consumptive use by 113,200 AF.
 - Cost farmers \$30 per affected acre.
 - Cost farmers \$21 per certified acre.
 - Cost the Republican Valley \$32.5M, which is equal to \$125 per AF change in pumping and \$287 per AF change in consumptive use.

Conclusions

- Crop prices can substantially mitigate or exacerbate regulatory impacts. For example, the effect on irrigators (basin-wide) of a 20% decrease in pumping is roughly equivalent to a 4.7% decrease in crop prices.
- Off-farm economic sectors most affected are grain handling and farm supply firms and retail trade.

Conclusions

- Impacts on grain handling and farm supply firms likely to be less than what has been experienced in recent years from crop shifts (corn to soybeans) and technology (Round-up Ready, Bt corn, etc.), except perhaps for a sustained drought scenario.
- Land values will increase a little less in future years than they would have without regulations, but an absolute decline in the property tax base is unlikely.

Conclusions

- Regulations based on percentage reductions in pumping across NRD's have differential impacts on a per acre basis, i.e., those in the URNRD pay more than those in the Middle or Lower NRD's.
- There is no easy way for Nebraska to meet it's obligations to Kansas, but perhaps this economic information can help the NRD's and the State make the hard choices.