

Kansas v. Nebraska & Colorado
No. 126, Orig., U.S. Supreme Court

Analysis of Measures that Would Have Been Required for Nebraska to Achieve Water-
Short Year Compliance with Republican River Compact in 2006

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1.0 Introduction

This report describes the analysis and opinions prepared by Spronk Water Engineers (SWE) to determine actions that would have been necessary for Nebraska to reduce beneficial consumptive use to its compact allocation under the Republican River Compact for the years 2005 - 2006. The reductions are assumed to be achieved through a combination of adjustments to surface water use and groundwater use that would have been necessary for Nebraska to achieve compliance with the Water-Short Year test for 2006, as required by the Final Settlement Stipulation (FSS) approved by the decree in *Kansas v. Nebraska & Colorado*.

The purpose of the analysis was to quantify reductions in surface water use and groundwater use necessary to bring Nebraska's Computed Beneficial Consumptive Use (CBCU) within its allocation for the two years. The analysis determined the extent to which surface water storage and consumption was available to reduce Nebraska's overuse in 2005 and 2006, in combination with reduction in pumping that would have been necessary to completely eliminate Nebraska's overuse. The effect of pumping reduction on streamflow was determined by the Groundwater Model adopted in the FSS, as amended by the Republican River Compact Administration (RRCA). The amounts of reductions in surface water use and reduced pumping were provided to the economists for calculations of benefits in the State of Nebraska.

The RRCA Accounting for the two years, 2005 and 2006, provides the values for Nebraska's overuse and surface water use. The amount of overuse in Nebraska under the water-short year test (two-year test above Guide Rock) was 79,000 acre-feet. The analysis assumes that most of the surface water diverted by the major project canals would have been eliminated in the two years and reservoir storage remaining in 2006 would have been released. The balance of the overuse would have been remedied through pumping reductions in the 10 - 2 Rapid Response Region identified by Nebraska. The combination of pumping reductions and available surface water provided the necessary reduction in CBCU for Nebraska to achieve compliance.

Several assumptions are inherent in this analysis:

- Pumping restrictions would have been applied within a defined zone along the streams. The area identified by Nebraska DNR, as the 10 - 2 Rapid Response Region was adopted for purposes of this analysis. Historical pumping was assumed turned off within this area for the two years.

- Surface water could have been acquired and provided to Kansas instead of being diverted for irrigation in Nebraska.
- Water would have been available from storage for release to help achieve compliance. The amount of water available in Project reservoirs in excess of the minimum water levels, at the end of 2006, was assumed available. Releases of additional stored water have the effect in the Compact Accounting of increasing the annual allocations.

2.0 Description of Analysis

The amount of overuse in Nebraska for the two years is shown on Table 1. Given the approximate amount of surface water used in the two years, alternative pumping reductions were analyzed to quantify pumping impacts. The benefits to streamflow achieved by pumping reductions were determined with the RRCA Groundwater (GW) model. Removal of pumping in the area identified by Nebraska as the 10 – 2 Rapid Response Region in the groundwater model provided the necessary reductions in CBCU. This area corresponds to approximately 110,000 acres of irrigation.

Pumping was removed on 115,380 acres in 2005 and 103,837 acres in 2006 (Table 2). The RRCA GW Model was used to compute the GW CBCU resulting from the reduced pumping for the years 2005 and 2006. Reductions caused by this change, as compared to the historical condition, were 13,700 acre-feet in 2005 and 20,100 acre-feet in 2006, expressed as reductions in GW CBCU above Guide Rock. Table 3 shows the changes in GW CBCU determined by the model.

The surface water CBCU available for reduction was estimated from the RRCA accounting. It was assumed that CBCU associated with surface water pumping and reservoir evaporation would have continued. The surface water supply was obtained from the diversions and CBCU reported in the compact accounting sheets for the two years. Tables 4 and 5 list the diversions and CBCU in Nebraska for each year. The surface water diversions totaled 77,900 acre-feet for the two years, with associated CBCU of 37,300 acre-feet. The use associated with the small pumps and non-federal diversions was assumed unavailable to offset overuse.

The canals for which diversions were assumed to be eliminated in the two years are identified on Tables 4 and 5. The modified CBCU remaining after removing the diversions from the canals is provided. The reduction in diversions amounted to 28,400 acre-feet in 2005 and 25,500 acre-feet in 2006. This corresponded to reduction in CBCU of a total of 23,200 acre-feet for the two years.

The diversions were removed from the Culbertson, Cambridge and Riverside Canals for 2005. The diversions were removed from the Bartley and Cambridge Canals for 2006.

The availability of reservoir storage was also considered for the purpose of offsetting the two-year shortfall. Based on reservoir storage contents at the end of September, 2006, the estimated available storage was approximately 27,900 acre-feet, located primarily in Swanson and Harry Strunk Reservoirs. Table 6 shows the reservoir storage status at the end of 2006.

The RRCA compact accounting for the two years with adjustments for reduced surface water and GW CBCU is summarized in Table 7. The results incorporate the release from storage in 2006. The effects, as measured at Guide Rock, are summarized as follows:

Effect on Nebraska's Compliance Accounting	Acre-feet
Overuse of Compact Allocation in 2005 – 2006	79,000
Amount of reduced GW CBCU (Deduction from overuse)	33,900
Amount of reduced surface water CBCU (Deduction from overuse)	23,200
Increase in Nebraska Allocation	14,600
Increase in computed Imported Water Supply Credit	7,400
Remaining Overuse of allocation after applying deductions and additions	-100

3.0 Surface Water Needed

The amount of reduced surface water diversion and the canals affected were provided to the economists for use in the calculations of Nebraska benefits. The information provided included the delivery to the fields, after deduction of conveyance loss, and the reduced acreage amounts by natural resources district (NRD) location. These results are summarized in Table 8.

The amount of surface water that would have been removed from irrigation in Nebraska is expressed in terms of diversions from the river and estimated deliveries to the fields. The diversion supply removed was 28,400 acre-feet for 2005 and 25,500 acre-feet for 2006, totaling

53,900 acre-feet for the two years. This translated to reduced delivery to the fields of 11,700 acre-feet in 2005 and 11,800 acre-feet in 2006.

The amount of acreage irrigated with surface water under each of the canals identified in 2005 and 2006 that was irrigated by groundwater within the 10 – 2 Rapid Response Region was determined. This is referred to as commingled acreage. The coverage of commingled acreage received from Nebraska for 2003 was overlayed on the 10 – 2 Rapid Response Region and the amount of commingled acreage totaled for each of the canals (Table 8). No data were available for the Bartley Canal in the 2003 coverage. The commingled acreage under the Bartley Canal was estimated using mapping of the surface water acreage and the 2007 well database.

The amount of storage water remaining in 2006, shown on Table 6, was also assumed to have been available for release for compliance. The amount of storage was 27,900 acre-feet, as determined from the records of storage content in the project reservoirs at the end of 2006. The storage water identified for release in 2006 remained in storage for subsequent use. The timing and amount of use was determined by reviewing the subsequent records of reservoir and canal operations for those identified in Table 6. The Swanson Reservoir storage was subsequently released in 2009. The water in Hugh Butler was released in 2008. Releases from Enders Reservoir did not occur after 2006.

The amount of storage water that was released and delivered for irrigation was determined from records for each reservoir. The evaporation loss between September, 2006 and the time when the water was released was calculated based on the change of surface water area on the reservoir and the monthly net evaporation rates that occurred over the period. The evaporation loss for Swanson to 2009 was 17%. The evaporation loss for Hugh Butler to 2008 was 9%.

The amount remaining at the time of release was translated to the amount delivered to the farms, using the canal efficiency for the year of release. The canal efficiency for Swanson releases to the Meeker Driftwood Canal was 24%. This efficiency resulted in delivery of 3,300 acre-feet in 2009. The average application depth under this canal was 5.3 inches in 2009.

The canal efficiency for Hugh Butler releases to Red Willow Canal in 2008 was 30%. This efficiency resulted in delivery of 250 acre-feet in 2008. The average application depth under this canal was 5.4 inches.

4.0 Class 5 and 6 Land Capability

Land capability classification shows, in a general way, the suitability of soils to cultivate most kinds of field crops. The land classifications are specific for irrigated and non-irrigated lands. The description of the classifications indicate that irrigated and non-irrigated Class 1-4 lands are suitable for production with appropriate land management. Class 5 and 6 lands have restricted use mainly to pasture, rangeland, forestland, or wildlife habitat. SWE was requested to provide the amount of Class 5 and 6 acreage that was irrigated within the Rapid Response Region. GIS analysis was used to quantify this acreage.

Tabular and spatial soils data for all Republican River counties in Nebraska was downloaded from the NRCS Soil Survey Geographic database (SSURGO). Spatial soils data for each county were merged in GIS to provide the soil coverage for the entire basin. This coverage was then constrained to the model grid cells located within the 10 – 2 Rapid Response Region.

A percentage of non-irrigated class 5 and class 6 lands within each model grid cell was derived by comparing non-irrigated class 1-4 acres within each grid cell to the 2005 and 2006 model grid cell irrigated acres. Irrigated area in excess of the non-irrigated Class 1 – 4 acreage in each cell was calculated, up to the limit of the class 5 and 6 land in each cell. This percentage was computed for each county and NRD and provided to the economists. The results of this analysis are summarized in Tables 9 and 10.

5.0 Conclusions

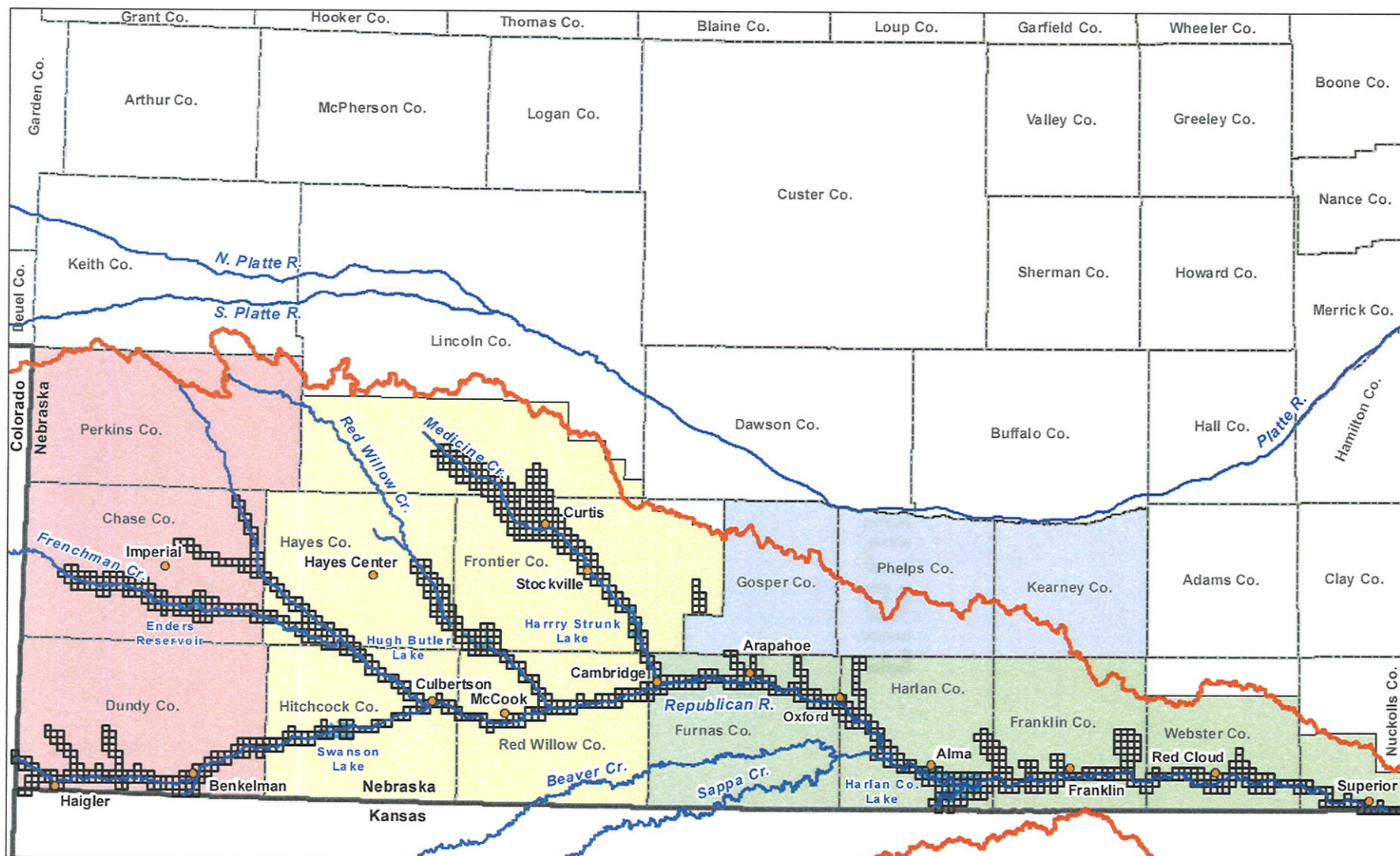
To achieve Nebraska compliance, the required reduction in acreage irrigated by groundwater pumping was 115,380 acres in 2005 and 103,837 acres in 2006. The total surface water needed was 53,900 acre-feet, diverted at the river, and 27,900 acre-feet of reservoir storage. The combination of pumping reductions and available surface water provided the necessary reduction in CBCU for Nebraska to achieve water-short year compliance with the Courts decree and the Republican River Compact in 2006.

6.0 References

1. Perkins, S.P. and Larson, S.P., (2011), Pumping Reduction Impacts for 2005- 2006
2. RRCA Accounting Spreadsheets
3. US Bureau of Reclamation Annual Operating Plans, Kansas River Basin (2005 – 2009)
<http://www.usbr.gov/gp/aop/niobrara/08nk.pdf>
4. US Bureau of Reclamation spreadsheet data provided by KDWR (reservoir data)

5. 10-2 Rapid Response Region GIS coverage provided by KDWR
6. Nebraska's Response to Kansas' Second Set of Requests for Production - Nebraska GIS coverages: 2003 commingled, 2005 and 2006 surface water area and 2007 well database
7. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for Nebraska (<http://soildatamart.nrcs.usda.gov>)

FIGURE



Source:
10-2 Rapid Response Region - modified version of the Nebraska's
10-2 corridor flag called RR10_2AVUmod.tif, excluding the Tri-Basin
part of the corridor from Sam Perkins (KDWR, Nov. 1, 2011).

Figure 1
Location Map
10-2 Rapid Response Region

10 5 0 10 20 Miles

Approximate Scale = 1:1,310,000

8

Legend

- 10-2 Rapid Response Region
- Republican R. Basin
- City
- Reservoir
- NRD Name**
- Lower Republican
- Middle Republican
- Upper Republican
- Tri-Basin



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TABLES

Table 1
Nebraska's Water-Short Year Compact Compliance: 2005 - 2006
(acre-feet)

FSS Accountning Procedures - Table 5C: Nebraska's Compliance During Water-Short Year Administration

Year	Allocation			Computed Beneficial Consumptive Use			Imported Water Supply Credit above Guide Rock	Allocation - (CBCU - IWS above Guide Rock)
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock		
2005	199,450	4,586	194,864	253,740	4,052	249,689	11,965	(42,860)
2006	187,060	2,290	184,770	236,150	3,064	233,086	12,214	(36,100)
Average	193,260	3,440	189,820	244,950	3,560	241,390	12,090	(39,480)
Total	386,510	6,880	379,630	489,890	7,120	482,770	24,180	(78,960)

Source: RRCA Accounting Spreadsheets

Table 2
Summary of Reduced Groundwater Acreage in Nebraska
2005 - 2006
(acres)

County	2005	2006
Chase	23,914	19,478
Dundy	8,433	8,261
Perkins	0	0
Upper NRD	32,347	27,739
Frontier	8,459	9,330
Hayes	5,131	3,952
Hitchcock	10,226	10,099
Lincoln	2,993	2,085
RedWillow	10,579	12,053
Middle NRD	37,388	37,519
Franklin	12,232	11,276
Furnas	13,993	9,843
Gosper	0	0
Harlan	11,165	9,815
Phelps	0	0
Webster	6,147	5,505
Nuckolls	2,108	2,140
Lower NRD	45,645	38,579
Total	115,380	103,837

Source: KDWR Summary of gw area within
10-2 Rapid Response Region by county.

Table 3
Summary of Reduced Groundwater Computed Beneficial
Consumptive Use in Nebraska
2005 - 2006
(acre-feet)

Subbasin	Change in Nebraska Pumping Impacts	
	2005	2006
Arikaree	72	73
Beaver	0	0
Buffalo	75	175
Driftwood	35	85
Frenchman	5,842	6,095
North Fork	609	503
Above Swanson	2,130	2,870
Swanson - Harlan	-4,923	104
Harlan - Guide Rock	7,431	6,227
Guide Rock - Hardy	652	598
Medicine	1,725	2,854
Prairie Dog	0	0
Red Willow	74	221
Rock	0	1
Sappa	0	0
South Fork	112	401
Hugh Butler	106	71
Bonny	0	0
Keith Sebelius	0	0
Enders	186	278
Harlan	100	59
Harry Strunk	24	3
Swanson	122	125
Total above Guide Rock	13,720	20,145
Total	14,372	20,743

Source: RRCA accounting and "Pumping Reduction Impacts for 2005-2006" (Perkins/Larson, 2011)

Table 4
Nebraska's Surface Water Use Summary
2005 RRCA Accounting
(acre-feet)

Sub Basin	Canal	Historical				Adjusted			
		Canal Diversions	Surface Water Pumping	CU Factor	CBCU	Canal Diversions	Surface Water Pumping	CU Factor	CBCU
North Fork	Haigler	4,745		60%	2,847	4,745		60%	2,847
Arikaree	Non-Federal Small Pumps		- -		- -		- -		- -
Buffalo	Non-Federal Small Pumps		171 34	60% 75%	103 26		171 34	60% 75%	103 26
Rock	Non-Federal Small Pumps		- -		- -		- -		- -
South Fork	Hale Non-Federal Small Pumps	- -	- -		- -	- -	- -		- -
Frenchman	Champion Riverside Culbertson Culbertson Canal Extension Non-Federal Small Pumps	- 2,096 6,562 -	- -	60% 22%	1,258 1,438	- - -	- -	60% 22%	- -
			1	75%	0.8		1	75%	0.8
Driftwood	Meeker-Driftwood Non-Federal Small Pumps	- -	- -		- -	- -	- -		- -
Red Willow	Red Willow Non-Federal Small Pumps	- -	- 123		- 92	- -	- 123		- 92
Medicine Creek	Non-Federal Small Pumps Non-Federal - Below Gage Small Pumps - Below Gage	- 259 -	- 78	75% 75%	194 59	- 259 -	- 78	75% 75%	194 59
Beaver	Non-Federal Small Pumps Non-Federal - Below Gage Small Pumps - Below Gage	- -	- -		- -	- -	- -		- -
Sappa	Non-Federal Small Pumps Non-Federal - Below Gage Small Pumps - Below Gage	- 54 -	- -	75%	41	- 54 -	- -	75%	41
Prairie Dog	Almena Non-Federal - Below Gage Small Pumps - Below Gage	- -	- 21		- 16	- -	- 21		- 16
Mainstem	Bartley Cambridge Naponee Franklin Franklin Pump Superior Courtland Non-Federal Small Pumps Non-Federal - Below Guide Rock Small Pumps - Below Guide Rock	- 19,732 -	- -	46%	9,153	- -	- -	46%	-
		4,712		36%	1,687	4,712		36%	1,687
			1,661	60%	997		1,661	60%	997
			1,918	75%	1,439		1,918	75%	1,439
			1,278	75%	959		1,278	75%	959
Total		37,847	5,598		20,306	9,457	5,598		8,458

Source: RRCA Accounting Spreadsheets with adjustments made to Nebraska's GW CBCU.

Change in CBCU 11,848

Note: Reduced diversions using assumption of no change in reservoir storage and evaporation.

Table 5
Nebraska's Surface Water Use Summary
2006 RRCA Accounting
(acre-feet)

		Historical				Adjusted			
Sub Basin	Canal	Canal Diversions	Surface Water Pumping	CU Factor	CBCU	Canal Diversions	Surface Water Pumping	CU Factor	CBCU
North Fork	Haigler	4,418		60%	2,651	4,418		60%	2,651
Arikaree	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
Buffalo	Non-Federal		170	60%	102		170	60%	102
	Small Pumps		-		-		-		-
Rock	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
South Fork	Hale	-			-	-			-
	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
Frenchman	Champion	-			-	-			-
	Riverside	-			-	-			-
	Culbertson	-			-	-			-
	Culbertson Canal Extension	-			-	-			-
	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
Driftwood	Meeker-Driftwood	-			-	-			-
	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
Red Willow	Red Willow	-			-	-			-
	Non-Federal		-		-		-		-
	Small Pumps		121	75%	91		121	75%	91
Medicine Creek	Non-Federal		-		-		-		-
	Small Pumps		305	75%	229		305	75%	229
	Non-Federal - Below Gage		-		-		-		-
	Small Pumps - Below Gage		94	75%	71		94	75%	71
Beaver	Non-Federal		-		-		-		-
	Small Pumps		-		-		-		-
	Non-Federal - Below Gage		-		-		-		-
	Small Pumps - Below Gage		-		-		-		-
Sappa	Non-Federal		-		-		-		-
	Small Pumps		22	75%	17		22	75%	17
	Non-Federal - Below Gage		-		-		-		-
	Small Pumps - Below Gage		-		-		-		-
Prairie Dog	Almena	-			-	-			-
	Non-Federal - Below Gage		-		-		-		-
	Small Pumps - Below Gage		21	75%	16		21	75%	16
Mainstem	Bartley	5,830		44%	2,553	-		44%	-
	Cambridge	19,692		45%	8,813	-		45%	-
	Naponee	-			-	-			-
	Franklin	-			-	-			-
	Franklin Pump	-			-	-			-
	Superior	-			-	-			-
	Courtland	-			-	-			-
	Non-Federal		2,460	60%	1,476		2,460	60%	1,476
	Small Pumps		590	75%	443		590	75%	443
	Non-Federal - Below Guide Rock		-		-		-		-
	Small Pumps - Below Guide Rock		697	75%	523		697	75%	523
Total		29,940	4,480		16,982	4,418	4,480		5,616

Source: RRCA Accounting Spreadsheets with adjustments made to Nebraska's GW CBCU.

Change in CBCU 11,366

Note: Reduced diversions using assumption of no change in reservoir storage and evaporation.

Table 6
Storage Available for Release in 2006
(1000 acre-feet)

Reservoir	September ¹ EOM	Minimum ² Storage	Available for Release in 2006
Enders	10.7	8.9	1.8
Harlan Co	116.1	118	0.0
Harry Strunk	17.7	8.9	8.8
Hugh Butler	12.1	11.2	0.9
Swanson	37.3	20.9	16.4
Total			27.9

(1) USBR and Corps of Engineers reservoir records

(2) Minimum Storage is minimum contracted water level

Table 7

Estimated Effect on Compliance from Reduction in Nebraska's Pumping and Reservoir Releases: 2005 - 2006
(acre-feet)

FSS Accounting Procedures - Table 5C: Nebraska's Compliance During Water-Short Year Administration

Year	Allocation			Computed Beneficial Consumptive Use			Imported Water Supply Credit above Guide Rock	Allocation - (CBCU - IWS above Guide Rock)
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock		
2005	199,430	4,596	194,834	227,520	3,400	224,121	13,053	(16,230)
2006	201,720	2,311	199,409	204,030	2,466	201,564	18,535	16,380
Average	200,580	3,450	197,120	215,780	2,930	212,840	15,790	75
Total	401,150	6,910	394,240	431,550	5,870	425,680	31,590	150

Source: RRCA Accounting Spreadsheets with adjustments made to Nebraska's surface water and GW CBCU.

Note: Adjusted values assume no change in reservoir storage and evaporation while evacuating reservoirs in 2006 to their operational minimum.

Table 8
Summary of Changes to Canal Water Supply and Acreage
Republican River Canals in Nebraska
2005 and 2006

Year	Canal	County	(1) Historical (af)	(2) Diversions Allowed (af)	(3) Reduction (af)	(4) Historical Field Delivery (af)	NRD Location	(5) Irrigated Area (acres)	(6) Groundwater Area within 10-2 Rapid Response Region (acres)
2005	Riverside	Hitchcock	2,096	0	2,096	1,534	Middle	602	358
	Culbertson	Hitchcock	6,562	0	6,562	447	Middle	1,482	197
		Hayes							
	Cambridge	Furnas Harlan	19,732	0	19,732	9,758	Lower	15,945	4,538
Total			28,390	0	28,390	11,739		18,029	5,093
2006	Bartley	Red Willow	5,830	0	5,830	2,620	Middle - 33%	1,888	591
		Furnas					Lower - 67%	3,834	756
	Cambridge	Furnas	19,692	0	19,692	9,178	Lower	15,077	3,835
		Harlan							
Total			25,522	0	25,522	11,798		20,799	5,182

- (1) Historical Diversions listed in RRCA accounting.
- (2) Surface water available to Nebraska to achieve CBCU level to meet Compact Compliance.
- (3) Reduction to Nebraska surface water diversions = (1) - (2)
- (4) Historical Field Delivery listed in RRCA accounting Attachment 7.
- (5) Source of irrigated acreage - Annual Operating Plans of USBR.
- (6) From Nebraska 2003 coverage (Bartley Canal estimated from 2006 surface irrigated lands and 2007 well database).

Table 9
Land Capability Classification
Constrained to 10-2 Rapid Response Region
2005

County	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Irrigated Class 1-4 Acre	Non- Irrigated Class 1-4 Acres	Non- Irrigated Class 5 Acres	Non- Irrigated Class 6 Acres	Change in Irr Class 1-4 to Non-Irr Class 5-6 Acres	2005 Irrigated Acres	10-2 Rapid Response Region Class 5-6 Acres (Acres in Excess of Non-Irrigated Class 1-4 Acres) Acres Percent	
Upper Republican Counties						32,347	6,955	21.5%
Chase	41,117	32,142	2,563	37,292	8,975	23,914	4,774	20.0%
Dundy	39,887	23,358	0	49,246	16,529	8,433	2,181	25.9%
Middle Republican Counties						37,388	2,272	6.1%
Frontier	35,422	35,422	743	54,720	0	8,459	269	3.2%
Hayes	17,410	17,064	147	22,639	366	5,131	327	6.4%
Hitchcock	26,425	24,595	1,658	19,140	1,829	10,226	424	4.1%
Lincoln	12,666	12,619	534	19,126	60	2,993	736	24.6%
Red Willow	33,664	33,244	1,598	11,484	420	10,579	516	4.9%
Lower Republican Counties						45,645	1,057	2.3%
Franklin	36,713	36,713	0	16,830	0	12,232	354	2.9%
Furnas	44,684	44,679	820	7,430	4	13,993	122	0.9%
Harlan	33,878	33,878	0	24,235	0	11,165	476	4.3%
Nuckolls	9,687	10,808	0	896	0	2,108	0	0.0%
Webster	26,406	25,965	0	9,845	442	6,147	105	1.7%
Total	357,959	330,486	8,064	272,883	28,625	115,380	10,284	8.9%

Notes:

- (1) Soils with irrigated capability class 1 - 4 within model grid cells.
- (2) Soils with non-irrigated capability class 1 - 4 within model grid cells.
- (3) Soils with non-irrigated capability class 5 within model grid cells.
- (4) Soils with irrigated class 1-4 and non-irrigated capability class 6 within model grid cells.
- (5) Total soil acreage with non-irrigated capability class 6 within model grid cells.
- (6) 2005 10-2 zone irrigated acres.
- (7) 2005 10-2 zone irrigated acres (6) greater than non-irrigated class 1-4 acres (2) in the model grid cells;
limited to total non-irrigated class 5-6 acres [(3) + (4)].
- (8) (7)/(6) *100%

Table 10
Land Capability Classification
Constrained to 10-2 Rapid Response Region
2006

County	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Irrigated Class 1-4 Acre	Non- Irrigated Class 1-4 Acres	Non- Irrigated Class 5 Acres	Non- Irrigated Class 6 Acres	Change in Irr Class 1-4 to Non-Irr Class 5-6 Acres	10-2 Rapid Response Region		
						2005 Irrigated Acres	Class 5-6 Acres (Acres in Excess of Non-Irrigated Class 1-4 Acres) Acres	Percent
Upper Republican Counties						27,739	4,440	16.0%
Chase	41,117	32,142	2,563	37,292	8,975	19,478	2,818	14.5%
Dundy	39,887	23,358	0	49,246	16,529	8,261	1,622	19.6%
Middle Republican Counties						37,519	1,481	3.9%
Frontier	35,422	35,422	743	54,720	0	9,330	460	4.9%
Hayes	17,410	17,064	147	22,639	366	3,952	114	2.9%
Hitchcock	26,425	24,595	1,658	19,140	1,829	10,099	201	2.0%
Lincoln	12,666	12,619	534	19,126	60	2,085	284	13.6%
Red Willow	33,664	33,244	1,598	11,484	420	12,053	422	3.5%
Lower Republican Counties						38,579	541	1.4%
Franklin	36,713	36,713	0	16,830	0	11,276	459	4.1%
Furnas	44,684	44,679	820	7,430	4	9,843	23	0.2%
Harlan	33,878	33,878	0	24,235	0	9,815	59	0.6%
Nuckolls	9,687	10,808	0	896	0	2,140	0	0.0%
Webster	26,406	25,965	0	9,845	442	5,505	0	0.0%
Total	357,959	330,486	8,064	272,883	28,625	103,837	6,462	6.2%

Notes:

- (1) Soils with irrigated capability class 1 - 4 within model grid cells.
- (2) Soils with non-irrigated capability class 1 - 4 within model grid cells.
- (3) Soils with non-irrigated capability class 5 within model grid cells.
- (4) Soils with irrigated class 1-4 and non-irrigated capability class 6 within model grid cells.
- (5) Total soil acreage with non-irrigated capability class 6 within model grid cells.
- (6) 2005 10-2 zone irrigated acres.
- (7) 2005 10-2 zone irrigated acres (6) greater than non-irrigated class 1-4 acres (2) in the model grid cells; limited to total non-irrigated class 5-6 acres [(3) + (4)].
- (8) (7)/(6) *100%