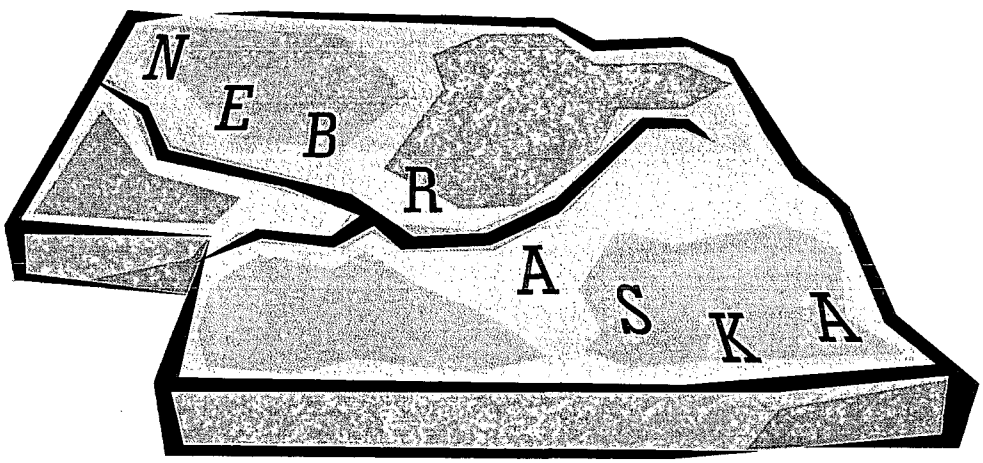
Integrated Management Meeting

Republican River Natural Resource Districts
&
The Department of Natural Resources



January 25, 2007
Lincoln, Nebraska

Privileged and Confidential Attorney Client Communication
And Attorney Work Product

Potential Agenda for RRNRD Meeting

January 25, 2007
8:00 A.M. DNR Office, Lincoln

Meeting goals:

1. Develop a list of all feasible options for maintaining Compact compliance;
2. Develop a list of options for allocating the available water supplies among NRDs and between surface water and ground water users
3. Develop a work plan and decision making process with the goal of having plans ready before the next Compact meeting.

Agenda

1. Required IMP goals include Compact Compliance, what objectives are we trying to achieve?

2. What tools can we use?
   a. Near-term
      i. 2007
      ii. 2008-2010
   b. Long-term

3. How do we distribute the allocated supply
   a. Among NRDs?
   b. Between surface water and ground water users

4. Status of current studies to develop better methods for Compact compliance

5. Review available data and determine additional data needs

6. Develop decision making process for developing new or changed components of the plan

7. Develop a schedule and task assignments for work completion

Points to Consider

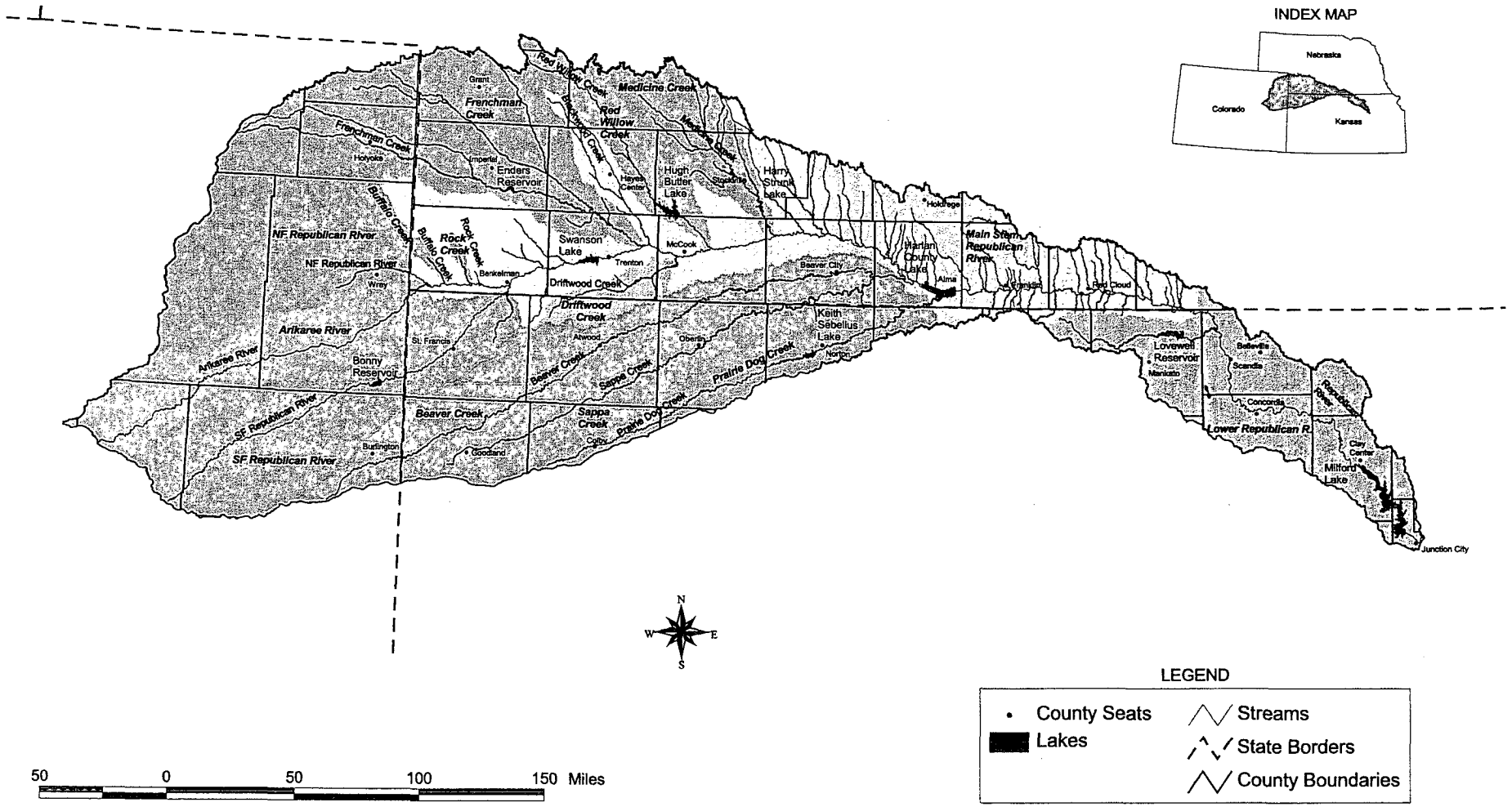
1. Controls proposed for adoption in IMP shall, when considered together with any applicable incentive programs
   a. Sustain a balance between supply and use

DRAFT FOR DISCUSSION PURPOSES ONLY

b. Remain in compliance with Republican River Compact
c. Protect ground water users and surface water appropriators whose water wells and appropriations are dependent on the river from stream flow depletions from uses begun after the date the river basin was designated as fully appropriated (Neb.Rev. Stat. 46-715).

2. Potential Objectives
   a. Maximize economic and environmental beneficial consumptive use of Nebraska's Compact allocation
   b. Minimize nonbeneficial consumptive use of water
   c. Minimize the adverse economic and social impacts on the basin that will result from the necessary reductions in water use
   d. Distribute allocation fairly among users
   e. Promote long-term stability
3. Tools to achieve objectives
   a. Reduce pumping allocations and the number of certified aces in the next IMP cycle to meet Compact requirements
      i. Regulatory controls
         1. Allocations
         2. Reductions in irrigated acres
      ii. Incentive plans CREP, EQIP
      iii. Other?
   b. Methods to allow flexibility to make maximum use of water given the wide fluctuations in water supply
      i. Use of Quick Response Area wells and surface water supplies to achieve timely response to river
         1. Dry-year leasing
      ii. Other augmentation plans
      iii. Other?
   c. Methods to optimize the use of surface water infrastructure to conjunctively manage available water supplies
   d. Methods to increase productivity per acre-foot of water consumed
   e. Methods to decrease nonbeneficial consumptive use of water (removal of water consuming invasive species and vegetation in the river channel)
   f. Other?

Update of Figure 3 - Map Showing Sub-basins, Streams, and the Basin Boundaries
RRCA Accounting Procedures and Reporting Requirements
January 12, 2005



Nebraska Republican Basin Precipitation, 1950-2006

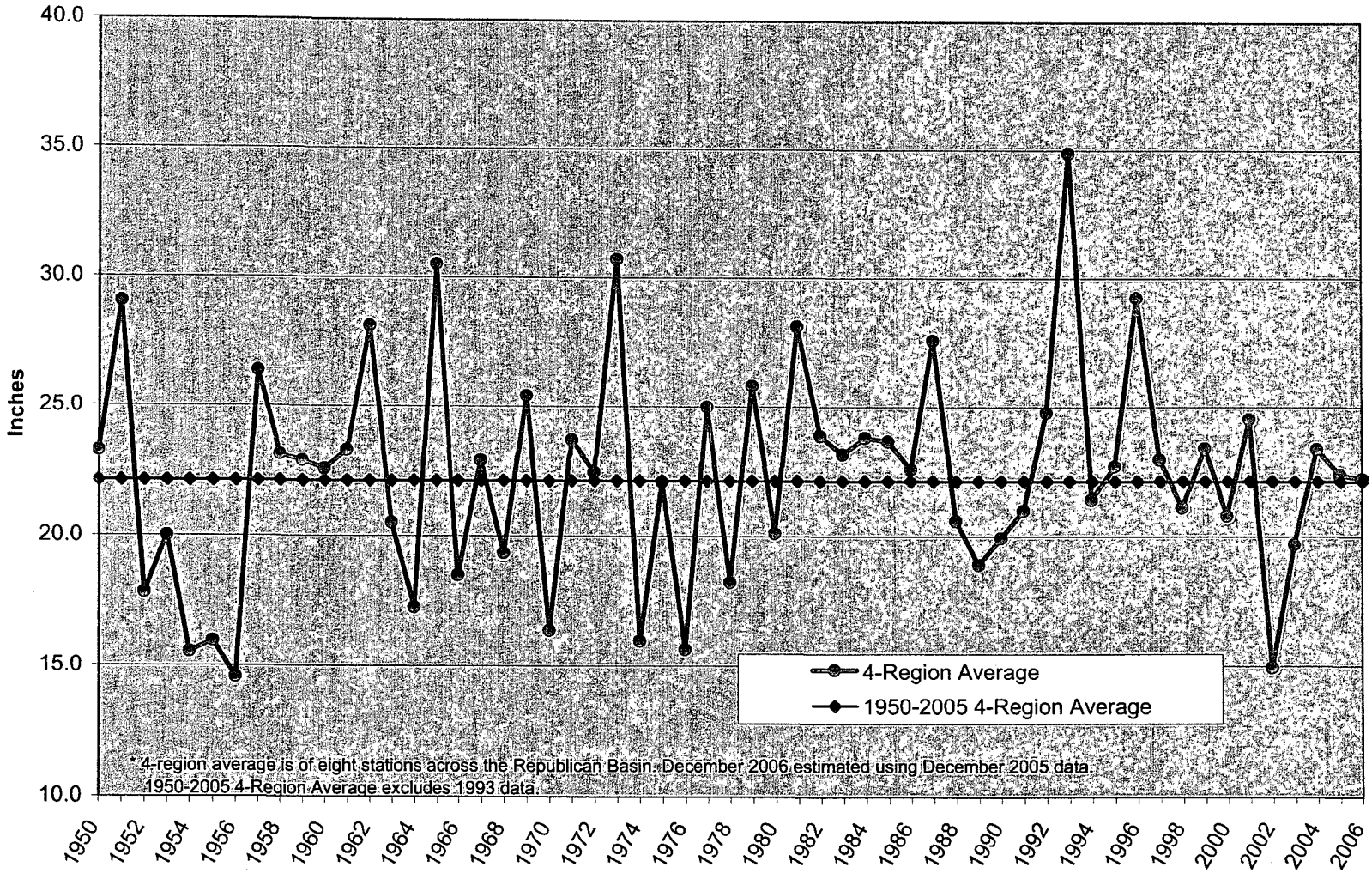
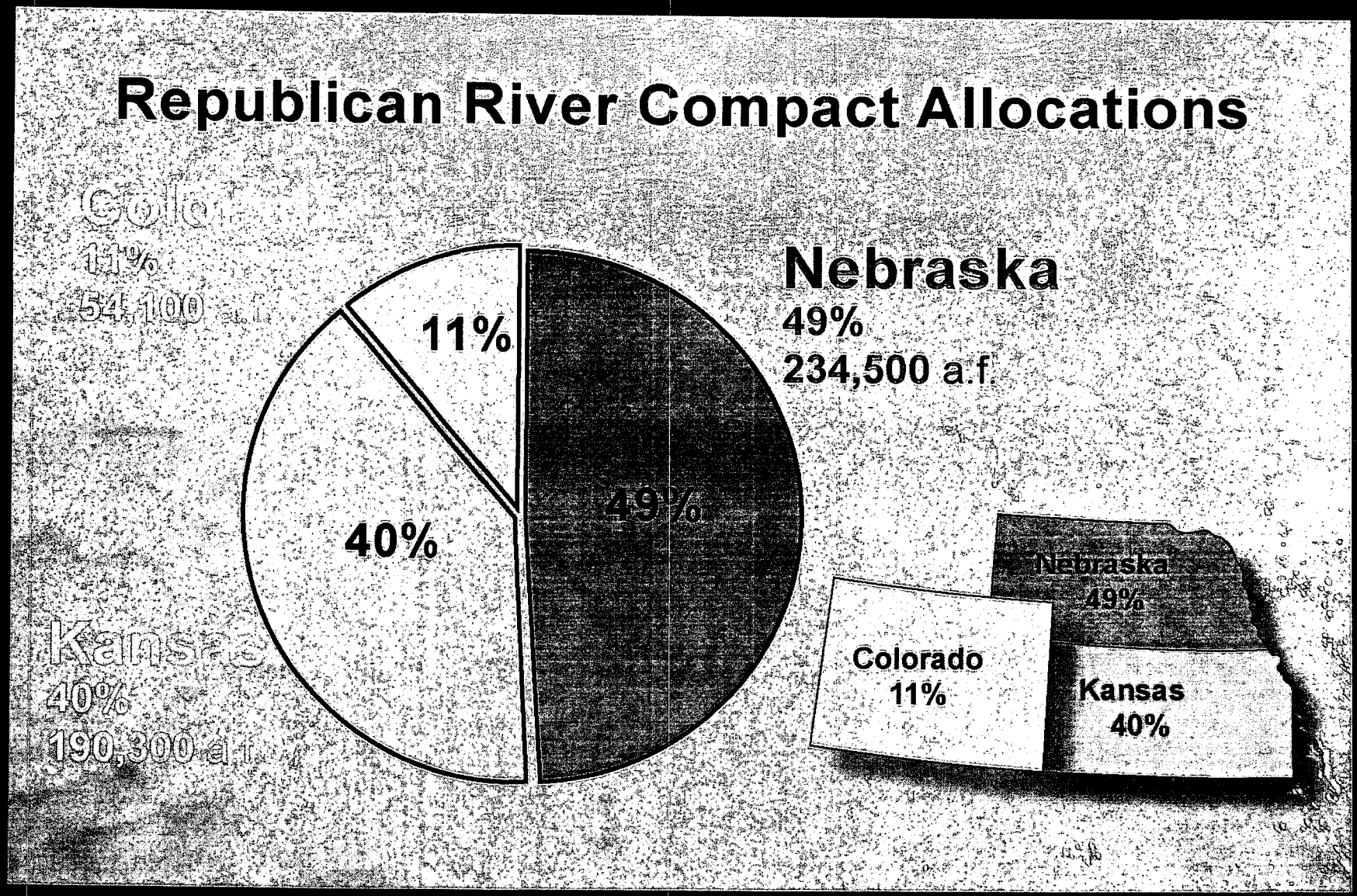


Table 2: Original Compact Virgin Water Supply and Allocations

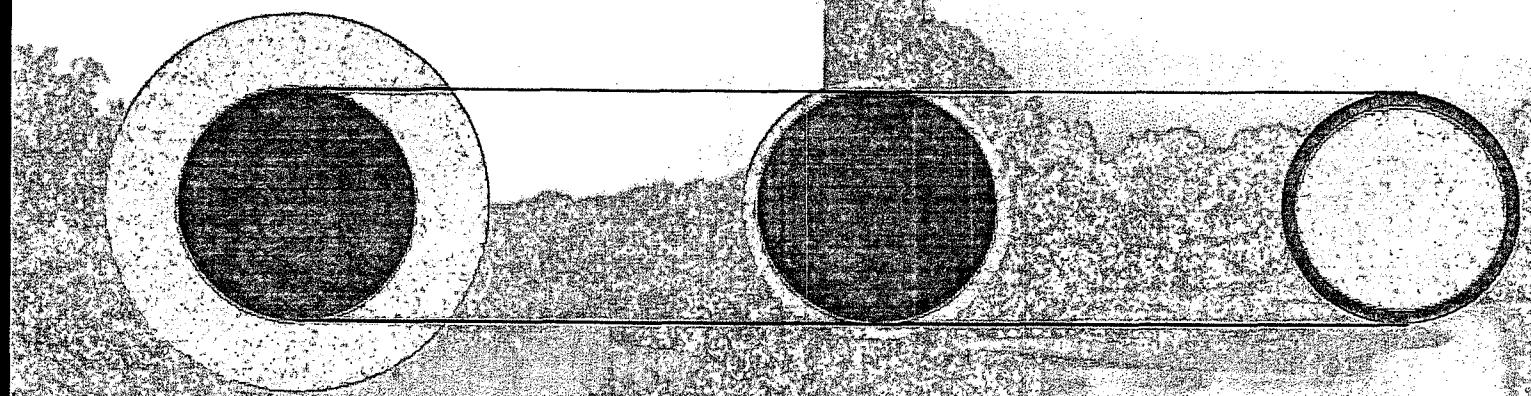
Basin	Virgin Water Supply	Colorado Allocation	% of Basin Supply	Kansas Allocation	% of Basin Supply	Nebraska Allocation	% of Basin Supply	Unallocated	% of Basin Supply
North Fork	44,700	10,000	22.4%			11,000	24.6%	23,700	53.0%
Arikaree	19,610	15,400	78.5%	1,000	5.1%	3,300	16.8%	-90	-0.4%
Buffalo	7,890					2,600	33.0%	5,290	67.0%
Rock	11,000					4,400	40.0%	6,600	60.0%
South Fork	57,200	25,400	44.4%	23,000	40.2%	800	1.4%	8,000	14.0%
Frenchman	98,500					52,800	53.6%	45,700	46.4%
Driftwood	7,300			500	6.9%	1,200	16.4%	5,600	76.7%
Red Willow	21,900					4,200	19.2%	17,700	80.8%
Medicine	50,800					4,600	9.1%	46,200	90.9%
Beaver	16,500	3,300	20.0%	6,400	38.8%	6,700	40.6%	100	0.6%
Sappa	21,400			8,800	41.1%	8,800	41.1%	3,800	17.8%
Prairie Dog	27,600			12,600	45.7%	2,100	7.6%	12,900	46.7%
Tributaries Sub-Total	384,000							175,500	
Main Stem	94,500								
Main Stem + Unallocated	270,000			138,000	51.1%	132,000	48.9%		
Total	478,900	54,100		190,300		234,500			

Original Compact Allocations



Nebraska's 49% Share

Grows and Shrinks with the Water Supply



Wet Year
Allocation: 400 K AF
C.U.: 267K AF

Average Year
Allocation: 268K AF
C.U. 258K AF

Dry Year
Allocation :211K AF
C.U. 263K AF

Nebraska's Adjusted Allocation

Nebraska's Consumptive Use

RRCA
Compact Accounting without non-federal reservoir evaporation below Harlan County

Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin

2005	Virgin Water	Computed	Allocations				Computed Beneficial Consumptive Use		
Basin	Supply	Water Supply	Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	44,800	44,800	10,040	0	11,020	23,740	17,530	20	4,290
Arikaree	2,370	2,370	1,860	120	400	-10	810	160	250
Buffalo	6,050	6,050	0	0	2,000	4,050	310	0	3,510
Rock	9,360	9,360	0	0	3,740	5,620	60	0	3,830
South Fork	26,050	27,550	12,230	11,080	390	3,850	18,660	7,520	1,370
Frenchman	110,950	110,950	0	0	59,470	51,480	40	0	86,800
Driftwood	3,400	3,400	0	230	560	2,610	0	10	1,480
Red Willow	16,360	14,560	0	0	2,800	11,760	0	0	8,800
Medicine	39,990	34,390	0	0	3,130	31,260	0	0	21,320
Beaver	4,560	4,560	910	1,770	1,850	30	0	1,660	2,730
Sappa	-310	-310	0	-130	-130	-50	0	-1,180	790
Prairie Dog	11,720	11,620	0	5,310	880	5,430	0	8,180	40
Main Stem	116,560	90,960	0	46,480	44,480	0	-1,950	27,940	117,480
Total All Basins	391,860	360,260	25,040	64,860	130,590	139,770	35,460	44,310	252,690
Main Stem Including Unallocated		230,730	0	117,900	112,830				
Total	391,860	360,260	25,040	136,280	198,940	0	35,460	44,310	252,690

Negative numbers represent the residual accounting impacts from groundwater well pumping. Reference RRCA accounting user's manual for comprehensive explanation.

RRCA
Compact Accouting without non-federal reservoir evaporation below Harlan County

Table 3A: Colorado's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	21,420	33,470	NA	(12,050)
2004	21,540	33,670	NA	(12,130)
2005	25,040	35,460	NA	(10,420)
2006			NA	
2007			NA	
Average	22,670	34,200		(11,530)
Sum				(34,600)

Table 3B: Kansas's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	167,780	48,910	NA	118,870
2004	137,450	38,120	NA	99,330
2005	136,280	44,310	NA	91,970
2006			NA	
2007			NA	
Average	147,170	43,780		103,390
Sum				310,170

Table 3C: Nebraska's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	227,580	262,780	9,780	(25,420)
2004	205,630	252,650	10,380	(36,640)
2005	198,940	252,690	11,965	(41,785)
2006				
2007				
Average	210,720	256,040	10,710	(34,620)
Sum				(103,845)

RRCA

Compact Accounting with non-federal reservoir evaporation above Harlan County

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Preliminary Estimate

Provisional Information Under Review

Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin

2006	Virgin Water	Computed	Allocations				Computed Beneficial Consumptive Use		
Basin	Supply	Water Supply	Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	41,470	41,470	9,290	0	10,200	21,980	17,050	10	4,300
Arikaree	2,040	2,040	1,600	100	340	0	1,390	90	140
Buffalo	5,650	5,650	0	0	1,860	3,790	310	0	3,510
Rock	9,000	9,000	0	0	3,600	5,400	60	0	3,910
South Fork	20,100	21,600	9,590	8,680	300	3,030	16,000	4,410	1,190
Frenchman	105,100	105,720	0	0	56,670	49,050	30	0	81,730
Driftwood	2,130	2,130	0	150	350	1,630	0	10	1,460
Red Willow	13,830	20,950	0	0	4,020	16,930	0	0	8,250
Medicine	34,190	37,470	0	0	3,410	34,060	0	0	20,800
Beaver	4,740	4,740	950	1,840	1,920	30	0	1,670	2,820
Sappa	-440	-440	0	-180	-180	-80	0	-960	780
Prairie Dog	6,030	5,930	0	2,710	450	2,770	0	5,780	40
Main Stem	53,220	65,660	0	33,550	32,110	0	-3,290	39,810	97,750
Total All Basins	297,060	321,920	21,430	46,850	115,050	138,590	31,550	50,820	226,680
Main Stem Including Unallocated		204,250	0	104,370	99,880				
Total	297,060	321,920	21,430	117,670	182,820	0	31,550	50,820	226,680

Negative numbers represent the residual accounting impacts from groundwater well pumping. Reference RRCA accounting user's manual for comprehensive explanation.

RRCA
Compact Accounting with non-federal reservoir evaporation below Harlan County

Table 3A: Colorado's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	21,420	33,470	NA	(12,050)
2004	21,540	33,670	NA	(12,130)
2005	21,430	31,550	NA	(10,120)
2006			NA	
2007			NA	
Average	21,460	32,900		(11,430)
Sum				(34,300)

Table 3B: Kansas's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	167,780	48,910	NA	118,870
2004	137,450	38,120	NA	99,330
2005	117,670	50,820	NA	66,850
2006			NA	
2007			NA	
Average	140,970	45,950		95,020
Sum				285,050

Table 3C: Nebraska's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	227,580	262,780	9,780	(25,420)
2004	205,630	252,650	10,380	(36,640)
2005	198,940	252,690	11,965	(41,785)
2006	182,820	226,680	11,486	(32,374)
2007				
Average	203,740	248,700	10,900	(34,050)
Sum				(136,219)

Early estimate assumes KS takes Harlan Evap for 2006 based on current accounting procedures.

KS WATER DELIVERIES

(inches/acre)

	2001	2002	2003	2004	2005	2006
KAN-BOST.	11.1	12.4	8.2	0.0/6.4	0.0/5.1	3.0/6.0
ALMENA	4.0	3.9	3.7	0.0	0.0	0.0
KIRWIN	10.0	11.4	7.9	3.3	0.0	0.0
WEBSTER	8.5	9.3	7.1	2.2	0.0	0.0
GLEN ELDER	9.1	15.4	11.5	6.5	7.4	12.0

NE WATER DELIVERIES

(inches/acre)

	2001	2002	2003	2004	2005	2006
AINSWORTH	16.4	21.4	17.7	18.8	15.8	19.2
TWIN LOUPS	10.3	13.0	13.0	12.0	10.8	11.7
MIR. FLATS	8.0	7.2	4.8	3.5	4.5	4.4
FR. VALLEY	4.0	3.7	4.1	3.1	0.6	0.0
H&RW	2.7	0.0	0.0	0.0	0.0	0.0
FR. CAMB.	7.6	6.1	0.0/7.6	0.0/7.8	0.0/6.0	0.0/6.0
BOST. IN NEB.	10.1	11.6	6.2	0.0/2.9	0.0/3.0	0.0

KS WATER AVAILABILITY

(inches/acre)- Estimated for 2007

KAN-BOSTWICK	0.0/6.0
ALMENA	2.5
KIRWIN	3.5
WEBSTER	.5
GLEN ELDER	Full Supply

NE WATER AVAILABILITY

(inches/acre)- Estimated for 2007

AINSWORTH	Full Supply
TWIN LOUPS	Full Supply
MIRAGE FLATS	3.0
FR. VALLEY	0.5
H&RW	0.5
FR. CAMBRIDGE	3.5/8.0
BOST. IN NEB.	0.0

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Provisional Information
Under Review

Comparison of Accounting for Nebraska's Lease of Surface Water in 2006 [t]

Table 3C: Nebraska's Five-Year Average Allocation and CBCU with Early 2006 Estimate*

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	227,580	262,780	9,780	(25,420)
2004	205,630	252,650	10,380	(36,640)
2005	198,940	252,690	11,965	(41,785)
2006	182,820	226,680	11,486	(32,374)
2007				
Average	203,870	248,960	10,900	(34,190)

* Since no Nebraska canals diverted storage water released from Harlan County Dam, the existing accounting procedures were used. This results in Kansas assuming all the charge for evaporation from Harlan County Lake.

Table 3C: Nebraska's Five-Year Average Allocation and CBCU with Hypothetical 2006 Diversions*

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2003	227,580	262,780	9,780	(25,420)
2004	205,630	252,650	10,380	(36,640)
2005	198,940	252,690	11,965	(41,785)
2006	182,890	241,440	11,486	(47,064)
2007				
Average	203,890	252,650	10,900	(37,860)

* This estimate is based on the hypothetical condition that Nebraska had actually diverted water into the Nebraska Bostwick canals, Culbertson Canal and Riverside Canal. For the Bureau of Reclamation project canals estimated diversions and deliveries were produced, so that the Compact Accounting could be conducted.

[t] The two estimated data sets used non-federal evaporation estimates for the basin above Harlan County Lake.

Potential CBCU Savings **14,690 AF** Provisional Information Under Review

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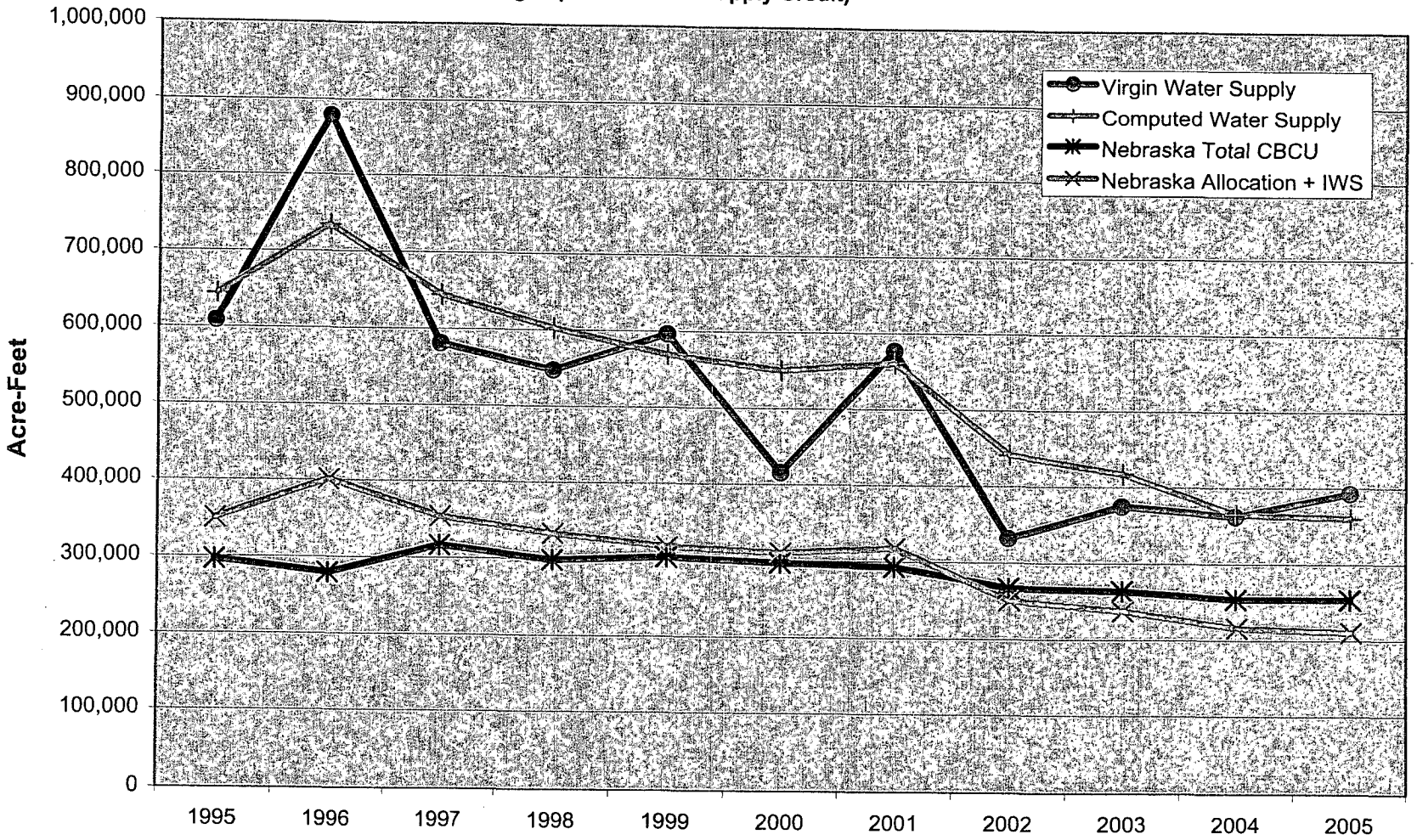
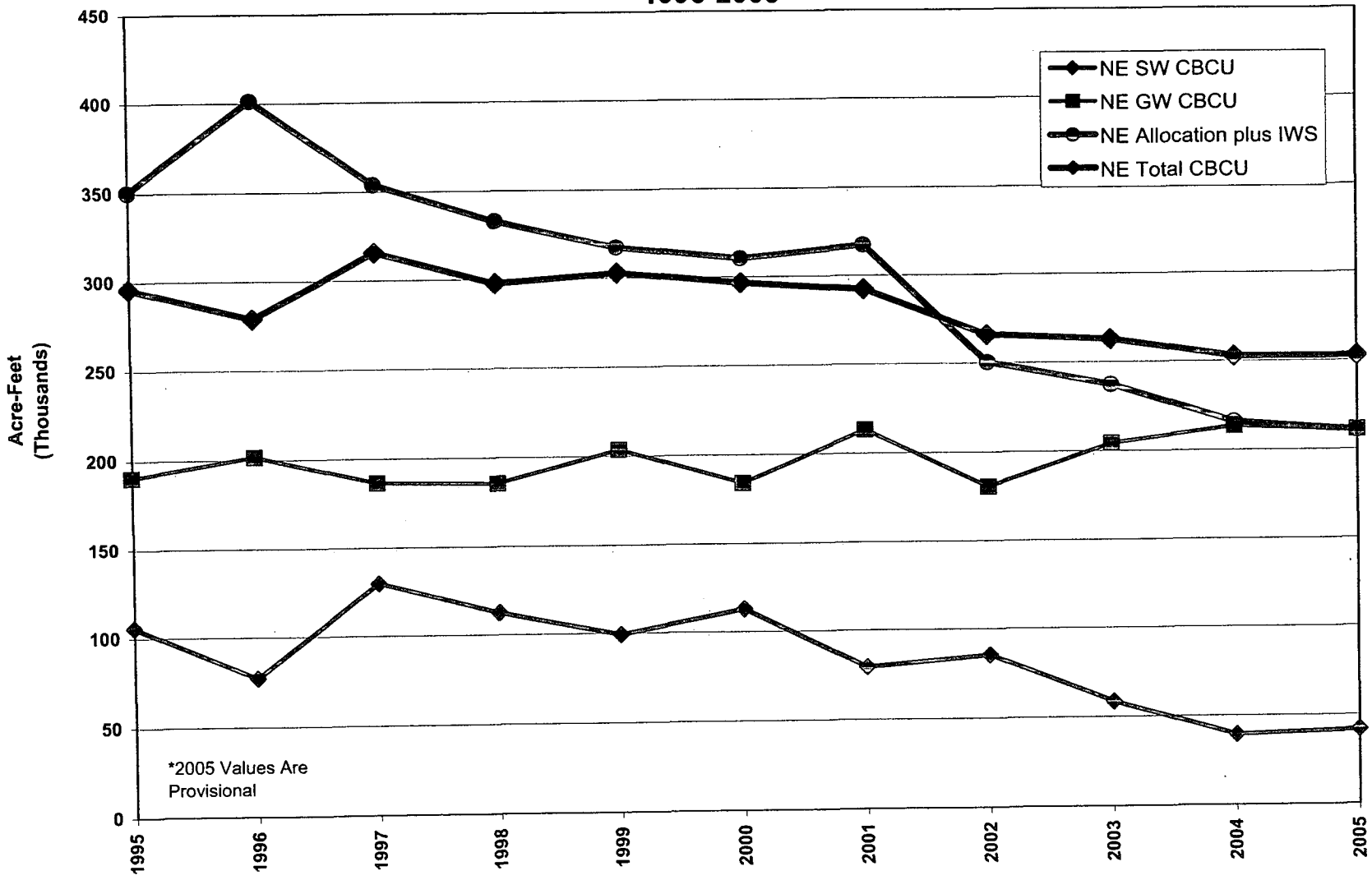
Compact Water Supply, Allocation and Consumptive Use Values
(including Imported Water Supply Credit)



Summary_SW-GW_Table1&2.xls

Republican River Compact Data
1995-2005*



Allocation_CBCU_95-05prov.xls

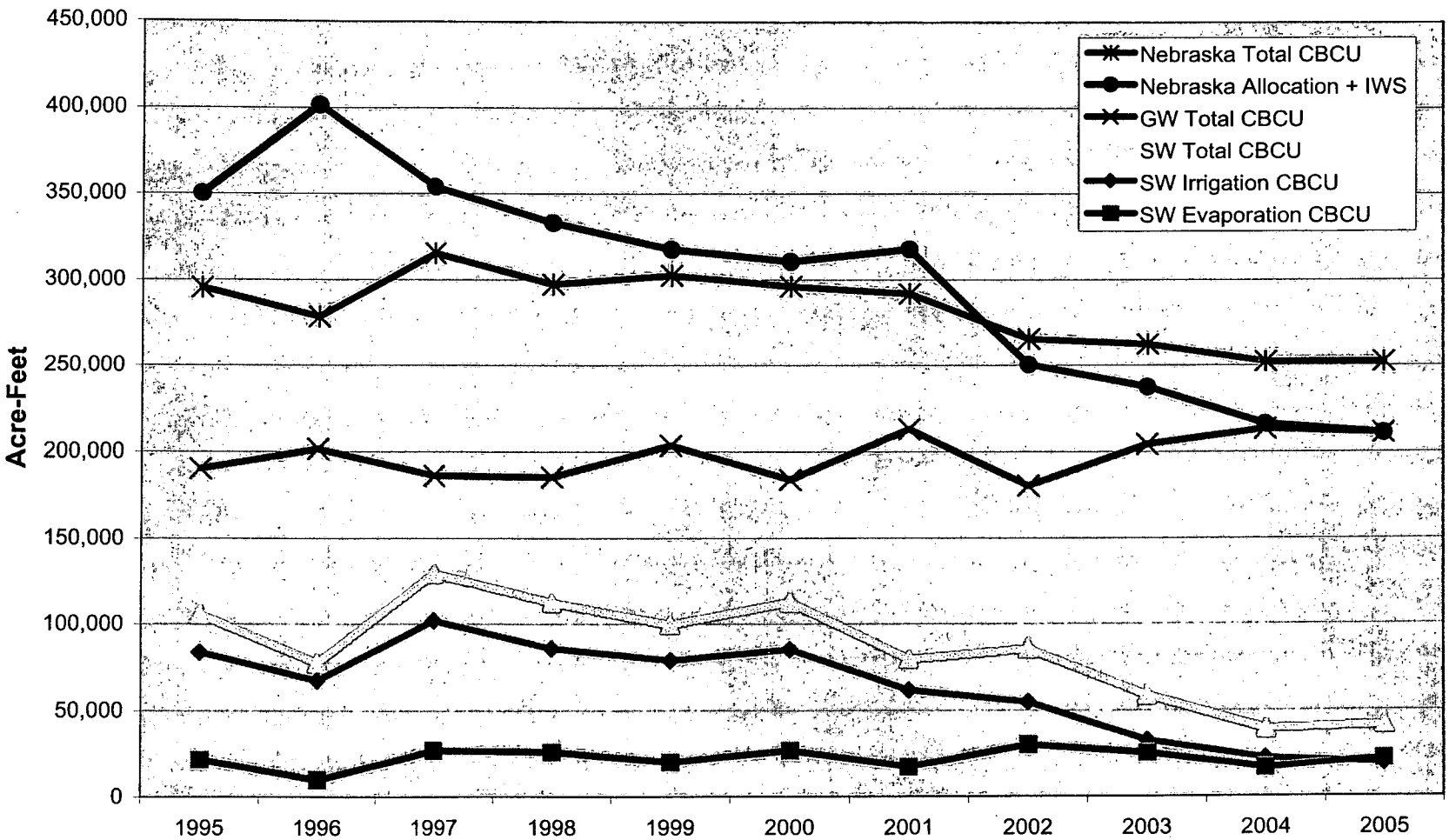
Blue shade indicates values directly or derived from old accounting tables
Green shade indicates raw values from model output or values from accounting spreadsheet that utilized model data

Year	CWS	NE Allocation	NE CBCU	Compact Accounting GW CBCU	NE GW Impacts from GW Model	NE IWS (Mound Credit) from GW Model	NE SW CBCU (Using Compact Accounting)	NE Allocation minus CBCU	NE Allocation plus IWS after 1994	NE Allocation minus CBCU (Plus IWS Credit after 1994)
1981	518,900	259,390	174,500	84,140	142,490	15,240	90,360	84,890	259,390	84,890
1982	676,300	342,860	233,080	122,120	133,830	13,780	110,960	109,780	342,860	109,780
1983	672,570	337,620	248,130	115,010	124,240	13,140	133,120	89,490	337,620	89,490
1984	799,450	399,940	266,910	136,630	143,720	13,740	130,280	133,030	399,940	133,030
1985	605,300	307,510	257,130	143,810	151,680	16,790	113,320	50,380	307,510	50,380
1986	585,180	298,660	311,090	178,430	143,410	13,150	132,660	-12,430	298,660	-12,430
1987	717,680	362,140	275,680	162,060	152,180	16,760	113,620	86,460	362,140	86,460
1988	525,720	270,290	263,630	140,450	151,420	13,810	123,180	6,660	270,290	6,660
1989	506,930	258,660	296,060	172,530	147,570	13,850	123,530	-37,400	258,660	-37,400
1990	520,198	266,368	299,070	177,730	158,980	14,820	121,340	-32,702	266,368	-32,702
1991	421,300	210,960	263,220	158,450	175,050	12,690	104,770	-52,260	210,960	-52,260
1992	514,650	260,670	234,300	157,350	181,220	14,670	76,950	26,370	260,670	26,370
1993	1,035,820	512,950	105,970	55,720	177,490	24,610	50,250	406,980	512,950	406,980
1994	664,049	333,539	309,800	176,760	167,040	15,950	133,040	23,739	333,539	23,739
1995	644,010	332,550	295,880	190,320	190,320	17,900	105,560	36,670	350,450	54,570
1996	734,040	377,300	278,900	201,530	201,530	24,390	77,370	98,400	401,690	122,790
1997	644,210	337,700	315,680	186,350	186,350	16,430	129,330	22,020	354,130	38,450
1998	602,120	315,410	297,750	185,460	185,460	17,680	112,290	17,660	333,090	35,340
1999	569,030	299,050	302,890	203,490	203,490	18,440	99,400	-3,840	317,490	14,600
2000	549,700	291,920	296,530	184,020	184,020	18,660	112,510	-4,610	310,580	14,050
2001	560,520	299,380	292,320	212,870	212,870	18,240	79,450	7,060	317,620	25,300
2002	441,480	236,550	265,910	180,440	180,440	14,000	85,470	-29,360	250,550	-15,360
2003	416,780	227,580	262,780	204,170	204,170	9,780	58,610	-35,200	237,360	-25,420
2004	364,620	205,630	252,650	213,120	213,120	10,380	39,530	-47,020	216,010	-36,640
2005	360,260	198,940	252,690	210,880	210,880	11,960	41,800	-54,290	210,900	-41,790

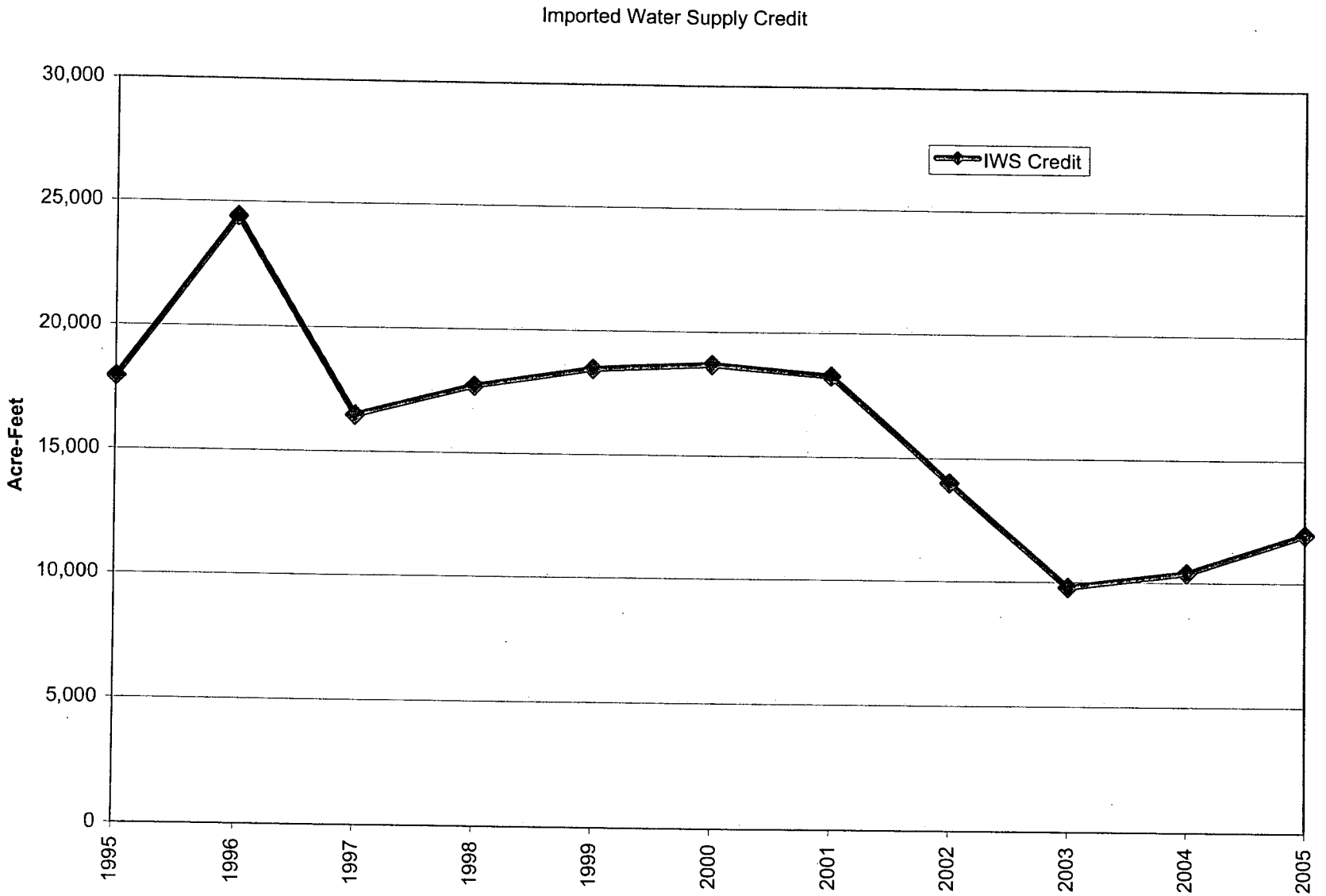
2005 is not finally adopted by the RRCA as of 1-16-2007, NFR Evap for SW CBCU for above Harlan County Lake

'81-'00	318,774	266,310	156,618	165,075	16,325	109,692	52,464	324,449	58,139
'81-'05	301,743	266,102	166,154	172,919	15,634	99,948	35,619	308,857	42,755
'81-'85	329,464	235,950	120,342	139,192	14,538	115,608	93,514	329,464	93,514
'86-'90	291,224	289,106	166,240	150,712	14,478	122,866	2,118	291,224	2,118
'91-'95	330,134	241,834	147,720	178,224	17,164	94,114	88,300	333,714	91,880
'96-'00	324,276	298,350	192,170	192,170	19,120	106,180	25,926	343,396	45,046
'01-'05	233,616	265,270	204,296	204,296	12,872	60,972	-31,762	246,488	-18,782
'96-'05	278,946	281,810	198,233	198,233	15,996	83,576	-2,918	294,942	13,132
'99-'05	251,293	275,110	201,284	201,284	14,494	73,824	-23,894	265,787	-9,323

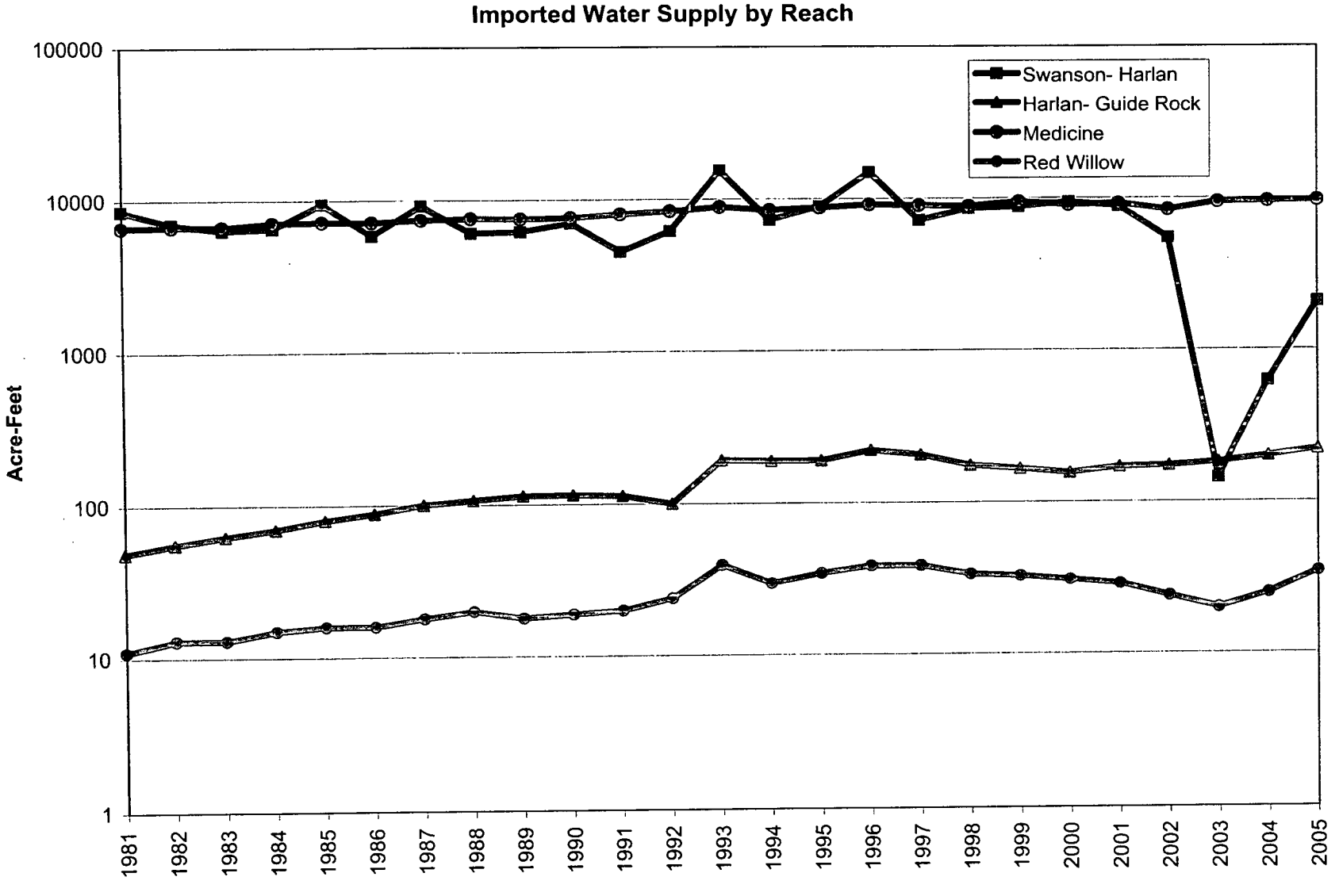
Compact CBCU and Allocation Values
(including Imported Water Supply Credit)



Summary_SW-GW_Table1&2.xls

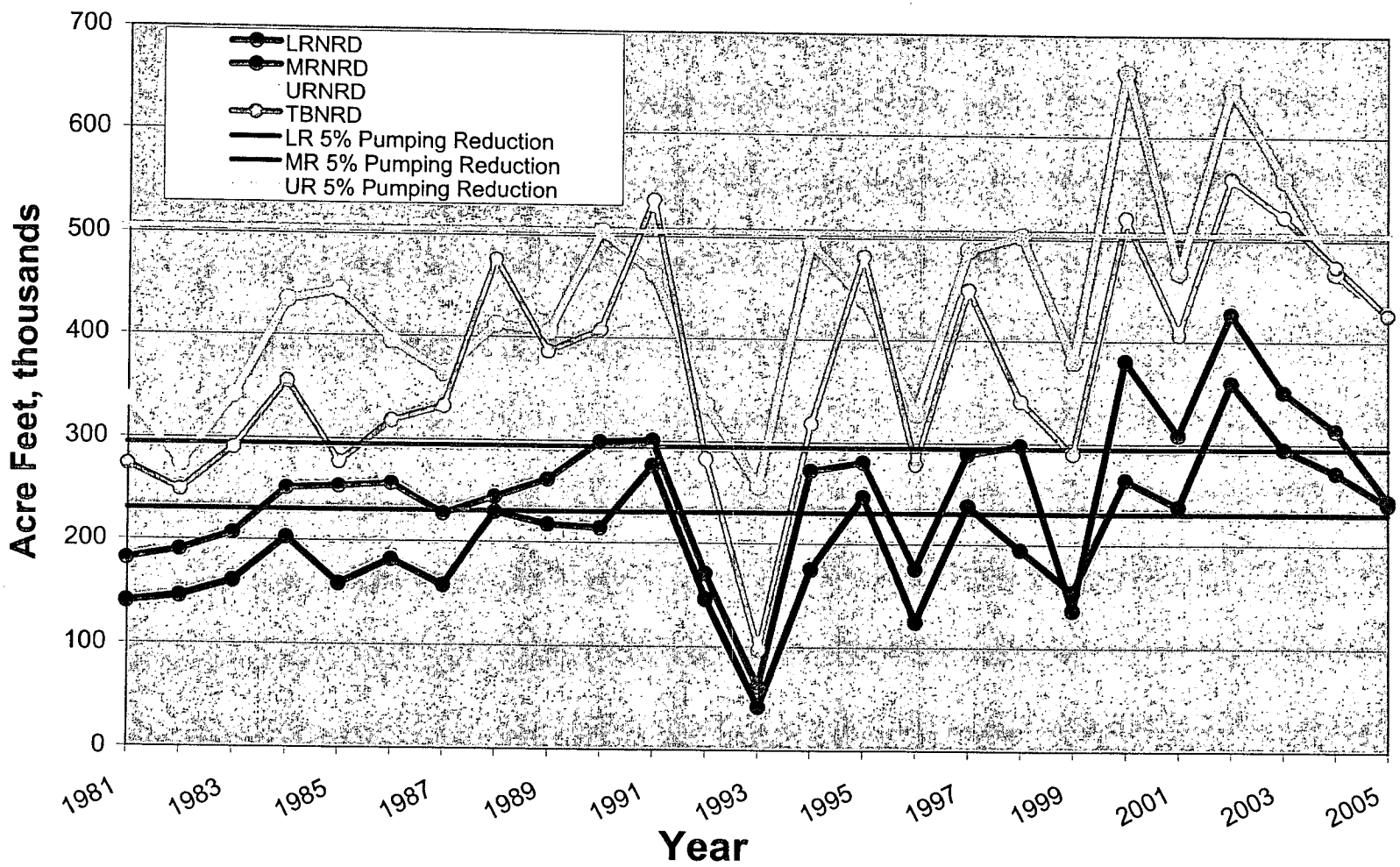


Allocation_CBCU_95-05prov.xls



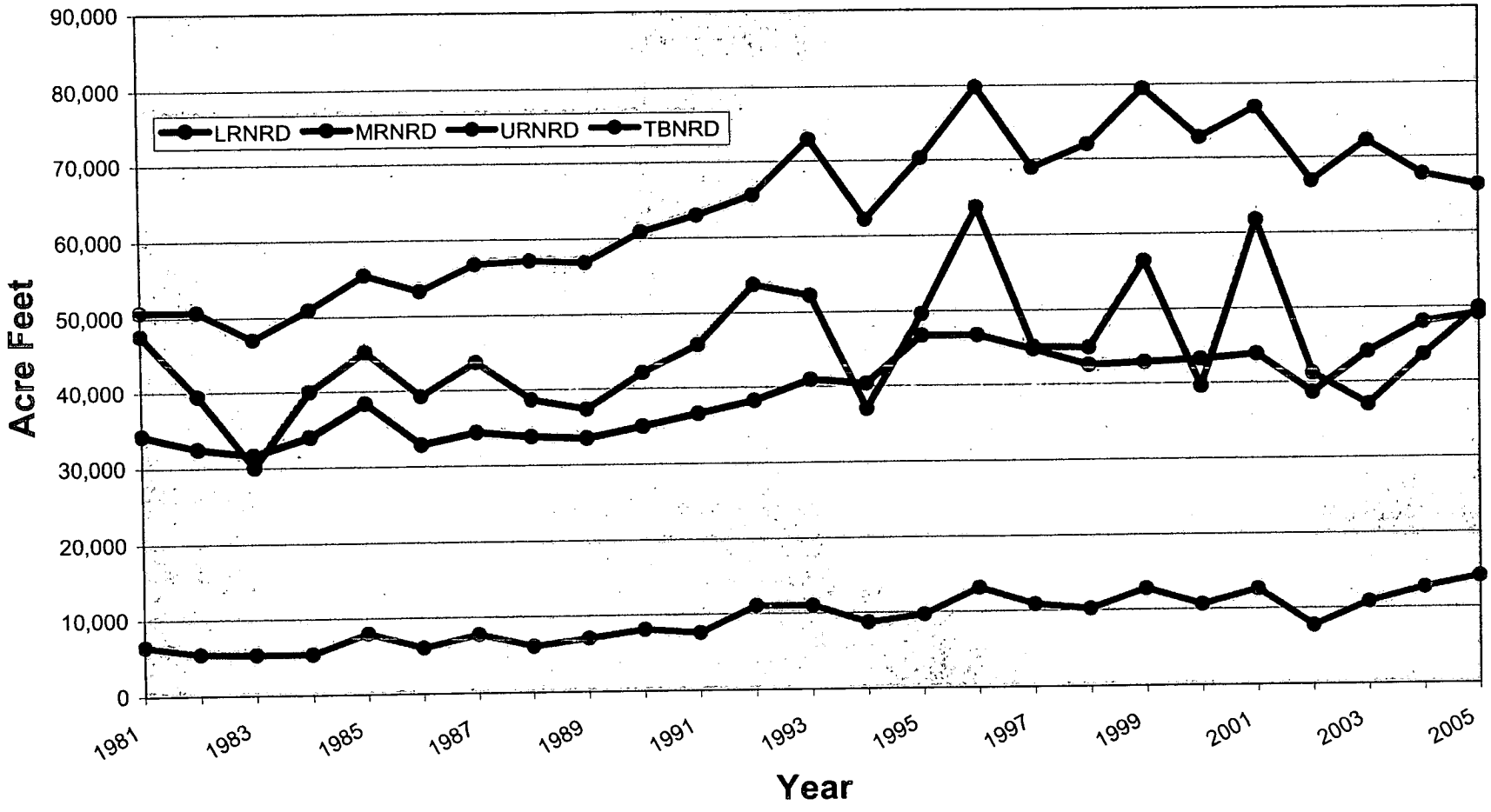
Impacts_1981-2005_plus_IWS_chart.xls

Republican Model Region Groundwater Pumping by NRD



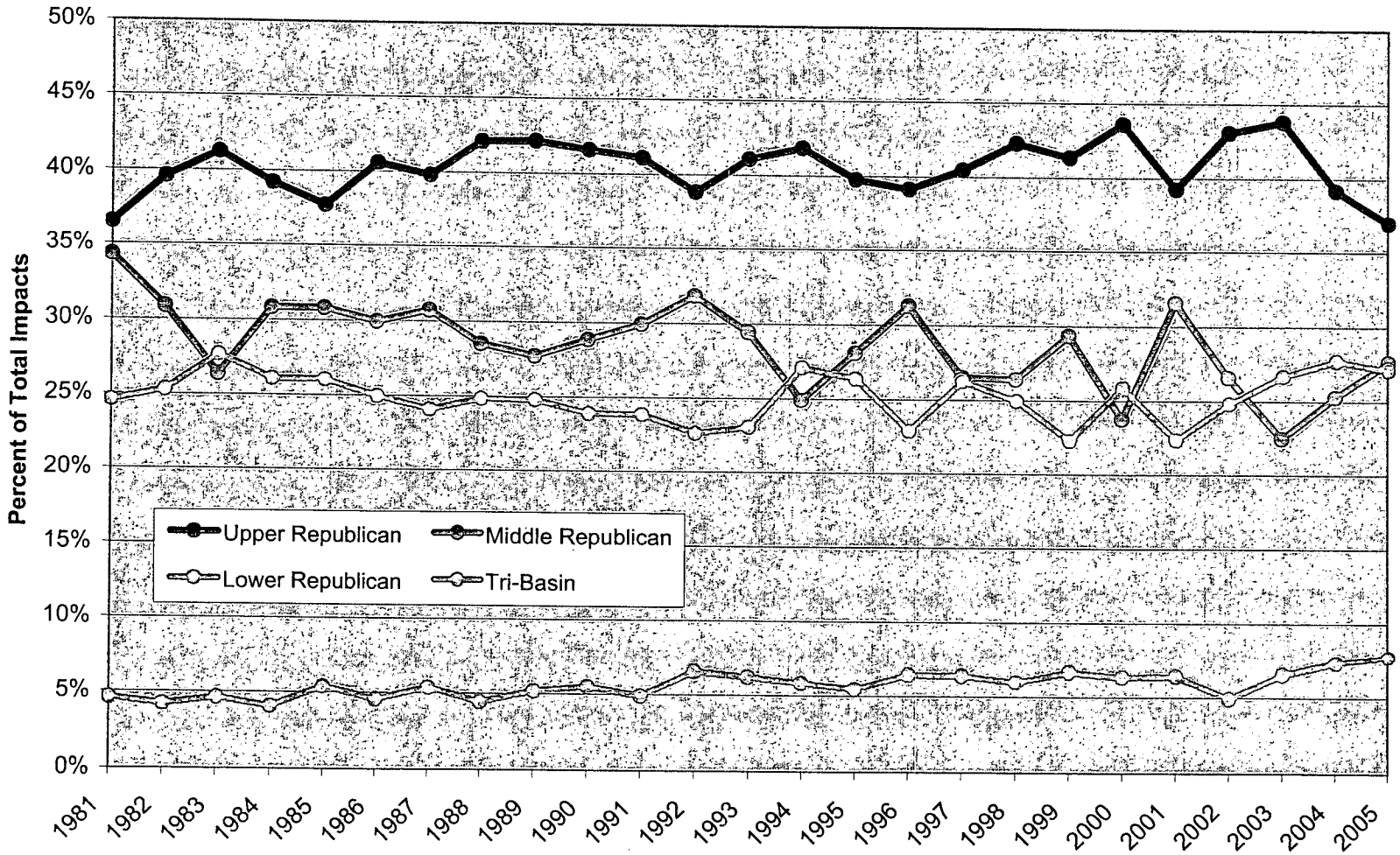
NRD_Impacts81_Ongoing_PK .xls

Ground Water Depletions to Stream by NRD



NRD_Impacts81_Ongoing_PK .xls

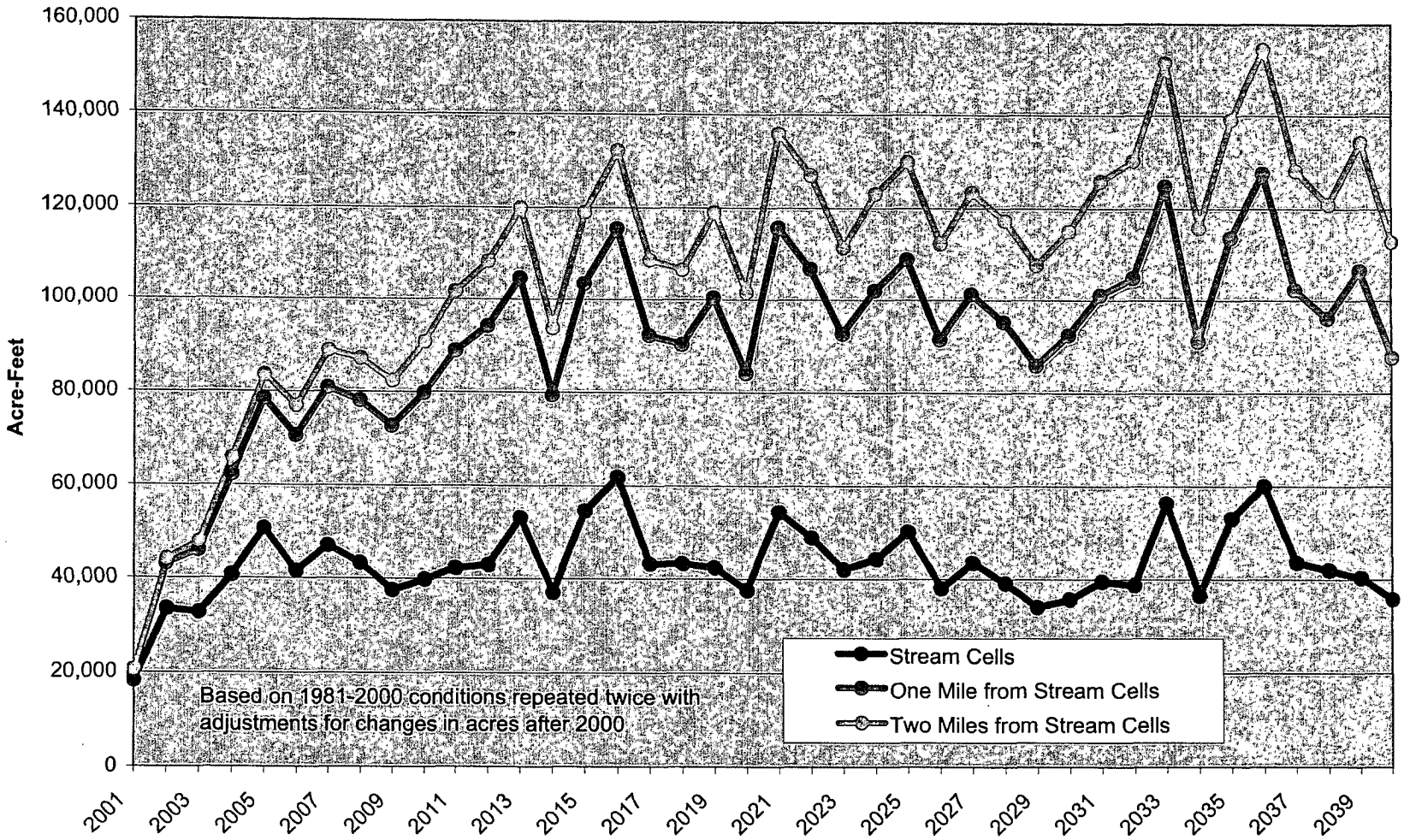
Percentages of Stream Depletion from Ground Water Pumping, 1981 - 2005, Republican Basin NRDs



NRD_ImpactChart1981-2005.xls

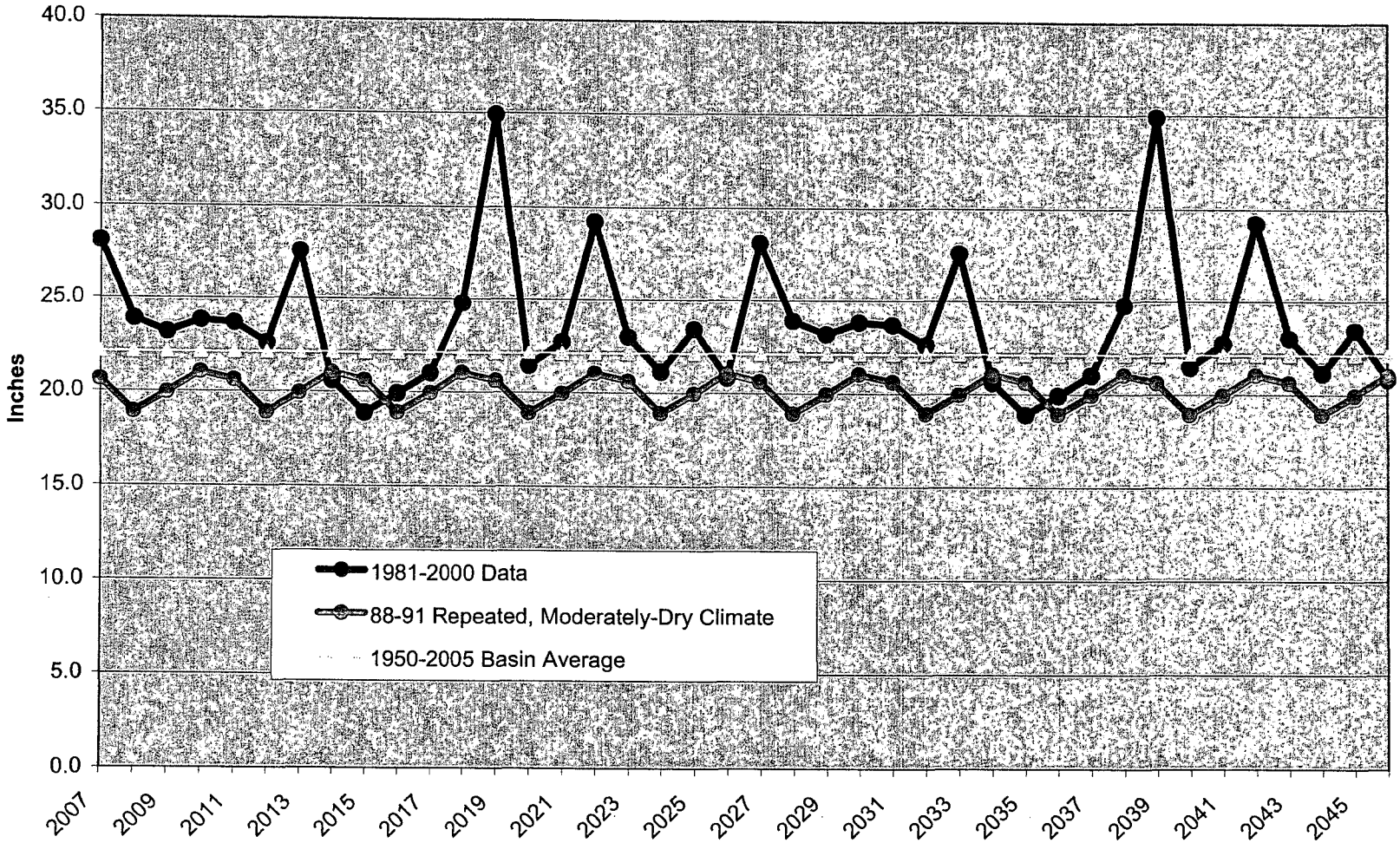
year	UR	MR	LR	TB	Other	Total Impact (acre-ft	UR	MR	LR	TB	Other
1981	50,771	47,662	34,285	6,430	127	139,275	36.5%	34.2%	24.6%	4.6%	0.1%
1982	50,778	39,540	32,510	5,403	140	128,371	39.6%	30.8%	25.3%	4.2%	0.1%
1983	47,117	30,077	31,661	5,308	176	114,339	41.2%	26.3%	27.7%	4.6%	0.2%
1984	51,033	40,042	34,005	5,300	-105	130,275	39.2%	30.7%	26.1%	4.1%	-0.1%
1985	55,514	45,318	38,381	7,955	203	147,371	37.7%	30.8%	26.0%	5.4%	0.1%
1986	53,350	39,330	32,852	6,008	36	131,576	40.5%	29.9%	25.0%	4.6%	0.0%
1987	56,840	43,808	34,431	7,675	160	142,914	39.8%	30.7%	24.1%	5.4%	0.1%
1988	57,229	38,740	33,812	6,051	270	136,102	42.0%	28.5%	24.8%	4.4%	0.2%
1989	56,937	37,409	33,521	7,007	355	135,229	42.1%	27.7%	24.8%	5.2%	0.3%
1990	60,916	42,208	35,024	8,071	391	146,610	41.5%	28.8%	23.9%	5.5%	0.3%
1991	63,031	45,852	36,623	7,526	541	153,573	41.0%	29.9%	23.8%	4.9%	0.4%
1992	65,634	53,720	38,260	11,062	539	169,215	38.8%	31.7%	22.6%	6.5%	0.3%
1993	73,008	52,256	40,980	11,011	636	177,891	41.0%	29.4%	23.0%	6.2%	0.4%
1994	62,266	37,051	40,368	8,667	631	148,983	41.8%	24.9%	27.1%	5.8%	0.4%
1995	70,391	49,689	46,749	9,666	656	177,151	39.7%	28.0%	26.4%	5.5%	0.4%
1996	79,901	63,741	46,763	13,106	779	204,290	39.1%	31.2%	22.9%	6.4%	0.4%
1997	68,944	45,154	44,775	10,830	801	170,504	40.4%	26.5%	26.3%	6.4%	0.5%
1998	72,091	44,966	42,582	10,175	821	170,635	42.2%	26.4%	25.0%	6.0%	0.5%
1999	79,557	56,416	42,901	12,746	911	192,531	41.3%	29.3%	22.3%	6.6%	0.5%
2000	72,858	39,637	43,258	10,579	888	167,220	43.6%	23.7%	25.9%	6.3%	0.5%
2001	76,913	61,776	43,891	12,579	1,022	196,181	39.2%	31.5%	22.4%	6.4%	0.5%
2002	66,937	41,262	38,652	7,672	993	155,516	43.0%	26.5%	24.9%	4.9%	0.6%
2003	72,315	37,052	44,131	10,794	937	165,229	43.8%	22.4%	26.7%	6.5%	0.6%
2004	67,786	43,700	48,026	12,648	926	173,086	39.2%	25.2%	27.7%	7.3%	0.5%
2005	66,268	49,496	48,644	13,764	1,198	179,370	36.9%	27.6%	27.1%	7.7%	0.7%
Averag	62,408	44,631	38,187	8,529	448	154,203	40.5%	28.9%	24.8%	5.5%	0.3%

Reduction in Stream Depletion due to Eliminating Pumping in or near Stream Cells



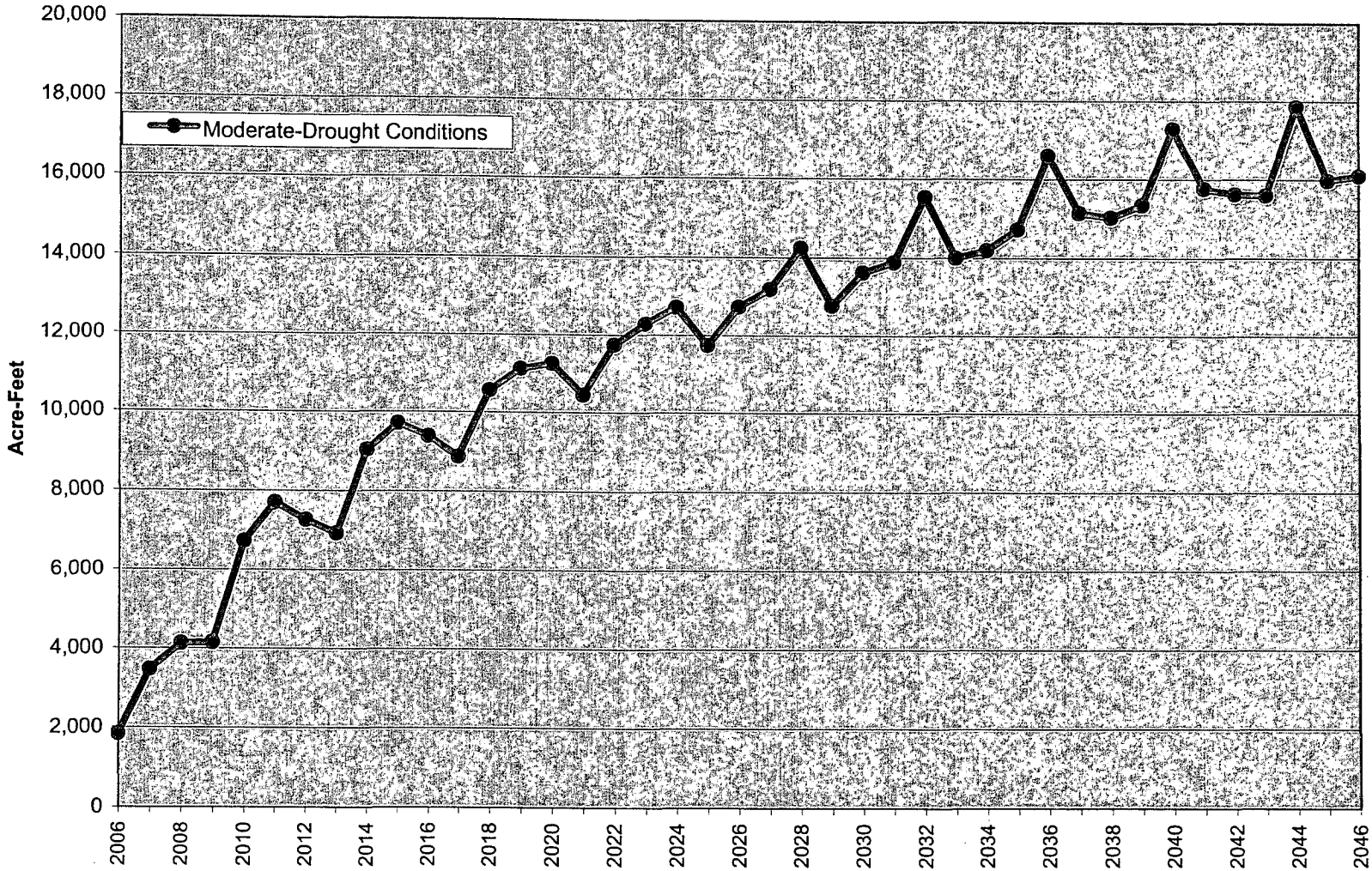
QR_ReductionsAnalysis_NRD.xls

2007-2046 Future Scenarios Precipitation



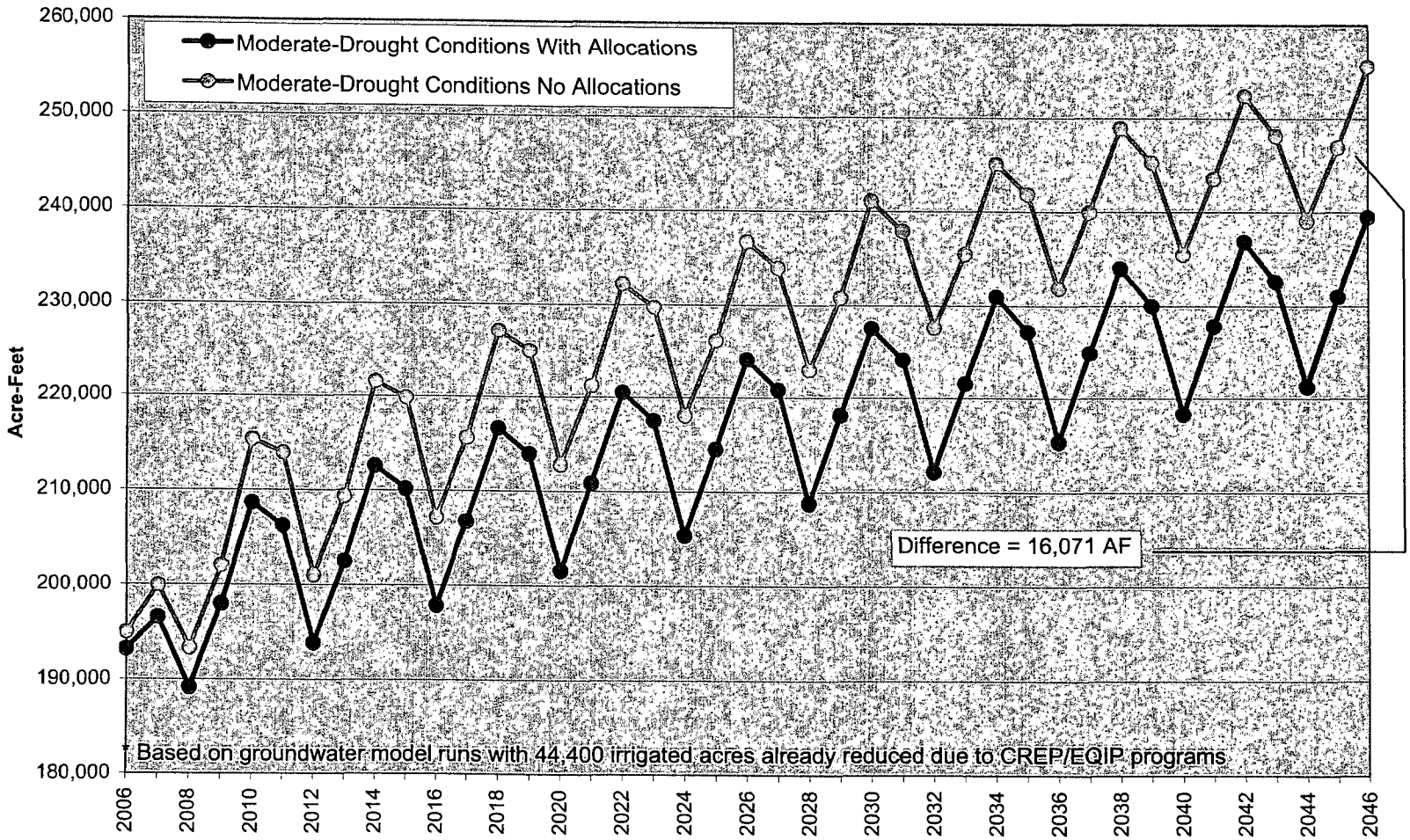
PrecipAnalysisFor0746Runs.xls

Republican Basin Reduction in Stream Depletions with Continued Current NRD Pumping Allocations, 2006 - 2046



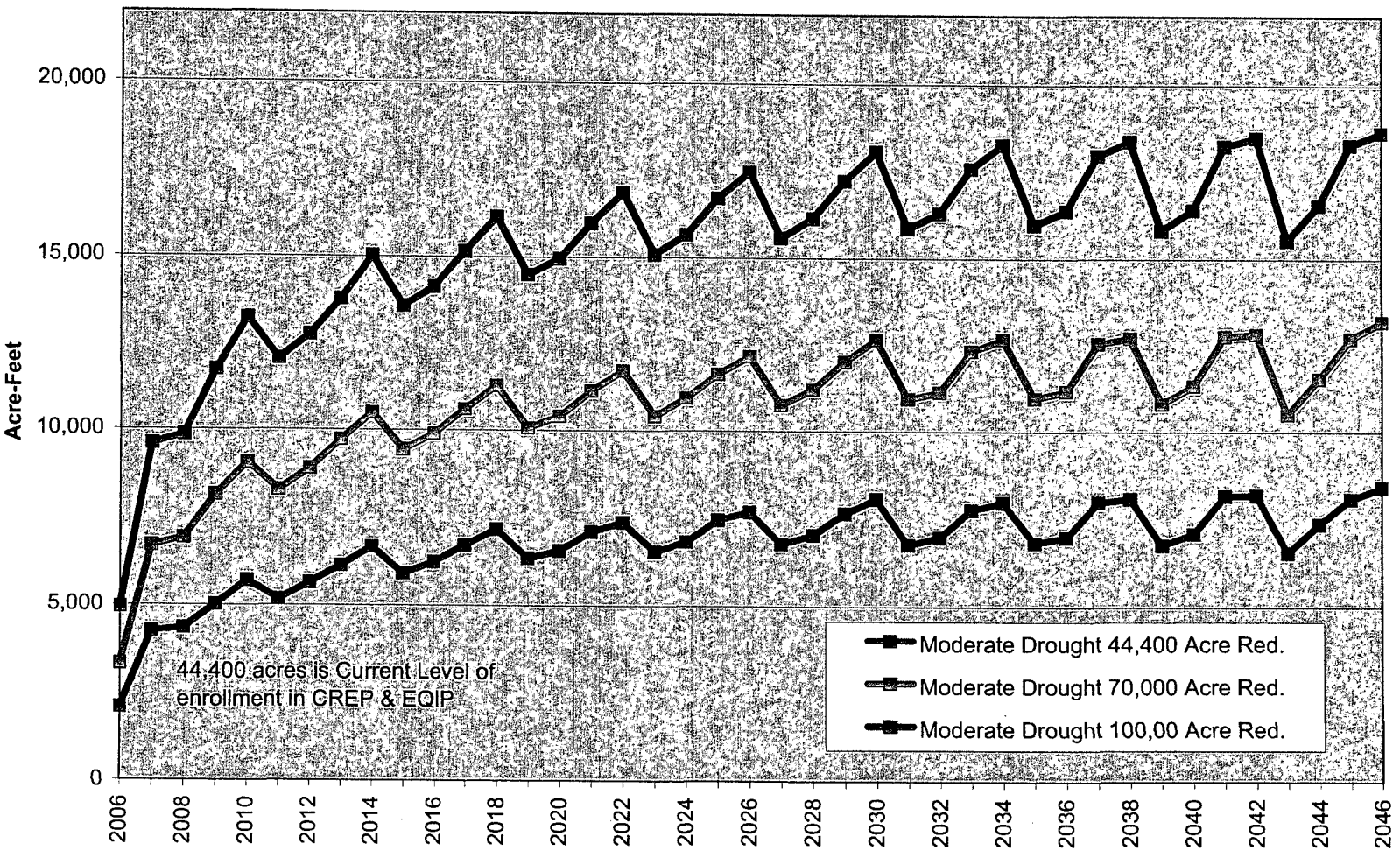
2006-2047_BaselineImpactSummary.xls

Republican Basin Stream Depletion for Moderate-Drought Conditions, with and without Current NRD Pumping Allocations



2006-2047_BaselineImpactSummary.xls

Republican Basin Reduction in Stream Depletion due to CREP/EQIP Irrigated Acres Conversion Programs

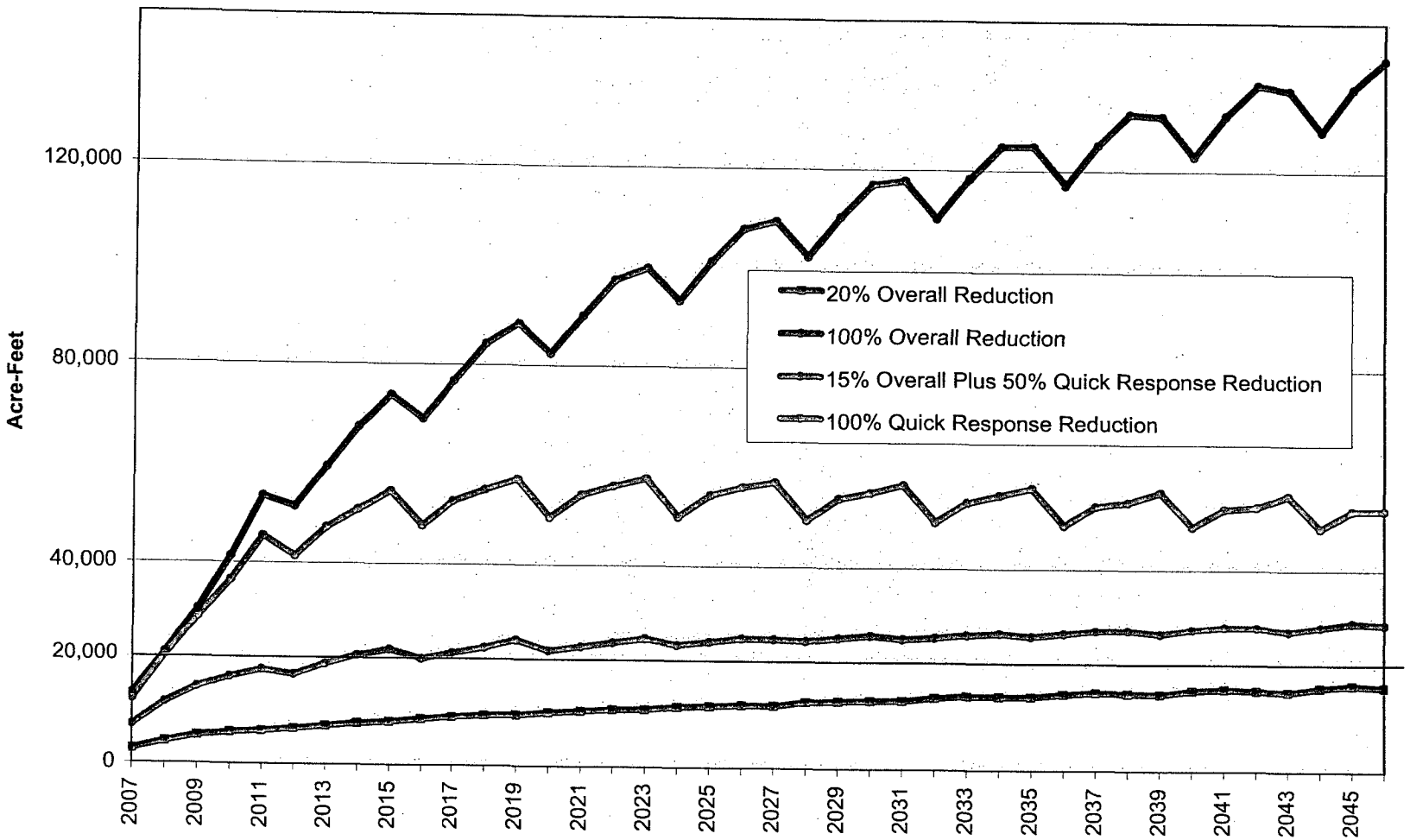


2006-2047_BaselineImpactSummary.xls

	Estimated Stream Depletion - Moderate Drought Conditions					Est. Reduction in Stream Depletion from CREP/EQIP			Est. Reduction in Stream Depletion from Current Allocations
Year	Alloc_Adj NO_CREP	Alloc_Adj 44,400	Alloc_Adj 70,000	Alloc_Adj 100,000	NO_Adj 44,400	Alloc_Adj 44,400	Alloc_Adj 70,000	Alloc_Adj 100,000	Alloc_Adj 44,400
2006	195,137	193,072	191,842	190,206	194,895	2,065	3,295	4,931	1,823
2007	200,692	196,459	194,016	191,121	199,916	4,233	6,676	9,571	3,457
2008	193,457	189,131	186,567	183,620	193,237	4,326	6,890	9,837	4,106
2009	202,905	197,907	194,789	191,174	202,041	4,998	8,116	11,731	4,134
2010	214,325	208,641	205,299	201,103	215,353	5,684	9,026	13,222	6,712
2011	211,406	206,248	203,148	199,348	213,937	5,158	8,258	12,058	7,689
2012	199,409	193,780	190,542	186,663	201,030	5,629	8,867	12,746	7,250
2013	208,589	202,471	198,894	194,820	209,387	6,118	9,695	13,769	6,916
2014	219,213	212,561	208,735	204,212	221,579	6,652	10,478	15,001	9,018
2015	216,045	210,147	206,628	202,472	219,841	5,898	9,417	13,573	9,694
2016	204,026	197,803	194,158	189,902	207,175	6,223	9,868	14,124	9,372
2017	213,452	206,760	202,866	198,324	215,613	6,692	10,586	15,128	8,853
2018	223,749	216,590	212,473	207,636	227,136	7,159	11,276	16,113	10,546
2019	220,220	213,884	210,170	205,739	224,988	6,336	10,050	14,481	11,104
2020	208,086	201,536	197,698	193,153	212,773	6,550	10,388	14,933	11,237
2021	217,868	210,774	206,737	201,926	221,205	7,094	11,131	15,942	10,431
2022	227,857	220,500	216,139	211,029	232,222	7,357	11,718	16,828	11,722
2023	223,986	217,453	213,584	208,922	229,713	6,533	10,402	15,064	12,260
2024	212,134	205,324	201,200	196,501	218,018	6,810	10,934	15,633	12,694
2025	221,863	214,423	210,237	205,185	226,140	7,440	11,626	16,678	11,717
2026	231,707	224,040	219,554	214,262	236,747	7,667	12,153	17,445	12,707
2027	227,572	220,811	216,836	212,021	233,979	6,761	10,736	15,551	13,168
2028	215,764	208,745	204,573	199,652	222,959	7,019	11,191	16,112	14,214
2029	225,686	218,051	213,678	208,496	230,799	7,635	12,008	17,190	12,748
2030	235,523	227,480	222,873	217,477	241,076	8,043	12,650	18,046	13,596
2031	230,834	224,082	219,907	214,995	237,943	6,752	10,927	15,839	13,861
2032	219,059	212,094	207,941	202,791	227,607	6,965	11,118	16,268	15,513
2033	229,253	221,508	216,930	211,689	235,487	7,745	12,323	17,564	13,979
2034	238,872	230,912	226,207	220,614	245,079	7,960	12,665	18,258	14,167
2035	233,948	227,135	222,996	218,001	241,831	6,813	10,952	15,947	14,696
2036	222,284	215,305	211,124	205,932	231,873	6,979	11,160	16,352	16,568
2037	232,780	224,814	220,229	214,826	239,931	7,966	12,551	17,954	15,117
2038	242,024	233,951	229,312	223,656	248,957	8,073	12,712	18,368	15,006
2039	236,703	229,952	225,906	220,899	245,272	6,751	10,797	15,804	15,320
2040	225,340	218,260	214,025	208,958	235,510	7,080	11,315	16,382	17,250
2041	235,939	227,780	223,169	217,705	243,519	8,159	12,770	18,234	15,739
2042	244,974	236,799	232,148	226,501	252,397	8,175	12,826	18,473	15,598
2043	239,120	232,587	228,634	223,598	248,155	6,533	10,486	15,522	15,568
2044	228,590	221,231	217,062	212,075	239,063	7,359	11,528	16,515	17,832
2045	239,028	230,962	226,323	220,753	246,917	8,066	12,705	18,275	15,955
2046	247,831	239,435	234,637	229,204	255,506	8,396	13,194	18,627	16,071

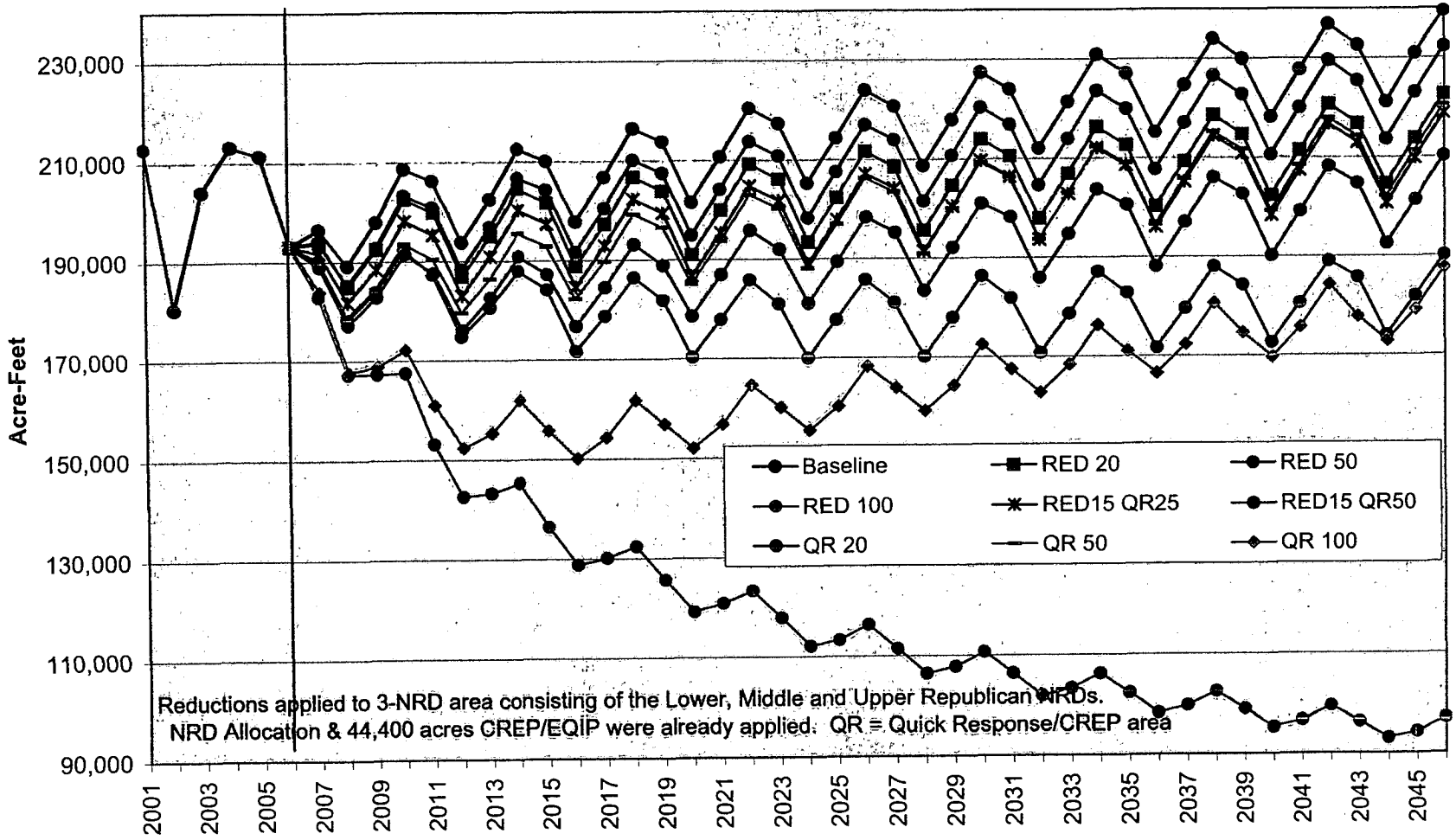
Current Level of Enrollment is 44,400 Acres for CREP EQIP

Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought



0746MdDrt_ImpactReductionsSummary.xls

Republican Basin Stream Depletion from GW Pumping, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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Republican Basin Stream Depletion from GW Pumping, 2007 - 2046
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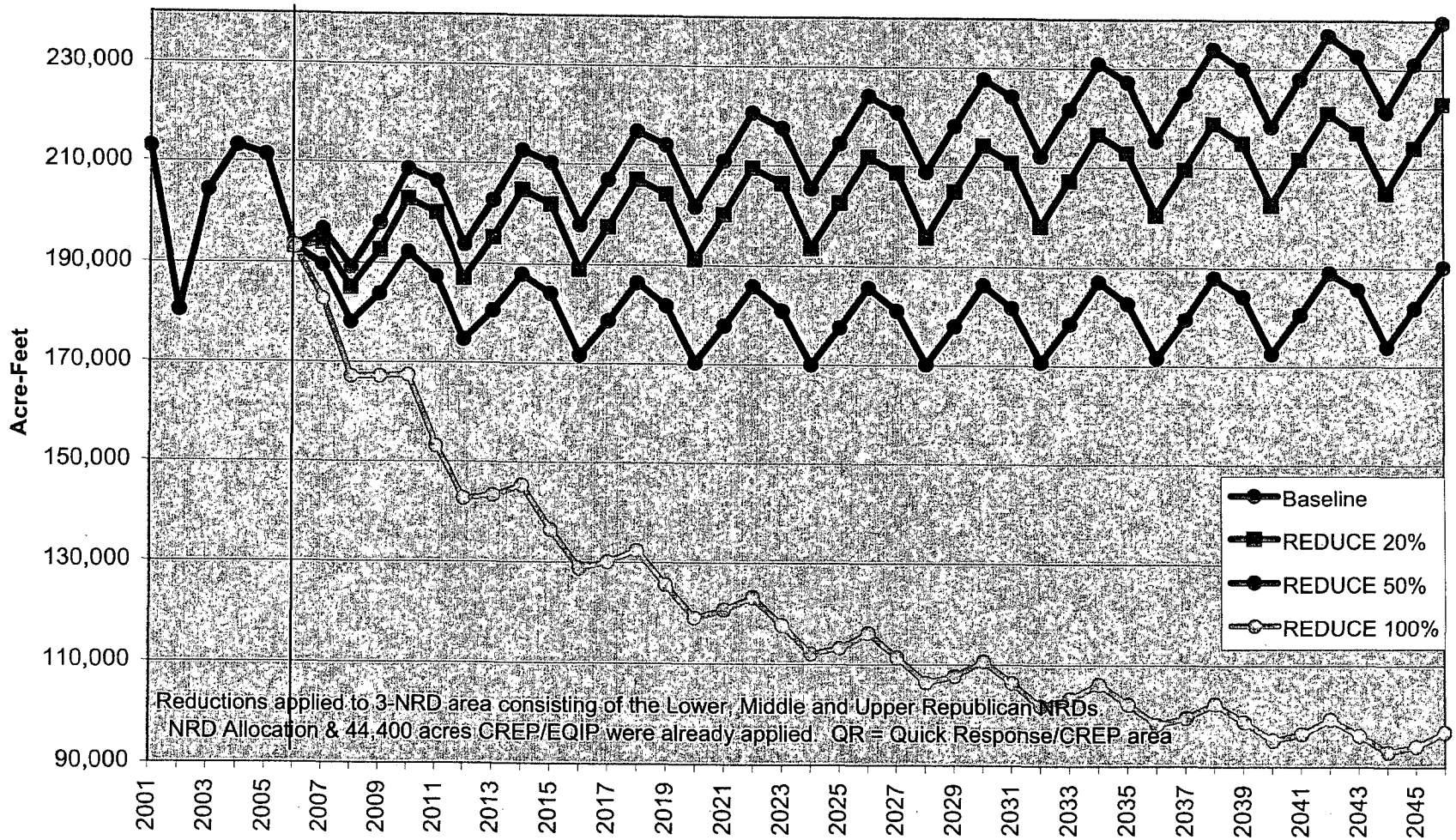

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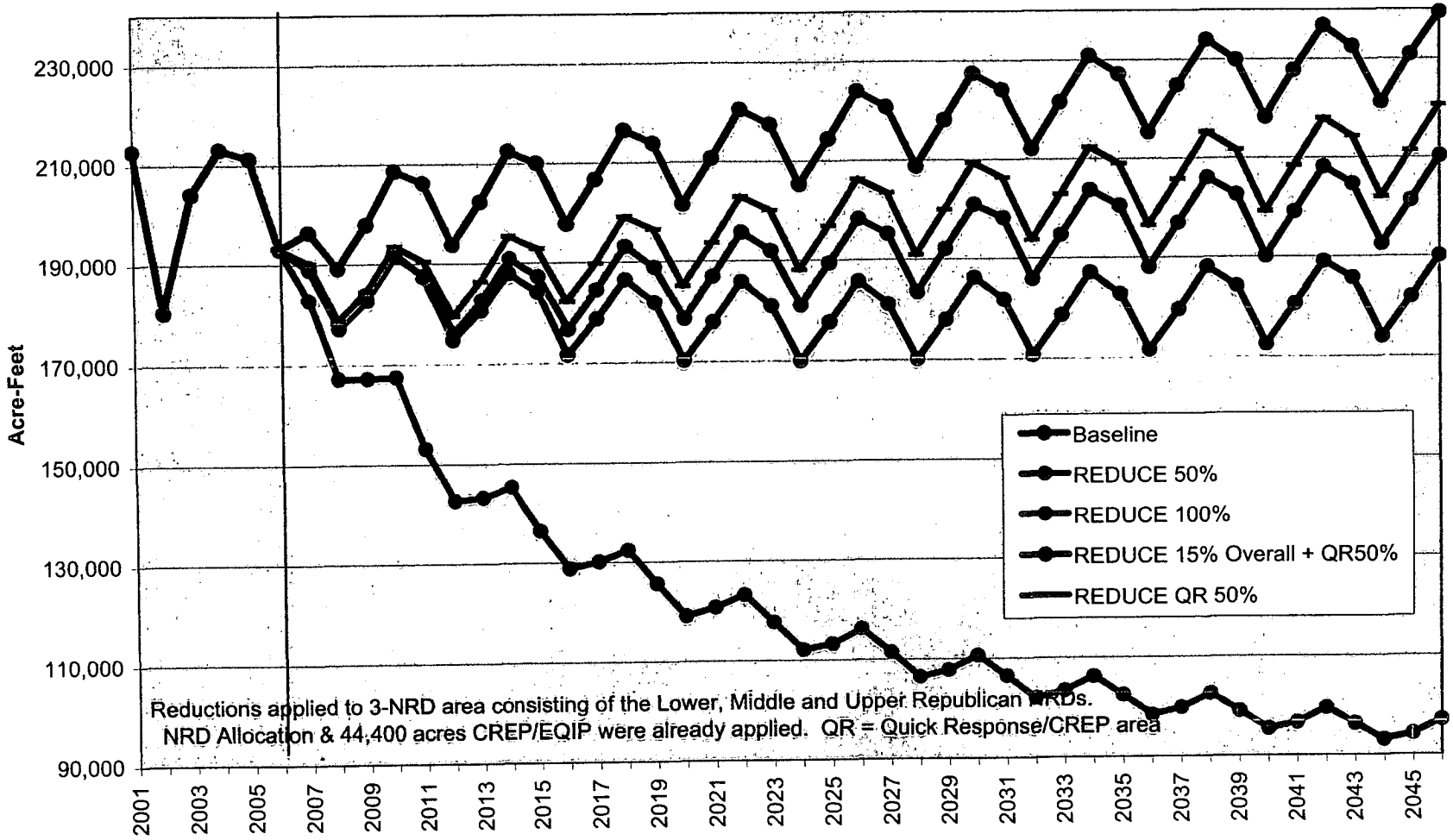
Republican Basin Stream Depletion from GW Pumping, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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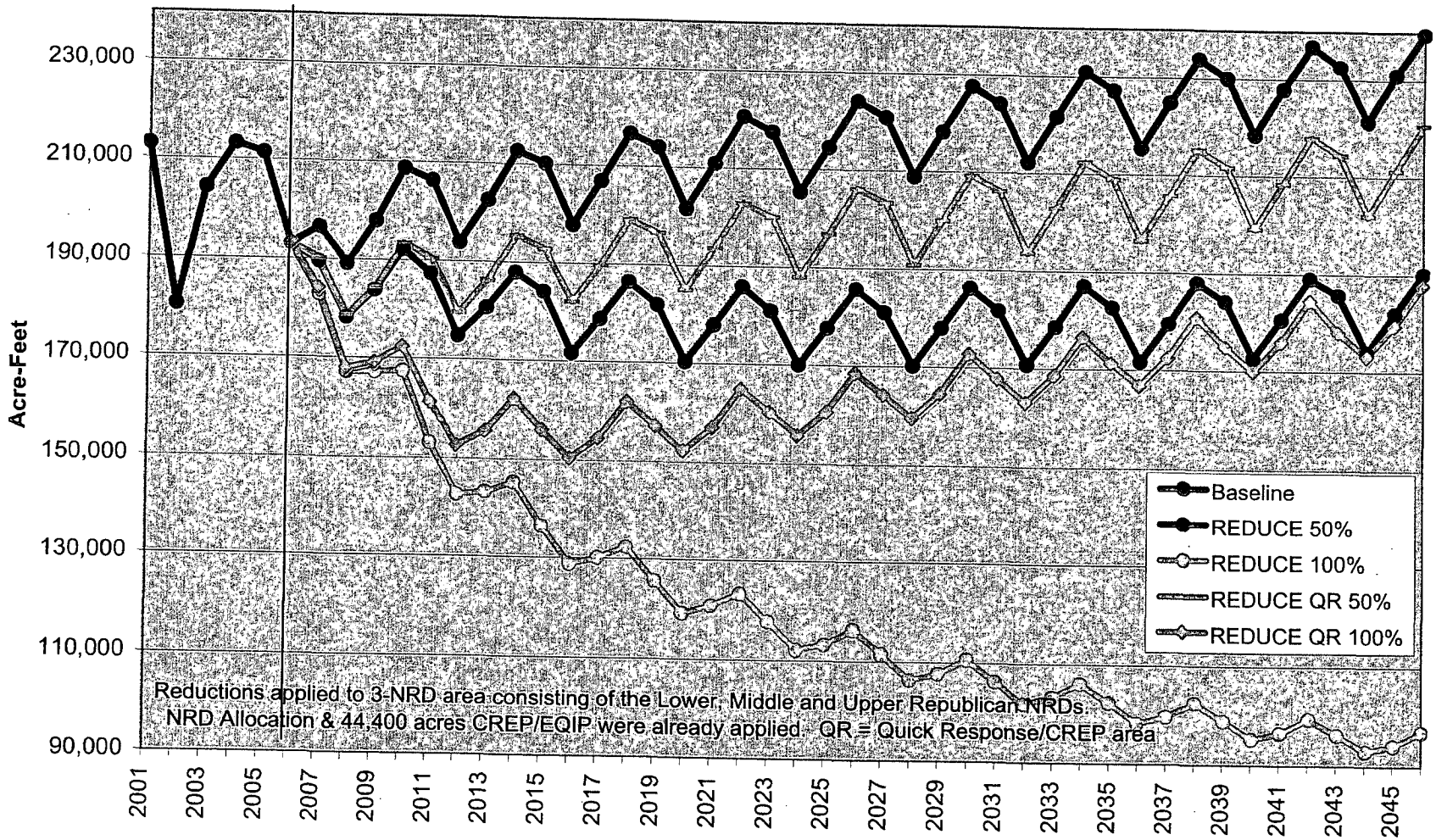
Republican Basin Stream Depletion from GW Pumping, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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Republican Basin Stream Depletion from GW Pumping, 2007 - 2046
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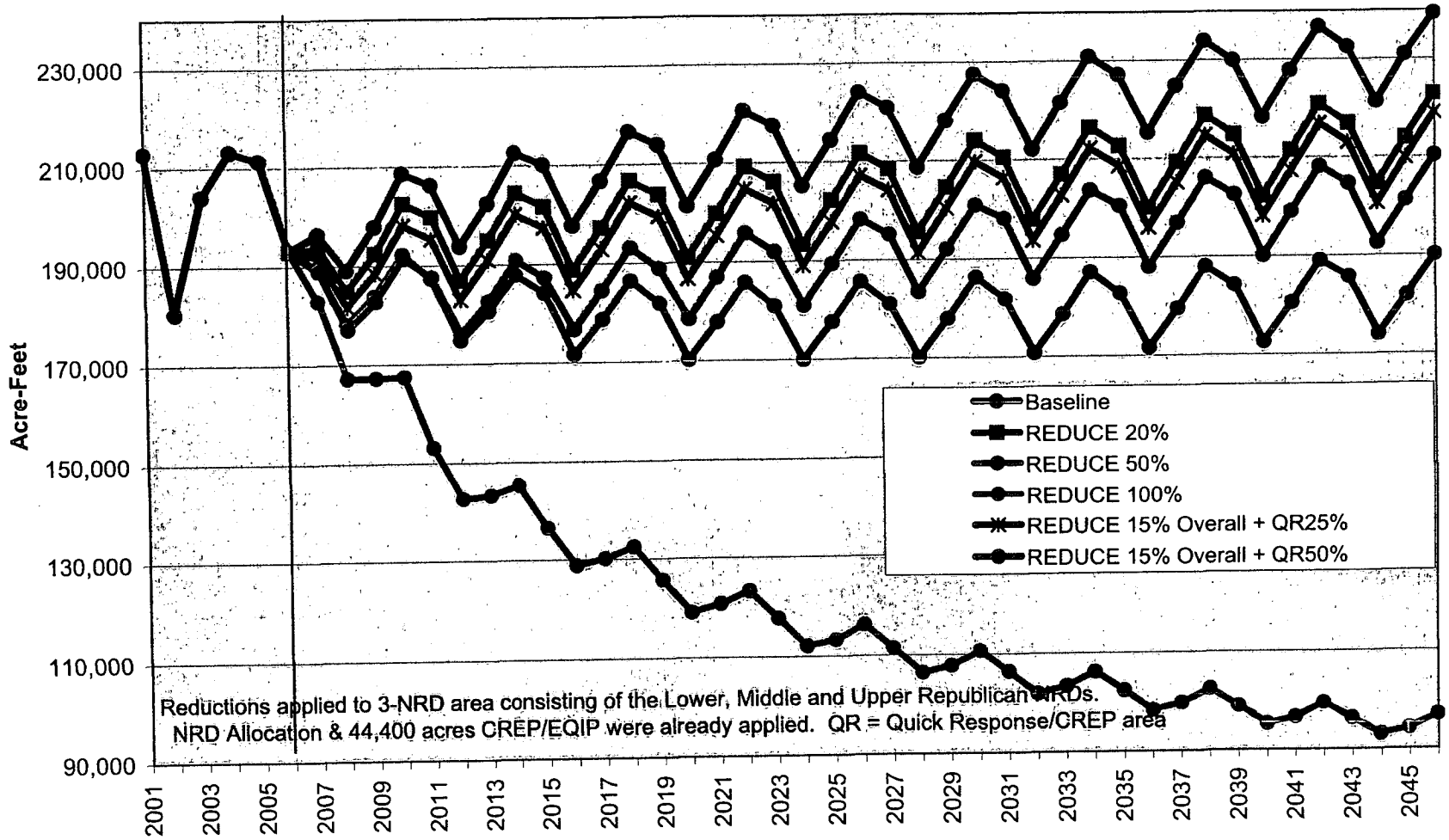

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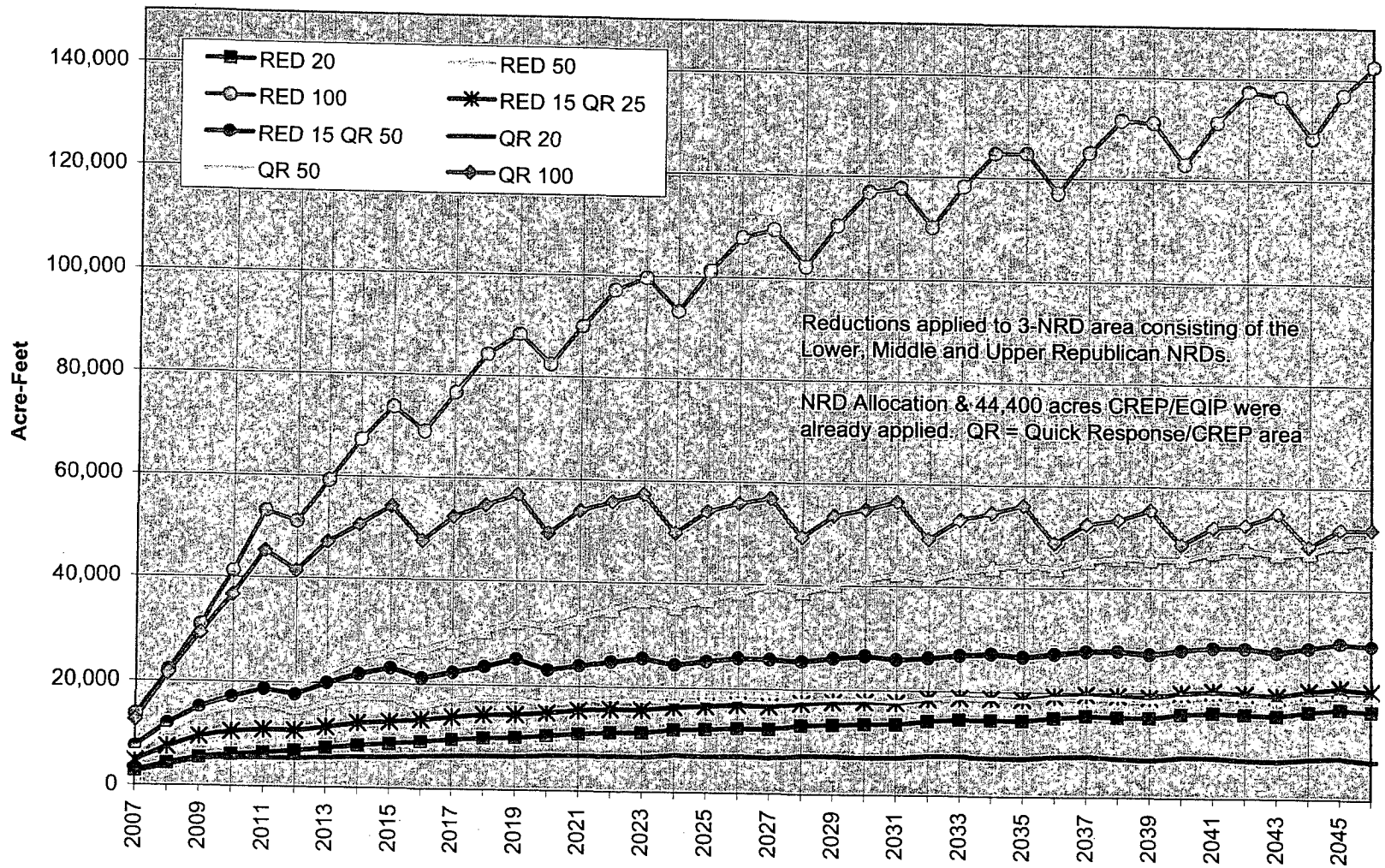
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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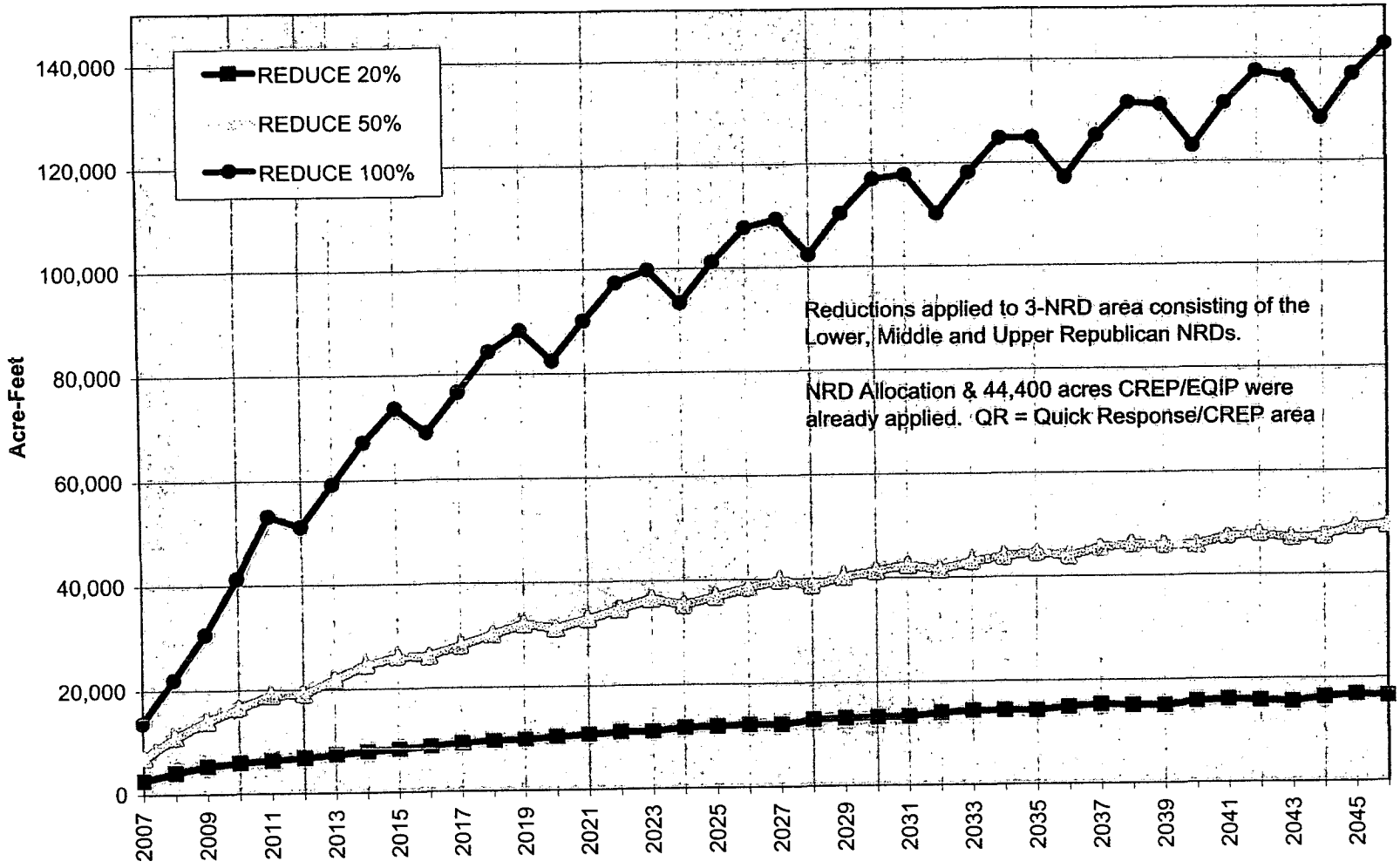
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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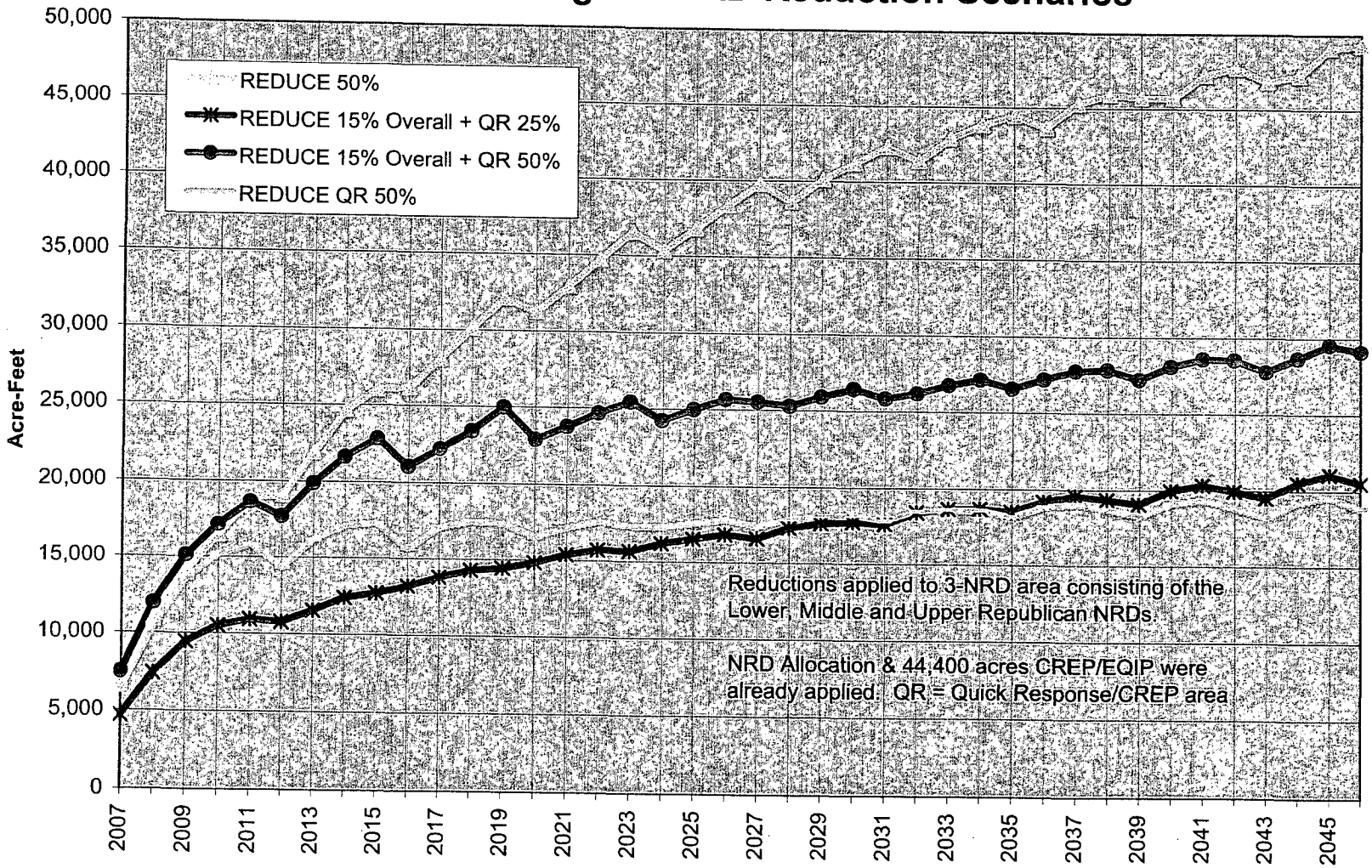
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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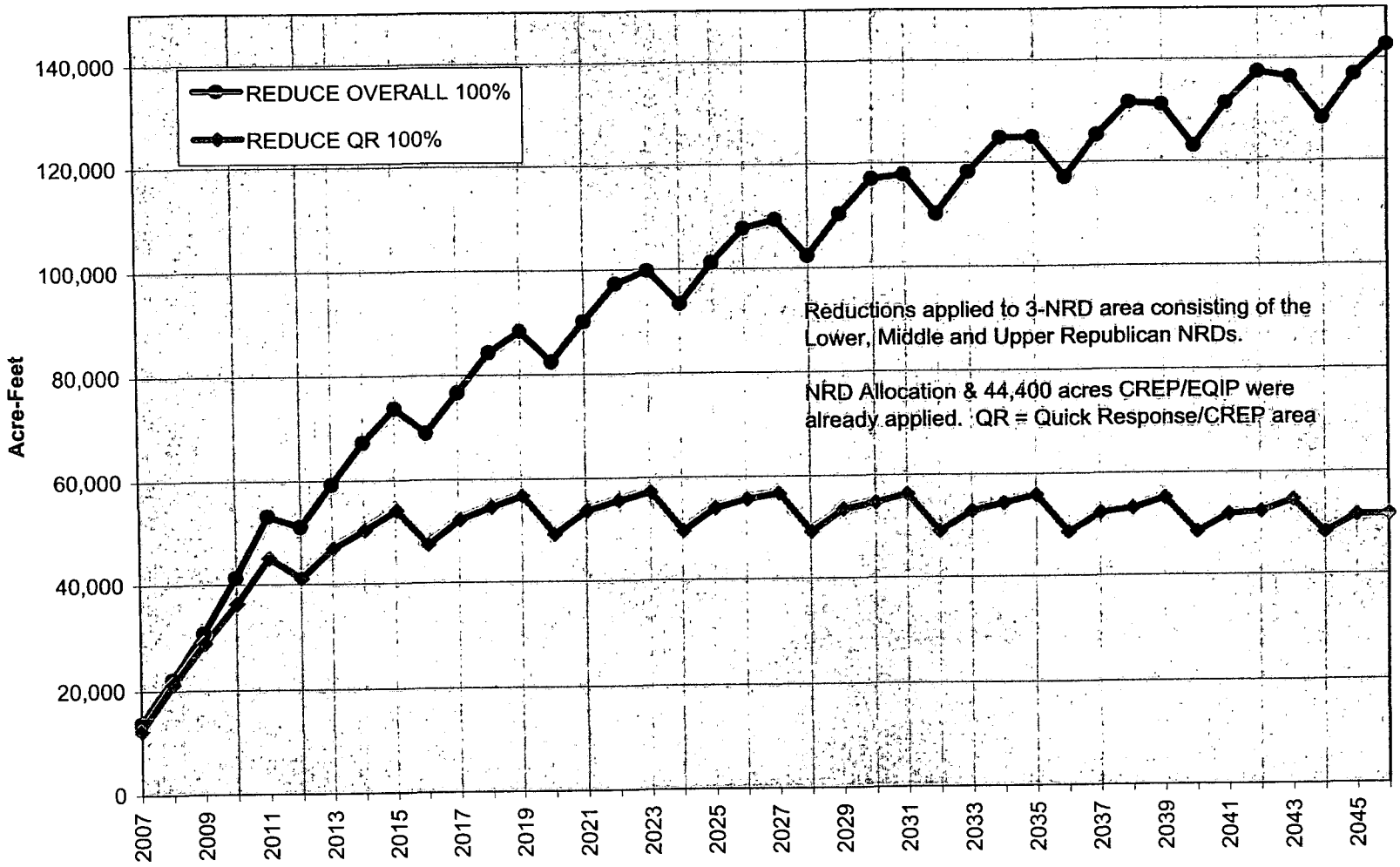
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



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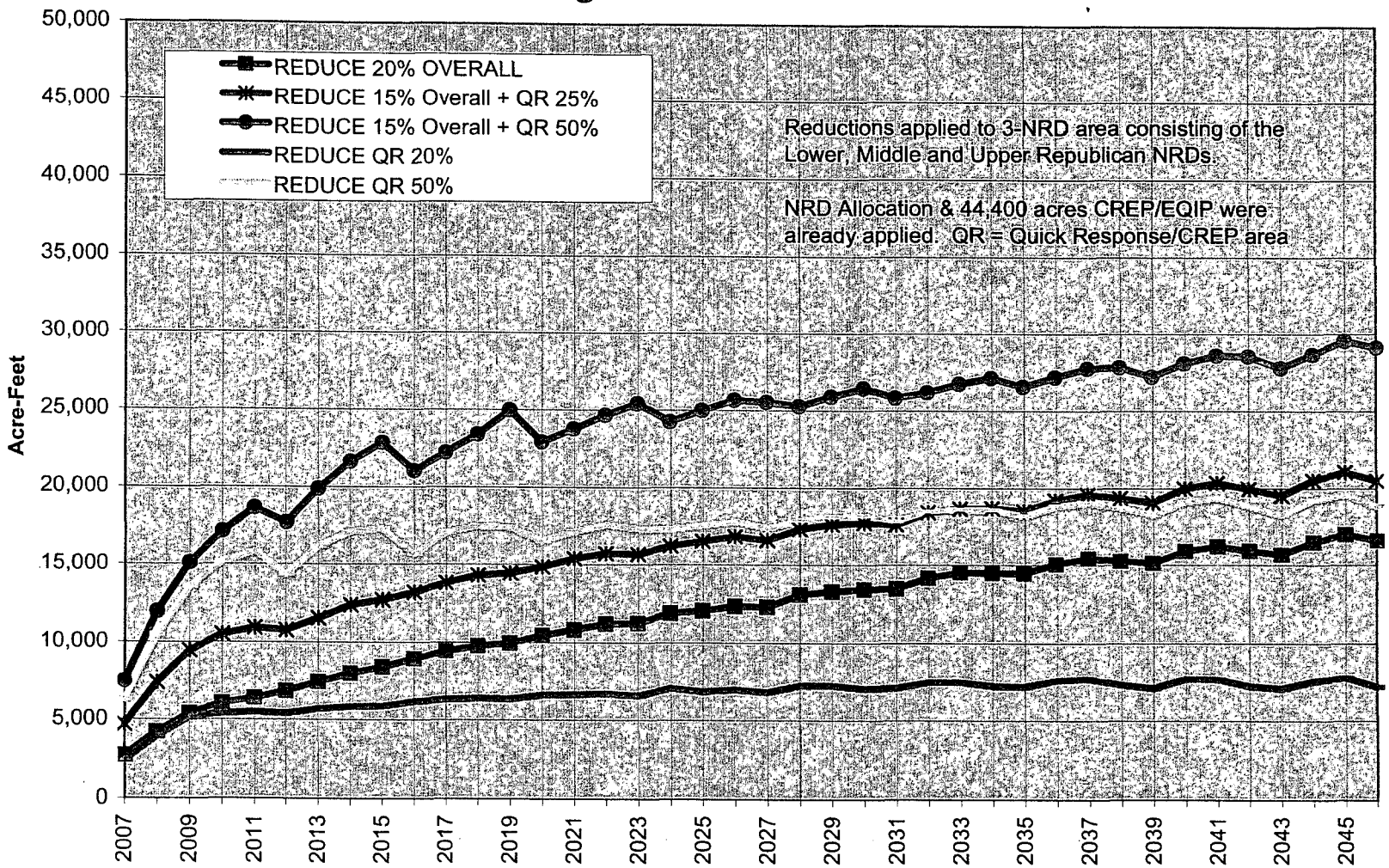
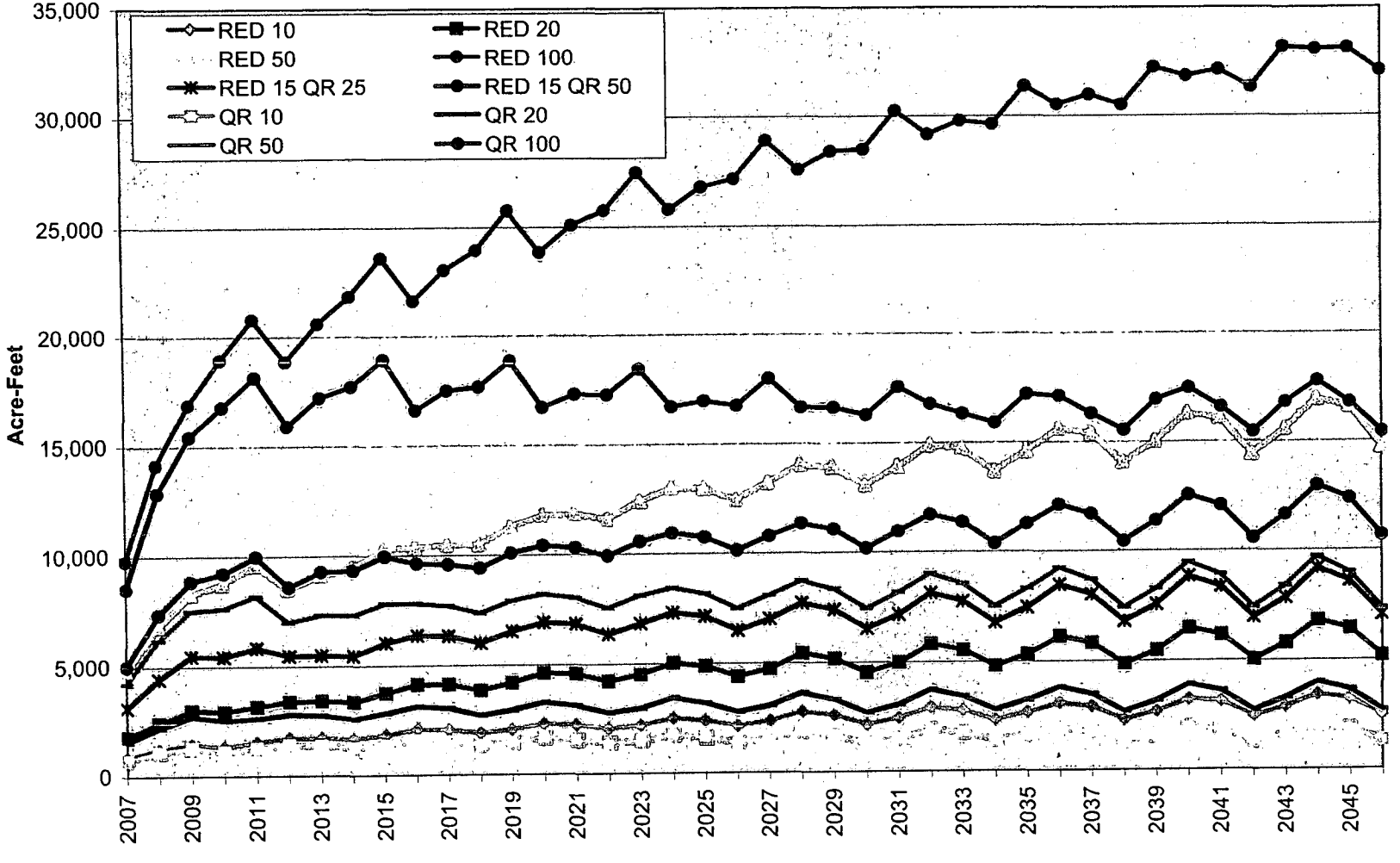
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought 3-NRD Reduction Scenarios



0746MdDrt_ImpactReductionsSummary.xls

Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought Lower Republican NRD Reduction Scenarios



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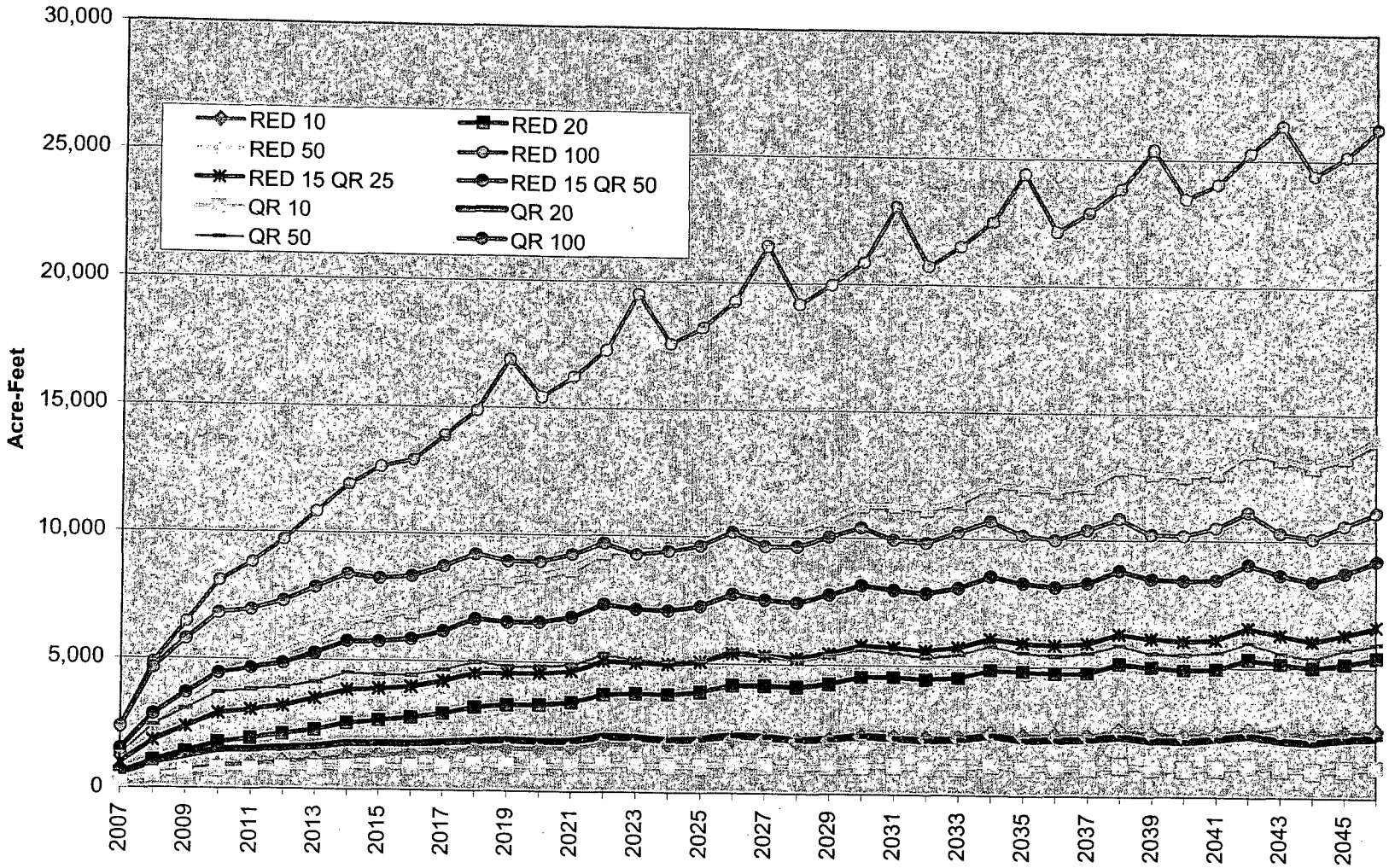
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought Middle Republican NRD Reduction Scenarios



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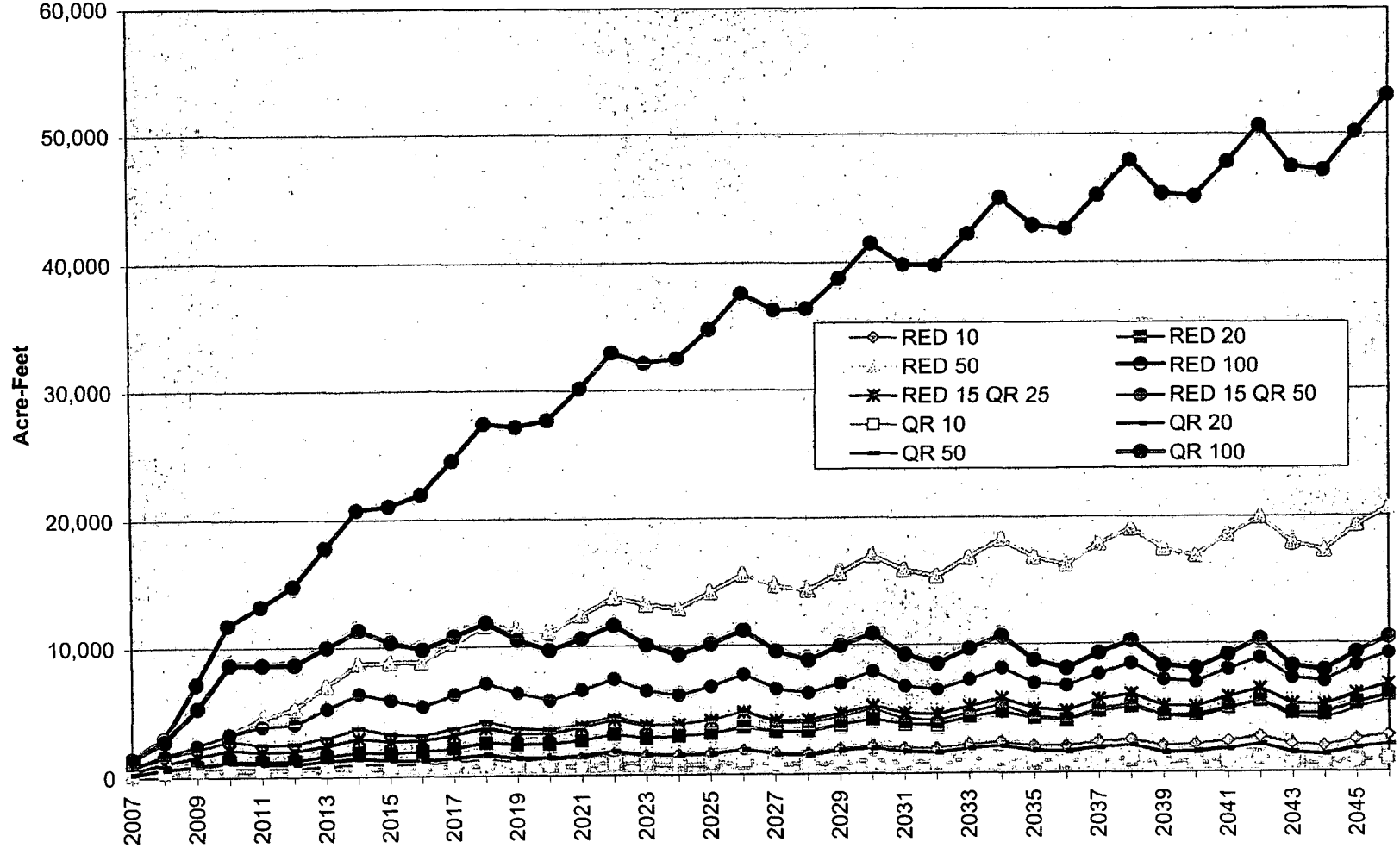
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought Upper Republican NRD Reduction Scenarios



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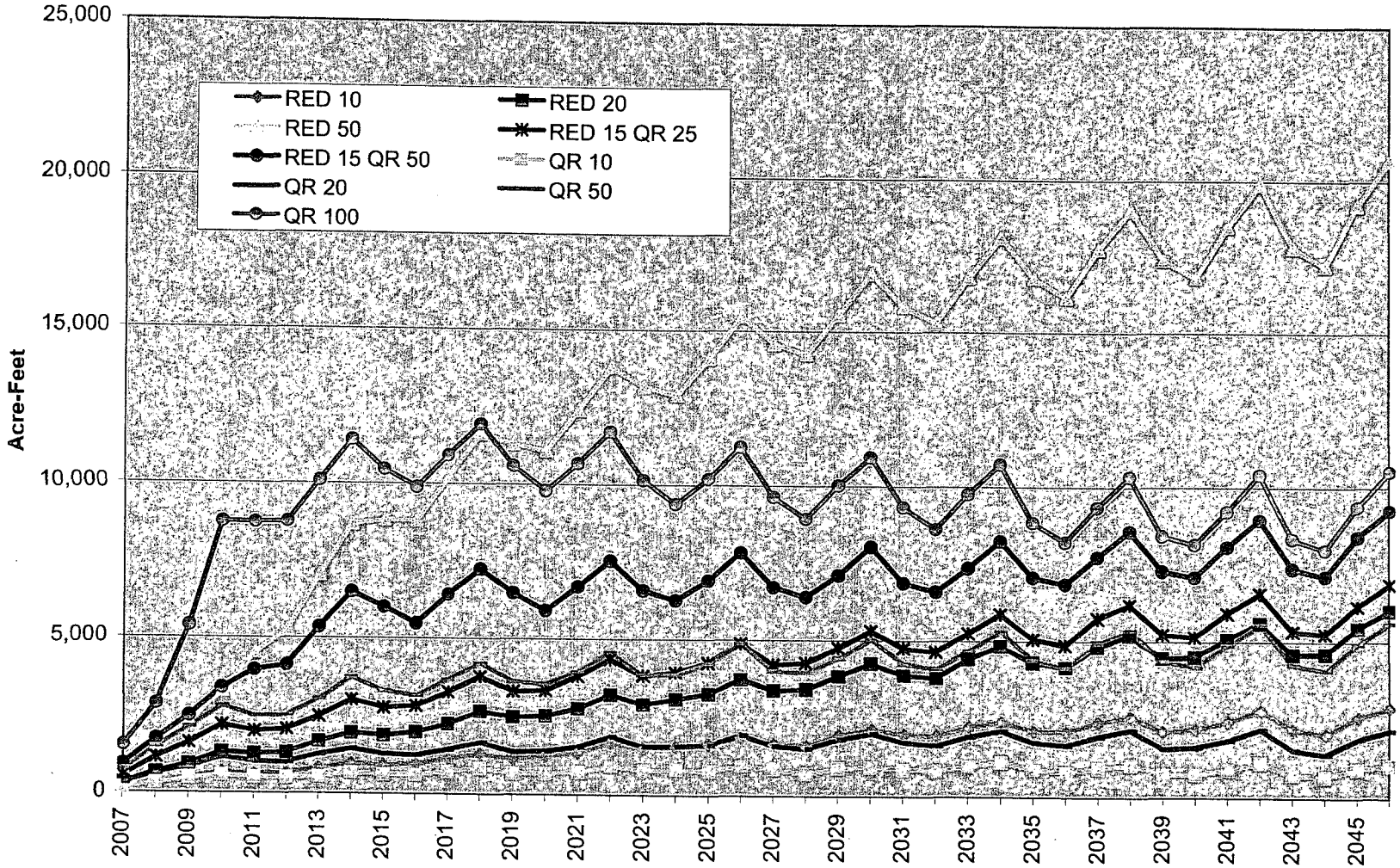
Republican Basin Reduction in Stream Depletion, 2007 - 2046
Moderate Drought Upper Republican NRD Reduction Scenarios



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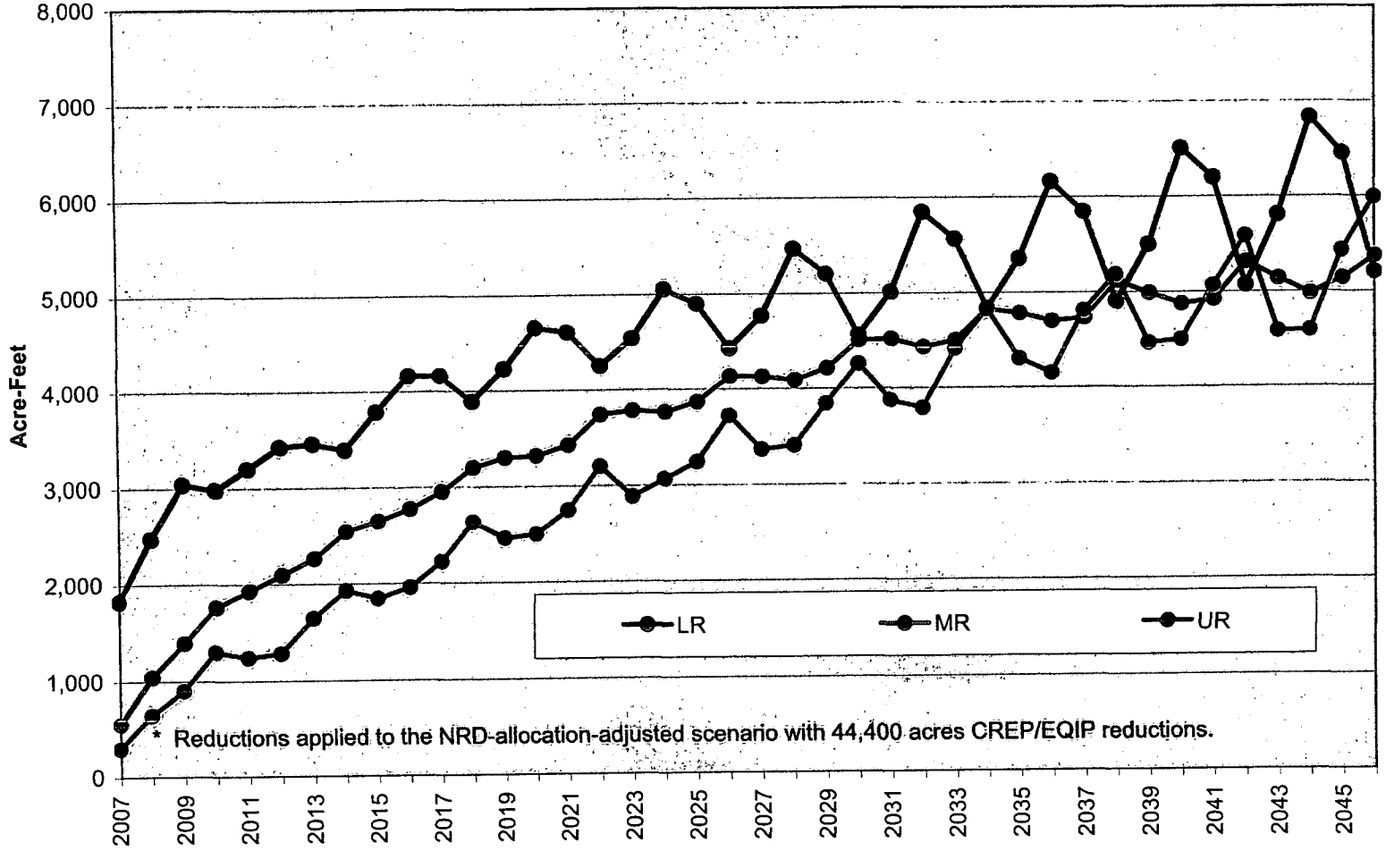
Moderate Drought Scenario Reduction in Stream Depletion due to 20% Pumping Reductions, by NRD



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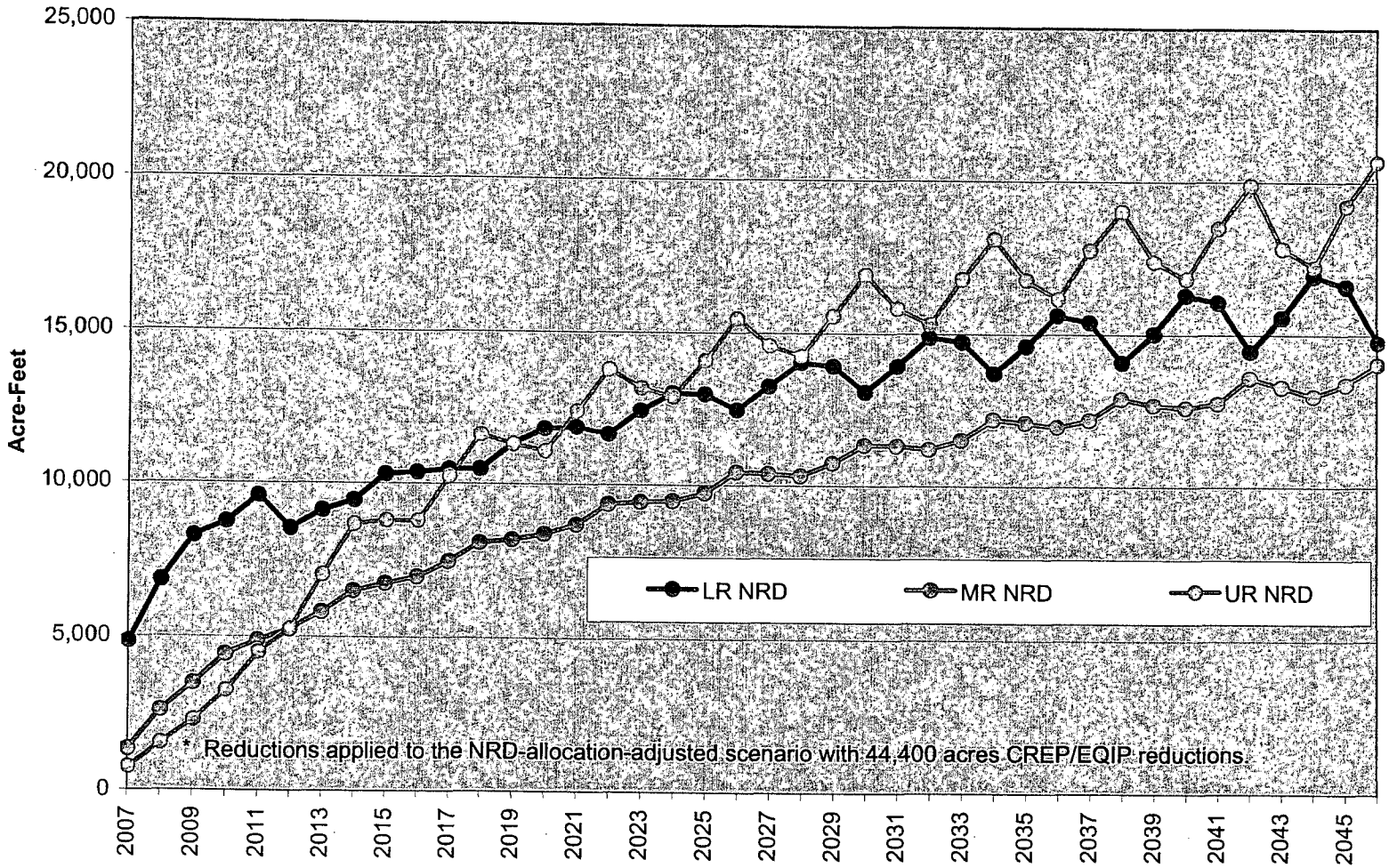
Moderate Drought Scenario Reduction in Stream Depletion due to 50% Pumping Reductions, by NRD



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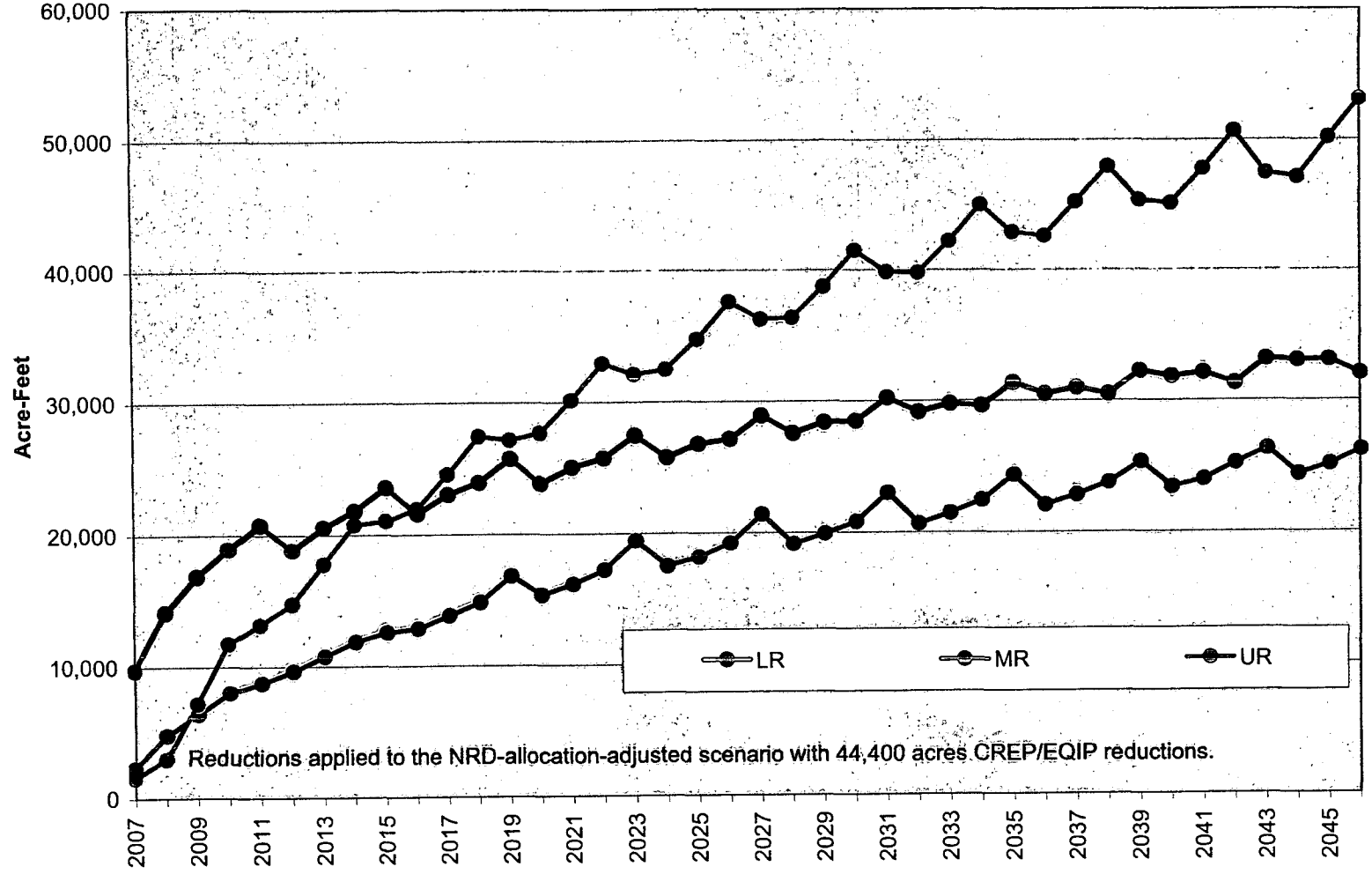
Moderate Drought Scenario Reduction in Stream Depletion due to 100% Pumping Reductions, by NRD



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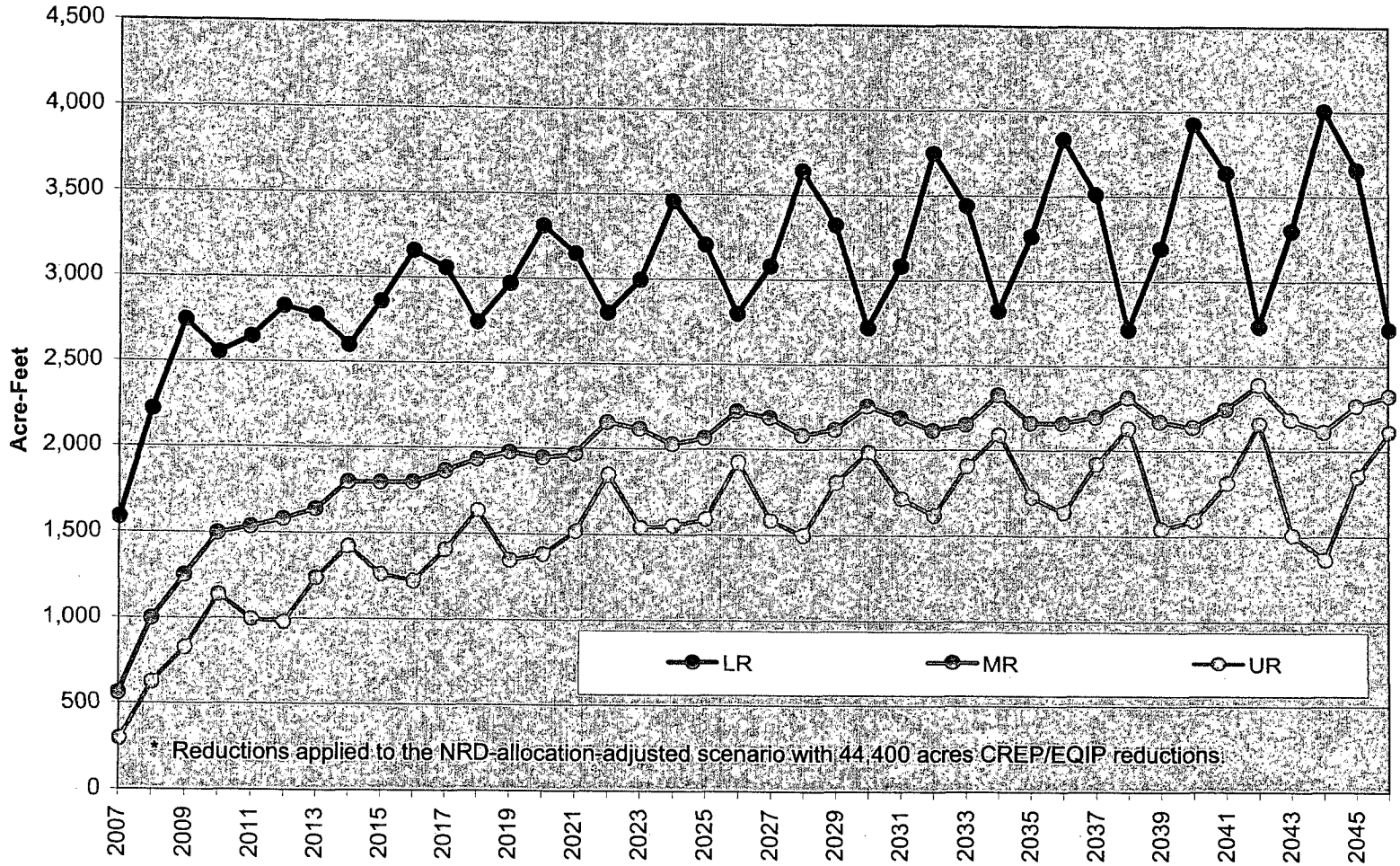
Moderate Drought Scenario Reduction in Stream Depletion due to 20% Pumping Reductions in the Quick-Response Area, by NRD



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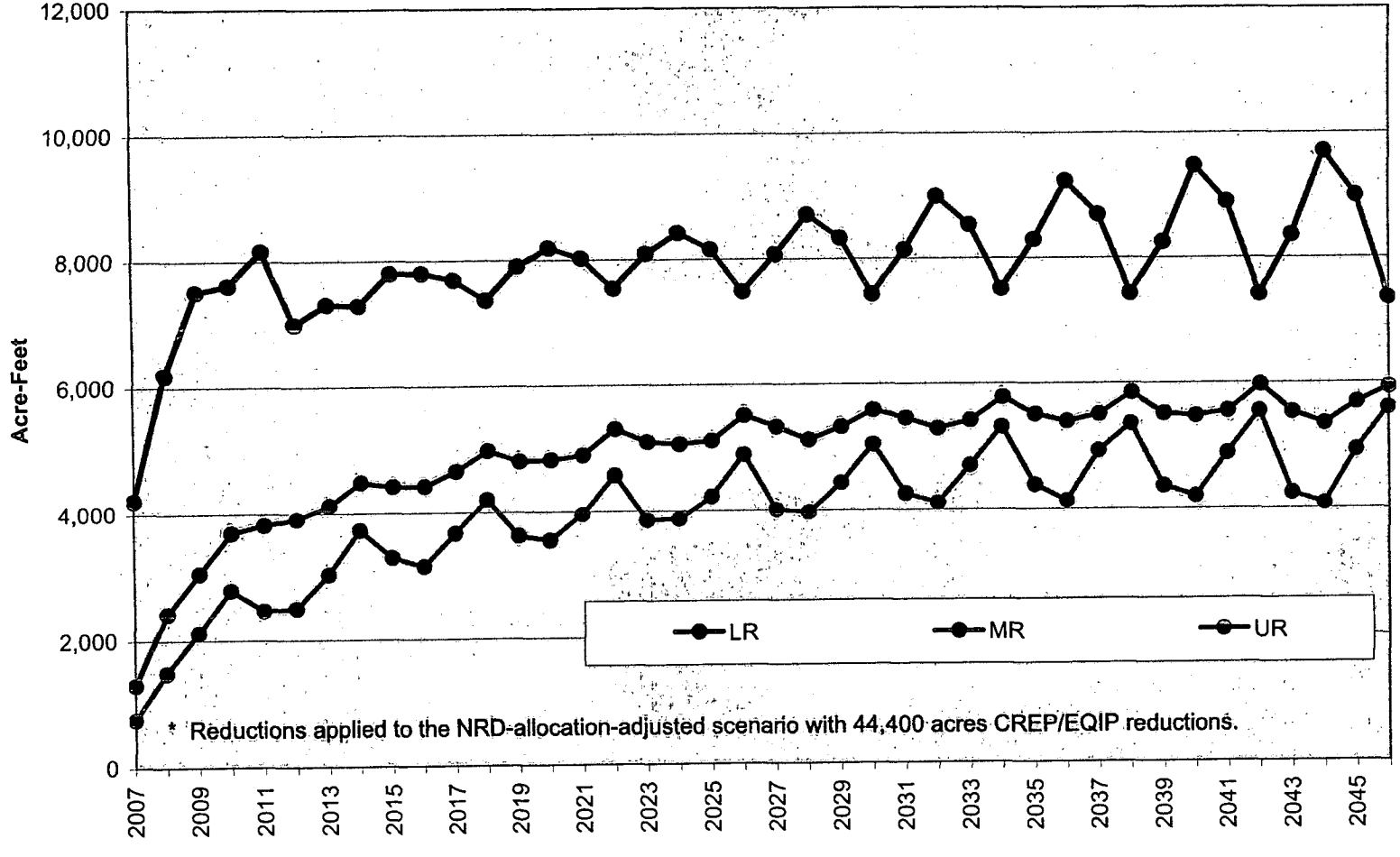
Moderate Drought Scenario Reduction in Stream Depletion due to 50% Pumping Reductions in the Quick-Response Area, by NRD



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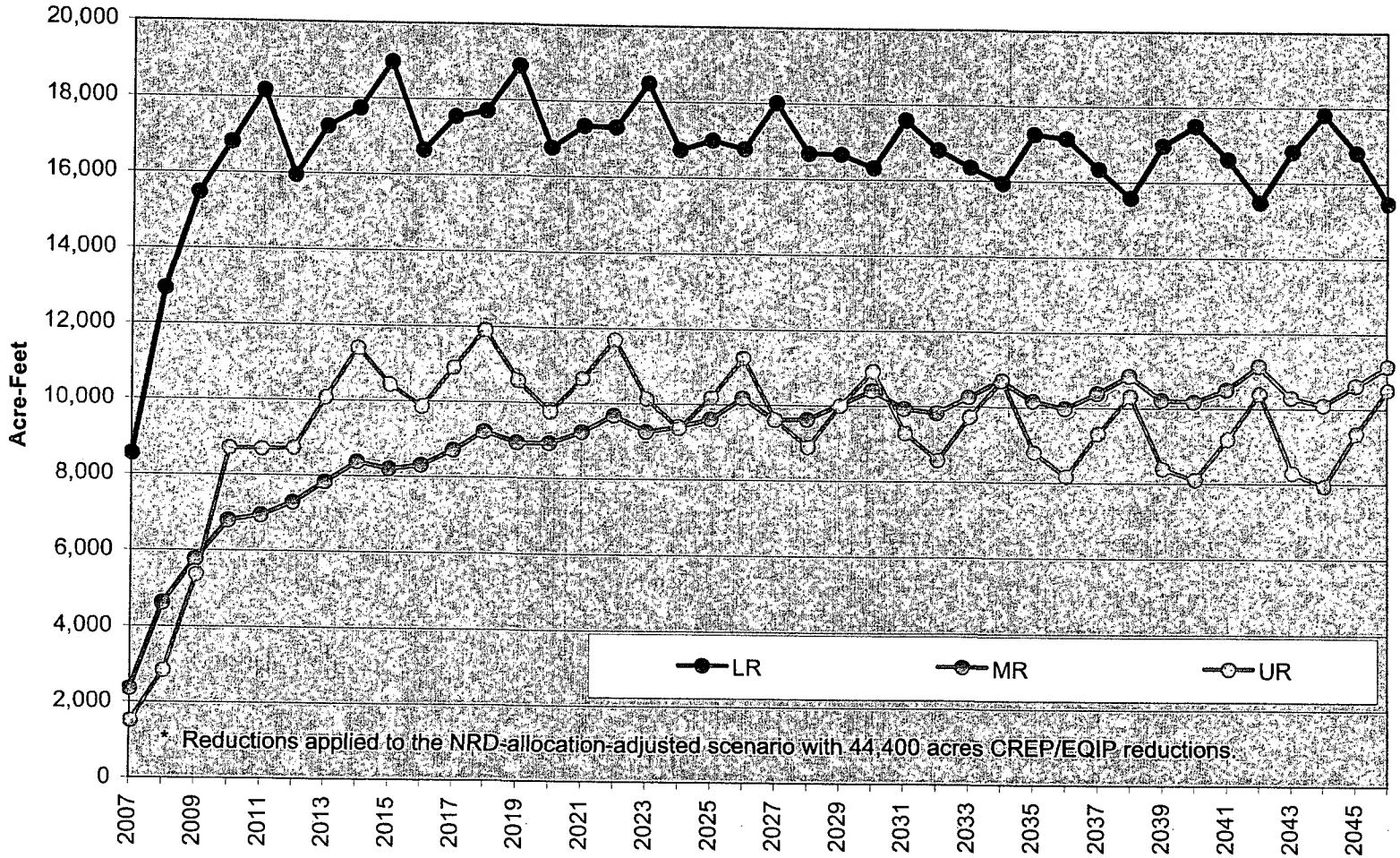
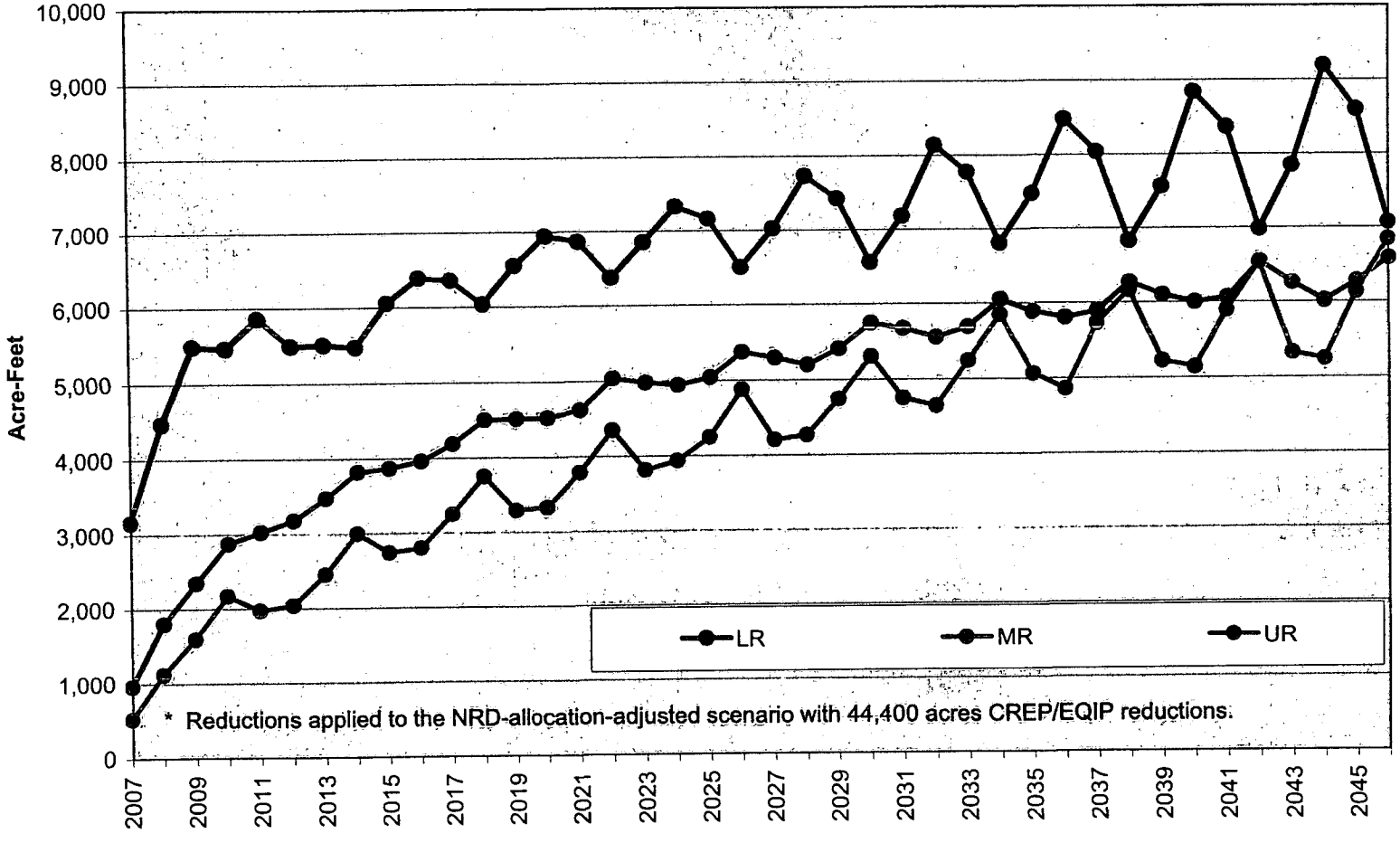
Moderate Drought Scenario Reduction in Stream Depletion due to 100% Pumping Reductions in the Quick-Response Area, by NRD



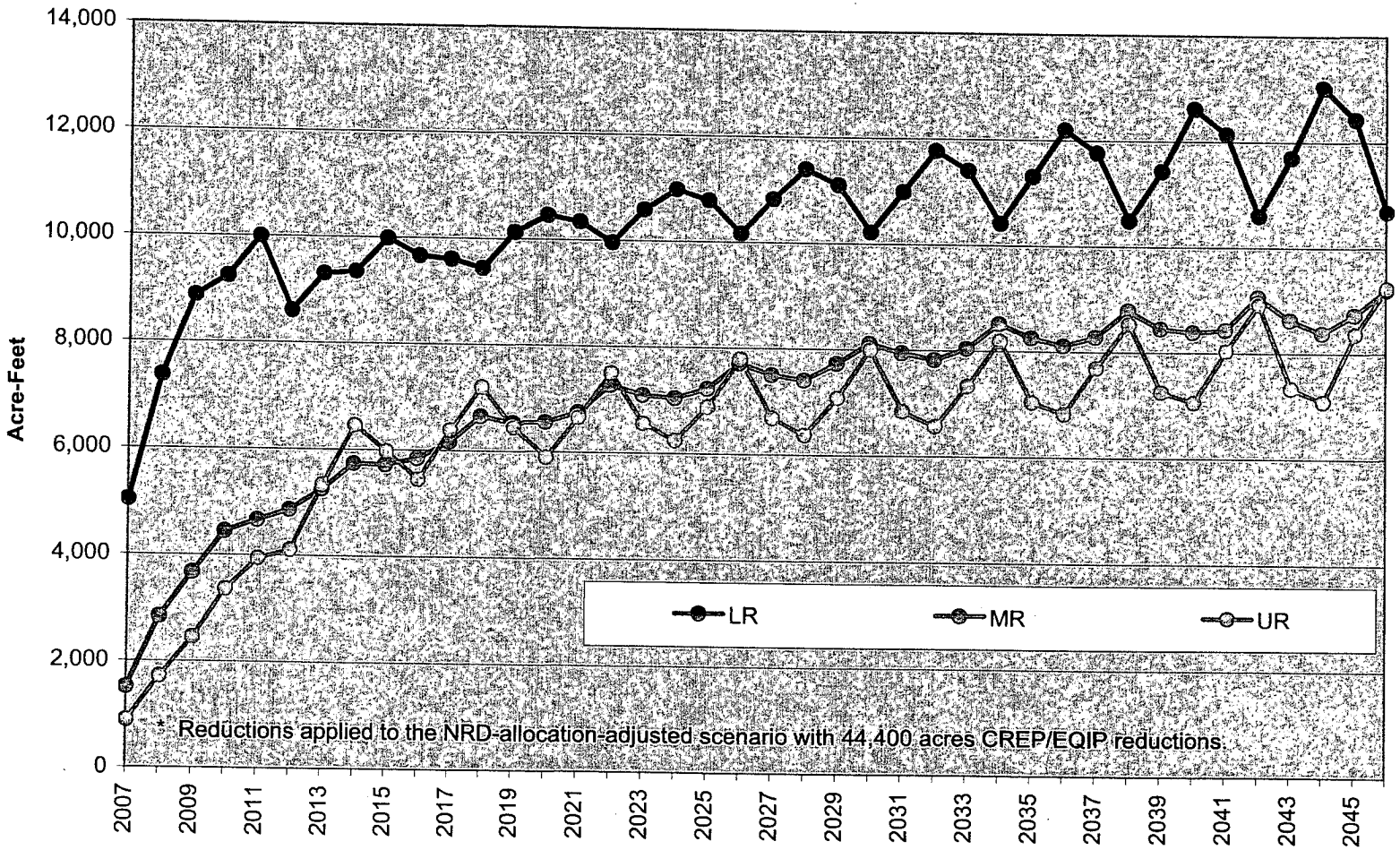
0746MdDrt_ImpactReductionsSummary.xls

Moderate Drought Scenario Reduction in Stream Depletion due to 15% Overall, plus 25% Quick-Response Area Pumping Reductions, by NRD



0746MdDrt_ImpactReductionsSummary.xls

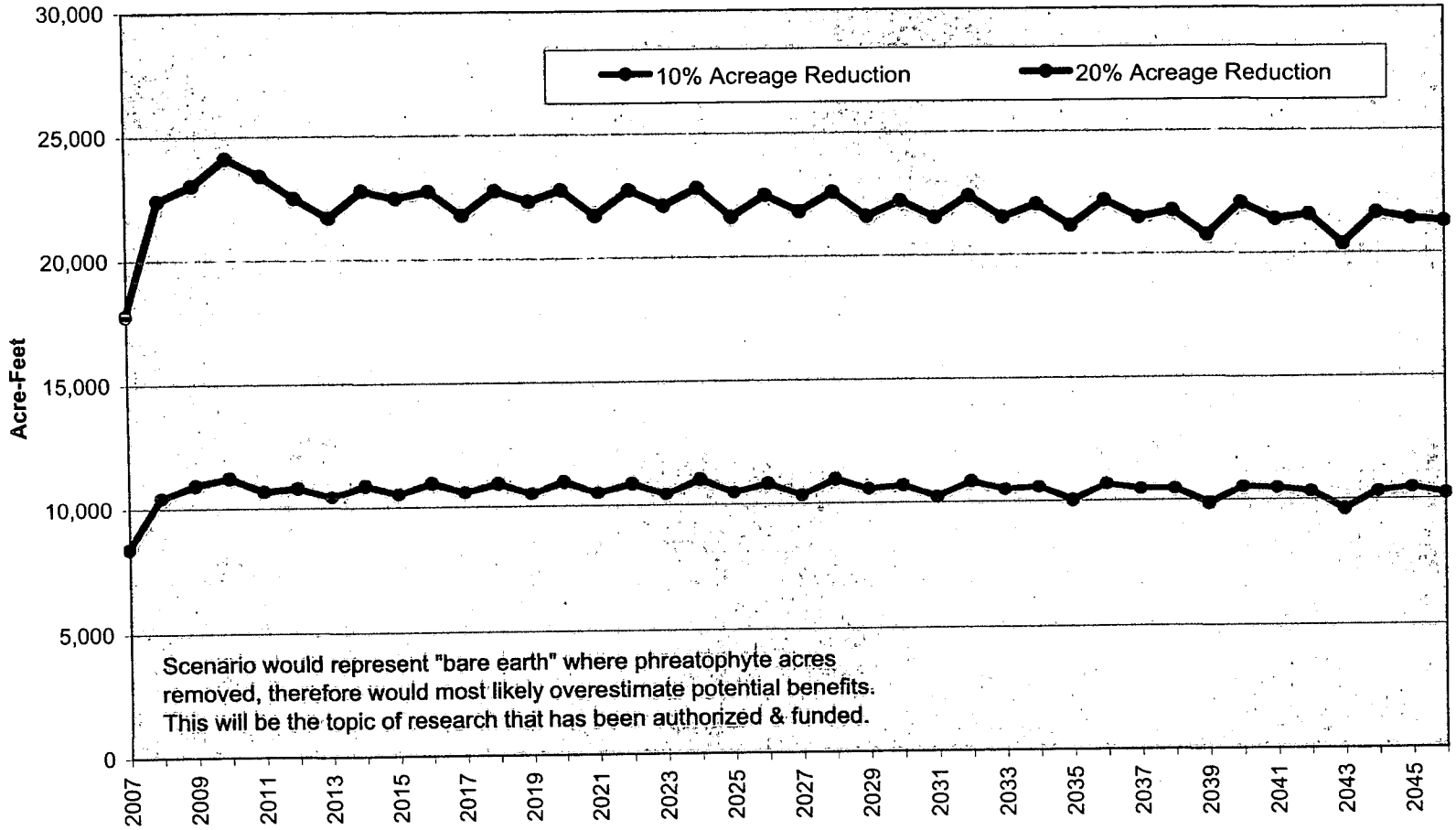
Moderate Drought Scenario Reduction in Stream Depletion due to 15% Overall, plus 50% Quick-Response Area Pumping Reductions, by NRD



* Reductions applied to the NRD-allocation-adjusted scenario with 44,400 acres CREP/EQIP reductions.

0746MdDrt_ImpactReductionsSummary.xls

Republican Basin Reduction in Stream Depletion due to Phreatophyte Acreage Reduction in the NE Quick-Response Area Moderate Drought Scenario 2007 - 2046



0746MdDrt_ImpactReductionsSummary.xls

Stream Depletion from Ground Water Pumping - Moderate Drought Scenarios

						RED 15	RED 15					Phreat.	Phreat.
	Base	RED 10	RED 20	RED 50	RED 100	QR 25	QR 50	QR10	QR20	QR50	QR100	RED 10%	RED 20%
2001	212,869												
2002	180,438												
2003	204,164												
2004	213,157												
2005	211,321												
2006	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072
2007	196,459	195,172	193,792	189,530	182,761	191,806	189,016	195,294	194,040	190,157	183,983	188,085	178,677
2008	189,131	187,057	184,965	178,174	167,166	181,777	177,231	187,225	185,221	178,648	167,753	178,687	166,714
2009	197,907	195,276	192,535	183,837	167,225	188,486	182,860	195,483	192,771	184,364	168,959	186,948	174,881
2010	208,641	205,766	202,617	192,188	167,452	198,185	191,553	206,074	203,252	193,480	172,221	197,400	184,511
2011	206,248	203,104	199,884	187,334	153,124	195,371	187,656	203,659	200,779	190,422	161,131	195,546	182,825
2012	193,780	190,354	186,964	174,750	142,673	183,056	176,131	191,083	188,396	179,475	152,533	182,946	171,262
2013	202,471	198,788	195,062	180,553	143,312	190,984	182,629	199,668	196,800	186,295	155,484	192,026	180,768
2014	212,561	208,579	204,591	187,917	145,352	200,237	190,968	209,658	206,726	195,456	162,073	201,651	189,781
2015	210,147	205,999	201,782	184,105	136,464	197,490	187,338	207,227	204,291	192,856	155,946	199,600	187,659
2016	197,803	193,353	188,886	171,649	128,832	184,668	176,797	194,694	191,632	182,162	150,292	186,811	175,042
2017	206,760	202,109	197,362	178,666	130,150	193,007	184,570	203,596	200,441	189,708	154,436	196,156	184,988
2018	216,590	211,777	206,829	186,435	132,414	202,355	193,230	213,445	210,205	199,128	161,902	205,630	193,824
2019	213,884	208,980	203,950	181,797	125,648	199,492	188,958	210,724	207,540	196,496	157,063	203,356	191,565
2020	201,536	196,322	191,101	170,290	119,146	186,744	178,659	198,205	194,925	185,004	152,217	190,530	178,762
2021	210,774	205,437	199,979	177,845	120,817	195,429	187,033	207,484	204,130	193,634	156,946	200,235	189,060
2022	220,500	214,958	209,330	185,798	123,269	204,813	195,873	217,121	213,805	202,929	164,796	209,593	197,764
2023	217,453	211,922	206,244	180,923	117,762	201,827	192,059	214,184	210,881	200,143	160,267	206,997	195,358
2024	205,324	199,378	193,470	169,987	112,085	189,145	181,091	201,761	198,282	188,038	155,627	194,266	182,518
2025	214,423	208,457	202,410	177,611	113,232	197,938	189,478	211,008	207,582	196,872	160,407	203,926	192,806
2026	224,040	217,921	211,746	185,704	116,287	207,236	198,424	220,603	217,086	206,233	168,356	213,188	201,550
2027	220,811	214,716	208,557	181,038	111,420	204,257	195,318	217,363	214,025	203,418	164,064	210,465	198,995
2028	208,745	202,319	195,713	170,126	106,409	191,459	183,501	205,154	201,516	190,874	159,457	197,740	186,149
2029	218,051	211,399	204,802	177,928	107,741	200,466	192,187	214,438	210,826	199,961	164,486	207,466	196,444
2030	227,480	220,903	214,096	186,260	110,607	209,771	201,081	224,009	220,450	209,326	172,662	216,757	205,261
2031	224,082	217,332	210,649	181,756	106,384	206,497	198,297	220,548	216,992	206,256	167,685	213,861	202,540
2032	212,094	205,031	197,985	170,705	101,869	193,695	185,947	208,340	204,633	193,628	162,968	201,237	189,694
2033	221,508	214,318	207,036	178,576	103,336	202,878	194,804	217,721	214,051	202,907	168,515	211,003	199,984
2034	230,912	223,788	216,482	187,063	106,171	212,243	203,827	227,284	223,705	212,331	176,431	220,320	208,876
2035	227,135	220,011	212,722	182,680	102,315	208,661	200,614	223,568	219,981	208,954	171,162	217,115	205,966
2036	215,305	207,840	200,290	171,600	98,267	196,135	188,166	211,553	207,717	196,465	166,658	204,608	193,126
2037	224,814	217,147	209,414	179,494	99,673	205,256	197,100	221,018	217,133	205,780	172,414	214,331	203,328
2038	233,951	226,467	218,726	188,005	102,464	214,625	206,154	230,397	226,638	215,241	180,682	223,467	212,191
2039	229,952	222,573	214,863	184,189	98,917	210,912	202,780	226,467	222,869	211,668	174,706	220,110	209,197
2040	218,260	210,433	202,385	172,560	95,292	198,309	190,217	214,481	210,586	199,162	169,757	207,721	196,214
2041	227,780	219,822	211,595	180,498	96,534	207,470	199,219	223,984	220,138	208,413	175,806	217,287	206,392
2042	236,799	228,972	220,894	189,031	99,401	216,866	208,293	233,277	229,587	217,960	184,349	226,468	215,225
2043	232,587	225,005	216,943	185,693	96,232	213,101	204,843	229,129	225,536	214,318	177,884	222,989	212,214
2044	221,231	213,388	204,774	173,962	93,001	200,742	192,616	217,540	213,700	201,991	172,954	210,917	199,587
2045	230,962	222,619	213,976	181,858	94,174	209,920	201,448	227,063	223,205	211,347	179,253	220,481	209,566
2046	239,435	231,503	222,862	190,118	96,878	218,970	210,364	235,918	232,284	220,579	187,683	229,215	218,158

Estimated Reduction in Stream Depletion in UR, MR, LR NRDs

					RED 15	RED 15					Phreat.	Phreat
	RED 10	RED 20	RED 50	RED 100	QR 25	QR 50	QR10	QR20	QR50	QR100	RED 10%	RED 20%
2001												
2002												
2003												
2004												
2005												
2006	0	0	0	0	0	0	0	0	0	0	0	0
2007	1,287	2,667	6,929	13,698	4,653	7,443	1,165	2,419	6,302	12,476	8,374	17,782
2008	2,074	4,166	10,957	21,965	7,354	11,900	1,906	3,910	10,483	21,378	10,444	22,417
2009	2,631	5,372	14,070	30,682	9,421	15,047	2,424	5,136	13,543	28,948	10,959	23,026
2010	2,875	6,024	16,453	41,189	10,456	17,088	2,567	5,389	15,161	36,420	11,241	24,130
2011	3,144	6,364	18,914	53,124	10,877	18,592	2,589	5,469	15,826	45,117	10,702	23,423
2012	3,426	6,816	19,030	51,107	10,724	17,649	2,697	5,384	14,305	41,247	10,834	22,518
2013	3,683	7,409	21,918	59,159	11,487	19,842	2,803	5,671	16,176	46,987	10,445	21,703
2014	3,982	7,970	24,644	67,209	12,324	21,593	2,903	5,835	17,105	50,488	10,910	22,780
2015	4,148	8,365	26,042	73,683	12,657	22,809	2,920	5,856	17,291	54,201	10,547	22,488
2016	4,450	8,917	26,154	68,971	13,135	21,006	3,109	6,171	15,641	47,511	10,992	22,761
2017	4,651	9,398	28,094	76,610	13,753	22,190	3,164	6,319	17,052	52,324	10,604	21,772
2018	4,813	9,761	30,155	84,176	14,235	23,360	3,145	6,385	17,462	54,688	10,960	22,766
2019	4,904	9,934	32,087	88,236	14,392	24,926	3,160	6,344	17,388	56,821	10,528	22,319
2020	5,214	10,435	31,246	82,390	14,792	22,877	3,331	6,611	16,532	49,319	11,006	22,774
2021	5,337	10,795	32,929	89,957	15,345	23,741	3,290	6,644	17,140	53,828	10,539	21,714
2022	5,542	11,170	34,702	97,231	15,687	24,627	3,379	6,695	17,571	55,704	10,907	22,736
2023	5,531	11,209	36,530	99,691	15,626	25,394	3,269	6,572	17,310	57,186	10,456	22,095
2024	5,946	11,854	35,337	93,239	16,179	24,233	3,563	7,042	17,286	49,697	11,058	22,806
2025	5,966	12,013	36,812	101,191	16,485	24,945	3,415	6,841	17,551	54,016	10,497	21,617
2026	6,119	12,294	38,336	107,753	16,804	25,616	3,437	6,954	17,807	55,684	10,852	22,490
2027	6,095	12,254	39,773	109,391	16,554	25,493	3,448	6,786	17,393	56,747	10,346	21,816
2028	6,426	13,032	38,619	102,336	17,286	25,244	3,591	7,229	17,871	49,288	11,005	22,596
2029	6,652	13,249	40,123	110,310	17,585	25,864	3,613	7,225	18,090	53,565	10,585	21,607
2030	6,577	13,384	41,220	116,873	17,709	26,399	3,471	7,030	18,154	54,818	10,723	22,219
2031	6,750	13,433	42,326	117,698	17,585	25,785	3,534	7,090	17,826	56,397	10,221	21,542
2032	7,063	14,109	41,389	110,225	18,399	26,147	3,754	7,461	18,466	49,126	10,857	22,400
2033	7,190	14,472	42,932	118,172	18,630	26,704	3,787	7,457	18,601	52,993	10,505	21,524
2034	7,124	14,430	43,849	124,741	18,669	27,085	3,628	7,207	18,581	54,481	10,592	22,036
2035	7,124	14,413	44,455	124,820	18,474	26,521	3,567	7,154	18,181	55,973	10,020	21,169
2036	7,465	15,015	43,705	117,038	19,170	27,139	3,752	7,588	18,840	48,647	10,697	22,179
2037	7,667	15,400	45,320	125,141	19,558	27,714	3,796	7,681	19,034	52,400	10,483	21,486
2038	7,484	15,225	45,946	131,487	19,326	27,797	3,554	7,313	18,710	53,269	10,484	21,760
2039	7,379	15,089	45,763	131,035	19,040	27,172	3,485	7,083	18,284	55,246	9,842	20,755
2040	7,827	15,875	45,700	122,968	19,951	28,043	3,779	7,674	19,098	48,503	10,539	22,046
2041	7,958	16,185	47,282	131,246	20,310	28,561	3,796	7,642	19,367	51,974	10,493	21,388
2042	7,827	15,905	47,768	137,398	19,933	28,506	3,522	7,212	18,839	52,450	10,331	21,574
2043	7,582	15,644	46,894	136,355	19,486	27,744	3,458	7,051	18,269	54,703	9,598	20,373
2044	7,843	16,457	47,269	128,230	20,489	28,615	3,691	7,531	19,240	48,277	10,314	21,644
2045	8,343	16,986	49,104	136,788	21,042	29,514	3,899	7,757	19,615	51,709	10,481	21,396
2046	7,932	16,573	49,317	142,557	20,465	29,071	3,517	7,151	18,856	51,752	10,220	21,277

		LRNRD Stream Depletion from Ground Water Pumping - Moderate Drought Scenarios										Estimated Reduction in Stream Depletion - LRNRD									
	Base	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100
2001	212,869																				
2002	180,438																				
2003	204,164																				
2004	213,157																				
2005	211,321																				
2006	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	0	0	0	0	0	0	0	0	0	0
2007	196,459	195,587	194,631	191,632	186,701	193,300	191,436	195,707	194,874	192,245	187,920	872	1,828	4,827	9,758	3,159	5,023	752	1,585	4,214	8,539
2008	189,131	187,897	186,657	182,298	174,972	184,664	181,763	188,026	186,913	182,939	176,209	1,234	2,474	6,833	14,159	4,467	7,368	1,105	2,218	6,192	12,922
2009	197,907	196,457	194,865	189,642	181,040	192,413	189,035	196,606	195,165	190,395	182,452	1,450	3,042	8,265	16,867	5,494	8,872	1,301	2,742	7,512	15,455
2010	208,641	207,312	205,659	199,912	189,724	203,175	199,403	207,522	206,090	201,028	191,842	1,329	2,982	8,729	18,917	5,466	9,238	1,119	2,551	7,613	16,799
2011	206,248	204,699	203,048	196,671	185,469	200,389	196,256	204,966	203,602	198,086	188,090	1,549	3,200	9,577	20,779	5,859	9,992	1,282	2,646	8,162	18,158
2012	193,780	192,048	190,353	185,269	174,944	188,285	185,179	192,349	190,956	186,792	177,844	1,732	3,427	8,511	18,836	5,495	8,601	1,431	2,824	6,988	15,936
2013	202,471	200,741	199,013	193,364	181,887	196,959	193,169	201,080	199,693	195,163	185,233	1,730	3,458	9,107	20,584	5,512	9,302	1,391	2,778	7,308	17,238
2014	212,561	210,891	209,169	203,131	190,735	207,082	203,213	211,280	209,963	205,274	194,838	1,670	3,392	9,430	21,826	5,479	9,348	1,281	2,598	7,287	17,723
2015	210,147	208,308	206,359	199,862	186,545	204,087	200,164	208,761	207,291	202,348	191,202	1,839	3,788	10,285	23,602	6,060	9,983	1,386	2,856	7,799	18,945
2016	197,803	195,704	193,638	187,444	176,190	191,413	188,143	196,202	194,646	190,002	181,164	2,099	4,165	10,359	21,613	6,390	9,660	1,601	3,157	7,801	16,639
2017	206,760	204,695	202,597	196,302	183,719	200,402	197,155	205,236	203,703	199,071	189,232	2,065	4,163	10,458	23,041	6,358	9,605	1,524	3,057	7,689	17,528
2018	216,590	214,682	212,701	206,119	192,640	210,552	207,151	215,239	213,850	209,223	198,894	1,908	3,889	10,471	23,950	6,038	9,439	1,351	2,740	7,367	17,696
2019	213,884	211,823	209,655	202,576	188,132	207,330	203,771	212,434	210,917	205,981	195,002	2,061	4,229	11,308	25,752	6,554	10,113	1,450	2,967	7,903	18,882
2020	201,536	199,223	196,879	189,724	177,687	194,590	191,084	199,876	198,227	193,343	184,787	2,313	4,657	11,812	23,849	6,946	10,452	1,660	3,309	8,193	16,749
2021	210,774	208,525	206,166	198,906	185,695	203,909	200,437	209,221	207,629	202,749	193,435	2,249	4,608	11,868	25,079	6,865	10,337	1,553	3,145	8,025	17,339
2022	220,500	218,438	216,247	208,859	194,752	214,123	210,547	219,114	217,701	212,957	203,195	2,062	4,253	11,641	25,748	6,377	9,953	1,386	2,799	7,543	17,305
2023	217,453	215,253	212,912	205,024	189,995	210,601	206,870	215,975	214,461	209,367	198,983	2,200	4,541	12,429	27,458	6,852	10,583	1,478	2,992	8,086	18,470
2024	205,324	202,802	200,272	192,322	179,548	197,990	194,351	203,580	201,868	196,900	188,594	2,522	5,052	13,002	25,776	7,334	10,973	1,744	3,456	8,424	16,730
2025	214,423	212,027	209,521	201,446	187,633	207,259	203,651	212,818	211,221	206,264	197,435	2,396	4,902	12,977	26,790	7,164	10,772	1,605	3,202	8,159	16,988
2026	224,040	221,905	219,611	211,576	196,891	217,530	213,886	222,673	221,242	216,556	207,269	2,135	4,429	12,464	27,149	6,510	10,154	1,367	2,798	7,484	16,771
2027	220,811	218,447	216,040	207,568	191,906	213,784	209,995	219,270	217,733	212,738	202,812	2,364	4,771	13,243	28,905	7,027	10,816	1,541	3,078	8,073	17,999
2028	208,745	205,976	203,274	194,721	181,184	201,010	197,360	206,896	205,107	200,036	192,071	2,769	5,471	14,024	27,561	7,735	11,385	1,849	3,638	8,709	16,674
2029	218,051	215,451	212,843	204,139	189,661	210,623	206,953	216,382	214,730	209,719	201,394	2,600	5,208	13,912	28,390	7,428	11,098	1,669	3,321	8,332	16,657
2030	227,480	225,327	222,921	214,408	199,014	220,918	217,268	226,206	224,763	220,046	211,177	2,153	4,559	13,072	28,466	6,562	10,212	1,274	2,717	7,434	16,303
2031	224,082	221,626	219,070	210,167	193,849	216,899	213,098	222,579	221,000	215,938	206,508	2,456	5,012	13,915	30,233	7,183	10,984	1,503	3,082	8,144	17,574
2032	212,094	209,157	206,245	197,215	182,948	203,954	200,331	210,201	208,349	203,100	195,294	2,937	5,849	14,879	29,146	8,140	11,763	1,893	3,745	8,994	16,800
2033	221,508	218,718	215,942	206,787	191,731	213,734	210,104	219,754	218,070	212,971	205,162	2,790	5,566	14,721	29,777	7,774	11,404	1,754	3,438	8,537	16,346
2034	230,912	228,583	226,075	217,218	201,293	224,099	220,504	229,514	228,091	223,398	214,987	2,329	4,837	13,694	29,619	6,813	10,408	1,398	2,821	7,514	15,925
2035	227,135	224,451	221,778	212,540	195,761	219,657	215,835	225,477	223,875	218,841	209,898	2,684	5,357	14,595	31,374	7,478	11,300	1,658	3,260	8,294	17,237
2036	215,305	212,213	209,144	199,703	184,789	206,823	203,121	213,402	211,476	206,075	198,169	3,092	6,161	15,602	30,516	8,482	12,184	1,903	3,829	9,230	17,136
2037	224,814	221,880	218,968	209,422	193,847	216,776	213,056	223,042	221,306	216,116	208,485	2,934	5,846	15,392	30,967	8,038	11,758	1,772	3,508	8,698	16,329
2038	233,951	231,638	229,051	219,887	203,455	227,120	223,469	232,641	231,240	226,520	218,379	2,313	4,900	14,064	30,496	6,831	10,482	1,310	2,711	7,431	15,572
2039	229,952	227,258	224,452	214,940	197,718	222,383	218,527	228,401	226,761	221,701	212,990	2,694	5,500	15,012	32,234	7,569	11,425	1,551	3,191	8,251	16,962
2040	218,260	215,021	211,755	201,983	186,441	209,422	205,662	216,323	214,341	208,790	200,770	3,239	6,505	16,277	31,819	8,838	12,598	1,937	3,919	9,470	17,490
2041	227,780	224,634	221,583	211,731	195,667	219,411	215,649	225,951	224,144	218,884	211,169	3,146	6,197	16,049	32,113	8,369	12,131	1,829	3,636	8,896	16,611
2042	236,799	234,350	231,729	222,360	205,490	229,816	226,208	235,495	234,067	229,387	221,330	2,449	5,070	14,439	31,309	6,983	10,591	1,304	2,732	7,412	15,469
2043	232,587	229,712	226,779	217,035	199,417	224,741	220,892	230,967	229,289	224,226	215,767	2,875	5,808	15,552	33,170	7,846	11,695	1,620	3,298	8,361	16,820
2044	221,231	217,823	214,401	204,317	188,174	212,043	208,222	219,242	217,229	211,535	203,433	3,408	6,830	16,914	33,057	9,188	13,009	1,989	4,002	9,696	17,798
2045	230,962	227,718	224,514	214,395	197,853	222,363	218,541	229,123	227,305	221,971	214,161	3,244	6,448	16,567	33,109	8,599	12,421	1,839	3,657	8,991	16,801
2046	239,435	236,948	234,229	224,690	207,389	232,366	228,757	238,145	236,720	232,081	223,990	2,487	5,206	14,745	32,046	7,069	10,678	1,290	2,715	7,354	15,445

	MRNRD Stream Depletion from Ground Water Pumping - Moderate Drought Scenarios											Estimated Reduction in Stream Depletion - MRNRD									
	Base	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100
2001	212,869																				
2002	180,438																				
2003	204,164																				
2004	213,157																				
2005	211,321																				
2006	193,072	193072	193072	193072	193072	193072	193072	193072	193072	193072	193072	0	0	0	0	0	0	0	0	0	0
2007	196,459	196185	195901	195140	194113	195486	194963	196188	195905	195151	194131	274	558	1,319	2,346	973	1,496	271	554	1,308	2,328
2008	189,131	188605	188079	186551	184276	187319	186305	188635	188138	186700	184538	526	1,052	2,580	4,855	1,812	2,826	496	993	2,431	4,593
2009	197,907	197203	196504	194439	191455	195551	194253	197281	196660	194837	192158	704	1,403	3,468	6,452	2,356	3,654	626	1,247	3,070	5,749
2010	208,641	207740	206868	204237	200566	205756	204211	207881	207150	204937	201873	901	1,773	4,404	8,075	2,885	4,430	760	1,491	3,704	6,768
2011	206,248	205285	204310	201387	197437	203212	201604	205488	204718	202420	199333	963	1,938	4,861	8,811	3,036	4,644	760	1,530	3,828	6,915
2012	193,780	192728	191677	188554	184065	190593	188936	192989	192204	189863	186520	1,052	2,103	5,226	9,715	3,187	4,844	791	1,576	3,917	7,260
2013	202,471	201313	200198	196680	191631	198985	197239	201641	200836	198335	194661	1,158	2,273	5,791	10,840	3,486	5,232	830	1,635	4,136	7,810
2014	212,561	211299	210009	206081	200625	208730	206840	211688	210769	208063	204210	1,262	2,552	6,480	11,936	3,831	5,721	873	1,792	4,498	8,351
2015	210,147	208789	207490	203419	197510	206267	204442	209220	208356	205714	201970	1,358	2,657	6,728	12,637	3,880	5,705	927	1,791	4,433	8,177
2016	197,803	196410	195019	190860	184882	193833	191974	196903	196009	193370	189519	1,393	2,784	6,943	12,921	3,970	5,829	900	1,794	4,433	8,284
2017	206,760	205290	203801	199326	192869	202564	200613	205833	204899	202094	198066	1,470	2,959	7,434	13,891	4,196	6,147	927	1,861	4,666	8,694
2018	216,590	214976	213385	208539	201699	212078	209955	215558	214662	211603	207400	1,614	3,205	8,051	14,891	4,512	6,635	1,032	1,928	4,987	9,190
2019	213,884	212233	210580	205726	197018	209364	207365	212910	211912	209065	204970	1,651	3,304	8,158	16,866	4,520	6,519	974	1,972	4,819	8,914
2020	201,536	199879	198214	193190	186121	197005	194997	200569	199595	196700	192627	1,657	3,322	8,346	15,415	4,531	6,539	967	1,941	4,836	8,909
2021	210,774	209047	207342	202115	194561	206147	204033	209780	208811	205867	201558	1,727	3,432	8,659	16,213	4,627	6,741	994	1,963	4,907	9,216
2022	220,500	218636	216753	211160	203235	215454	213242	219440	218348	215183	210837	1,864	3,747	9,340	17,265	5,046	7,258	1,060	2,152	5,317	9,663
2023	217,453	215574	213664	208035	197950	212463	210376	216413	215339	212346	208215	1,879	3,789	9,418	19,503	4,990	7,077	1,040	2,114	5,107	9,238
2024	205,324	203434	201558	195869	187780	200372	198297	204300	203300	200251	195950	1,890	3,766	9,455	17,544	4,952	7,027	1,024	2,024	5,073	9,374
2025	214,423	212494	210549	204714	196228	209372	207213	213388	212362	209299	204832	1,929	3,874	9,709	18,195	5,051	7,210	1,035	2,061	5,124	9,591
2026	224,040	221961	219898	213641	204777	218653	216345	222925	221819	218518	213885	2,079	4,142	10,399	19,263	5,387	7,695	1,115	2,221	5,522	10,155
2027	220,811	218710	216676	210448	199338	215505	213326	219743	218628	215471	211213	2,101	4,135	10,363	21,473	5,306	7,485	1,068	2,183	5,340	9,598
2028	208,745	206696	204648	198456	189565	203533	201351	207729	206665	203613	199142	2,049	4,097	10,289	19,180	5,212	7,394	1,016	2,080	5,132	9,603
2029	218,051	215963	213830	207342	198081	212626	210337	217000	215938	212712	208051	2,088	4,221	10,709	19,970	5,425	7,714	1,051	2,113	5,339	10,000
2030	227,480	225241	222968	216174	206610	221721	219381	226356	225226	221879	217091	2,239	4,512	11,306	20,870	5,759	8,099	1,124	2,254	5,601	10,389
2031	224,082	221840	219558	212797	201019	218397	216149	222979	221896	218610	214166	2,242	4,524	11,285	23,063	5,685	7,933	1,103	2,186	5,472	9,916
2032	212,094	209900	207658	200915	191375	206525	204284	211054	209983	206789	202288	2,194	4,436	11,179	20,719	5,569	7,810	1,040	2,111	5,305	9,806
2033	221,508	219294	217000	210028	199978	215802	213480	220436	219361	216075	211272	2,214	4,508	11,480	21,530	5,706	8,028	1,072	2,147	5,433	10,236
2034	230,912	228510	226080	218739	208408	224848	222408	229733	228589	225117	220223	2,402	4,832	12,173	22,504	6,064	8,504	1,179	2,323	5,795	10,689
2035	227,135	224806	222345	215067	202727	221237	218890	226084	224977	221611	216985	2,329	4,790	12,068	24,408	5,898	8,245	1,051	2,158	5,524	10,150
2036	215,305	212973	210601	203369	193176	209486	207207	214234	213149	209897	205345	2,332	4,704	11,936	22,129	5,819	8,098	1,071	2,156	5,408	9,960
2037	224,814	222480	220074	212649	201924	218910	216547	223719	222620	219290	214447	2,334	4,740	12,165	22,890	5,904	8,267	1,095	2,194	5,524	10,367
2038	233,951	231394	228827	221088	210117	227668	225178	232762	231641	228090	223118	2,557	5,124	12,863	23,834	6,283	8,773	1,189	2,310	5,861	10,833
2039	229,952	227515	224955	217291	204560	223841	221517	228855	227785	224423	219752	2,437	4,997	12,661	25,392	6,111	8,435	1,097	2,167	5,529	10,200
2040	218,260	215919	213378	205684	194796	212249	209886	217195	216127	212767	208098	2,341	4,882	12,576	23,464	6,011	8,374	1,065	2,133	5,493	10,162
2041	227,780	225338	222852	215057	203724	221706	219365	226660	225539	222211	217294	2,442	4,928	12,723	24,056	6,074	8,415	1,120	2,241	5,569	10,486
2042	236,799	234192	231477	223252	211509	230248	227756	235588	234414	230818	225690	2,607	5,322	13,547	25,290	6,551	9,043	1,211	2,385	5,981	11,109
2043	232,587	230069	227440	219329	206223	226319	223972	231469	230407	227038	222313	2,518	5,147	13,258	26,364	6,268	8,615	1,118	2,180	5,549	10,274
2044	221,231	218834	216242	208265	196811	215206	212863	220213	219122	215866	211159	2,397	4,989	12,966	24,420	6,025	8,368	1,018	2,109	5,365	10,072
2045	230,962	228452	225814	217615	205779	224675	222246	229860	228699	225262	220364	2,510	5,148	13,347	25,183	6,287	8,716	1,102	2,263	5,700	10,598
2046	239,435	236864	234055	225426	213184	232841	230244	238257	237114	233497	228325	2,571	5,380	14,009	26,251	6,594	9,191	1,178	2,321	5,938	11,110

	URNRD Stream Depletion from Ground Water Pumping - Moderate Drought Scenarios											Estimated Reduction in Stream Depletion - URNRD									
	Base	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100
2001	212,869																				
2002	180,438																				
2003	204,164																				
2004	213,157																				
2005	211,321																				
2006	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	0	0	0	0	0	0	0	0	0	0
2007	196,459	196,305	196,166	195,703	194,952	195,939	195,562	196,305	196,167	195,706	194,957	154	293	756	1,507	520	897	154	292	753	1,502
2008	189,131	188,821	188,493	187,595	186,206	188,013	187,414	188,831	188,510	187,649	186,289	310	638	1,536	2,925	1,118	1,717	300	621	1,482	2,842
2009	197,907	197,426	197,011	195,610	190,747	196,315	195,449	197,456	197,081	195,791	192,535	481	896	2,297	7,160	1,592	2,458	451	826	2,116	5,372
2010	208,641	207,981	207,344	205,373	196,910	206,472	205,279	208,076	207,502	205,857	199,924	660	1,297	3,268	11,731	2,169	3,362	565	1,139	2,784	8,717
2011	206,248	205,642	205,010	201,727	193,089	204,276	202,306	205,749	205,253	203,783	197,550	606	1,238	4,521	13,159	1,972	3,942	499	995	2,465	8,698
2012	193,780	193,136	192,499	188,522	179,053	191,743	189,675	193,280	192,801	191,287	185,054	644	1,281	5,258	14,727	2,037	4,105	500	979	2,493	8,726
2013	202,471	201,670	200,826	195,438	184,733	200,019	197,139	201,947	201,231	199,440	192,398	801	1,645	7,033	17,738	2,452	5,332	524	1,240	3,031	10,073
2014	212,561	211,604	210,633	203,882	191,797	209,567	206,097	211,896	211,138	208,839	201,165	957	1,928	8,679	20,764	2,994	6,464	665	1,423	3,722	11,396
2015	210,147	209,237	208,300	201,348	189,097	207,406	204,171	209,543	208,885	206,853	199,712	910	1,847	8,799	21,050	2,741	5,976	604	1,262	3,294	10,435
2016	197,803	196,855	195,845	189,015	175,868	195,004	192,350	197,209	196,580	194,655	187,942	948	1,958	8,788	21,935	2,799	5,453	594	1,223	3,148	9,861
2017	206,760	205,642	204,541	196,531	182,212	203,512	200,374	206,046	205,350	203,097	195,861	1,118	2,219	10,229	24,548	3,248	6,386	714	1,410	3,663	10,899
2018	216,590	215,313	213,960	204,967	189,174	212,839	209,385	215,758	214,952	212,391	204,682	1,277	2,630	11,623	27,416	3,751	7,205	832	1,638	4,199	11,908
2019	213,884	212,752	211,424	202,579	186,738	210,593	207,435	213,199	212,535	210,264	203,310	1,132	2,460	11,305	27,146	3,291	6,449	685	1,349	3,620	10,574
2020	201,536	200,301	199,038	190,454	173,883	198,208	195,645	200,852	200,151	197,995	191,773	1,235	2,498	11,082	27,653	3,328	5,891	684	1,385	3,541	9,763
2021	210,774	209,432	208,028	198,366	180,651	206,991	204,110	210,065	209,255	206,824	200,113	1,342	2,746	12,408	30,123	3,783	6,664	709	1,519	3,950	10,661
2022	220,500	218,849	217,301	206,711	187,579	216,155	213,001	219,588	218,651	215,932	208,806	1,651	3,199	13,789	32,921	4,345	7,499	912	1,849	4,568	11,694
2023	217,453	215,978	214,568	204,278	185,369	213,639	210,896	216,657	215,911	213,606	207,322	1,475	2,885	13,175	32,084	3,814	6,557	796	1,542	3,847	10,131
2024	205,324	203,779	202,264	192,422	172,866	201,392	199,082	204,521	203,770	201,458	195,964	1,545	3,060	12,902	32,458	3,932	6,242	803	1,554	3,866	9,360
2025	214,423	212,788	211,186	200,324	179,687	210,178	207,542	213,630	212,830	210,200	204,243	1,635	3,237	14,099	34,736	4,245	6,881	793	1,593	4,223	10,180
2026	224,040	222,186	220,322	208,567	186,477	219,163	216,246	223,097	222,114	219,154	212,804	1,854	3,718	15,473	37,563	4,877	7,794	943	1,926	4,886	11,236
2027	220,811	219,154	217,448	206,215	184,560	216,606	214,122	219,967	219,227	216,804	211,197	1,657	3,363	14,596	36,251	4,205	6,689	844	1,584	4,007	9,614
2028	208,745	207,146	205,340	194,491	172,385	204,479	202,372	208,033	207,246	204,780	199,849	1,599	3,405	14,254	36,360	4,266	6,373	712	1,499	3,965	8,896
2029	218,051	216,104	214,212	202,489	179,342	213,309	210,970	217,172	216,242	213,615	208,047	1,947	3,839	15,562	38,709	4,742	7,081	879	1,809	4,436	10,004
2030	227,480	225,346	223,223	210,565	186,015	222,173	219,476	226,543	225,493	222,439	216,556	2,134	4,257	16,915	41,465	5,307	8,004	937	1,987	5,041	10,924
2031	224,082	222,106	220,213	208,261	184,279	219,333	217,236	223,217	222,365	219,823	214,787	1,976	3,869	15,821	39,803	4,749	6,846	865	1,717	4,259	9,295
2032	212,094	210,151	208,306	196,783	172,345	207,451	205,527	211,273	210,475	207,985	203,514	1,943	3,788	15,311	39,749	4,643	6,567	821	1,619	4,109	8,580
2033	221,508	219,280	217,097	204,710	179,320	216,268	214,175	220,533	219,599	216,806	211,775	2,228	4,411	16,798	42,188	5,240	7,333	975	1,909	4,702	9,733
2034	230,912	228,520	226,087	212,792	185,936	225,060	222,714	229,803	228,820	225,599	220,201	2,392	4,825	18,120	44,976	5,852	8,198	1,109	2,092	5,313	10,711
2035	227,135	225,027	222,833	210,355	184,270	222,073	220,093	226,262	225,406	222,748	218,322	2,108	4,302	16,780	42,865	5,062	7,042	873	1,729	4,387	8,813
2036	215,305	213,228	211,156	199,148	172,721	210,449	208,478	214,510	213,667	211,172	207,131	2,077	4,149	16,157	42,584	4,856	6,827	795	1,638	4,133	8,174
2037	224,814	222,429	220,007	207,057	179,619	219,087	217,117	223,876	222,893	219,888	215,497	2,385	4,807	17,757	45,195	5,727	7,697	938	1,921	4,926	9,317
2038	233,951	231,390	228,772	214,922	186,020	227,788	225,413	232,916	231,819	228,597	223,635	2,561	5,179	19,029	47,931	6,163	8,538	1,035	2,132	5,354	10,316
2039	229,952	227,859	225,492	212,564	184,646	224,729	222,697	229,190	228,408	225,586	221,562	2,093	4,460	17,388	45,306	5,223	7,255	762	1,544	4,366	8,390
2040	218,260	216,090	213,765	201,433	173,185	213,122	211,200	217,507	216,668	214,060	210,151	2,170	4,495	16,827	45,075	5,138	7,060	753	1,592	4,200	8,109
2041	227,780	225,369	222,716	209,281	180,017	221,889	219,741	226,888	225,967	222,898	218,593	2,411	5,064	18,499	47,763	5,891	8,039	892	1,813	4,882	9,187
2042	236,799	234,022	231,214	216,903	186,167	230,268	227,882	235,703	234,639	231,252	226,405	2,777	5,585	19,896	50,632	6,531	8,917	1,096	2,160	5,547	10,394
2043	232,587	230,426	228,006	214,763	185,174	227,261	225,249	231,849	231,078	228,341	224,295	2,161	4,581	17,824	47,413	5,326	7,338	738	1,509	4,246	8,292
2044	221,231	219,226	216,640	204,012	174,158	215,990	214,143	220,553	219,864	217,154	213,293	2,005	4,591	17,219	47,073	5,241	7,088	678	1,367	4,077	7,938
2045	230,962	228,397	225,532	211,742	180,810	224,834	222,592	230,033	229,109	226,036	221,614	2,565	5,430	19,220	50,152	6,128	8,370	929	1,853	4,926	9,348
2046	239,435	236,598	233,448	218,774	186,372	232,597	230,203	238,405	237,322	233,841	228,933	2,837	5,987	20,661	53,063	6,838	9,232	1,030	2,113	5,594	10,502

Moderate-Drought Conditions 2007 through 2046 Modeling Scenario

Baseline Conditions and Assumptions

This scenario was performed in November of 2006 to calculate and analyze the baseflows and impacts to baseflows resulting from groundwater pumping during 'moderate drought' conditions. Five baseline runs (no pumping reductions apart from NRD allocations) were performed using the 'moderate drought' conditions, which were all based on final heads from equivalent (same NRD-pumping allocation and CREP/EQIP program acreage reductions) 2006 preliminary runs (See '*2006_PreliminaryModelRunExp.doc*'):

1) With NRD pumping allocations, no CREP/EQIP program irrigated acreage reductions.
2) With NRD pumping allocations, 44,400 Acres CREP/EQIP program irrigated acreage reductions. This is the baseline scenario upon which all future reduction scenarios were built (see below). It was chosen as the baseline for reduction scenarios because it is considered to be the most realistic representation of the current, unchanged condition.
3) With NRD pumping allocations, 70,000 acres CREP/EQIP program irrigated acreage reductions.
4) With NRD pumping allocations, 100,000 acres CREP/EQIP program irrigated acreage reductions.
5) No NRD pumping allocations, 44,400 acres CREP/EQIP program irrigated acreage reductions.

The years 1988 through 1991 were selected as years with relatively low precipitation, a time frame representative of real conditions. Both five-year and four-year time periods were examined to find a dry period with a low standard deviation indicating little deviation from the dry condition (See '*PrecipAnalysisFor0746Runs.xls*'). The average precipitation for the NE groundwater model region is 22.1 inches per year, and the 1988-1991 time period is characterized by an average rainfall of 20.1 inches per year with a standard deviation of only.9 inches. The climatic conditions and resulting irrigation applications from this period were repeated for 40 years. Therefore, this four-year climate condition was repeated ten times, 2007-2011, 2012-2015...2043-2046.

Phreatophyte evapotranspiration and precipitation for all three states were repeated using the cycles outlined above. Nebraska surface-water, canal deliveries and groundwater-commingled pumping were repeated using the same cycle. Kansas and Colorado irrigation were also repeated using the four-year cycle.

Nebraska groundwater-exclusive (GWEX) pumping was treated differently from the other irrigation categories, as irrigated acreage in this category has increased significantly since the reference years 1988-1991. The assumption was made that GWEX acreages would remain at the 2005 levels (as was the preliminary 2006 run) for the duration of the 40-year scenario, so 1988-1991 GWEX irrigated volumes were not used for the modeling scenarios. Groundwater-exclusive volumes were calculated by multiplying the specific county reference year's irrigation depth by the number of GWEX acres in each grid cell from the 2005 preliminary update. In this manner, the distribution of pumping corresponding to the precipitation pattern was preserved.

Pumping and Acreage Reduction Scenarios: Details

NRD Allocation Runs

Adjustments were made to the depths of irrigation application to account for allocations agreed upon by the Lower, Middle, and Upper Republican NRDs. Irrigation depth was capped at 13.5 inches for the Upper Republican, 13 inches for the Middle Republican, 12 inches west of the inlet to Harlan Reservoir and 11 inches east of the inlet to Harlan Reservoir in the Lower Republican NRD. The irrigation in Harlan County was capped at 11.5 inches since approximately one-half of the county has an 11-inch allocation and the other half a 12-inch allocation.

Runs with allocations were performed with four different levels of CREP/EQIP acreage reductions. One run was performed without NRD reductions, but with 44,400 acres of CREP/EQIP acreage reductions to compare to the principle baseline run and observe the impact reductions resulting from the current NRD allocations.

CREP/EQIP Program Acreage Reductions

Estimates of acres enrolled, and locations thereof, of CREP/EQIP program lands for the year 2006 were obtained from Jeremy Gehle of the NE Department of Natural resources. The total enrollment in these two programs for the year 2006 was estimated to be 44,400 acres, and this level was continued on through 2046 as the principle scenario upon which all reduction runs are based. For comparison purposes and to further understand potential baseflow impact reductions from acreage reductions, the model was run (as outlined above) with the four levels of CREP/EQIP program acreage reductions.

Actual locations of the lands taken out of production due to the CREP/EQIP programs was unknown; however, an approximate distribution of these lands by county was known. All reductions were applied to lands in the groundwater-exclusive (GWEX) irrigation category. These 44,400 acres, and their corresponding pumping volumes were removed from the appropriate counties to create what was assumed to be the most probable baseline scenario upon which to perform future reduction scenarios.

Since the actual distribution in each county of these acre distributions was unknown, the reductions were applied evenly to all GWEX-irrigated lands found within the quick-response areas of each county. This was performed by first calculating an acreage ratio for each county. The acreage ratio for each county was calculated as:

$$\frac{(\#\ \textit{Irrigated GWEX Acres in QR Area} - \#\ \textit{Acres Enrolled in CREP/EQIP Programs})}{\#\ \textit{Irrigated GWEX Acres in QR Area}}$$

These county-specific ratios were then multiplied by all the acres and volumes for each cell in the quick-response area, thereby calculating the new, reduced quick-response acres and volumes. This same method was used to prepare pumping files for all levels of CREP/EQIP reductions.

Pumping Reduction Scenarios

Several levels of reductions were applied to the baseline run with NRD allocations and 44,400 acres of CREP/EQIP reductions. The reductions fall into four categories: 1) Reductions applied to the 3-NRD region consisting of the Lower, Middle and Upper Republican NRDs ('RED' scenarios), 2) Reductions applied only to the quick-response area ('QR' scenarios) 3) Reductions applied to the 3-NRD and QR areas simultaneously, 4) Reductions applied to the Lower, Middle, Upper and Tri-Basin NRDs. The reductions applied are as follows:

RED 10%
RED 20%
RED 50%
RED 100 %
RED 15% + QR 25% (15% Reduction to both QR and Upland, plus 25% to just the QR area)
RED 15% +QR 25% (15% Reduction to both QR and Upland, plus 50% to just the QR area)
QR 20%
QR 50%
QR 100%

The reductions listed above were also applied to the individual NRDs.

Phreatophyte ET Control

Runs were performed to determine the reduction to baseflow impacts resulting from eliminating and controlling the return of phreatophyte vegetation located in the quick-response area. Reductions were not performed on vegetation outside of the quick response area. The total area of phreatophytes in NE, as represented by the groundwater model is 164,538 acres; 128,056 of these acres are in the quick-response area. Two levels of reductions, 10% and 20% were observed in the modeling scenarios.

Narrative for 15-50 Scenario Analysis

Discussed on December 15, 2006
McCook, Nebraska

Material Provided by
The Nebraska Department of
Natural Resources

Methods Used to Analyze the 15% Basin Wide Plus Additional 50% Pumping Reduction in the Quick Response Area from Ground Water Model Scenario Results

The following is a brief synopsis of the methods used to analyze the results of Scenario 15_50 in moderate drought conditions. The goal of the 15_50 scenario analysis was to estimate a volume of pumpage that would result in stream flow depletions less than a selected basin target allocation. The target allocation is Nebraska's estimated one-year share of the Computed Water Supply as determined by the methods detailed in Appendix C, Accounting Procedures and Reporting Requirements (as amended), of the Final Settlement Stipulation. Table 1 located in Microsoft Excel spreadsheet "15_50Summary.xls" provides a summary of Nebraska's allocation of water from the Republican River Basin from 1995 – 2005. These values represent the maximum volume of net consumptive use (the sum of all consumptive uses less the sum of all credits) which would approximate a one-year water budget. Using the allocation information from this table, a Basin target allocation of 200,000 acre-feet (AF) was selected.

Once the target allocation was selected, a series of model runs from the Republican River ground water model were scrutinized. This series of runs, collectively referred to as 0746-Moderate Drought, modeled a number of different scenarios involving various rates of groundwater pumpage with assumed conditions for climate, surface water, phreatophyte evapotranspiration, and land retirement programs. A more complete description of the 0746-Moderate Drought collection of runs can be located in the official DNR documentation document (DNR, 2006).

Table 2 provides a summary of the pumpage volumes, by Quick Response (QR) and Upland areas, assumed for each of the scenarios modeled as part of the 0746-Moderate Drought group of model runs. For each scenario, the computed beneficial consumptive use (CBCU) due to groundwater pumpage was calculated. These values (baseflow depletions) are summarized on Table 3. From this information, the pumpage volume represented in Scenario 15_50 was selected as an initial pumpage volume estimate from which to work. As shown on Table 3, Scenario 15_50 has a predicted average depletion due to groundwater pumpage from 2007-2010 of approximately 185,000 AF. With an Imported Water Supply (IWS} credit of 10,000 AF (based on trend information inferred from Table 1) and assumed surface water CBCU of 25,000 AF, the target of 200,000 AF could be met (185,000-10,000+25,000=200,000).

The pumpage volumes shown on Table 4 are based on Scenario 15_50. The reductions represented in Scenario 15_50 are uniform percentage reductions of the pumpage volumes currently represented in the model, as discussed in the documentation (DNR, 2006). The scenario did not look at optimizing the distribution of this volume; therefore, the volumes on Table 4 were presented as a range, rather than as a fixed volume. For instance, in the process of optimizing the pumpage volumes, it may make sense to have some QR areas greater than 50% while other areas might reduce less. The actual values will be dependent upon the results of optimization. The optimizations can be identified

by considerations regarding distribution of pump volumes across political boundaries or proximity to streams, desire to maximize production in the basin or other desired policies. The focus of Scenario 15_50 was to determine the general volume of pumpage from which to optimize.

Reference:

DNR, 2006. Moderate-Drought Conditions 2007 through 2046 Modeling Scenario (0746ModDrtModelingScenarioExp.doc).

TABLE 1
HISTORICAL NEBRASKA ALLOCATION, CBCU, AND IWS CREDIT

Year	Allocation	CBCU	IWS Credit	Alloc-(CBCU-IWS)				GW CBCU	SW CBCU
1995	332,550	295,880	17,902	54,572				190,317	105,581
1996	377,300	278,900	24,394	122,794				201,532	77,366
1997	337,700	315,680	16,434	38,454				186,345	129,340
1998	315,410	297,750	17,677	35,337				185,460	112,301
1999	299,050	302,890	18,444	14,604				203,488	99,390
2000	291,920	296,530	18,656	14,046				184,020	112,493
2001	299,380	292,320	18,242	25,302				212,871	79,446
2002	236,550	265,910	13,996	-15,364				180,438	85,465
2003	227,580	262,780	9,780	-25,420				204,165	58,614
2004	205,630	252,650	10,380	-36,640				213,115	39,530
2005	198,940	252,690	11,965	-41,785	w/ NFR evap above HC			210,879	41,803
Averages									
1995-2005	283,819		16,170					197,512	85,575
2000-2005	243,333		13,837					200,915	69,559
2003-2005	210,717		10,708					209,386	46,649

TABLE 2

PUMPAGE SUMMARY FOR MODEL SCENARIO 0746-MODERATE DROUGHT

RECEIVED FROM DNR ON 13 DEC 2006

Year	NRD_Area	Baseline QR Acres	Baseline QR Vol	Baseline Upland Acres	Baseline Upland Vol	Baseline Total Acres	Baseline Total Vol	QR20 QR VolSUM	QR20 Upland VolSUM	QR20 Total VolSUM	QR50 QR VolSUM	QR50 Upland VolSUM	QR50 Total VolSUM	QR100 QR VolSUM	QR100 Upland VolSUM	QR100 Total VolSUM	15-50 QR VolSUM	15-50 Upland VolSUM	15-50 Total VolSUM	RED20 QR VolSUM	RED20 Upland VolSUM	RED20 Total VolSUM	RED50 QR VolSUM	RED50 Upland VolSUM	RED50 Total VolSUM	RED100 QR VolSUM	RED100 Upland VolSUM	RED100 Total VolSUM
2007		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2008		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2009		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2010		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2011		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2012		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2013		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2014		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2015		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2016		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2017		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2018		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2019		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2020		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2021		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2022		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2023		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2024		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2025		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2026		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2027		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2028		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2029		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2030		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2031		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2032		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2033		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2034		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2035		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2036		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2037		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2038		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2039		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2040		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2041		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2042		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
2043		265,782	274,662	720,054	767,647	985,836	1,042,309	219,730	767,647	987,377	137,331	767,647	904,978	0	767,647	767,647	175,097	652,500	827,597	116,731	652,500	769,231	219,730	614,118	833,847	137,331	383,824	521,155	0	0	0
2044		265,751	270,482	720,123	736,319	985,873	1,006,801	216,385	736,319	952,704	135,241	736,319	871,560	0	736,319	736,319	172,432	625,871	798,303	114,955	625,871	740,826	216,385	589,055	805,441	135,241	368,159	503,400	0	0	0
2045		265,826	270,764	720,123	781,981	985,949	1,052,744	216,611	781,981	998,591	135,382	781,981	917,362	0	781,981	781,981	172,612	664,683	837,295	115,075	664,683	779,758	216,611	625,584	842,195	135,382	390,990	526,372	0	0	0
2046		266,362	275,311	720,123	790,026	986,485	1,065,338	220,249	790,026	1,010,275	137,656	790,026	927,682	0	790,026	790,026	175,511	671,522	847,033	117,007	671,522	788,530	220,249	632,021	852,270	137,656	395,013	532,669	0	0	0
Averages		265,930	272,805	720,106	768,993	986,036	1,041,798	218,244	768,993	987,237	136,402	768,993	905,396	0	768,993	768,993	173,913	653,644	827,557	115,942	653,644	769,586	218,244	615,195	833,438	136,402	384,497	520,899			
LR		119,641	113,190	153,642	146,929	273,283	260,119	90,552	146,929	237,481	56,595	146,929	203,524	0	146,929	146,929	72,159	124,890	197,049	48,106	124,890	172,996	90,552	117,543	208,095	56,595	73,465	130,060	0	0	0
MR		91,456	97,741	160,535	178,279	251,992	276,020	78,193	178,279	256,472	48,871	178,279	227,150	0	178,279	178,279	62,310	151,537	213,847	41,540	151,537	193,077	78,193	142,623	220,816	48,871	89,139	138,010	0	0	0
UR		54,832	61,873	405,929	443,785	460,760	505,658	49,499	443,785	493,284	30,937	443,785	474,722	0	443,785	443,785	39,444	377,217	416,661	26,296	377,217	403,513	49,499	355,028	404,527	30,937	221,893	252,829	0	0	0

	15-75 QR Vol	15-75 Upland Vol	15-75 Total Vol
LR	24,053	124,890	148,943
MR	20,770	151,537	172,307
UR	13,148	377,217	390,365
	57,971	653,644	711,615

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TABLE 3
SUMMARY OF DEPLETIONS FROM GROUNDWATER PUMPING FOR MODEL SCENARIO 0746-MODERATE DROUGHT
RECEIVED FROM DNR ON 13 DEC 2006

	Base	RED 10	RED 20	RED 50	RED 100	RED 15 QR 25	RED 15 QR 50	QR10	QR20	QR50	QR100	ET RED 10%	ET RED 20%
2001	212,869												
2002	180,438												
2003	204,164												
2004	213,157												
2005	211,321												
2006	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072	193,072
2007	196,459	195,172	193,792	189,530	182,761	191,806	189,016	195,294	194,040	190,157	183,983	188,085	178,677
2008	189,131	187,057	184,965	178,174	167,166	181,777	177,231	187,225	185,221	178,648	167,753	178,687	166,714
2009	197,907	195,276	192,535	183,837	167,225	188,486	182,860	195,483	192,771	184,364	168,959	186,948	174,881
2010	208,641	205,766	202,617	192,188	167,452	198,185	191,553	206,074	203,252	193,480	172,221	197,400	184,511
2011	206,248	203,104	199,884	187,334	153,124	195,371	187,656	203,659	200,779	190,422	161,131	195,546	182,825
2012	193,780	190,354	186,964	174,750	142,673	183,056	176,131	191,083	188,396	179,475	152,533	182,946	171,262
2013	202,471	198,788	195,062	180,553	143,312	190,984	182,629	199,668	196,800	186,295	155,484	192,026	180,768
2014	212,561	208,579	204,591	187,917	145,352	200,237	190,968	209,658	206,726	195,456	162,073	201,651	189,781
2015	210,147	205,999	201,782	184,105	136,464	197,490	187,338	207,227	204,291	192,856	155,946	199,600	187,659
2016	197,803	193,353	188,886	171,649	128,832	184,668	176,797	194,694	191,632	182,162	150,292	186,811	175,042
2017	206,760	202,109	197,362	178,666	130,150	193,007	184,570	203,596	200,441	189,708	154,436	196,156	184,988
2018	216,590	211,777	206,829	186,435	132,414	202,355	193,230	213,445	210,205	199,128	161,902	205,630	193,824
2019	213,884	208,980	203,950	181,797	125,648	199,492	188,958	210,724	207,540	196,496	157,063	203,356	191,565
2020	201,536	196,322	191,101	170,290	119,146	186,744	178,659	198,205	194,925	185,004	152,217	190,530	178,762
2021	210,774	205,437	199,979	177,845	120,817	195,429	187,033	207,484	204,130	193,634	156,946	200,235	189,060
2022	220,500	214,958	209,330	185,798	123,269	204,813	195,873	217,121	213,805	202,929	164,796	209,593	197,764
2023	217,453	211,922	206,244	180,923	117,762	201,827	192,059	214,184	210,881	200,143	160,267	206,997	195,358
2024	205,324	199,378	193,470	169,987	112,085	189,145	181,091	201,761	198,282	188,038	155,627	194,266	182,518
2025	214,423	208,457	202,410	177,611	113,232	197,938	189,478	211,008	207,582	196,872	160,407	203,926	192,806
2026	224,040	217,921	211,746	185,704	116,287	207,236	198,424	220,603	217,086	206,233	168,356	213,188	201,550
2027	220,811	214,716	208,557	181,038	111,420	204,257	195,318	217,363	214,025	203,418	164,064	210,465	198,995
2028	208,745	202,319	195,713	170,126	106,409	191,459	183,501	205,154	201,516	190,874	159,457	197,740	186,149
2029	218,051	211,399	204,802	177,928	107,741	200,466	192,187	214,438	210,826	199,961	164,486	207,466	196,444
2030	227,480	220,903	214,096	186,260	110,607	209,771	201,081	224,009	220,450	209,326	172,662	216,757	205,261
2031	224,082	217,332	210,649	181,756	106,384	206,497	198,297	220,548	216,992	206,256	167,685	213,861	202,540
2032	212,094	205,031	197,985	170,705	101,869	193,695	185,947	208,340	204,633	193,628	162,968	201,237	189,694
2033	221,508	214,318	207,036	178,576	103,336	202,878	194,804	217,721	214,051	202,907	168,515	211,003	199,984
2034	230,912	223,788	216,482	187,063	106,171	212,243	203,827	227,284	223,705	212,331	176,431	220,320	208,876
2035	227,135	220,011	212,722	182,680	102,315	208,661	200,614	223,568	219,981	208,954	171,162	217,115	205,966
2036	215,305	207,840	200,290	171,600	98,267	196,135	188,166	211,553	207,717	196,465	166,658	204,608	193,126
2037	224,814	217,147	209,414	179,494	99,673	205,256	197,100	221,018	217,133	205,780	172,414	214,331	203,328
2038	233,951	226,467	218,726	188,005	102,464	214,625	206,154	230,397	226,638	215,241	180,682	223,467	212,191
2039	229,952	222,573	214,863	184,189	98,917	210,912	202,780	226,467	222,869	211,668	174,706	220,110	209,197
2040	218,260	210,433	202,385	172,560	95,292	198,309	190,217	214,481	210,586	199,162	169,757	207,721	196,214
2041	227,780	219,822	211,595	180,498	96,534	207,470	199,219	223,984	220,138	208,413	175,806	217,287	206,392
2042	236,799	228,972	220,894	189,031	99,401	216,866	208,293	233,277	229,587	217,960	184,349	226,468	215,225
2043	232,587	225,005	216,943	185,693	96,232	213,101	204,843	229,129	225,536	214,318	177,884	222,989	212,214
2044	221,231	213,388	204,774	173,962	93,001	200,742	192,616	217,540	213,700	201,991	172,954	210,917	199,587
2045	230,962	222,619	213,976	181,858	94,174	209,920	201,448	227,063	223,205	211,347	179,253	220,481	209,566
2046	239,435	231,503	222,862	190,118	96,878	218,970	210,364	235,918	232,284	220,579	187,683	229,215	218,158
Averages													
2007 - 2010	198,035	195,818	193,477	185,932	171,151	190,064	185,165	196,019	193,821	186,662	173,229	187,780	176,196
2011 - 2014	203,765	200,206	196,625	182,639	146,115	192,412	184,346	201,017	198,175	187,912	157,805	193,042	181,159
2014 - 2046	219,809	213,357	206,741	180,360	110,562	202,503	193,977	216,332	212,821	201,795	166,967	209,257	197,872

15_50Summary.xls

TABLE 4

FOR PLANNING PURPOSES ONLY

Using Model Scenario Acreage

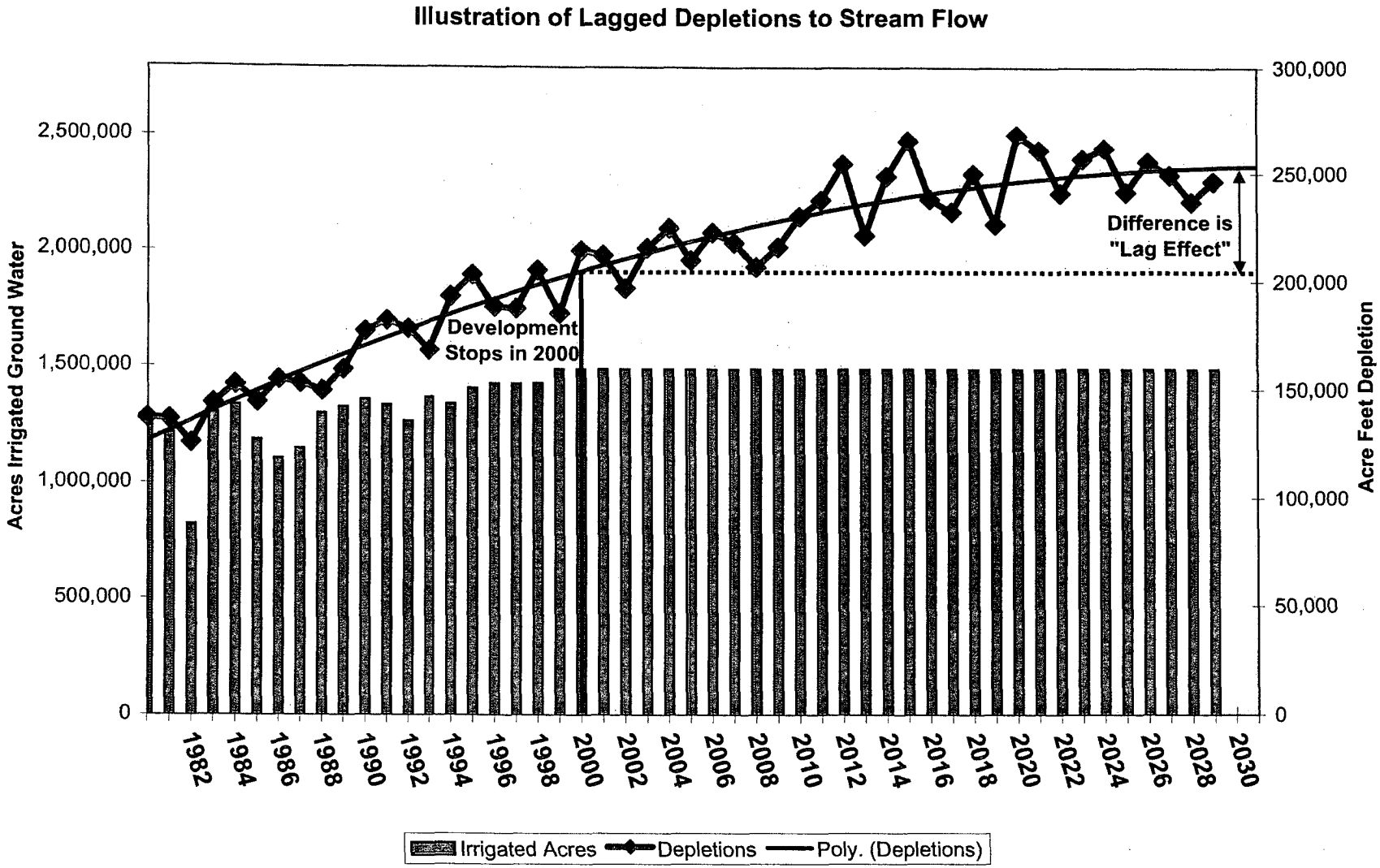
	Target Pumpage Volume Ranges		
	Quick Response Zone	Upland Zone	NRD
Upper Republican NRD	13,000 - 26,000	375,000	388,000 - 401,000
Middle Republican NRD	20,000 - 40,000	150,000	170,000 - 190,000
Lower Republican NRD	24,000 - 48,000	125,000	149,000 - 173,000
	Acreage for In/Ac Allocation Calculation		
	Quick Response Zone	Upland Zone	NRD
Upper Republican NRD	55,000	405,000	460,000
Middle Republican NRD	90,000	160,000	250,000
Lower Republican NRD	120,000	155,000	275,000
	Calculated In/Ac Allocation Ranges		
	Quick Response Zone	Upland Zone	NRD Average
Upper Republican NRD	2.8 - 5.7	11.1	10.1 - 10.5
Middle Republican NRD	2.7 - 5.3	11.3	8.2 - 9.1
Lower Republican NRD	2.4 - 4.8	9.7	6.5 - 7.5

Using IMP Planning Acreage

	Target Pumpage Volume Ranges		
	Quick Response Zone	Upland Zone	NRD
Upper Republican NRD	13,000 - 26,000	375,000	388,000 - 401,000
Middle Republican NRD	20,000 - 40,000	150,000	170,000 - 190,000
Lower Republican NRD	24,000 - 48,000	125,000	149,000 - 173,000
	Acreage for In/Ac Allocation Calculation		
	Quick Response Zone	Upland Zone	NRD
Upper Republican NRD	55,000	400,000	455,000
Middle Republican NRD	90,000	200,000	290,000
Lower Republican NRD	120,000	157,000	277,000
	Calculated In/Ac Allocation Ranges		
	Quick Response Zone	Upland Zone	NRD Average
Upper Republican NRD	2.8 - 5.7	11.3	10.2 - 10.6
Middle Republican NRD	2.7 - 5.3	9.0	7.0 - 7.9
Lower Republican NRD	2.4 - 4.8	9.6	6.5 - 7.5

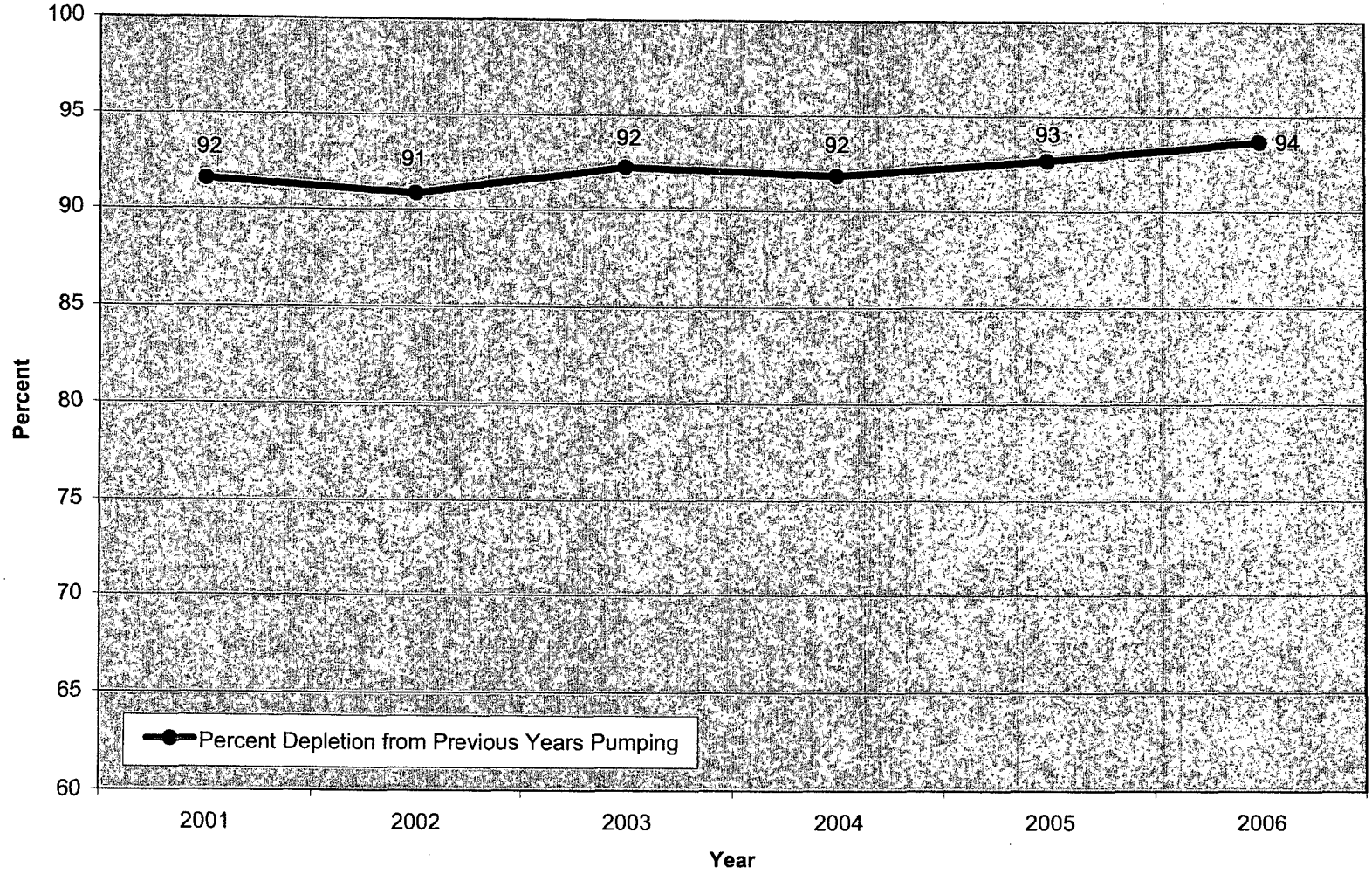
FOR PLANNING PURPOSES ONLY

	LRNRD						MRNRD						URNRD					
Year	QR SUM AREA	UL SUM AREA	SUM ACRES	QR SUM VOL	UL SUM VOL	SUM VOLUME	Year	QR SUM AREA	UL SUM AREA	SUM ACRES	QR SUM VOL	UL SUM VOL	SUM VOLUME	Year	QR SUM AREA	UL SUM AREA	SUM ACRES	QR SUM VOL	UL SUM VOL	SUM VOLUME
1981	82,936	92,647	175,583	62,399	77,275	139,674	1981	89,205	145,450	234,655	70,936	113,397	184,333	1981	53,386	275,699	329,085	63,074	272,714	335,788
1982	78,172	95,061	173,233	69,086	75,919	145,004	1982	84,845	134,241	219,086	74,780	119,201	193,980	1982	54,660	270,531	325,191	50,515	224,274	274,788
1983	60,834	63,179	124,013	74,238	85,564	159,802	1983	63,336	97,252	160,588	88,322	122,445	210,768	1983	38,334	210,063	248,397	61,512	280,216	341,729
1984	84,190	98,303	182,493	94,468	108,155	202,623	1984	84,058	139,876	223,935	99,527	156,689	256,216	1984	56,564	319,087	375,652	78,896	355,713	434,608
1985	84,670	101,442	186,112	72,576	85,123	157,699	1985	95,987	157,540	253,527	99,227	159,253	258,479	1985	53,591	305,799	359,390	80,008	364,584	444,593
1986	85,713	102,974	188,686	85,334	96,416	181,751	1986	79,068	128,638	207,706	102,527	159,186	261,713	1986	49,220	265,289	314,509	69,389	326,342	395,732
1987	78,191	91,158	169,349	68,738	88,117	156,855	1987	76,367	117,176	193,542	90,403	141,340	231,742	1987	50,103	266,268	316,371	64,804	299,702	364,506
1988	78,990	95,022	174,013	99,451	129,732	229,183	1988	75,653	117,133	192,787	95,519	153,388	248,908	1988	51,515	270,946	322,461	74,159	338,012	412,170
1989	93,430	107,629	201,059	101,148	116,255	217,403	1989	80,771	129,587	210,358	105,488	162,100	267,587	1989	55,464	292,757	348,221	73,541	331,934	405,475
1990	92,938	108,624	201,563	98,600	115,888	214,488	1990	85,359	134,620	219,979	117,211	187,633	304,845	1990	58,037	297,423	355,460	90,198	414,809	505,007
1991	93,445	109,074	202,519	124,005	152,072	276,077	1991	85,048	135,884	220,932	117,474	189,743	307,217	1991	61,295	308,471	369,765	79,307	383,822	463,129
1992	93,090	109,256	202,346	66,616	78,930	145,545	1992	84,878	135,690	220,568	65,548	107,742	173,291	1992	59,659	308,330	367,989	60,526	274,438	334,965
1993	90,120	106,523	196,643	17,421	24,111	41,532	1993	79,644	124,279	203,923	21,852	39,466	61,318	1993	57,515	302,413	359,928	47,621	209,080	256,701
1994	97,591	112,548	210,139	80,179	94,389	174,568	1994	84,559	135,590	220,149	109,818	167,495	277,313	1994	58,516	310,312	368,827	87,858	407,084	494,942
1995	95,097	109,159	204,255	108,726	137,469	246,195	1995	78,642	128,347	206,989	113,625	172,610	286,235	1995	58,879	315,734	374,614	76,093	363,274	439,368
1996	98,892	112,682	211,575	50,913	73,585	124,499	1996	84,967	141,202	226,169	69,751	108,620	178,371	1996	61,664	323,135	384,798	60,538	267,929	328,467
1997	107,420	125,536	232,956	104,864	132,923	237,787	1997	87,175	143,646	230,821	114,012	179,910	293,922	1997	61,371	315,799	377,170	90,324	399,214	489,538
1998	105,930	124,613	230,543	88,506	106,054	194,560	1998	86,869	146,984	233,852	118,746	184,284	303,030	1998	58,220	313,375	371,596	93,020	410,387	503,407
1999	102,305	125,890	228,194	64,943	88,562	153,505	1999	85,366	145,358	230,724	46,847	90,265	137,113	1999	57,630	311,406	369,036	68,764	311,462	380,226
2000	113,245	129,149	242,395	110,588	153,329	263,918	2000	88,060	151,689	239,749	144,099	242,826	386,924	2000	60,321	323,691	384,012	116,978	546,503	663,481
2001	112,277	132,332	244,610	101,064	136,200	237,263	2001	95,364	162,206	257,570	115,380	197,966	313,345	2001	84,002	359,497	443,499	94,629	390,827	485,456
2002	115,202	133,290	248,492	158,312	200,105	358,417	2002	94,468	161,198	255,666	158,950	274,962	433,912	2002	84,274	360,121	444,395	131,648	538,219	669,867
2003	124,853	146,734	271,587	124,672	169,858	294,529	2003	90,106	164,299	254,405	128,858	227,678	356,536	2003	70,395	380,953	451,349	87,989	473,189	561,178
2004	133,461	159,044	292,505	118,900	152,617	271,517	2004	93,503	171,237	264,739	115,911	202,902	318,813	2004	65,175	377,038	442,214	69,215	396,809	466,023
2005	127,294	153,565	280,859	106,125	133,082	239,206	2005	84,839	161,343	246,182	87,811	159,339	247,150	2005	68,490	405,929	474,419	61,459	364,480	425,939

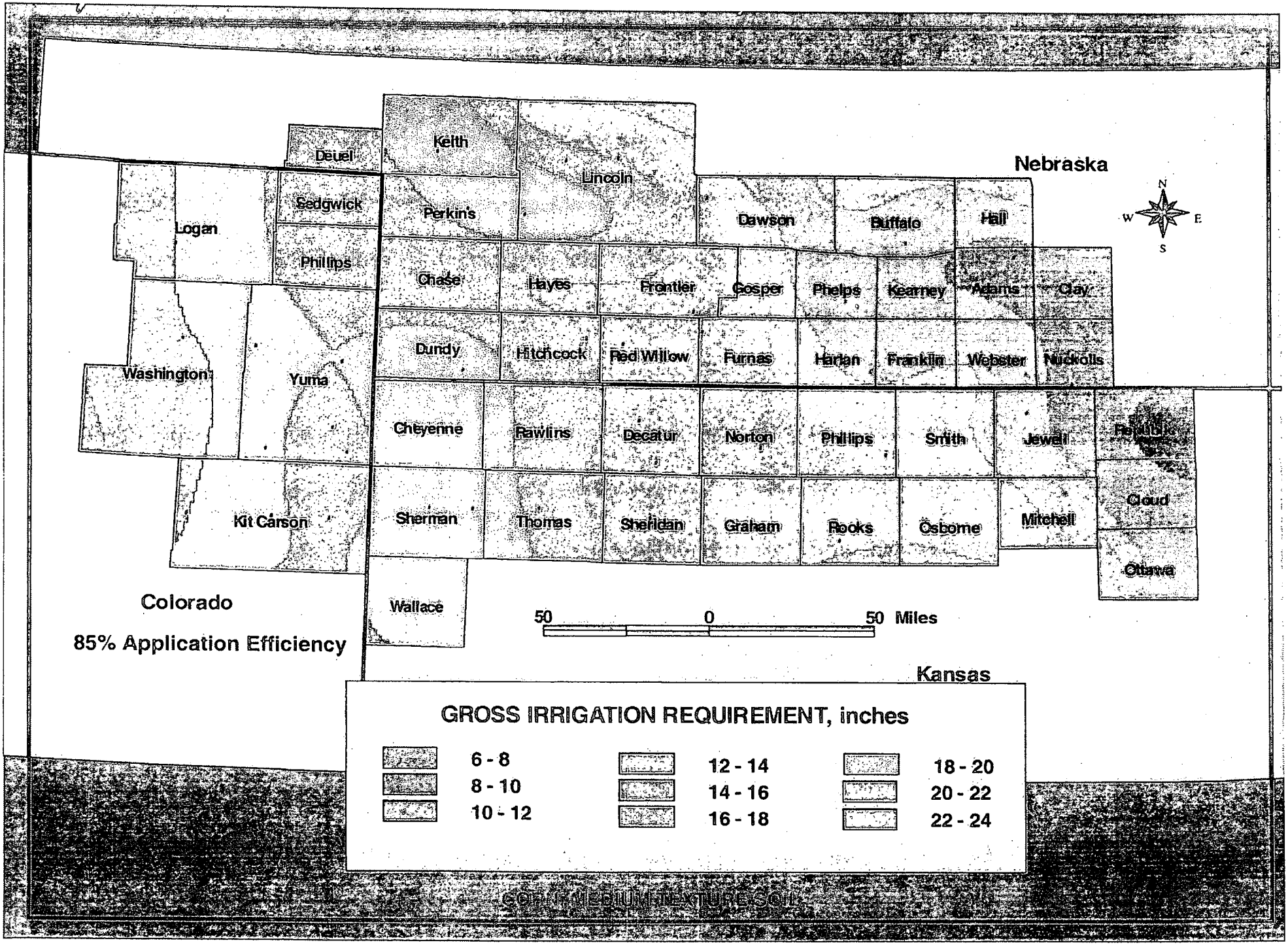


RR lag chart with polynomial trend.xls

Estimated Percent of Yearly Impacts from Past Pumping, 2001-2006



Lag0106_YrByYrSummary_.xls


Nebraska
Deuel
Keith
Lincoln
Sedgwick
Perkins
Dawson
Buffalo
Hall
Logan
Phillips
Chase
Hayes
Frontier
Gosper
Phelps
Kearney
Adams
Clay
Dundy
Hitchcock
Red Willow
Furnas
Harlan
Franklin
Webster
Nuckolls
Washington
Yuma
Cheyenne
Rawlins
Decatur
Norton
Phillips
Smith
Jewell
Republic
Cloud
Kit Carson
Sherman
Thomas
Sheridan
Graham
Rooks
Osborne
Mitchell
Ottawa
Wallace
Colorado
85% Application Efficiency
50 0 50 Miles
Kansas
GROSS IRRIGATION REQUIREMENT, inches
6 - 8
8 - 10
10 - 12
12 - 14
14 - 16
16 - 18
18 - 20
20 - 22
22 - 24
MEDIUM TEXTURE SOIL

Excerpts from the Final Settlement Stipulation Regarding Stream Augmentation

III. Existing Development

B. Exceptions to Moratorium on New Wells

1. The Moratorium shall not apply to the following:

k. Wells acquired or constructed by a State for the sole purpose of offsetting stream depletions in order to comply with its Compact Allocations. Provided that, such Wells shall not cause any new net depletion to stream flow either annually or long-term. The determination of net depletions from these Wells will be computed by the RRCA Groundwater Model and included in the State's Computed Beneficial Consumptive Use. Augmentation plans and related accounting procedures submitted under this Subsection III.B.1.k. shall be approved by the RRCA prior to implementation.

IV. Compact Accounting

A. The States will determine Virgin Water Supply, Computed Water Supply, Allocations, Imported Water Supply Credit, augmentation credit and Computed Beneficial Consumptive Use based on a methodology set forth in the RRCA Accounting Procedures, attached hereto as Appendix C.

H. Augmentation credit, as further described in Subsection III.B.1.k., shall be calculated in accordance with the RRCA Accounting Procedures and by using the RRCA Groundwater Model.

LR 389
Interim Study Hearing
Natural Resources Committee

May 16, 2006
Holdrege, Nebraska

Material Provided by
the Nebraska Department of
Natural Resources

Applicable Provisions in the Republican River Compact Settlement Agreement

Article II Definitions

Imported Water Supply Credit: The accretions to stream flow due to water imports from outside of the Basin as computed by the RRCA Groundwater Model. The Imported Water Supply Credit of a State shall not be included in the Virgin Water Supply and shall be counted as a credit/offset against the Computed Beneficial Consumptive use of that State's Allocation, except as provided in Subsection V.B.2. of this Stipulation and Subsections III.I.-J. of the RRCA Accounting Procedures;

Article V.B.2.b. Nebraska Action in Water-Short Year Administraion

b. Nebraska may offset any Computed Beneficial Consumptive Use in excess of its Allocation that is derived from sources above Guide Rock with Imported Water Supply Credit. If Nebraska chooses to exercise its option to offset with Imported Water Supply Credit, Nebraska will receive credit only for Imported Water Supply that: (1) produces water above Harlan county Lake; (2) produces water below Harlan County Lake and above Guide Rock that can be diverted during the Bostwick irrigation season; (3) produces water that can be stored and is needed to fill Lovewell Reservoir; or (4) Kansas and Nebraska will explore crediting water that is otherwise useable by Kansas.

Article III.B.1.k. Exception to Moratorium on New Wells

The moratorium [on new wells] shall not apply to the following:

k. Wells acquired or constructed by a State for the sole purpose of offsetting stream depletions in order to comply with its Compact Allocations. Provided that such Wells shall not cause any new net depletion to stream flow either annually or long-term. The determination of net depletions from these Wells will be computed by the RRCA Groundwater Model and included in the State's Computed Beneficial Consumptive Use. Augmentation plans and related accounting procedures submitted under this Subsection III.B.1.k. shall be approved by the RRCA prior to implementation.

Interbasin Transfer Statutes for Surface Water

46-206. Appropriation; water to be returned to stream. The water appropriated from a river or stream shall not be turned or permitted to run into the waters or channel of any other river or stream than that from which it is taken or appropriated, unless such stream exceeds in width one hundred feet, in which event not more than seventy-five percent of the regular flow shall be taken and any such taking shall be subject to the provisions of section 46-289.

Source: Laws 1889, c. 68, § 6, p. 504; Laws 1893, c. 40, § 3, p. 378, R.S.1913, § 3376; Laws 1919, c. 190, tit. VII, art. V, div. 1, § 8, p. 832 .S.1922, § 8413 C.S.1929, § 46-508 R.S.1943, § 46-206; Laws 1981, LB 252, § 2.

46-288. Interbasin transfers; terms, defined. For purposes of this section and section 46-289, unless the context otherwise requires:

(1) Basin of origin shall mean the river basin in which the point or proposed point of diversion of water is located;

(2) Beneficial use shall include, but not be limited to, reasonable and efficient use of water for domestic, municipal, agricultural, industrial, commercial, power production, subirrigation, fish and wildlife, ground water recharge, interstate compact, water quality maintenance, or recreational purposes. Nothing in this subdivision shall be construed to affect the preferences for use of surface water as provided in section 46-204;

(3) Interbasin transfer shall mean the diversion of water in one river basin and the transportation of such water to another river basin for storage or utilization for a beneficial use; and

(4) River basin shall mean any of the following natural hydrologic basins of the state as shown on maps located in the Department of Natural Resources: (a) the White River and Hat Creek basin; (b) the Niobrara River basin; (c) the Platte River basin, including the North Platte and South Platte River basins, except that for purposes of transfer between the North and South Platte River basins each shall be considered a separate river basin; (d) the Loup River basin; (e) the Elkhorn River basin; (f) the Republican River basin; (g) the Little Blue River basin; (h) the Big Blue River basin; (i) the Nemaha River basin; and (j) the Missouri tributaries basin.

Source: Laws 1981, LB 252, § 5; Laws 1993, LB 789, § 3; Laws 2000, LB 900, § 129.

46-289. Legislative findings; interbasin transfers; application for water; factors considered; order issued. The Legislature finds, recognizes, and declares that the transfer of water to outside the boundaries of a river basin may have impacts on the water and other resources in the basin and that such impacts differ from those caused by uses of water within the same basin in part because any unused water will not be returned to the stream from which it is taken for further use in that river basin. The Legislature therefor recognizes the need to delineate factors for consideration by the Director of Natural Resources when evaluating an application made pursuant to section 46-233 which involves an interbasin transfer of water in order to determine whether denial of such application is demanded by the public interest. Those considerations shall include, but not be limited to, the following factors:

(1) The economic, environmental, and other benefits of the proposed interbasin transfer and use;

(2) Any adverse impacts of the proposed interbasin transfer and use;

(3) Any current beneficial uses being made of the unappropriated water in the basin of origin;

(4) Any reasonably foreseeable future beneficial uses of the water in the basin of origin;

(5) The economic, environmental, and other benefits of leaving the water in the basin of origin for current or future beneficial uses;

(6) Alternative sources of water supply available to the applicant; and

(7) Alternative sources of water available to the basin of origin for future beneficial uses.

The application shall be deemed in the public interest if the overall benefits to the state and the applicant's basin are greater than or equal to the adverse impacts to the state and the basin of origin. The director's order granting or denying an application shall specify the reasons for such action, including a discussion of the required factors for consideration, and shall document such decision by reference to the hearing record, if any, and to any other sources used by the director in making the decision.

Source: Laws 1981, LB 252, § 6; Laws 1986, LB 309, § 2; Laws 2000, LB 900, § 130.

Surface Water Right Transfer Statute

46-294. Applications; approval; requirements; conditions; burden of proof. (1) Except for applications approved in accordance with subsection (1) of section 46-291, the Director of Natural Resources shall approve an application filed pursuant to section 46-290 only if the application and the proposed transfer or change meet the following requirements:

(a) The application is complete and all other information requested pursuant to section 46-293 has been provided;

(b) The proposed use of water after the transfer or change will be a beneficial use of water;

(c)(i) Any requested transfer in the location of use is within the same river basin as defined in section 46-288 or (ii) the river basin from which the appropriation is to be transferred is tributary to the river basin to which the appropriation is to be transferred;

(d) Except as otherwise provided in subsection (4) of this section, the proposed transfer or change, alone or when combined with any new or increased use of any other source of water at the original location or within the same irrigation district, reclamation district, public power and irrigation district, or mutual irrigation or canal company for the original or other purposes, will not diminish the supply of water available for or otherwise adversely affect any other water appropriator and will not significantly adversely affect any riparian water user who files an objection in writing pursuant to section 46-291;

(e) The quantity of water that is transferred for diversion or other use at the new location will not exceed the historic consumptive use under the appropriation or portion thereof being transferred, except that this subdivision does not apply to a transfer in the location of use if both the current use and the proposed use are for irrigation, the number of acres to be irrigated will not increase after the transfer, and the location of the diversion from the stream will not change;

(f) The appropriation, prior to the transfer or change, is not subject to termination or cancellation pursuant to sections 46-229 to 46-229.04;

(g) If a proposed transfer or change is of an appropriation that has been used for irrigation and is in the name of an irrigation district, reclamation district, public power and irrigation district, or mutual irrigation or canal company or is dependent upon any such district's or company's facilities for water delivery, such district or company has approved the transfer or change;

(h) If the proposed transfer or change is of a storage-use appropriation and if the owner of that appropriation is different from the owner of the associated

storage appropriation, the owner of the storage appropriation has approved the transfer or change;

(i) If the proposed transfer or change is to be permanent, either (i) the purpose for which the water is to be used before the transfer or change is in the same preference category established by section 46-204 as the purpose for which the water is to be used after the transfer or change or (ii) the purpose for which the water is to be used before the transfer or change and the purpose for which the water is to be used after the transfer or change are both purposes for which no preferences are established by section 46-204;

(j) If the proposed transfer or change is to be temporary, it will be for a duration of no less than one year and, except as provided in section 46-294.02, no more than thirty years;

(k) The transfer or change will not be inconsistent with any applicable state or federal law and will not jeopardize the state's compliance with any applicable interstate water compact or decree or cause difficulty in fulfilling the provisions of any other formal state contract or agreement; and

(l) The proposed transfer or change is in the public interest. The director's considerations relative to the public interest shall include, but not be limited to, (i) the economic, social, and environmental impacts of the proposed transfer or change and (ii) whether and under what conditions other sources of water are available for the uses to be made of the appropriation after the proposed transfer or change. The Department of Natural Resources shall adopt and promulgate rules and regulations to govern the director's determination of whether a proposed transfer or change is in the public interest.

(2) The applicant has the burden of proving that the proposed transfer or change will comply with subdivisions (d)(a) through (d) of this section, except that (a) the burden is on a riparian user to demonstrate his or her riparian status and to demonstrate a significant adverse effect on his or her use in order to prevent approval of an application and (b) if both the current use and the proposed use after a transfer are for irrigation, the number of acres to be irrigated will not increase after the transfer, and the location of the diversion from the stream will not change, there is a rebuttable presumption that the transfer will be consistent with subdivision (1)(d) of this section.

(3) In approving an application, the director may impose any reasonable conditions deemed necessary to protect the public interest, to ensure consistency with any of the other criteria in subsection (1) of this section, or to provide the department with information needed to properly and efficiently administer the appropriation while the transfer or change remains in effect. If necessary to prevent diminution of supply for any other appropriator, the conditions imposed by the director shall require that historic return flows be maintained or replaced in

quantity, timing, and location. After approval of any such transfer or change, the appropriation shall be subject to all water use restrictions and requirements in effect at any new location of use and, if applicable, at any new diversion location. An appropriation for which a transfer or change has been approved shall retain the same priority date as that of the original appropriation. If an approved transfer or change is temporary, the location of use, purpose of use, or type of appropriation shall revert to the location of use, purpose of use, or type of appropriation prior to the transfer or change.

(4) In approving an application for a transfer, the director may also authorize the overlying of water appropriations on the same lands, except that if any such overlying of appropriations would result in either the authorized diversion rate or the authorized aggregate annual quantity that could be diverted to be greater than is otherwise permitted by section 46-231, the director shall limit the total diversion rate or aggregate annual quantity for the appropriations overlain to the rate or quantity that he or she determines is necessary, in the exercise of good husbandry, for the production of crops on the land involved. The director may also authorize a greater number of acres to be irrigated if the amount and rate of water approved under the original appropriation is not increased by the change of location. An increase in the number of acres to be irrigated shall be approved only if (a) such an increase will not diminish the supply of water available to or otherwise adversely affect another water appropriator or (b) the transfer would not adversely affect the water supply for any river basin, subbasin, or reach that has been designated as overappropriated pursuant to section 46-713 or determined to be fully appropriated pursuant to section 46-714 and (i) the number of acres authorized under the appropriation when originally approved has not been increased previously, (ii) the increase in the number of acres irrigated will not exceed five percent of the number of acres being irrigated under the permit before the proposed transfer or a total of ten acres, whichever acreage is less, and (iii) all the use will be either on the quarter section to which the appropriation was appurtenant before the transfer or on an adjacent quarter section.

Source: Laws 1983, LB 21, § 6; Laws 1984, LB 818, § 2; Laws 1993, LB 789, § 4; Laws 2000, LB 900, § 135; Laws 2004, LB 962, § 20.

Applicable Groundwater Transfer/Transport Statutes

Interstate Transfer of Groundwater

46-613.01. Ground water; transfer to another state; permit; Department of Natural Resources; conditions. The Legislature recognizes and declares that the maintenance of an adequate source of ground water within this state is essential to the social stability of the state and the health, safety, and welfare of its citizens and that reasonable restrictions on the transportation of ground water from this state are a proper exercise of the police powers of the state. The need for such restrictions, which protect the health, safety, and general welfare of the citizens of this state, is hereby declared a matter of legislative determination.

Any person, firm, city, village, municipal corporation, or other entity intending to withdraw ground water from any water well located in the State of Nebraska and transport it for use in another state shall apply to the Department of Natural Resources for a permit to do so. In determining whether to grant or deny such permit, the Director of Natural Resources shall consider:

(1) The nature of the proposed use and whether it is a beneficial use of ground water;

(2) The availability to the applicant of alternative sources of surface or ground water;

(3) Any negative effect of the proposed withdrawal on ground water supplies needed to meet present or reasonable future demands for water in the area of the proposed withdrawal, to comply with any interstate compact or decree, or to fulfill the provisions of any other formal state contract or agreement;

(4) Any negative effect of the proposed withdrawal on surface water supplies needed to meet present or reasonable future demands within the state, to comply with any interstate compact or decree, or to fulfill the provisions of any other formal state contract or agreement;

(5) Any adverse environmental effect of the proposed withdrawal or transportation of ground water;

(6) The cumulative effect of the proposed withdrawal and transfer relative to the matters listed in subdivisions (3) through (6) of this section when considered in conjunction with all other transfers subject to this section; and

(7) Any other factors consistent with the purposes of this section that the director deems relevant to protect the health, safety, and welfare of the state and its citizens.

Issuance of a permit shall be conditioned on the applicant's compliance with the rules and regulations of the natural resources district from which the water is to be withdrawn. The applicant shall be required to provide access to his or her property at reasonable times for purposes of inspection by officials of the district or the department.

The director may include such reasonable conditions on the proposed use as he or she deems necessary to carry out the purposes of this section.

Source: Laws 1967, c. 281, § 5, p. 761; Laws 1969, c. 9, § 69, p. 144; Laws 1984, LB 1060, § 1; Laws 1993, LB 131, § 11; Laws 2000, LB 900, § 174; Laws 2003, LB 619, § 7.

Agricultural Transfer of Groundwater

46-691. Transfer off overlying land; when allowed; objection; procedure; natural resources district; powers and duties; Director of Natural Resources; duties. (1) Any person who withdraws ground water for agricultural purposes, or for any purpose pursuant to a ground water remediation plan as required under the Environmental Protection Act, including the providing of water for domestic purposes, from aquifers located within the State of Nebraska may transfer the use of the ground water off the overlying land if the ground water is put to a reasonable and beneficial use within the State of Nebraska and is used for an agricultural purpose, or for any purpose pursuant to a ground water remediation plan as required under the Environmental Protection Act, including the providing of water for domestic purposes, after transfer, and if such withdrawal, transfer, and use (a) will not significantly adversely affect any other water user, (b) is consistent with all applicable statutes and rules and regulations, and (c) is in the public interest. The determination made by a natural resources district under subsection (2) of this section or the Director of Natural Resources under subsection (3) of this section shall include consideration of the factors set forth in subdivisions (1) through (7) of section 46-613.01. For purposes of this section, domestic has the same meaning as in section 46-613.

(2) Any affected party may object to the transfer of ground water by filing written objections, specifically stating the grounds for such objection, in the office of the natural resources district containing the land from which the ground water is withdrawn. Upon the filing of such objections or on its own initiative, the natural resources district shall conduct a preliminary investigation to determine if the

withdrawal, transfer, and use of ground water is consistent with the requirements of subsection (1) of this section. Following the preliminary investigation, if the district has reason to believe that the withdrawal, transfer, or use may not comply with any rule or regulation of the district, it may utilize its authority under the Nebraska Ground Water Management and Protection Act to prohibit such withdrawal, transfer, or use. If the district has reason to believe that the withdrawal, transfer, and use is consistent with all rules and regulations of the district but may not comply with one or more other requirements of subsection (1) of this section, the district shall request that the Department of Natural Resources hold a hearing on such transfer.

(3) At the hearing, all interested persons may appear and present testimony. Agencies or political subdivisions of this state and the appropriate natural resources districts shall offer as evidence any information in their possession which they deem relevant to the purposes of the hearing. After the hearing, if the Director of Natural Resources finds that the withdrawal, transfer, or use of ground water is contrary to the requirements of subsection (1) of this section, he or she shall issue a cease and desist order prohibiting the withdrawal and transfer.

(4) The director may adopt and promulgate rules and regulations to carry out this section.

Source: Laws 1995, LB 251, § 1; Laws 2000, LB 900, § 223; Laws 2003, LB 619, § 14.

Cross References

Environmental Protection Act, see section 81-1532.
Nebraska Ground Water Management and Protection Act, see section 46-701.

NRD Approval of Transfers to a Stay or Moratorium Area

46-742. Transport of ground water; prohibited; when. (1) Whenever the drilling of new wells has been stayed pursuant to section 46-714, ground water withdrawn outside the affected area shall not be transported for use inside such area unless (a) such withdrawal and transport began before the stay took effect, (b) the water is used solely for domestic purposes, or (c) such withdrawal and transport is approved in advance by the district in which the stay is in effect and, if the water is withdrawn in another natural resources district, by the other district.

(2) Whenever a natural resources district pursuant to subdivision (1)(m) of section 46-739 has closed all or part of the district to the issuance of additional well permits, ground water withdrawn outside the affected area shall not be transported for use inside such area unless (a) such withdrawal and transport began before the affected area was closed to the issuance of additional well permits, (b) the water is used solely for domestic purposes, or (c) such withdrawal and transport is approved in advance by the district that closed the affected area to additional well permits and, if the water is withdrawn in another natural resources district, by the other district.

(3) If a proposed withdrawal and transport of water under subsection (1) or (2) of this section is intended for municipal purposes, the natural resources district shall approve the withdrawal and transport of ground water into the affected area when a public water supplier providing water for municipal purposes receives a permit from the Department of Natural Resources pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act.

Source: Laws 2003, LB 619, § 11; R.S.Supp.,2003, § 46-656.24; Laws 2004, LB 962, § 82.

Cross Reference

Municipal and Rural Domestic Ground Water Transfers Permit Act, see section 46-650.

General NRD Authority to Approve and Regulate Physical Transfers of Ground Water and Transfers of Rights to Use Ground Water

46-739. Management area; controls authorized; procedure.

(1) A district in which a management area has been designated shall by order adopt one or more of the following controls for the management area:

(k) It may require district approval of (i) transfers of ground water off the land where the water is withdrawn or (ii) transfers of rights to use ground water that result from district allocations imposed pursuant to subdivision (1)(a) of this section or from other restrictions on use that are imposed by the district in accordance with this section. Such approval may be required whether the transfer is within the management area, from inside to outside the management area, or from outside to inside the management area, except that transfers for which permits have been obtained from the Department of Natural Resources prior to July 16, 2004, or pursuant to the Municipal and Rural Domestic Ground Water Transfers

Permit Act shall not be subject to district approval pursuant to this subdivision. If the district adopts rules and regulations pursuant to this subdivision, such regulations shall require that the district deny or condition the approval of any such transfer when and to the extent such action is necessary to (A) ensure the consistency of the transfer with the purpose or purposes for which the management area was designated, (B) prevent adverse effects on other ground water users or on surface water appropriators, (C) prevent adverse effects on the state's ability to comply with an interstate compact or decree or to fulfill the provisions of any other formal state contract or agreement, and (D) otherwise protect the public interest and prevent detriment to the public welfare.

Note: There are several other Nebraska statutes relating to transfer of ground water that are not included here because they are less likely to be applicable. Those are:

- Municipal and rural domestic transfers- Sections 46-638 through 46-650
- Industrial transfers of ground water – Sections 46-675 through 46-690
- Small capacity domestic transfers – Sections 46-691.01 and 46-691.02
- Transfers for environmental or recreational purposes – Section 46-691.03

Excerpt from Nebraska New Depletion Plan for the Platte River Recovery Implementation Program

Beginning on January 1, 2006, the responsibility for implementing this plan will be shared between the state and the NRDs involved. To the extent that new uses of groundwater require permits from NRDs (presently includes all new wells with pumping capacities greater than 50 gpm), the following new and expanded groundwater uses begun on or after January 1, 2006 (including any for which the purpose is to increase the water supply in a river basin other than the Platte River Basin) will not be allowed **unless** the adverse effects of those uses on stateprotected flows and on target flows will be offset: uses that (a) are located within the North Platte, South Platte or the Platte River watershed in Nebraska and (b) are so located and constructed that if water were intentionally withdrawn for 40 years, the cumulative stream depletion to the North Platte, the South Platte, the Platte River or a base flow tributary thereto upstream of Chapman, NE would be greater than or equal to 28% of the total groundwater consumed as a result of the withdrawals from those wells. The relative responsibilities for providing offsets for uses that are initiated will vary depending on the nature of the use and the extent to which it causes new depletions to state-protected flows and/or to target flows. For new or expanded uses of groundwater that are not subject to the Federal Depletions Plan, are within the geographic area described in (a) and (b) above, but do not require permits from NRDs (e.g. less than 50 gpm wells), the cumulative impact of all such uses and of any offsetting decreases in uses of the same type will be estimated and the adverse net effects on state-protected flows and on target flows will be offset by the state.

To the extent that the Department of Natural Resources (DNR) has jurisdiction over new uses of surface water (presently includes all diversions from natural streams except those for instream livestock watering and all on-stream storage reservoirs greater than 15AF), new uses to be begun on or after January 1, 2006 (including any for which the purpose is to increase the water supply in any river basin other than the Platte River Basin) will not be allowed by the department unless any adverse effects on state-protected flows and target flows are either prevented or are offset. The extent to which the new surface water appropriator or the state is responsible for the offset will depend on the nature of the use and the extent to which it causes new depletions to stateprotected flows and/or to target flows. For new or expanded sandpits and other surface water bodies that do not require permits from DNR (e.g. some new reservoirs with less than 15AF storage

capacity), the cumulative impact of all such uses will be estimated and adverse effects on state-protected flows and on target flows will be estimated and will be offset by the state. Nebraska has not permitted any new surface water storage reservoirs in the Platte River Basin upstream of the confluence of the Platte River with the Loup River since July 1, 1997 and currently has a moratorium on the issuance of any new surface water appropriations in that area. If that moratorium were to be lifted or modified during the term of the Program, the ESA compliance coverage provided for new surface water storage reservoirs through implementation of the Program (including this depletions plan) will include compliance coverage for (1) the depletions to target flows that are caused by all such Nebraska reservoirs constructed after that date, regardless of storage capacity; (2) the impacts to FWS peak flows that are caused by Program-approved reservoirs, regardless of storage capacity, that are implemented after that date in accordance with the Water Action Plan; and (3) as long as the storage capacities of all other Nebraska reservoirs constructed or permitted for construction in that part of the basin after Program initiation do not collectively exceed 10,000 acre feet, the impacts to FWS peak flows that are caused by any such other reservoir. Any need to mitigate separately for adverse peak flow impacts caused by a new Nebraska reservoir that is subject to ESA Section 7 consultation (other than a reservoir that is to be implemented in accordance with the Water Action Plan) after that collective storage capacity has been exceeded shall be determined during that Section 7 consultation.

Protection of Water Once Added to the Receiving Basin

46-252. Conducting of water into or along natural channels; withdrawal; permit, when required; liability. (1) Any person may conduct, either from outside the state or from sources located in the state, quantities of water over and above those already present into or along any of the natural streams or channels of this state, for purposes of instream beneficial uses or withdrawal of some or all of such water for out-of-stream beneficial uses, at any point without regard to any prior appropriation of water from such stream, due allowance being made for losses in transit to be determined by the Department of Natural Resources. The department shall monitor movement of the water by measurements or other means and shall be responsible for assuring that such quantities are not subsequently diverted or withdrawn by others unless they are authorized to do so by the person conducting the water.

(2) Except as provided in subsections (3) and (4) of this section, before any person may conduct water into or along any of the natural streams or channels of the state, he or she shall first obtain a permit from the department. Application for the permit shall be made on forms provided by the department. Applications shall include plans and specifications detailing the intended times, amounts, and streamreach locations and such other information as required by the department. The water subject to such a permit shall be deemed appropriated for the use specified in the permit. Permitholders shall be liable for any damages resulting from the overflow of such stream or channel when water so conducted contributed to such overflow.

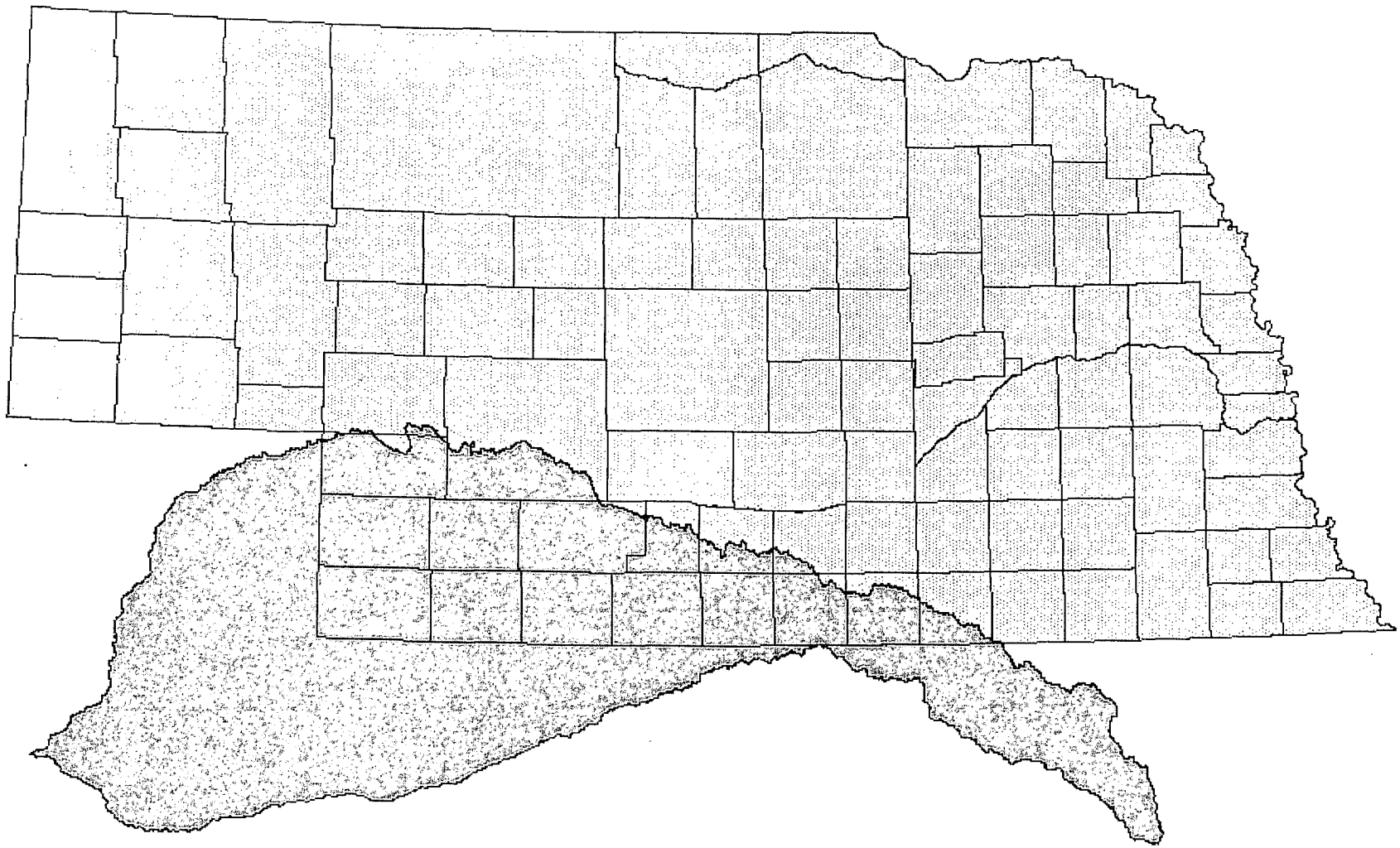
(3) Any person actually engaged in the construction or operation of any water power plant may, without filing with the department and upon payment of all damages, use any such stream or channel for a tailrace or canal and may, whenever necessary, widen, deepen, or straighten the bed of any such stream. All damages resulting therefrom shall be determined in the manner set forth in sections 76-704 to 76-724.

(4) Any person holding a storage use permit pursuant to section 46-242 shall not be required to obtain the permit required by this section.

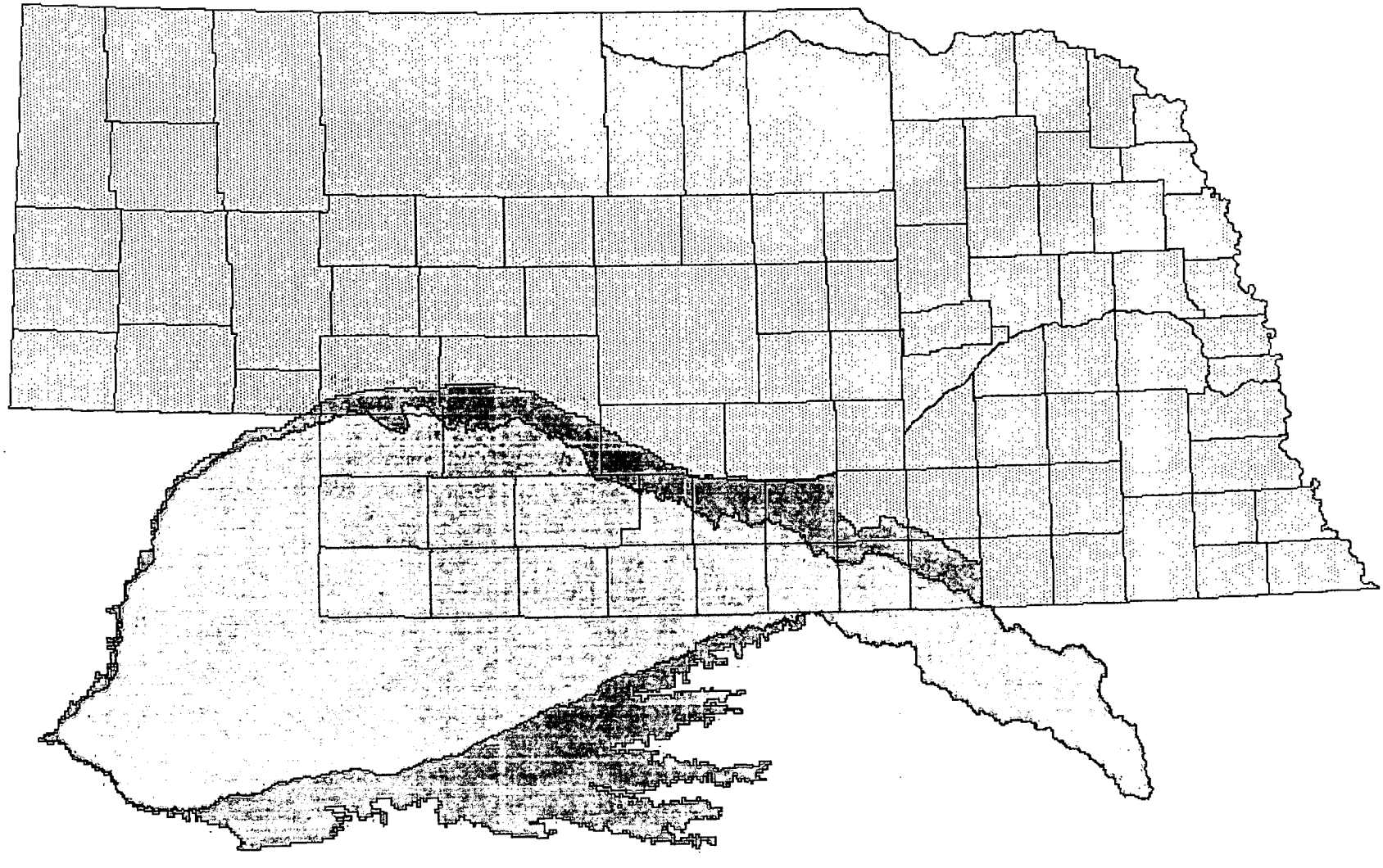
(5) Nothing in this section shall be construed to exempt a person from obtaining any other permits required by law.

Source: Laws 1919, c. 190, tit. VII, art. V, div. 3, § 8, p. 848; C.S.1922, § 8458; C.S.1929, § 46-608; R.S.1943, § 46-252; Laws 1951, c. 101, § 94, p. 488; Laws 1955, c. 183, § 4, p. 516; Laws 1992, LB 49, § 1; Laws 2000, LB 900, § 118.

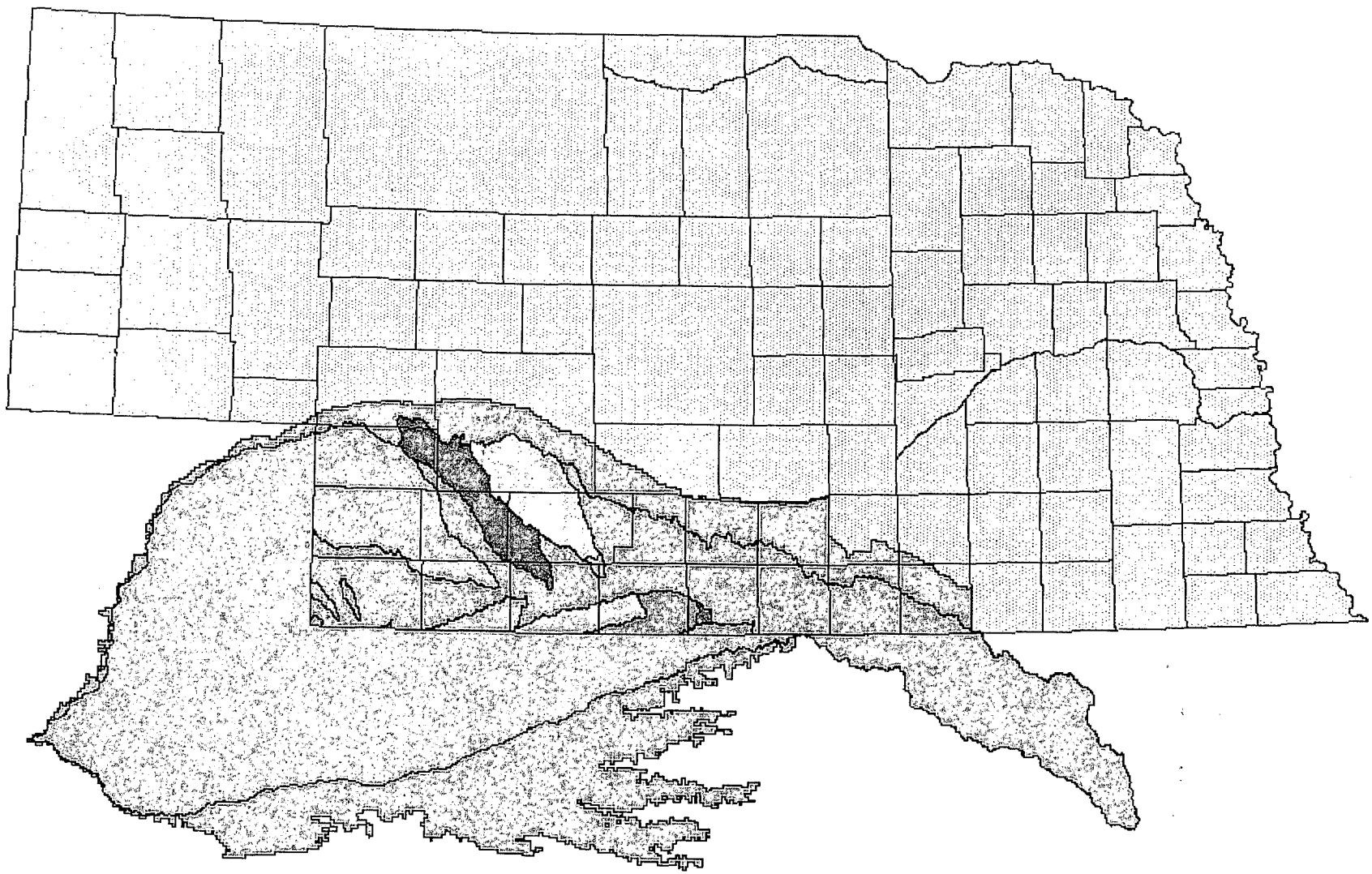
Republican River Compact Domain



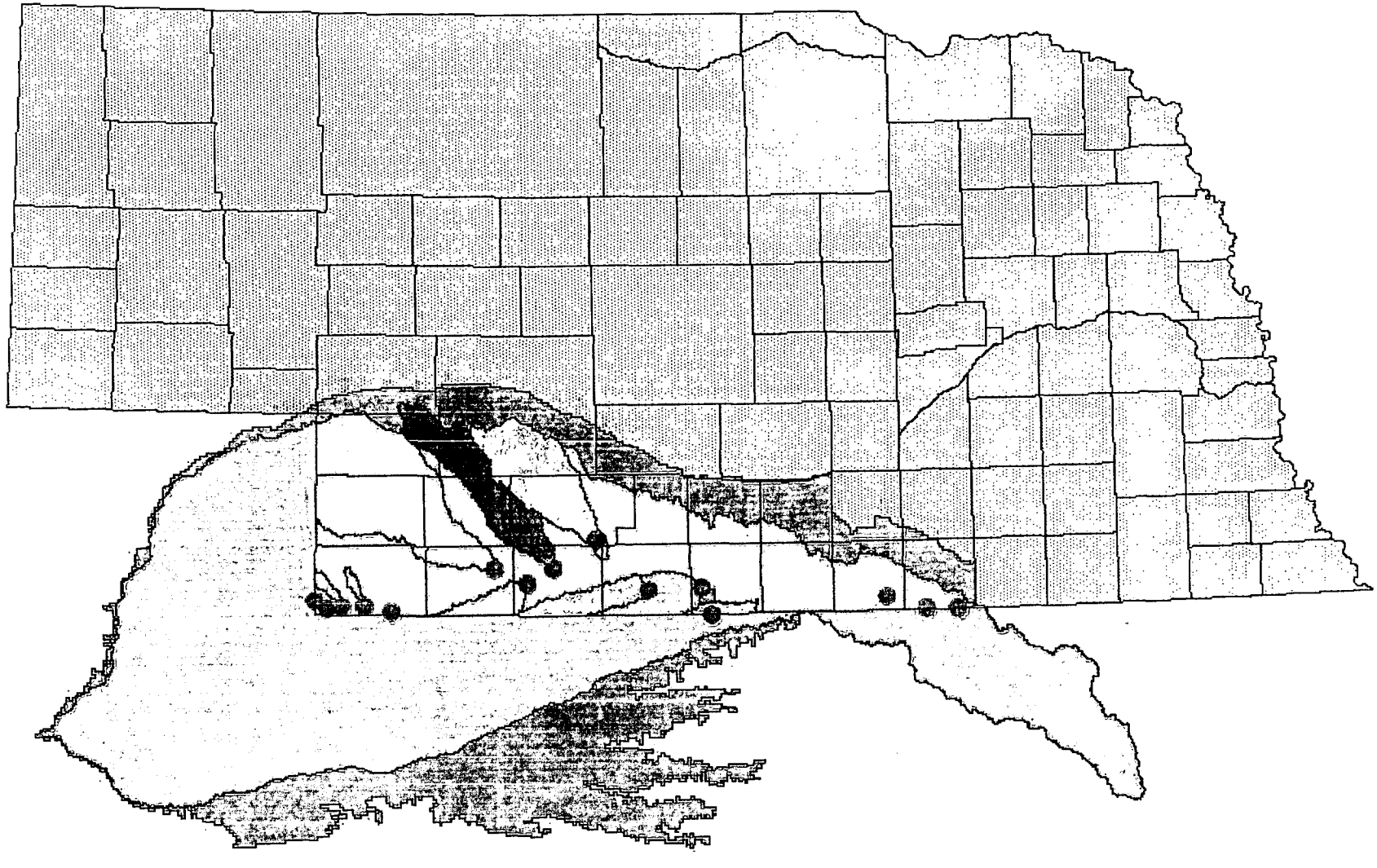
RRC Ground Water Model Domain

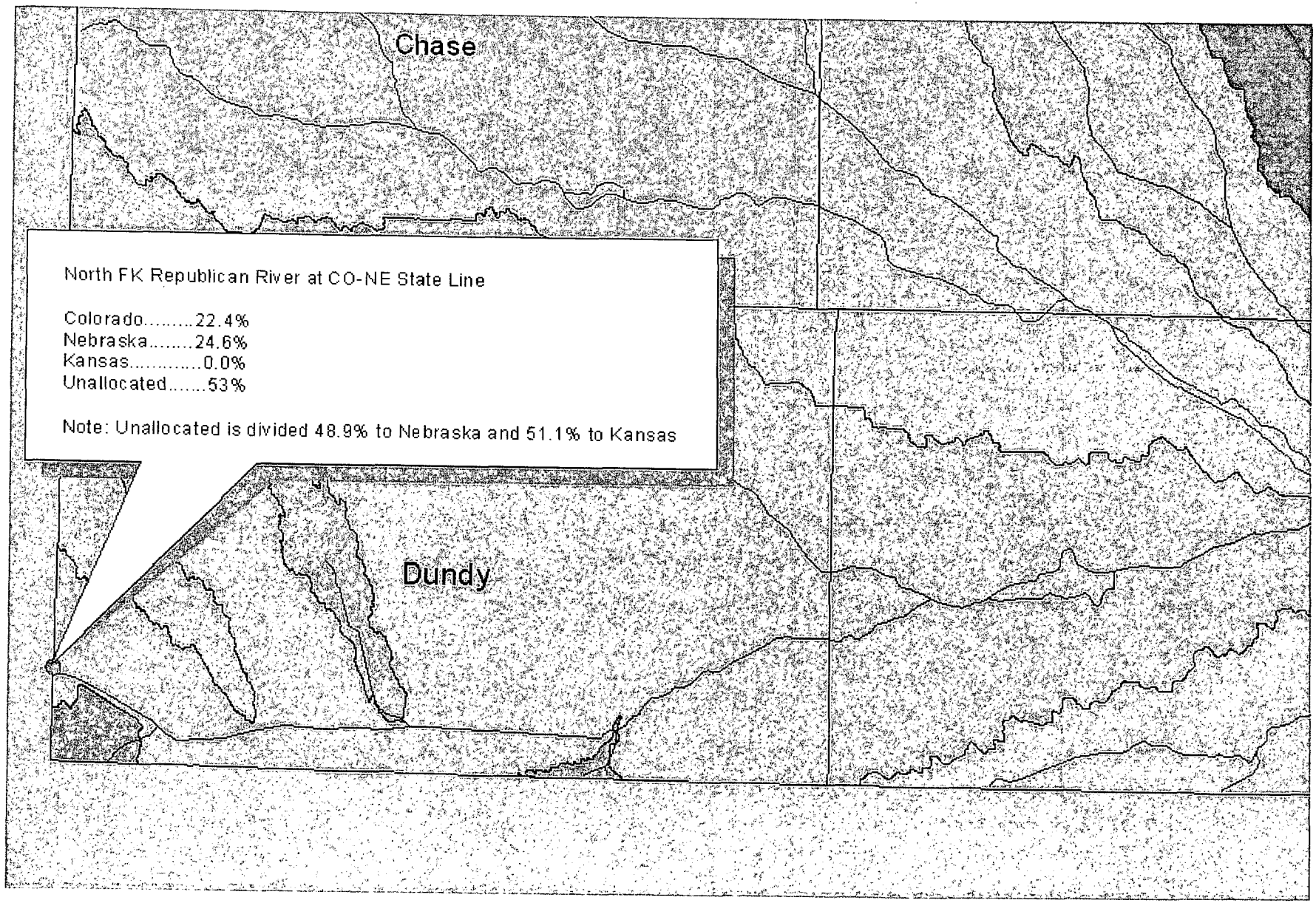


Republican River Mainstem and sub basins in Nebraska

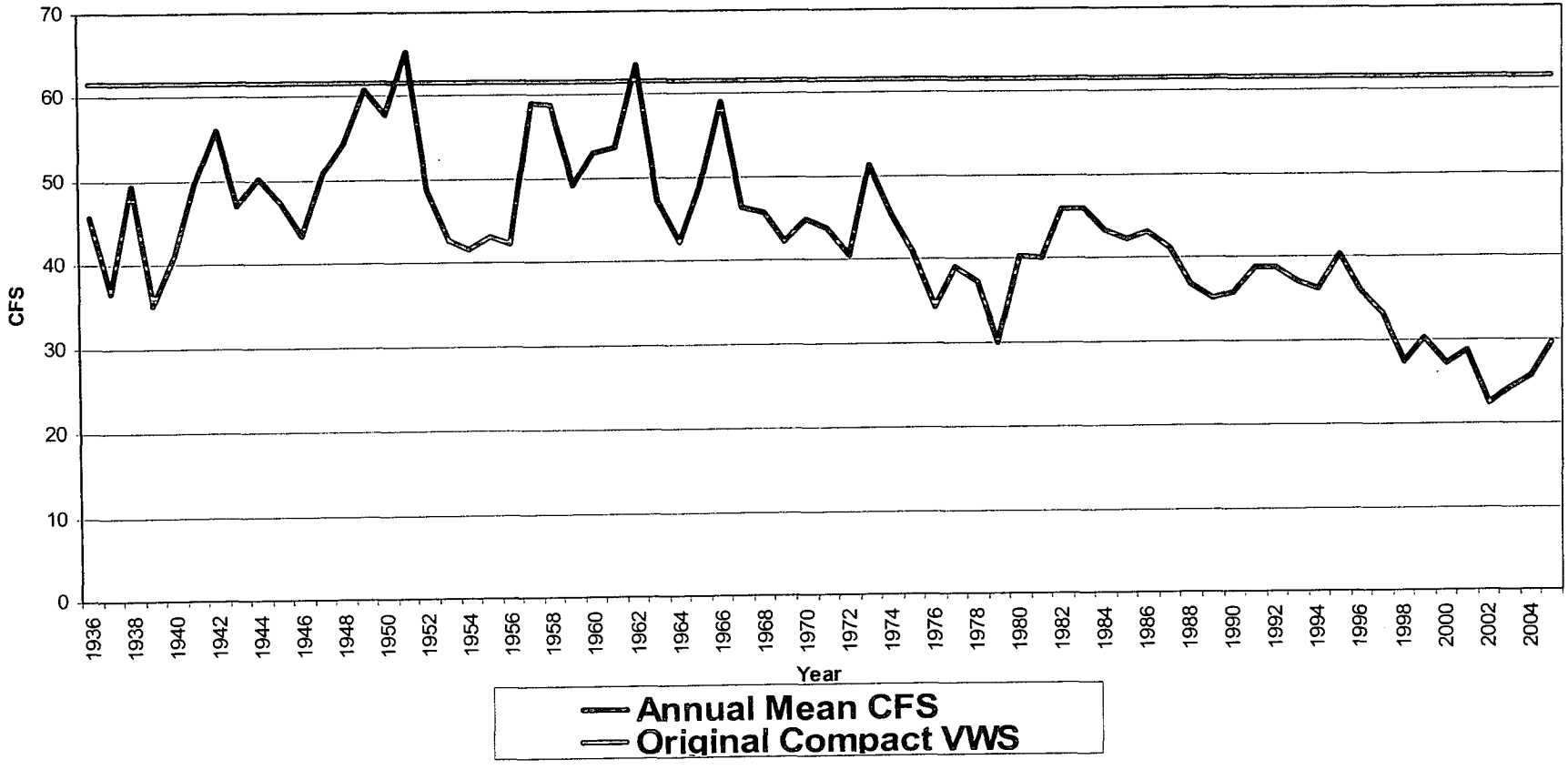


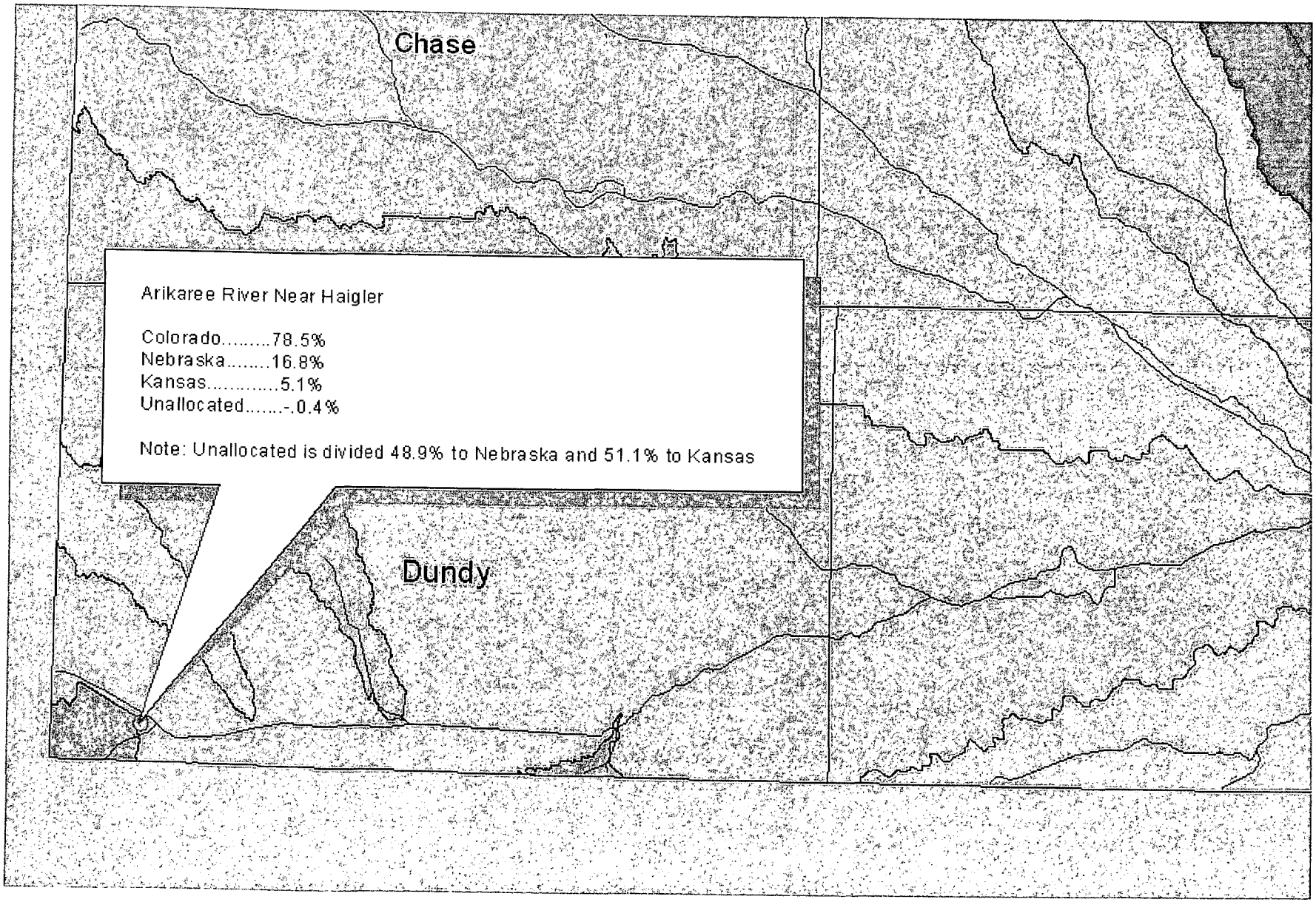
Republican River Compact Gaging Stations



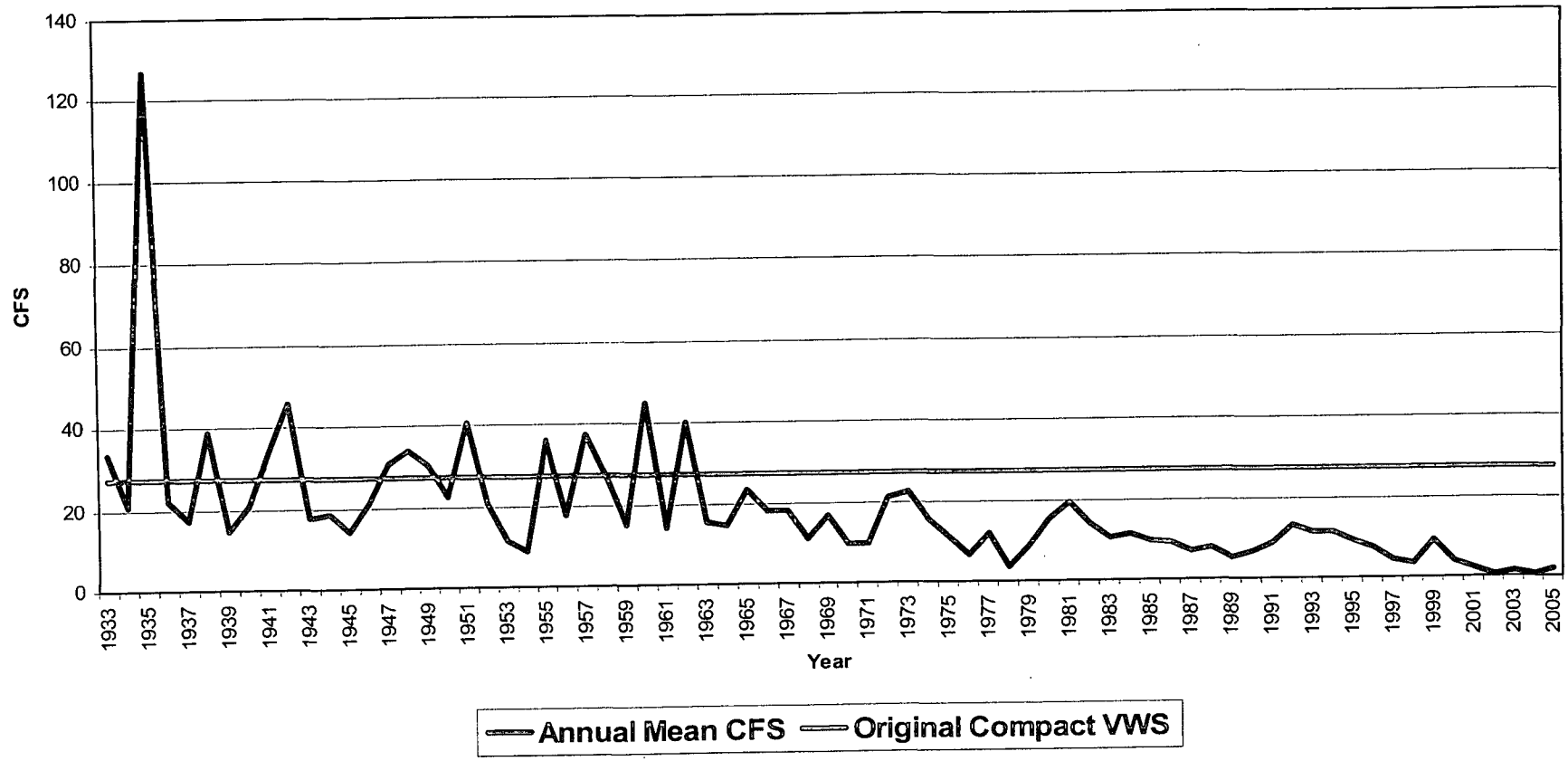

Chase
North FK Republican River at CO-NE State Line
Colorado.....22.4%
Nebraska.....24.6%
Kansas.....0.0%
Unallocated.....53%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Dundy

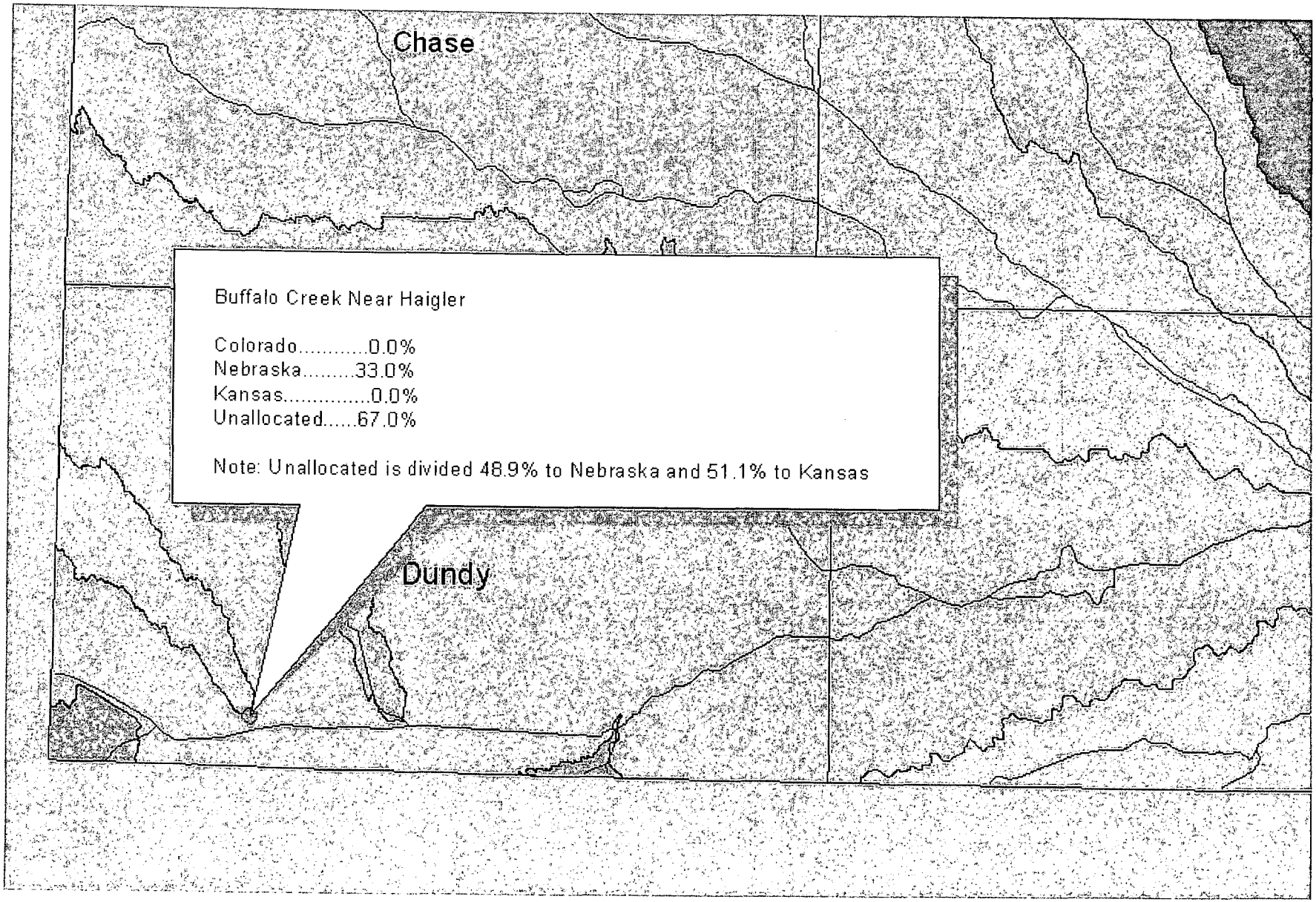
North Fork Republican River At Co-Ne State Line
1936 to 2005
Compact Station



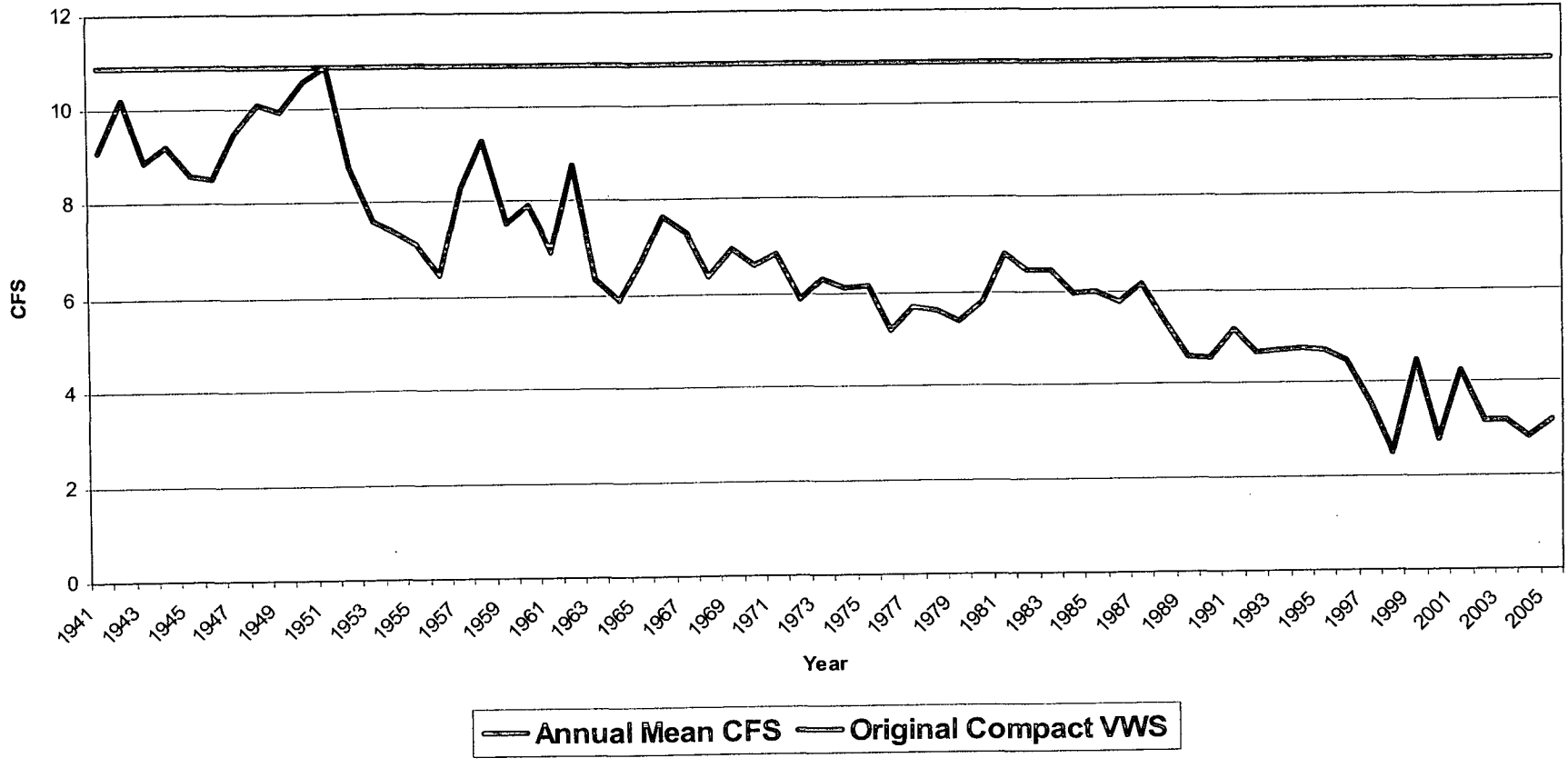

Chase
Arikaree River Near Haigler
Colorado.....78.5%
Nebraska.....16.8%
Kansas.....5.1%
Unallocated.....-.0.4%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Dundy

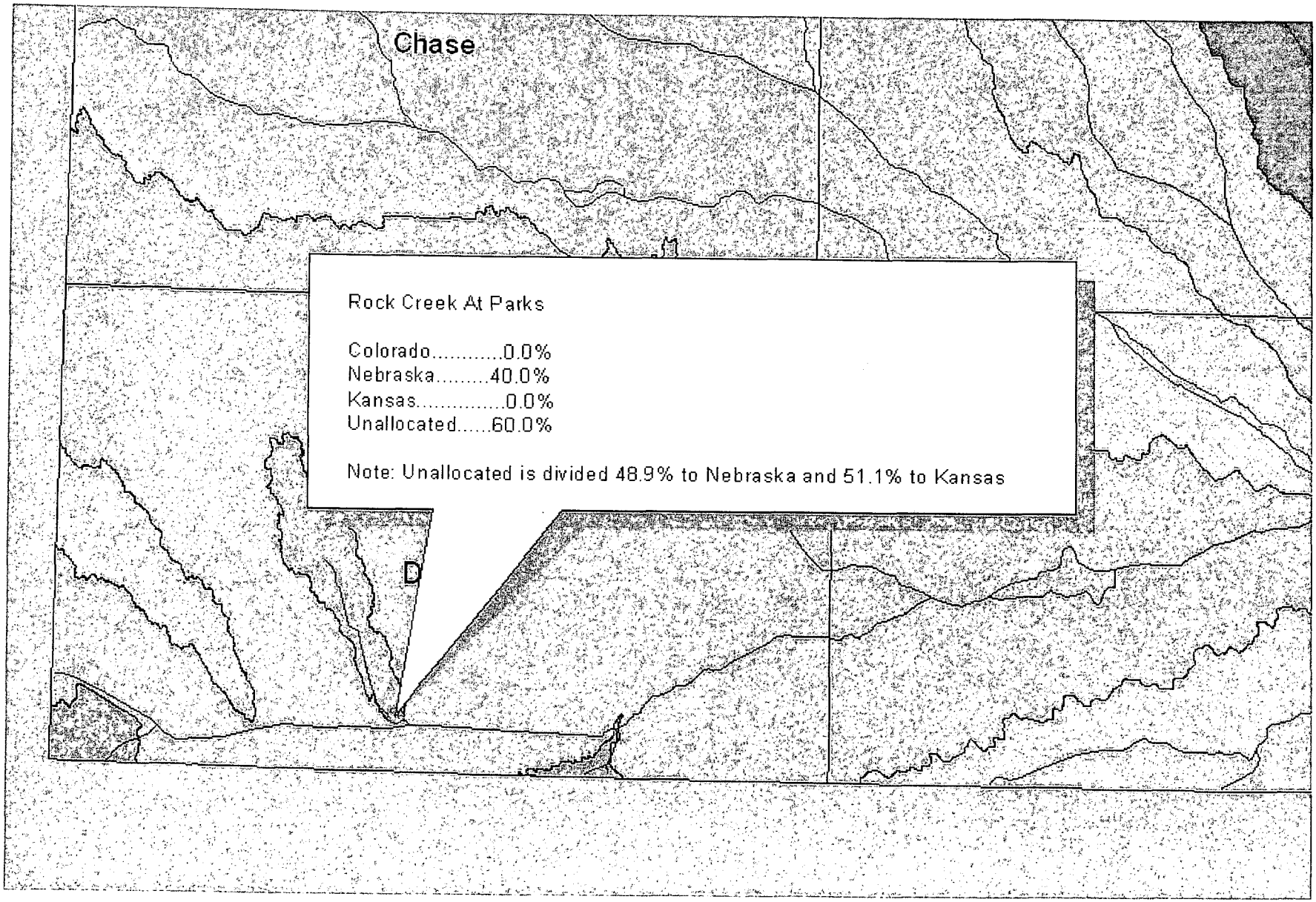
Arikaree River Near Haigler
1933 to 2005
Compact Station



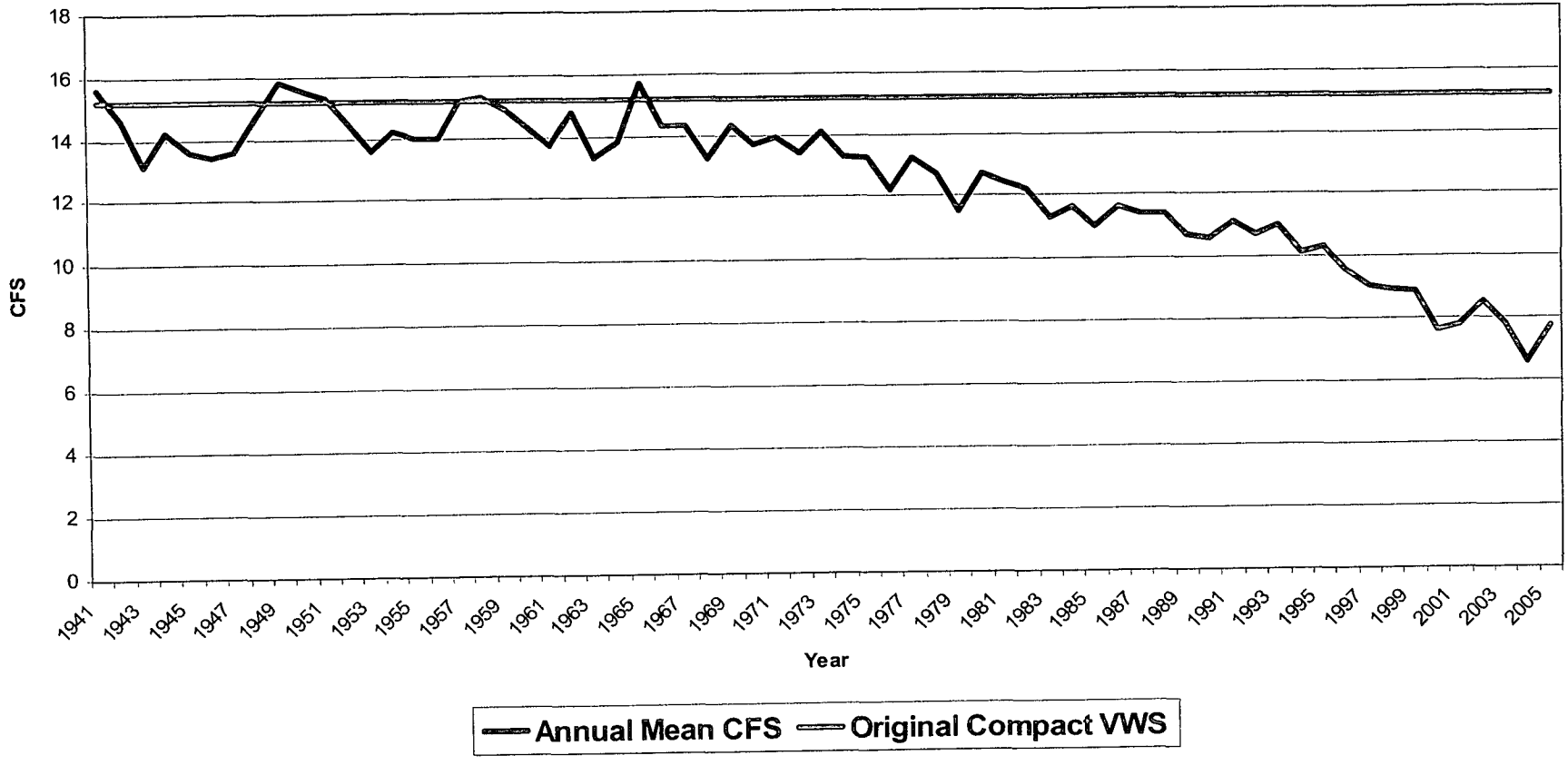

Chase
Buffalo Creek Near Haigler
Colorado.....0.0%
Nebraska.....33.0%
Kansas.....0.0%
Unallocated.....67.0%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Dundy

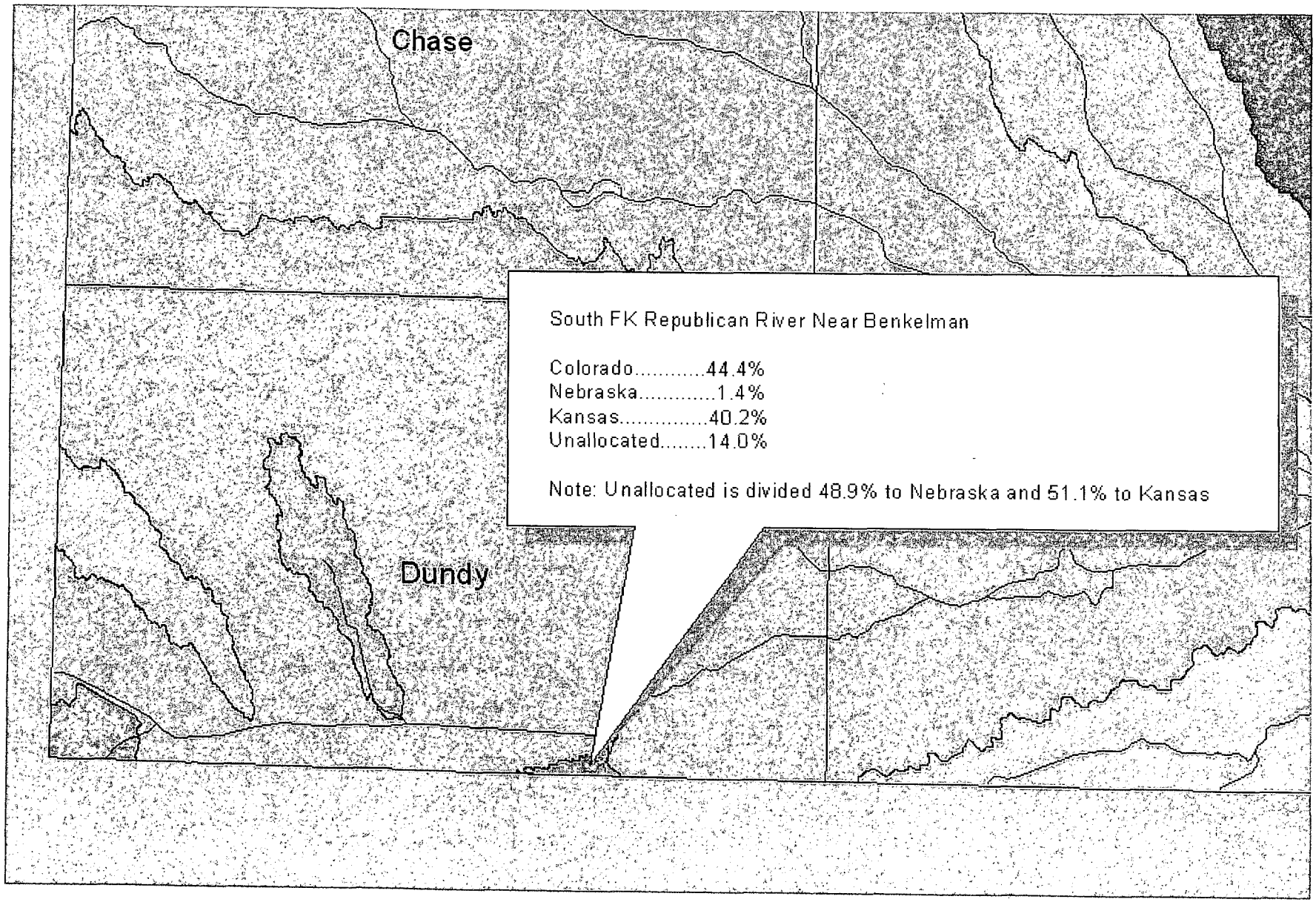
Buffalo Creek Near Haigler
1941 to 2005
Compact Station



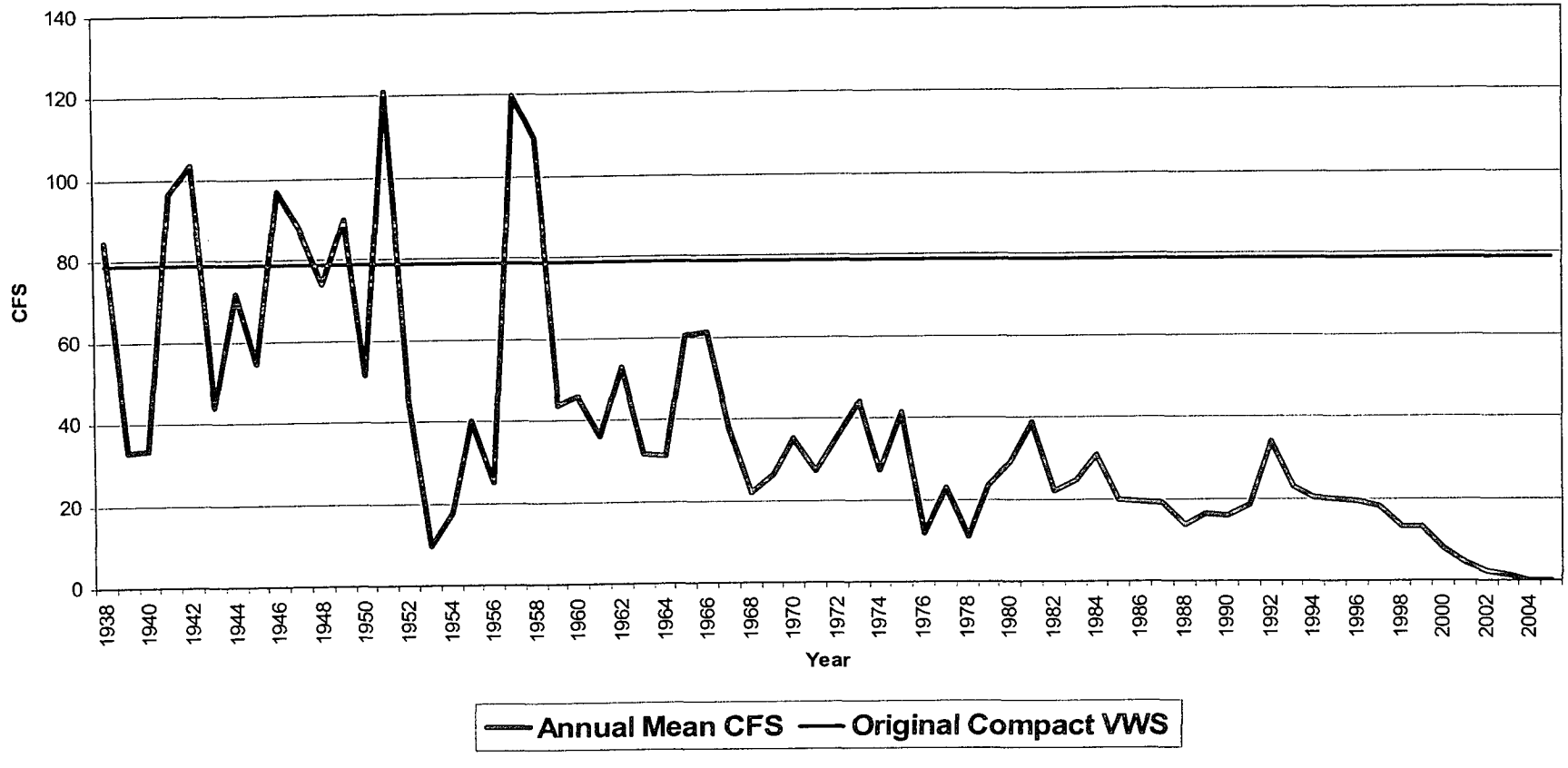

Chase
Rock Creek At Parks
Colorado.....0.0%
Nebraska.....40.0%
Kansas.....0.0%
Unallocated.....60.0%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas

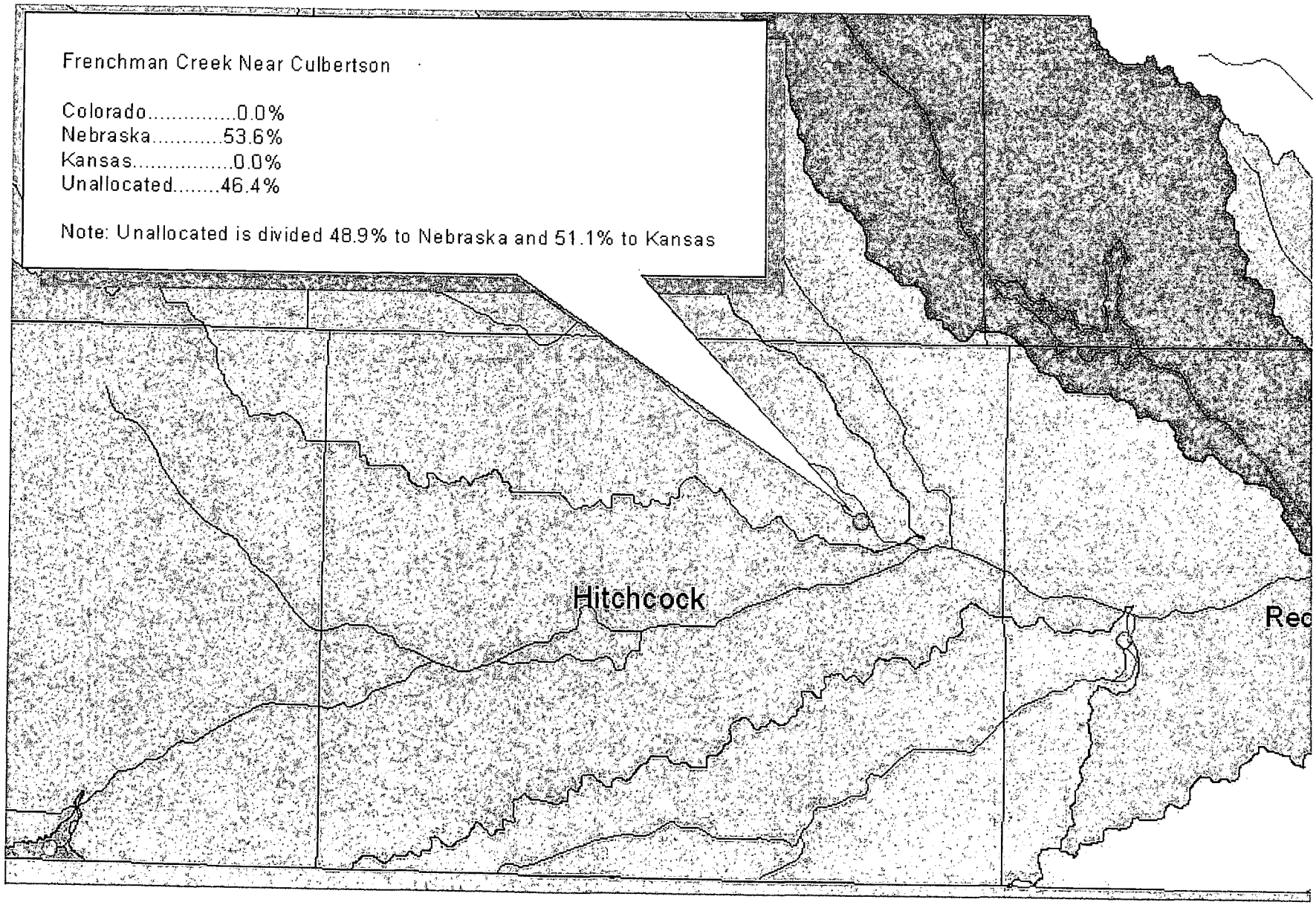
Rock Creek At Parks NE
1941 to 2005
Compact Station



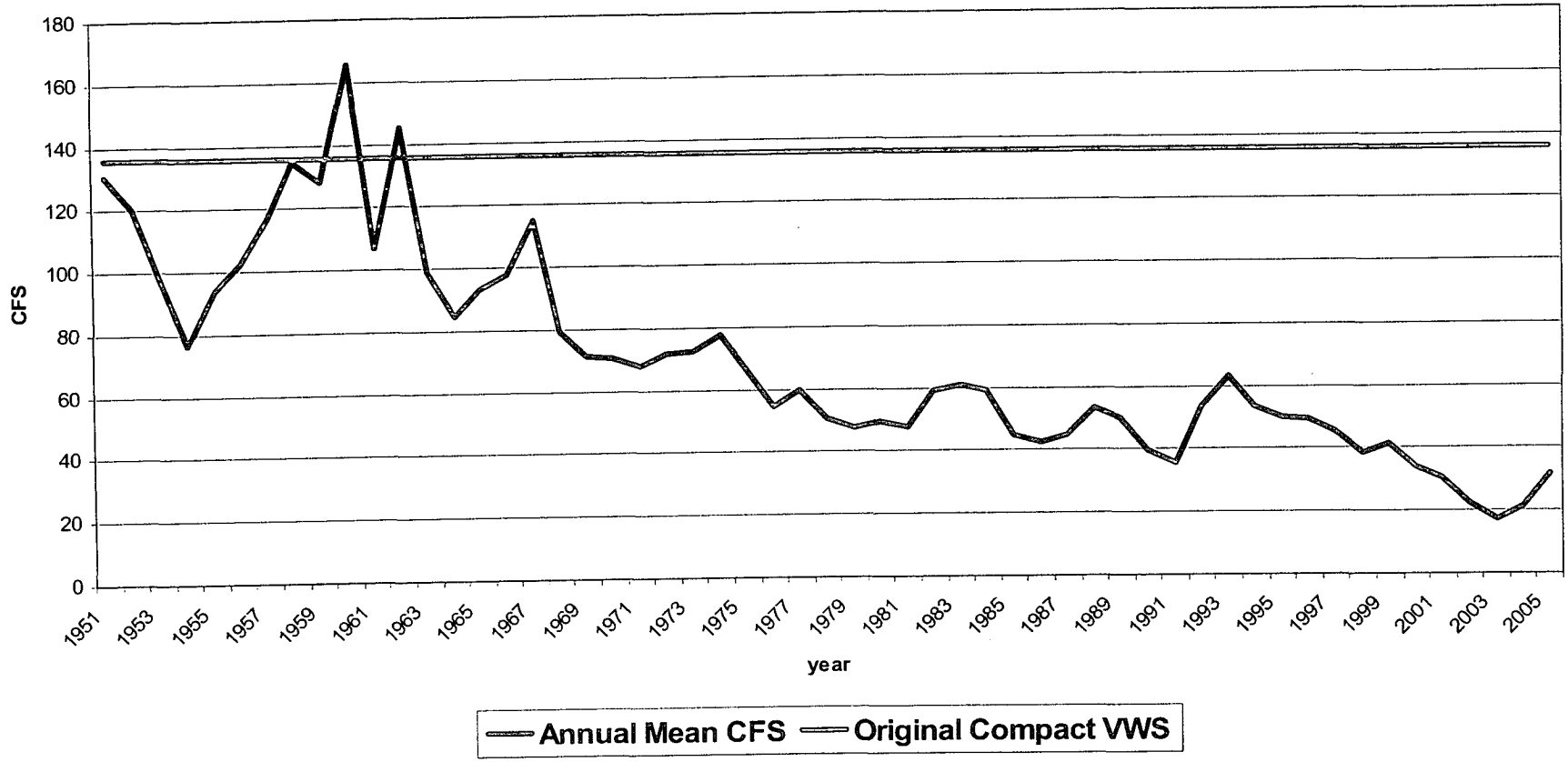

Chase
Dundy
South FK Republican River Near Benkelman
Colorado.....44.4%
Nebraska.....1.4%
Kansas.....40.2%
Unallocated.....14.0%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas

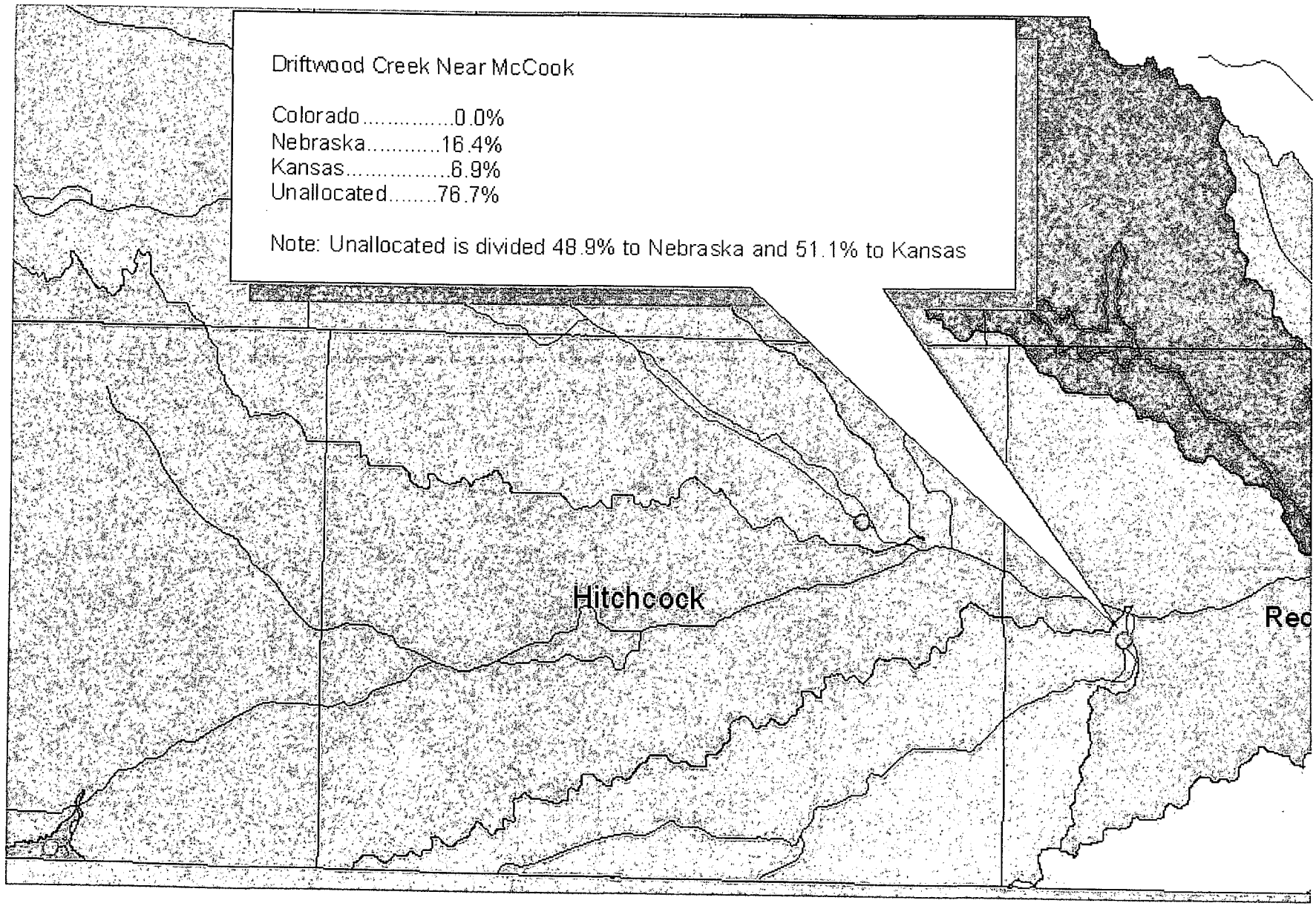
South Fork Republican R. Near Benkelman
1938 to 2005
Compact Station



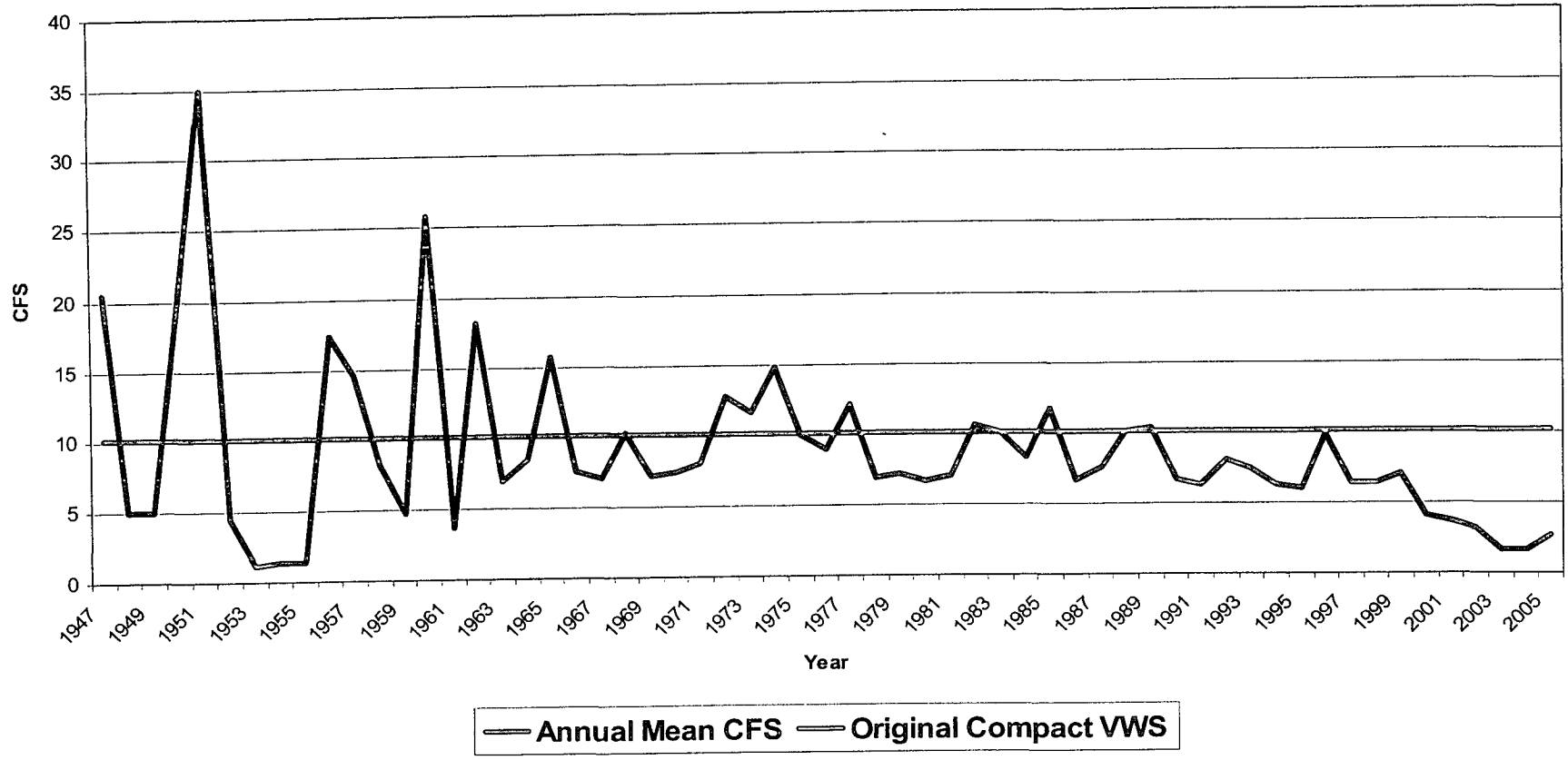

Frenchman Creek Near Culbertson
Colorado.....0.0%
Nebraska.....53.6%
Kansas.....0.0%
Unallocated.....46.4%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Hitchcock
Red

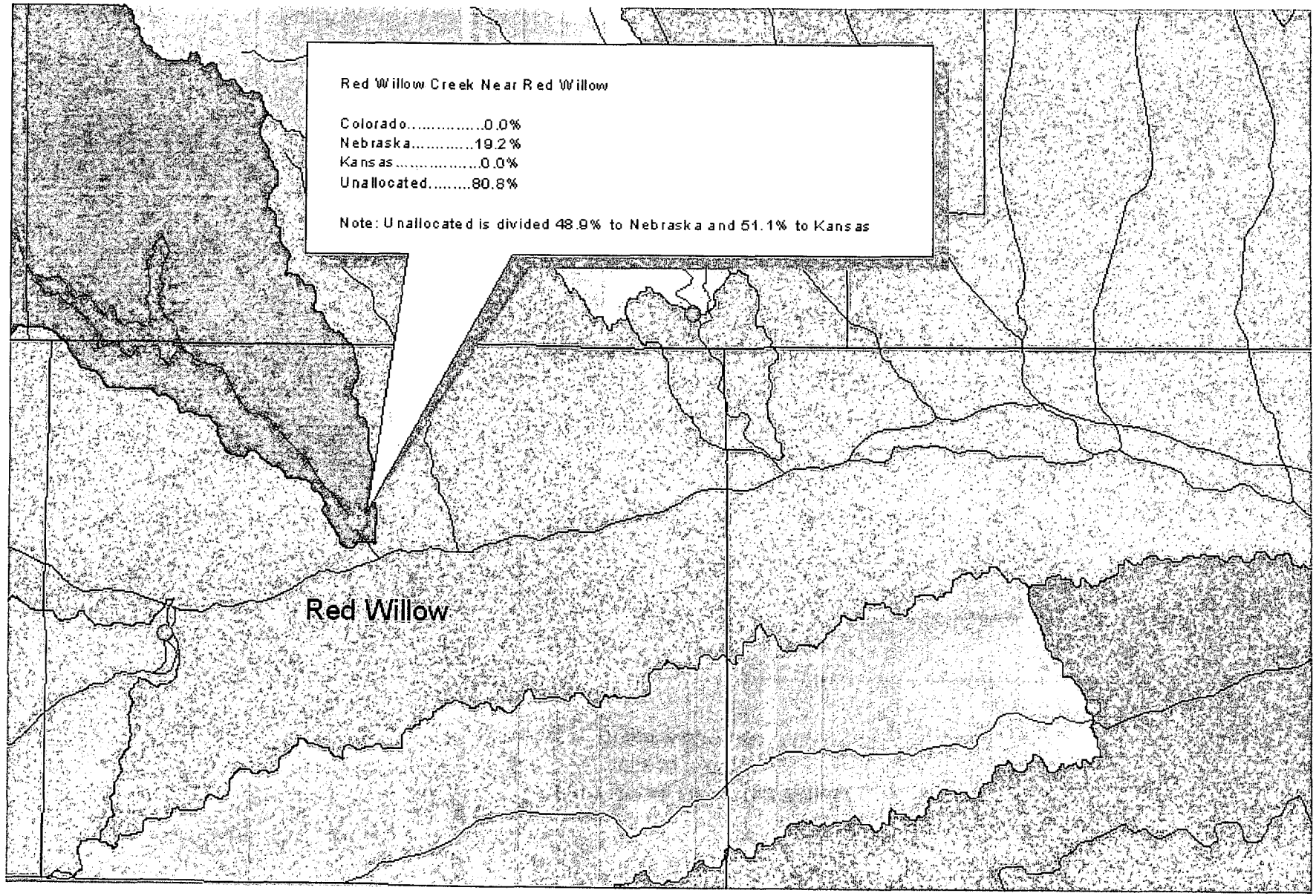
Frenchman Creek near Culbertson
1951 to 2005
Compact Station



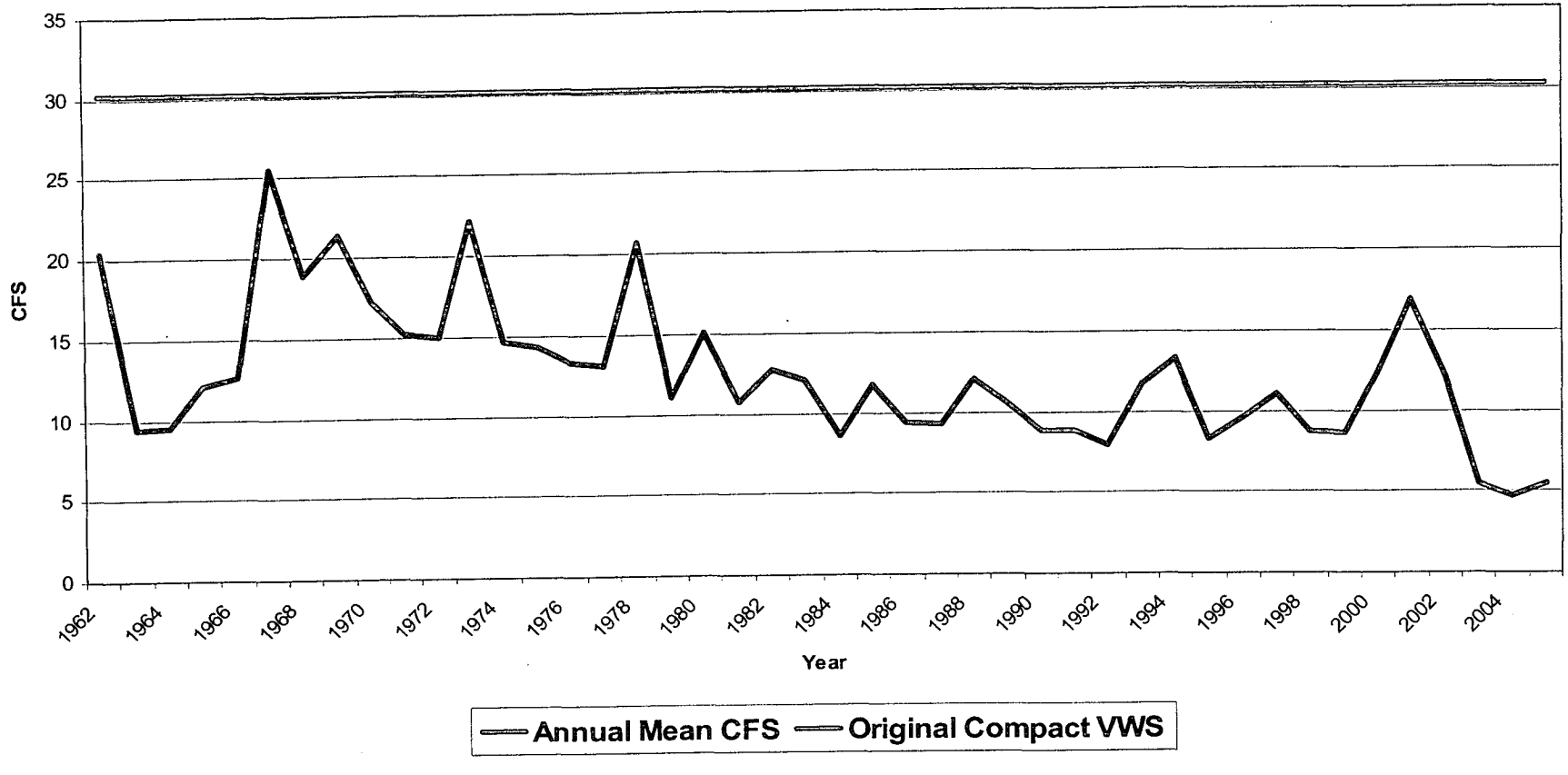

Driftwood Creek Near McCook
Colorado.....0.0%
Nebraska.....16.4%
Kansas.....6.9%
Unallocated.....76.7%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Hitchcock
Red

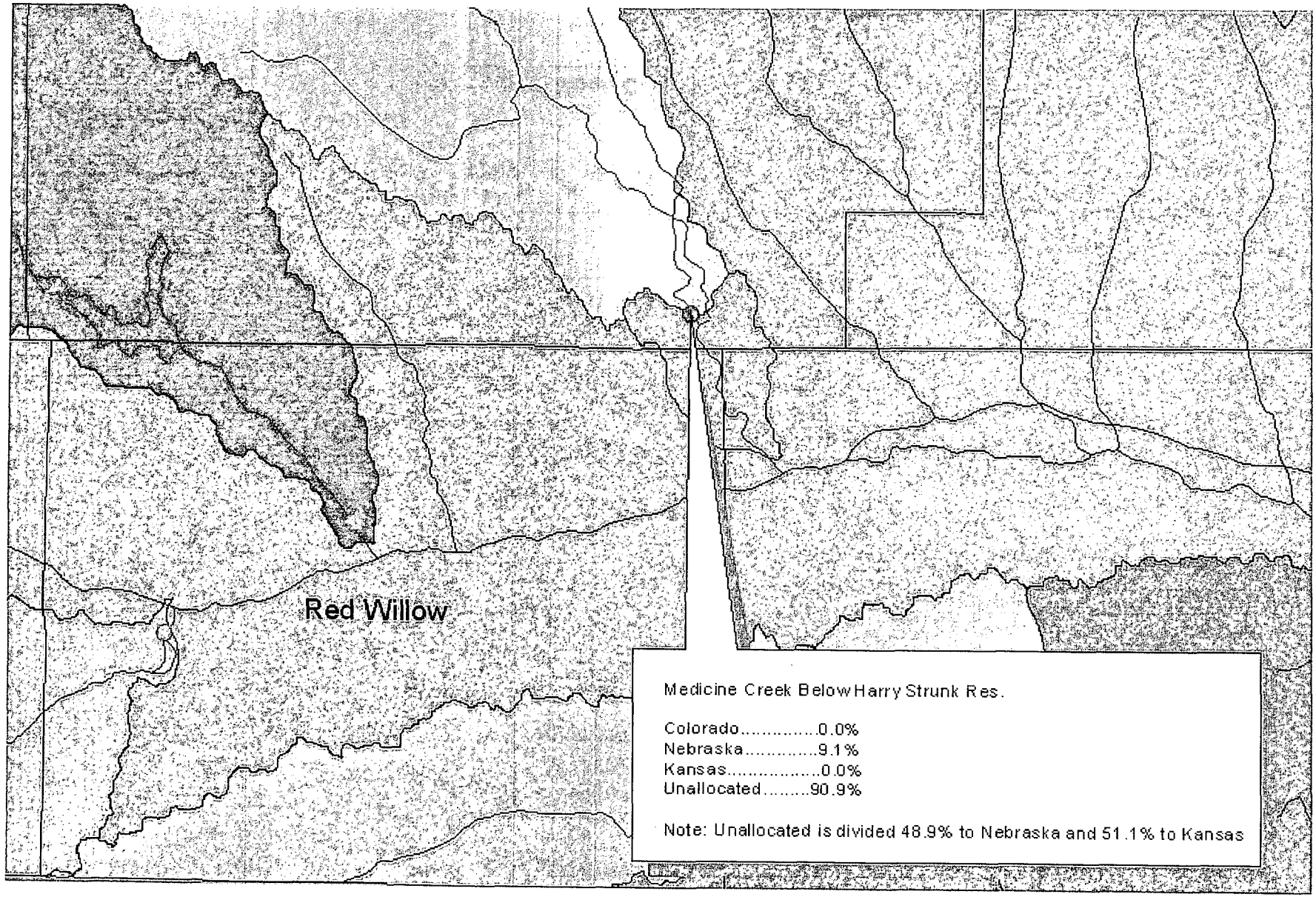
Driftwood Creek Near McCook
1947 to 2005
Compact Station



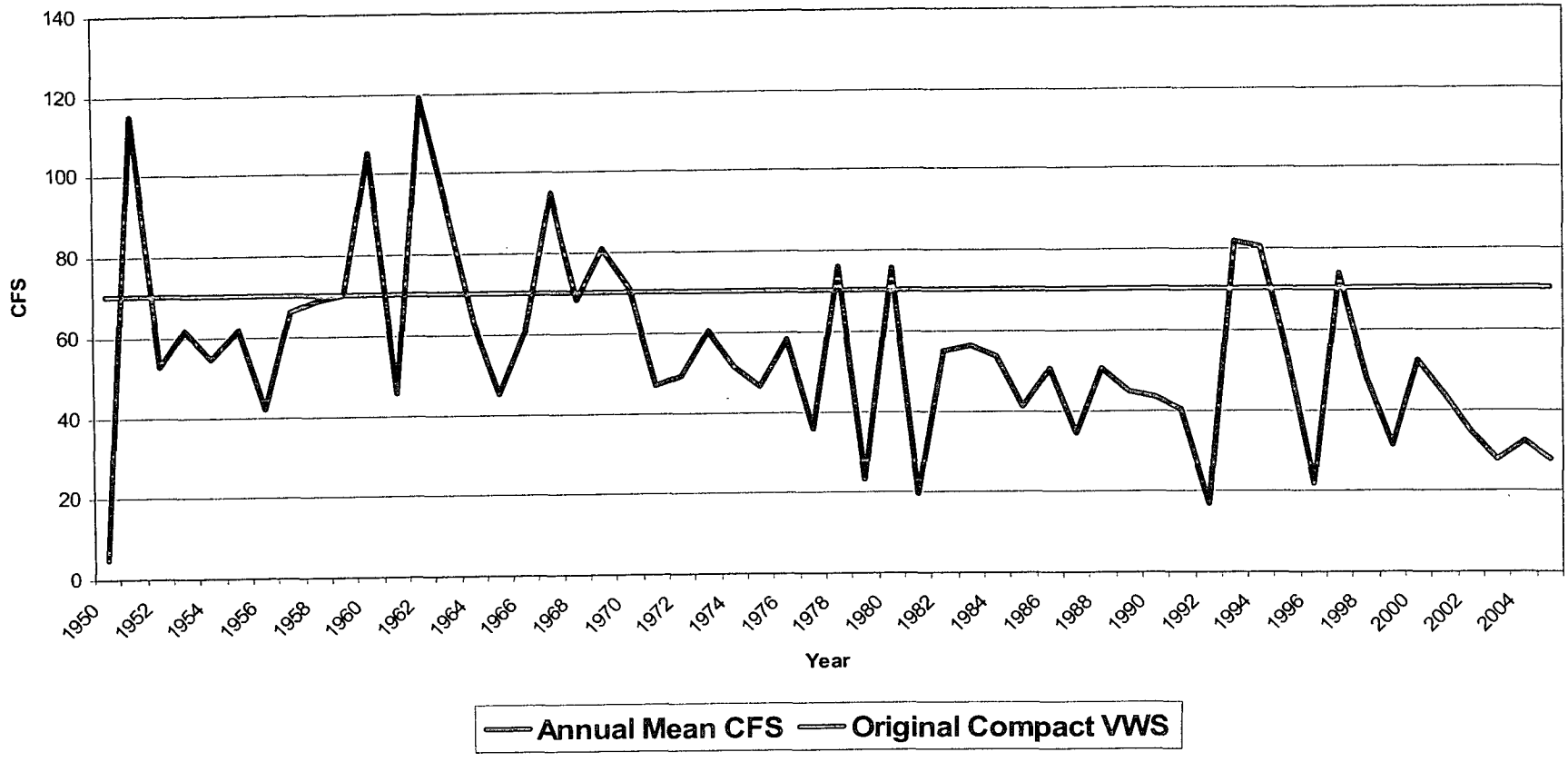

Red Willow Creek Near Red Willow
Colorado.....0.0%
Nebraska.....19.2%
Kansas.....0.0%
Unallocated.....80.8%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Red Willow

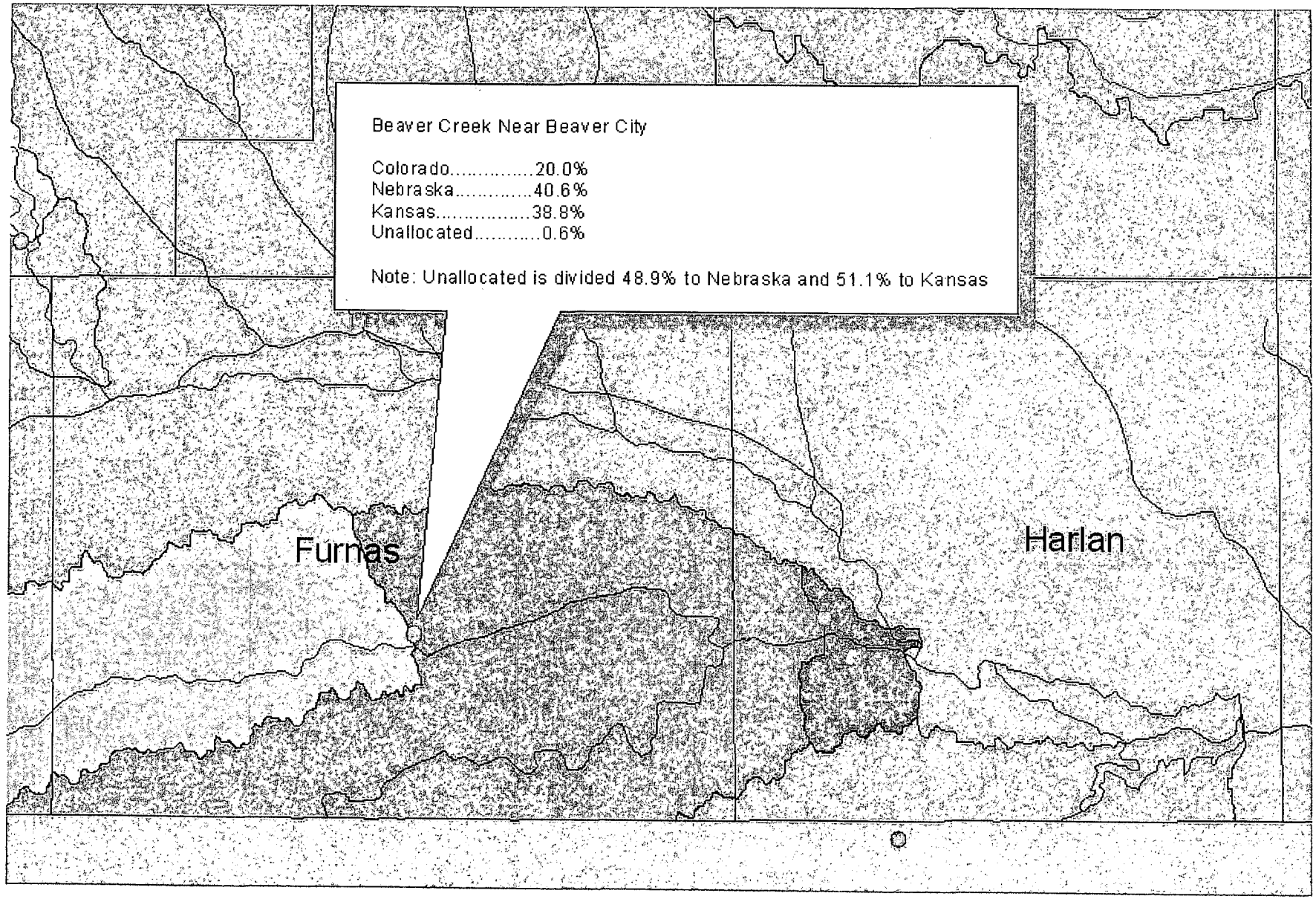
Red Willow Creek Near Red Willow
1962 to 2005
Compact Station



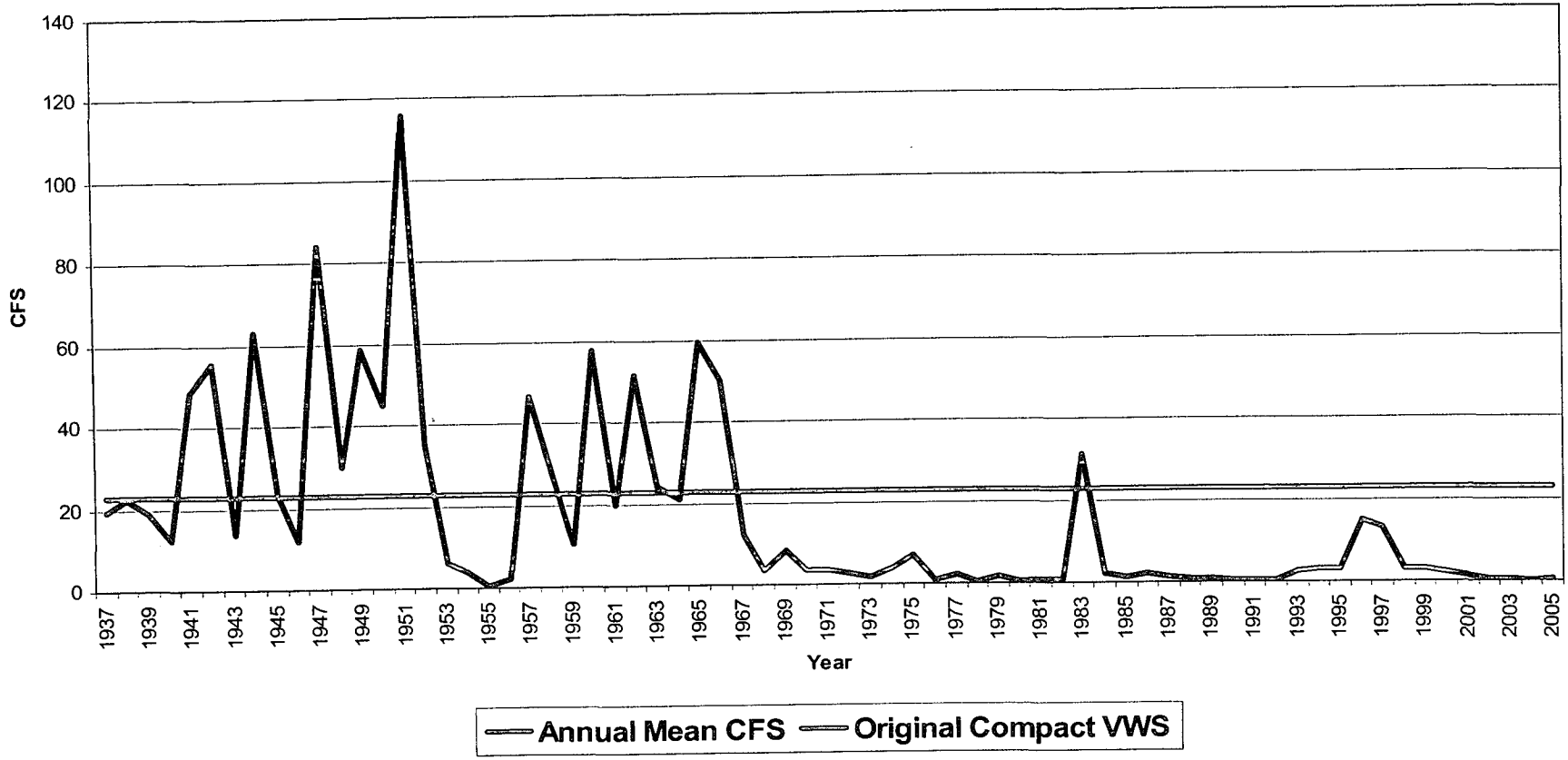

Red Willow
Medicine Creek Below Harry Strunk Res.
Colorado.....0.0%
Nebraska.....9.1%
Kansas.....0.0%
Unallocated.....90.9%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas

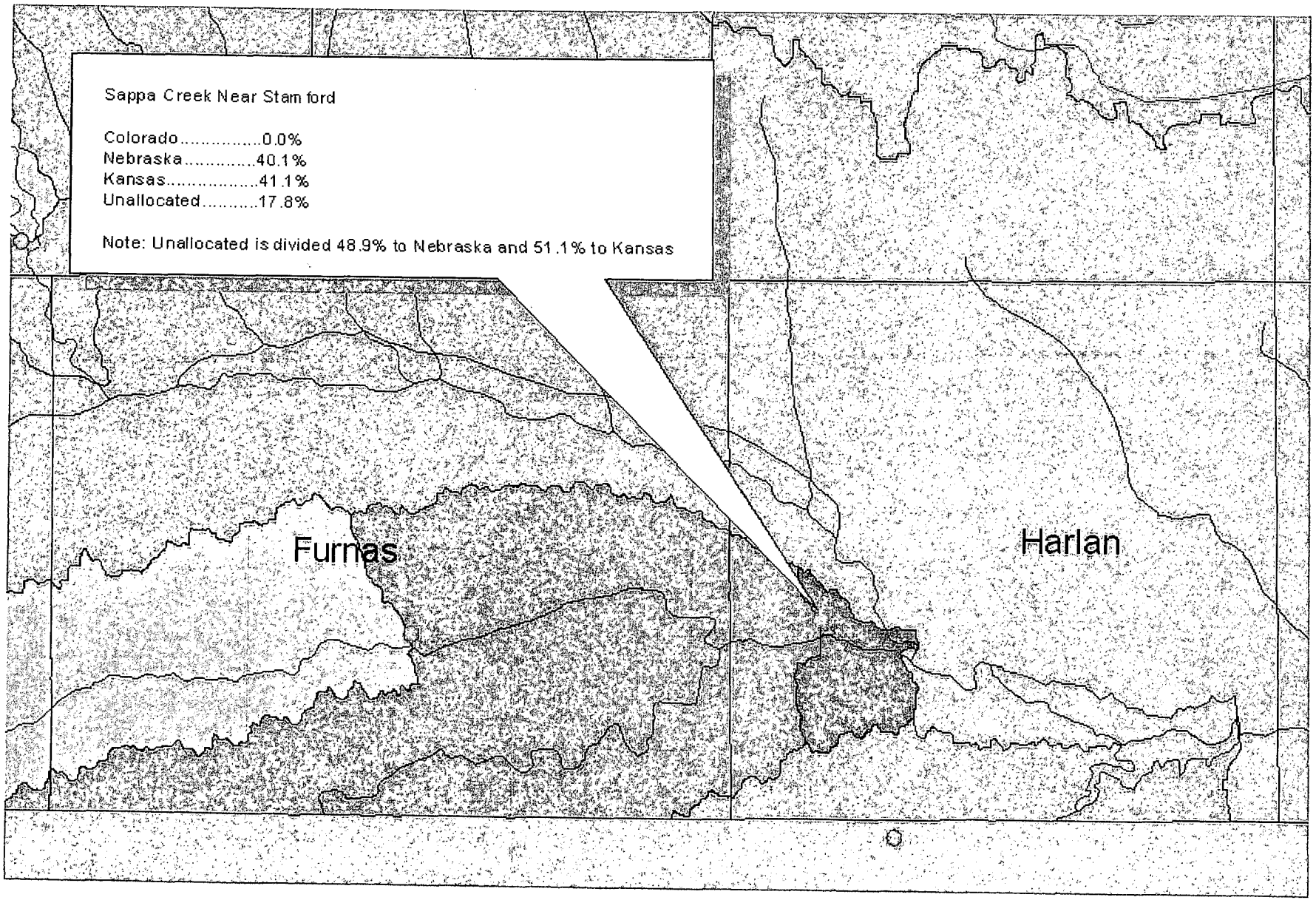
Medicine Creek Below Harry Strunk Lake
1950 to 2005
Compact Station



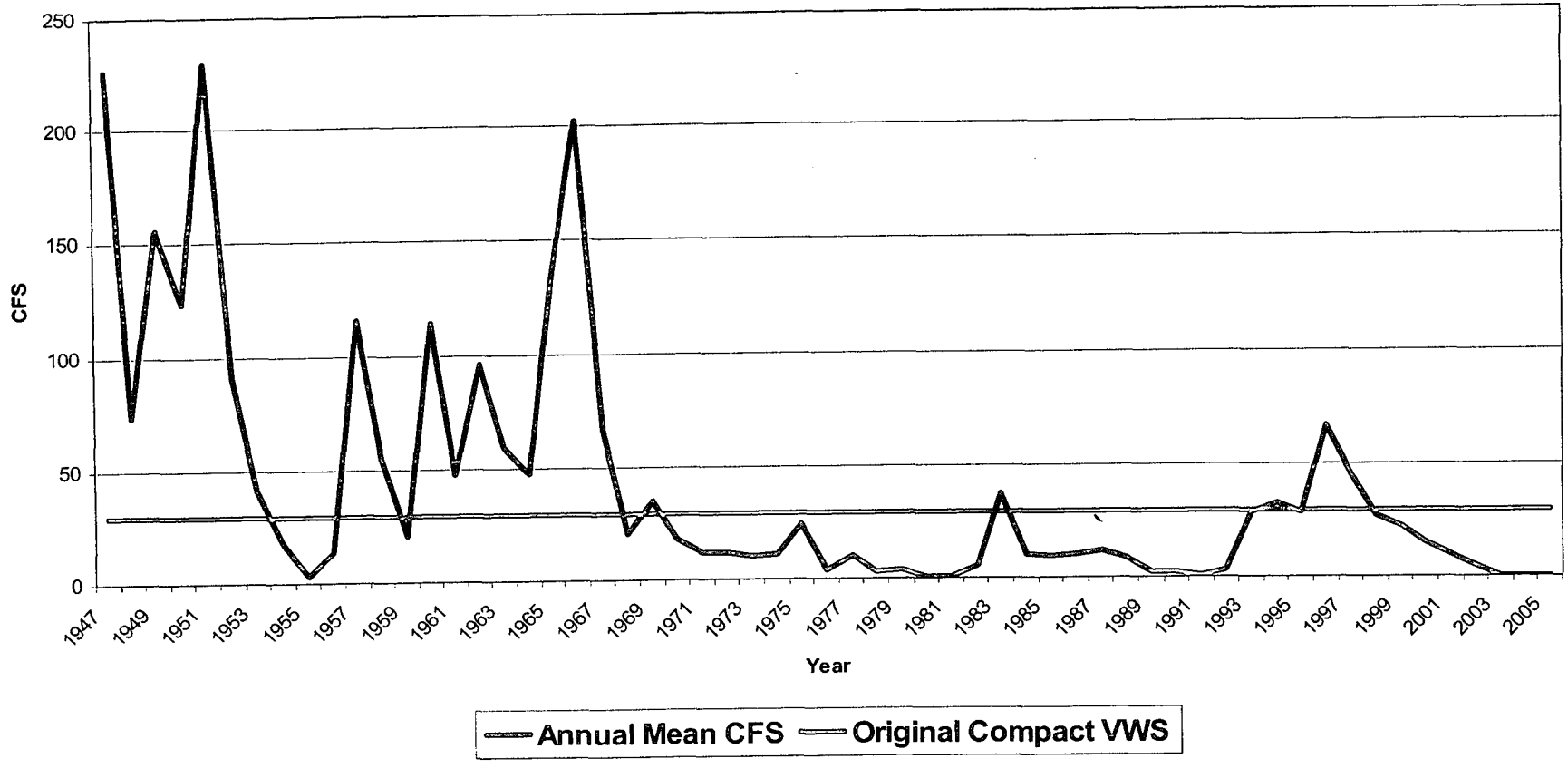

Beaver Creek Near Beaver City
Colorado.....20.0%
Nebraska.....40.6%
Kansas.....38.8%
Unallocated.....0.6%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Furnas
Harlan

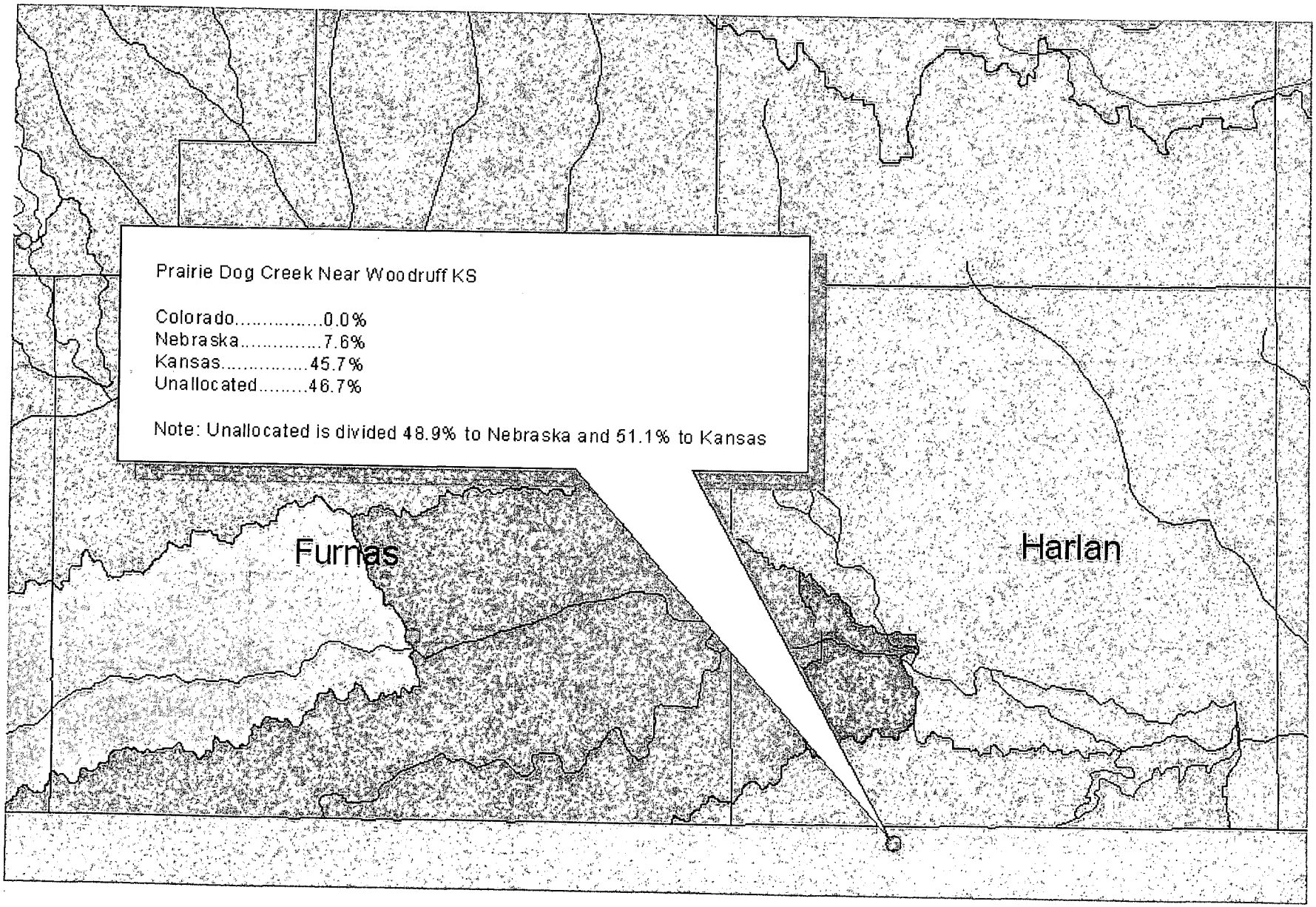
Beaver Creek Near Beaver City
1937 to 2005
Compact Station



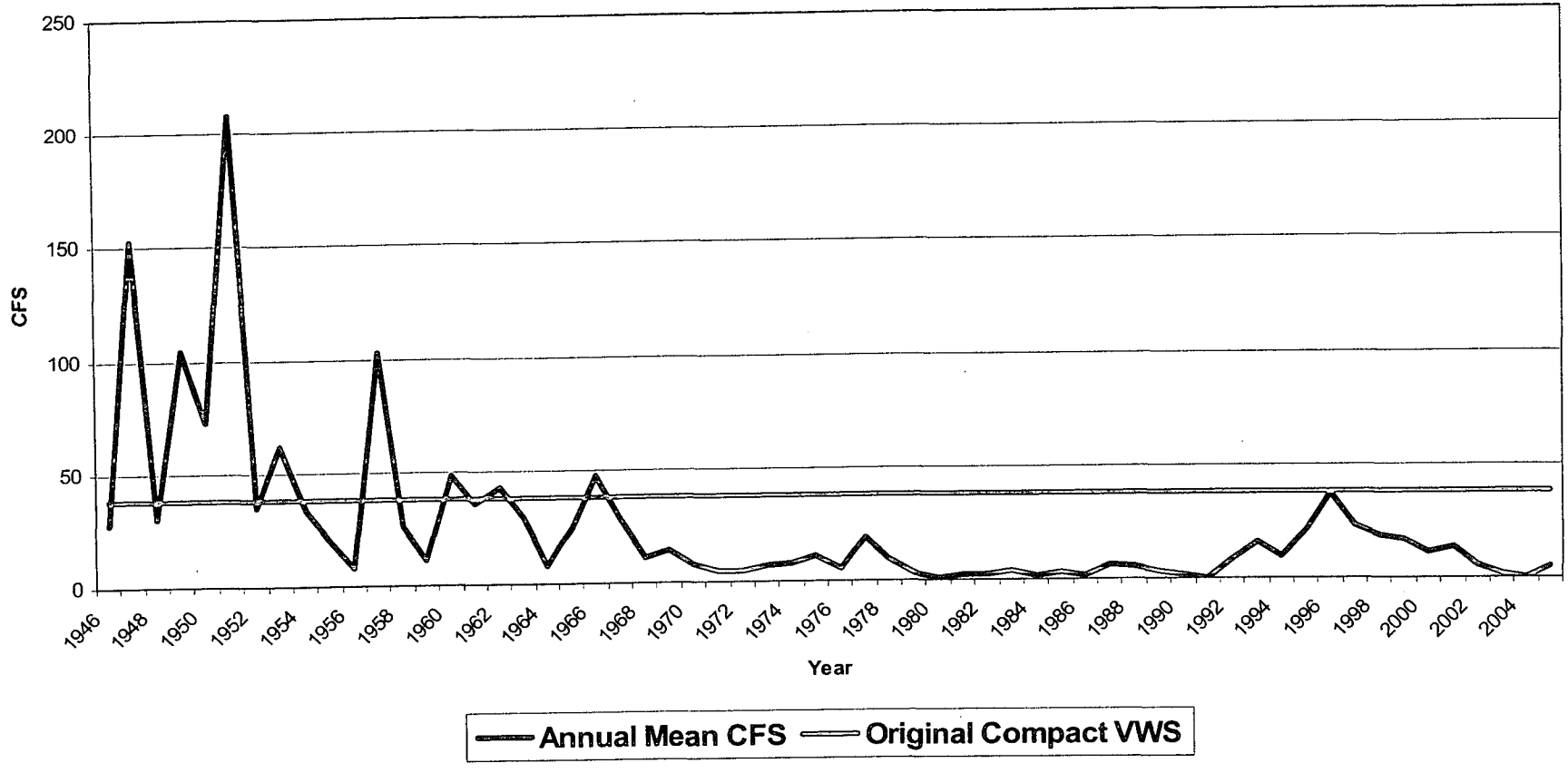

Sappa Creek Near Stam ford
Colorado.....0.0%
Nebraska.....40.1%
Kansas.....41.1%
Unallocated.....17.8%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Furnas
Harlan

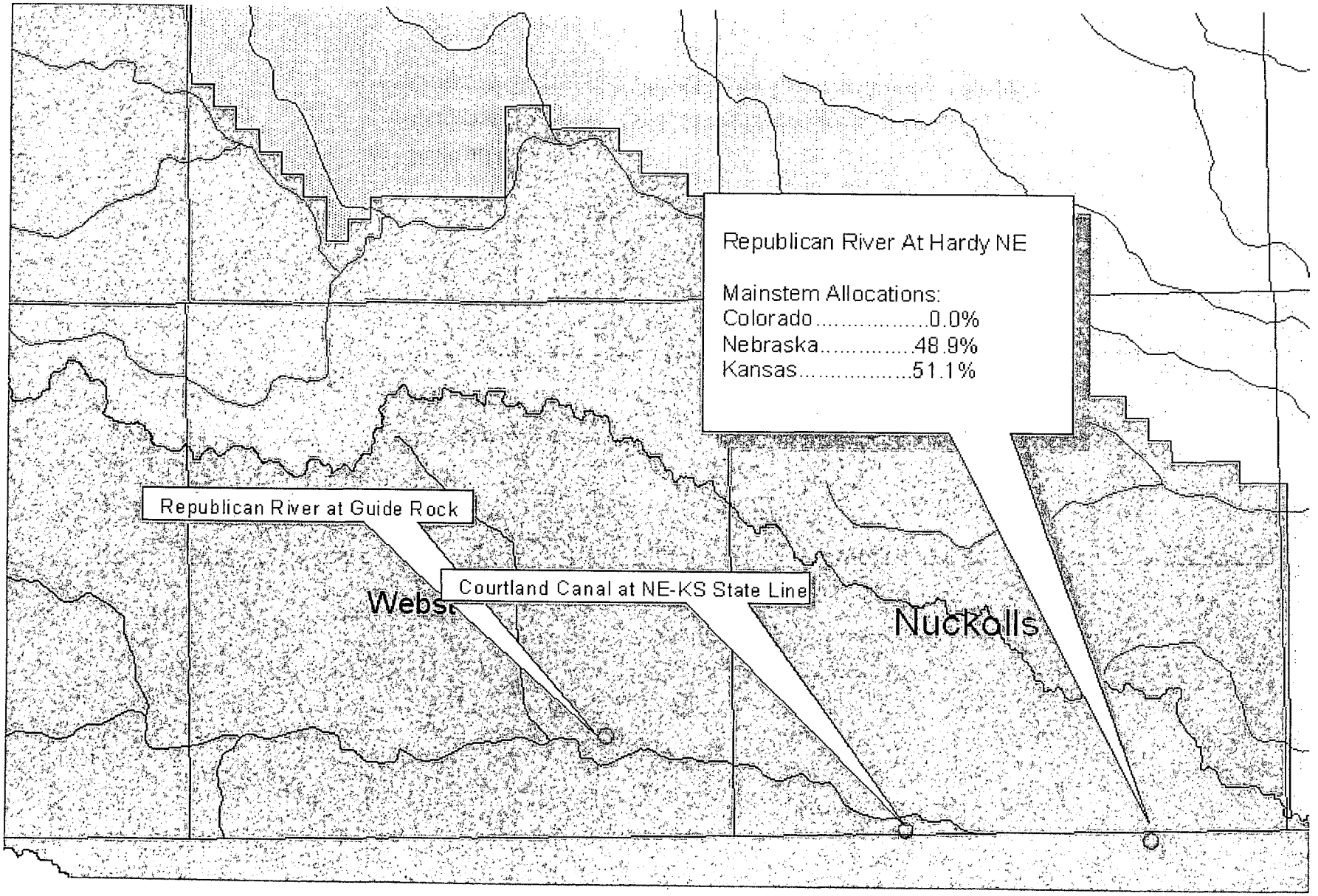
Sappa Creek Near Stanford, NE
1947 to 2005
Compact Station




Prairie Dog Creek Near Woodruff KS
Colorado.....0.0%
Nebraska.....7.6%
Kansas.....45.7%
Unallocated.....46.7%
Note: Unallocated is divided 48.9% to Nebraska and 51.1% to Kansas
Furnas
Harlan

Prairie Dog Creek Near Woodruff KS
1946 to 2005
Compact Station




Republican River At Hardy NE
Mainstem Allocations:
Colorado.....0.0%
Nebraska.....48.9%
Kansas.....51.1%
Republican River at Guide Rock
Courtland Canal at NE-KS State Line
Webst
Nuckolls

Republican River At Hardy NE
1958 to 2005