

Figure 1

Illustration of the Effect of Groundwater Pumping on Streamflow

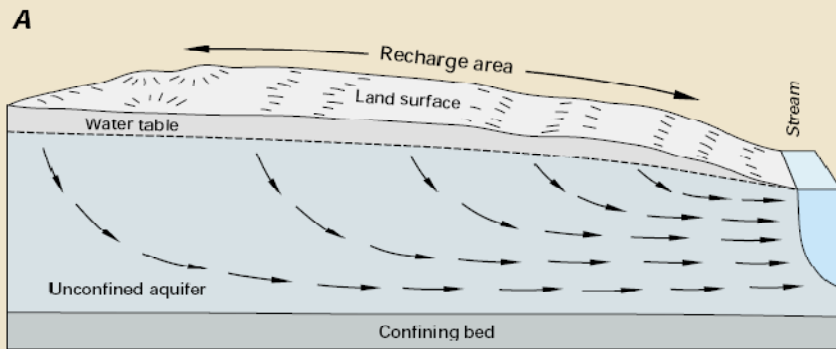
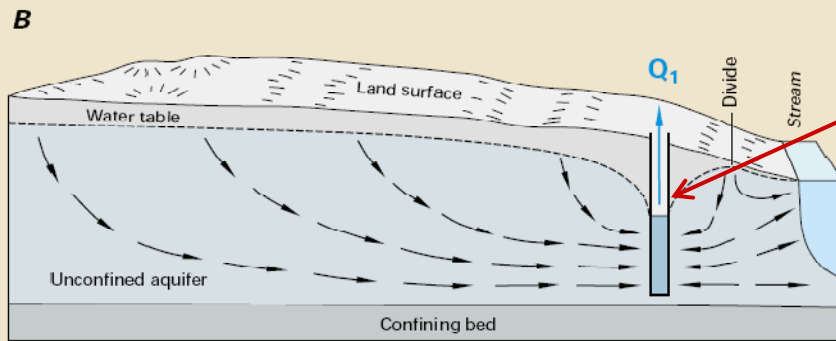
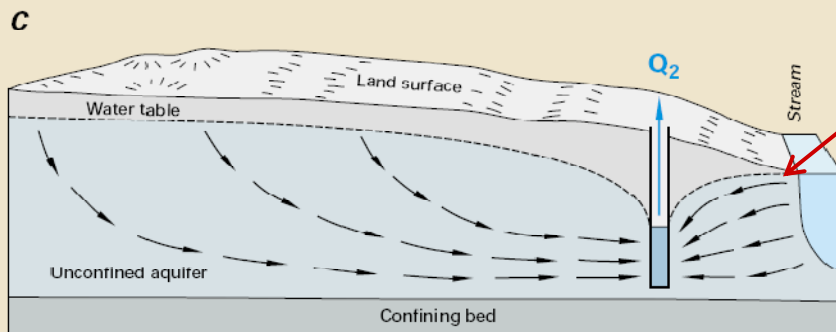


Figure C-1. In a schematic hydrologic setting where ground water discharges to a stream under natural conditions (A), placement of a well pumping at a rate (Q_1) near the stream will intercept part of the ground water that would have discharged to the stream (B). If the well is pumped at an even greater rate (Q_2), it can intercept additional water that would have discharged to the stream in the vicinity of the well and can draw water from the stream to the well (C).



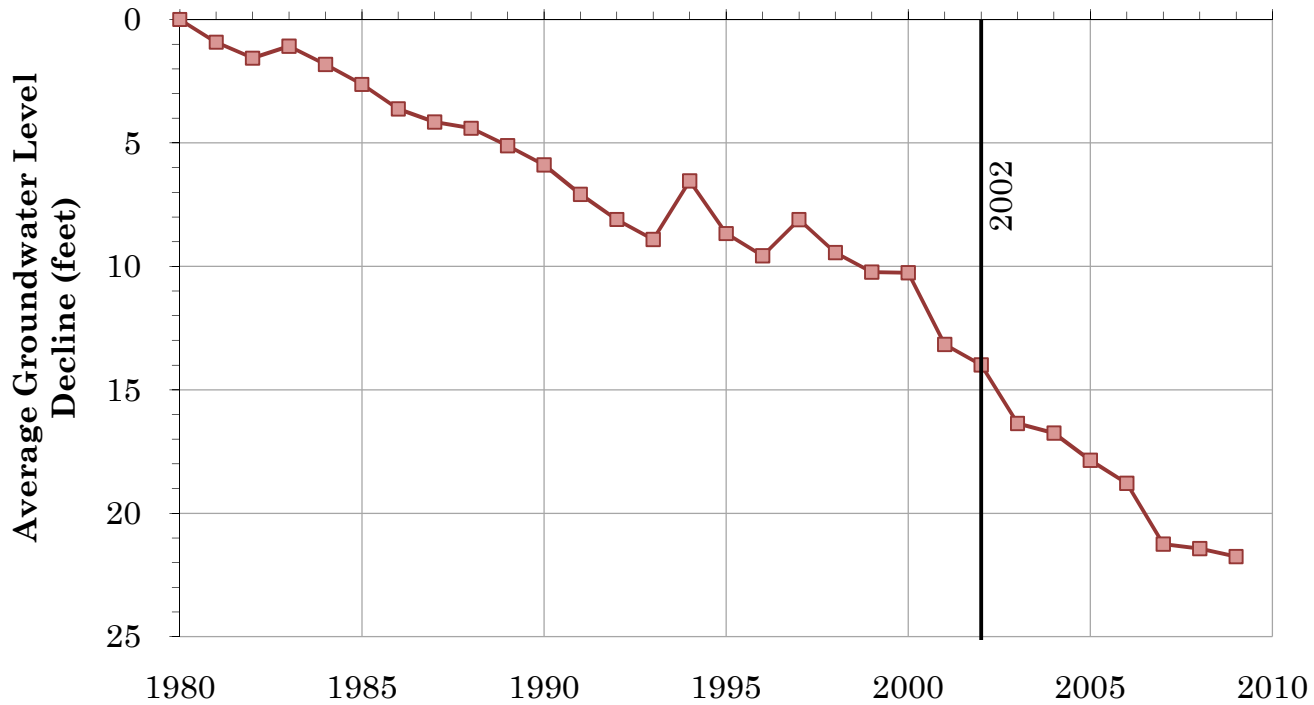
Cone of Depression



Intersection of stream by the cone of depression, resulting in diminishing streamflow.

Source: United States Geological Survey, Circular 1139, *Ground Water and Surface Water: A Single Resource* (1998), Figure C-1, p. 15 (Figure title and boxed annotations in red added).

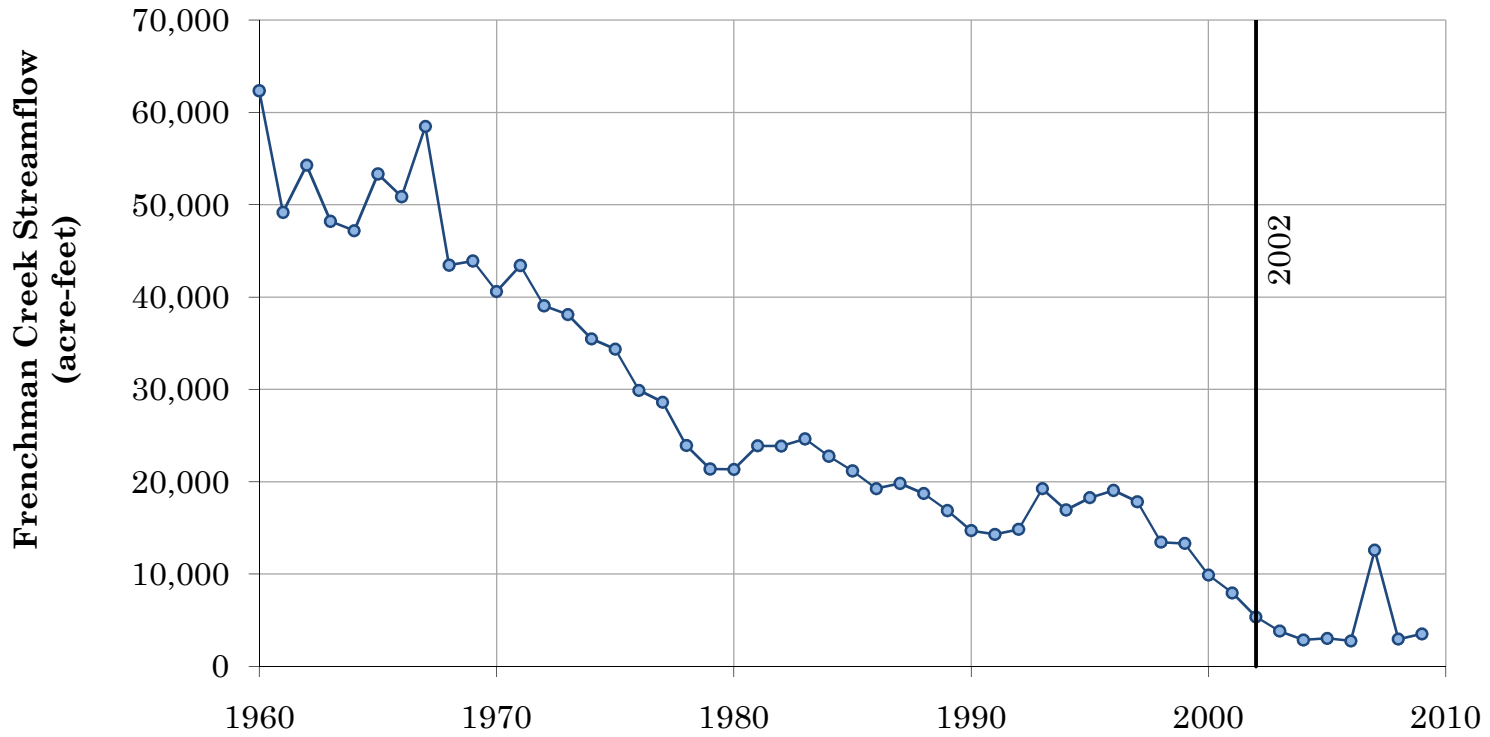
Figure 2
Average Groundwater Level Decline
Upper Republican Natural Resources District, Nebraska



Source: United States Geological Survey National Water Information System

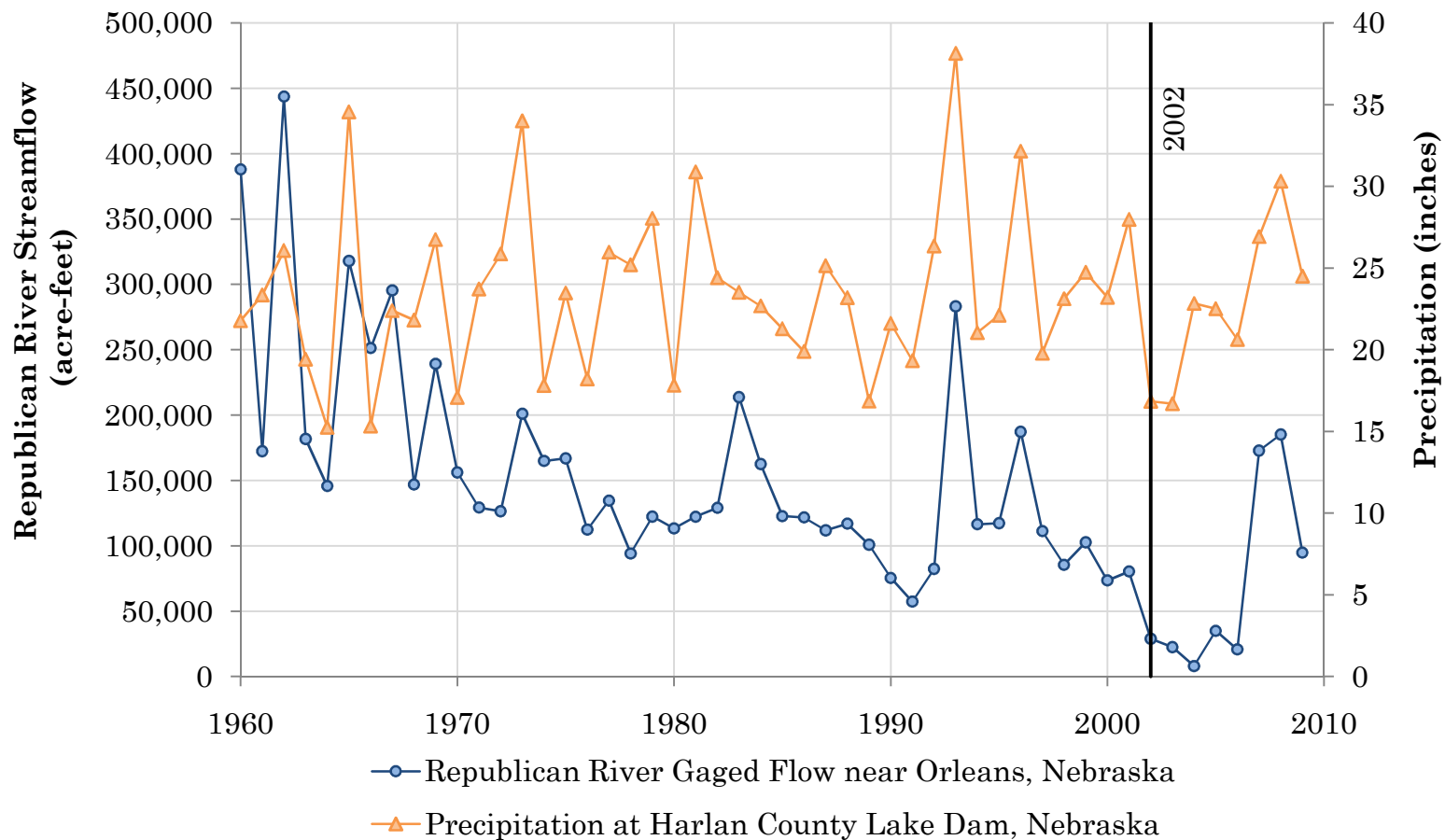
Note: Each data point represents the average for wells with data in 1980 and each corresponding year. Number of observations included in each average value varies from 190 to 238.

Figure 3
Frenchman Creek Annual Streamflow
Upper Republican Natural Resources District, Nebraska



Source: United States Geological Survey (1960 - September, 1994) and Nebraska Department of Natural Resources (October, 1994 - 2009), Gage 06831500 Frenchman Creek near Imperial, Nebraska

Figure 4
 Annual Republican River Streamflow ⁽¹⁾ and Local Precipitation ⁽²⁾
 Harlan County Lake, Nebraska

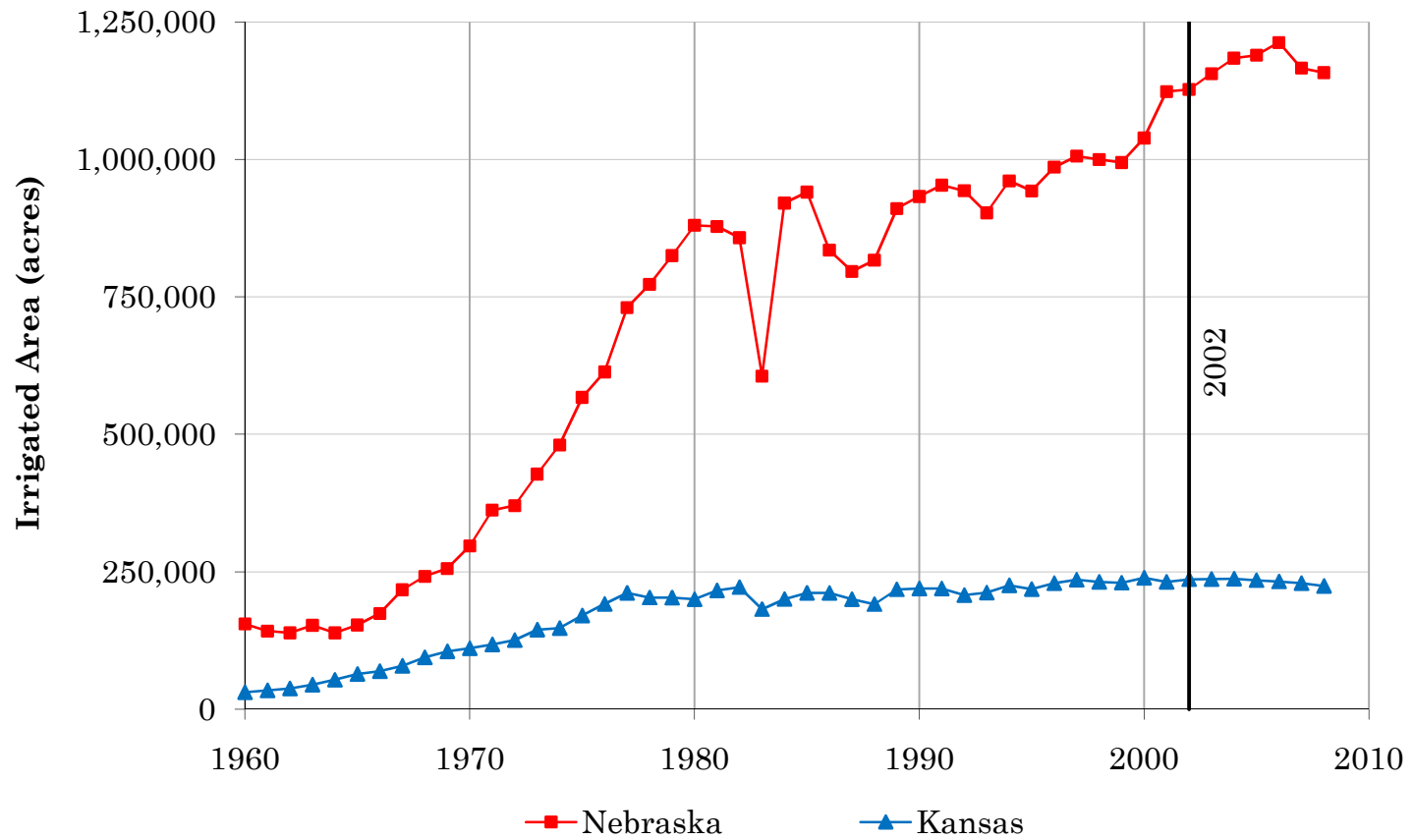


Source:

(1) United States Geological Survey Gage 06844500 Republican River near Orleans, Nebraska

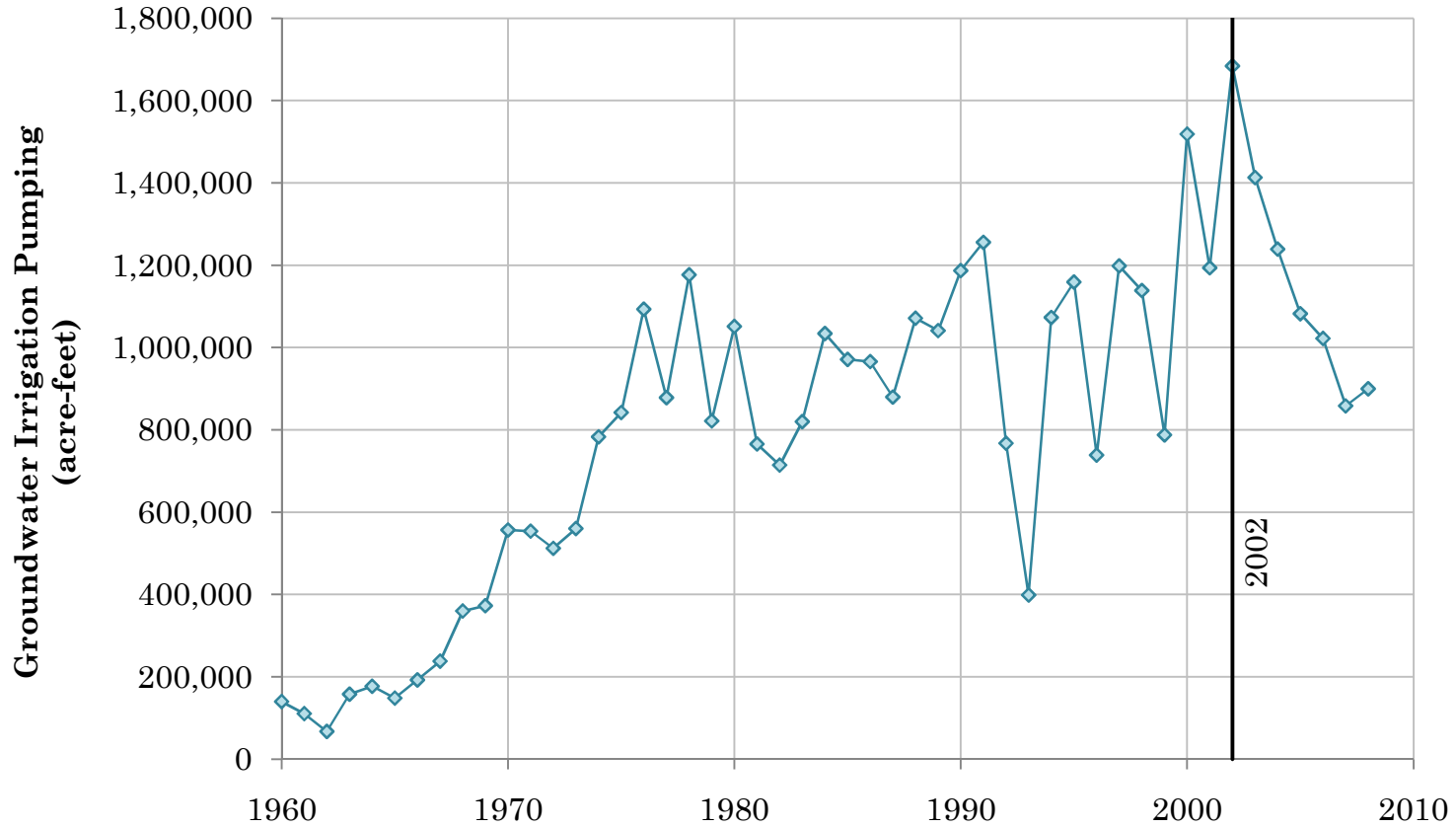
(2) United States Bureau of Reclamation precipitation at Harlan County Lake Dam

Figure 5
Groundwater Irrigated Area
Republican River Basin, Nebraska and Kansas



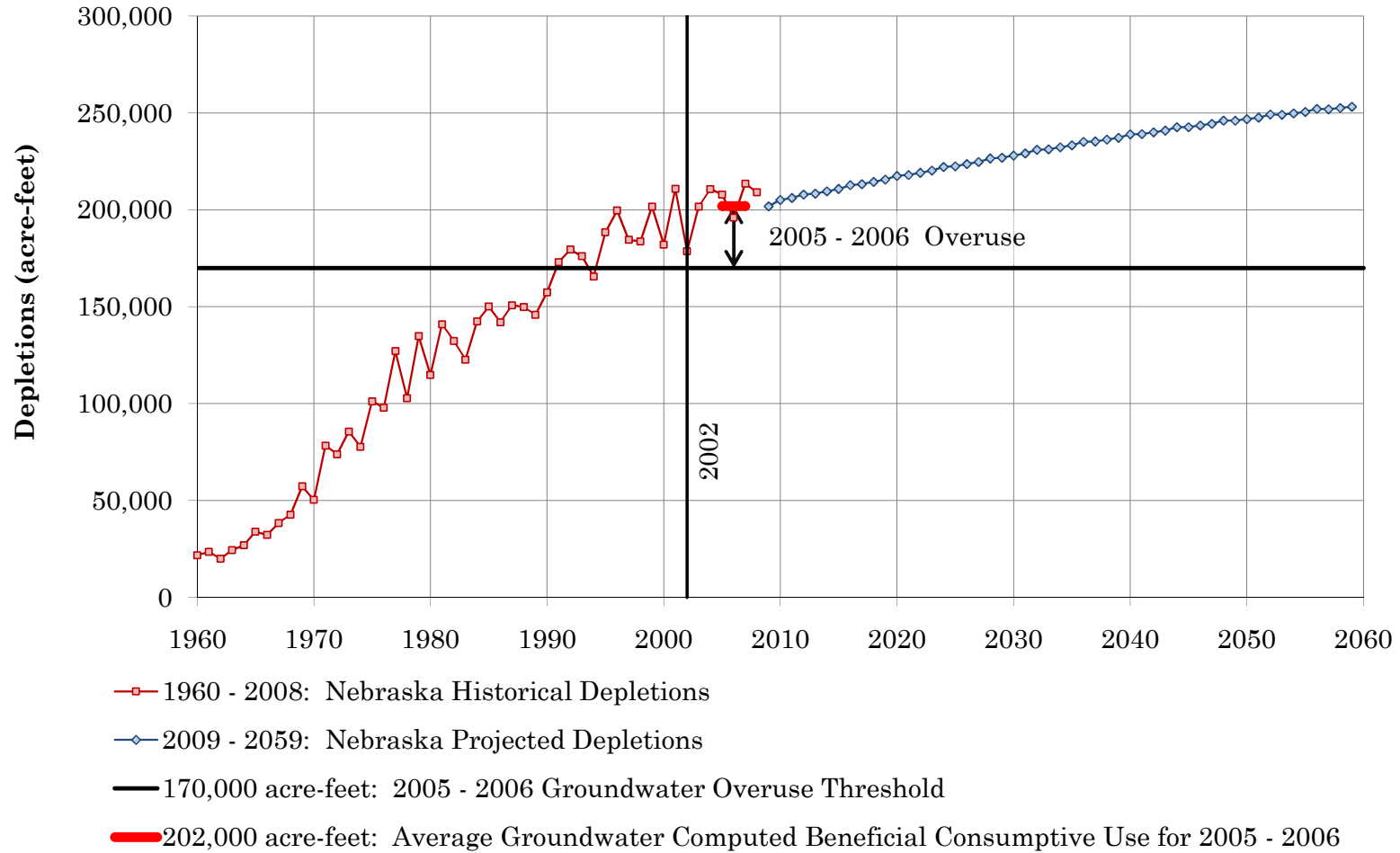
Source: Republican River Compact Administration Groundwater Model data.

Figure 6
Groundwater Irrigation Pumping by Nebraska
Republican River Basin, Nebraska



Source: Republican River Compact Administration Groundwater Model data.

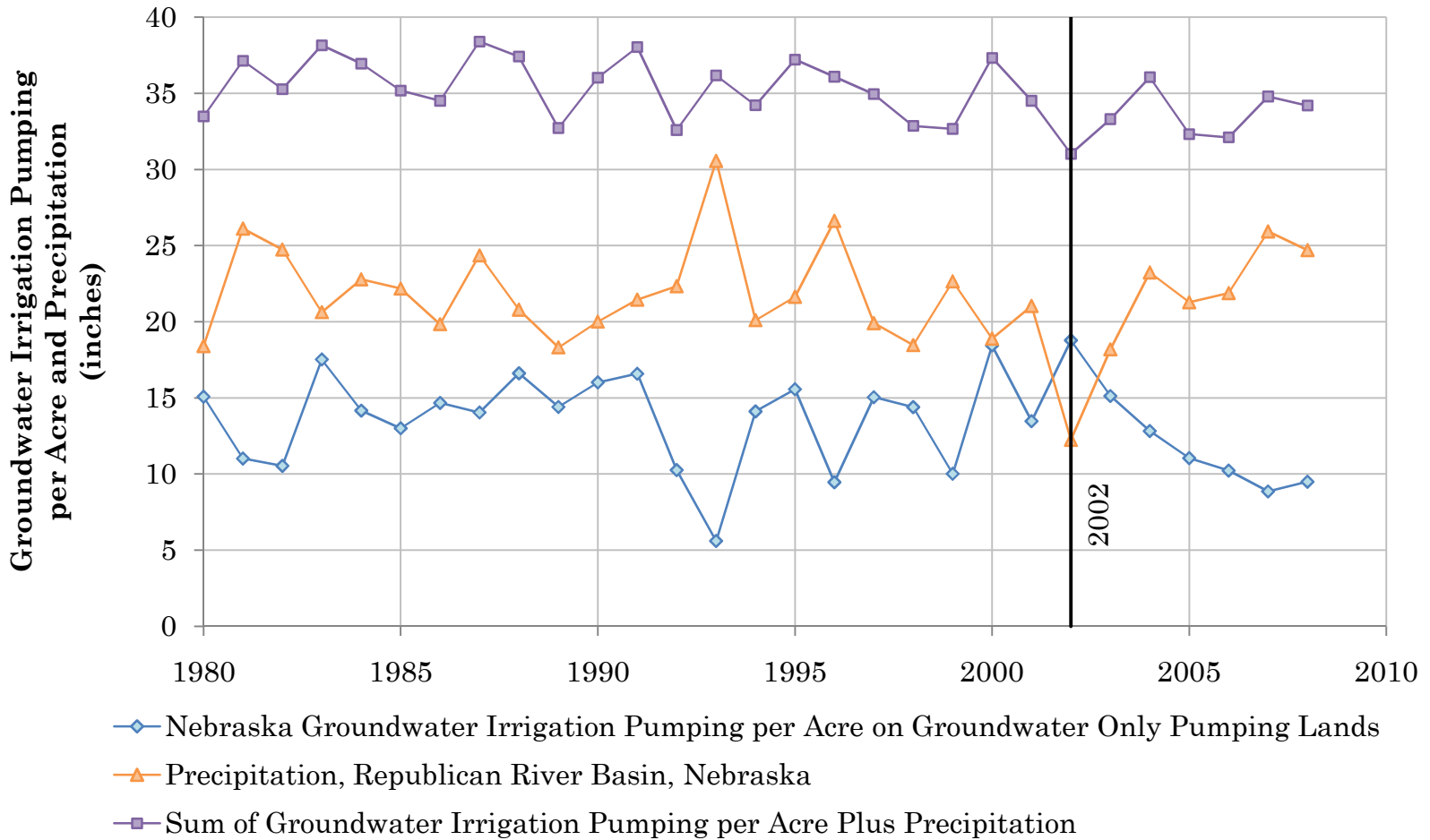
Figure 7
 Depletions of Republican River Streamflow Above Guide Rock, Nebraska
 By Nebraska Groundwater Pumping
 Historical and Projected



Source:

- (1) Historical Depletions - Republican River Compact Administration Groundwater Model results.
- (2) Projected Depletions - Republican River Compact Administration Groundwater Model results generally based on average conditions for years 1959 - 2008 and 2003 - 2008 average groundwater pumping per acre.

Figure 8
 Nebraska Groundwater Irrigation and Precipitation
 Republican River Basin, Nebraska



Source: Republican River Compact Administration Groundwater Model data.

Table 1
Nebraska Overuse
2003 - 2006

1	2	3	4	5
Year	Water-Short Year Test Guide Rock		Statewide Test Hardy	
	per Kansas (acre-feet)	per Nebraska (acre-feet)	per Kansas (acre-feet)	per Nebraska (acre-feet)
2003			25,420	25,420
2004			36,640	36,640
2005	42,860	42,390	42,325	41,785
2006	36,100	28,615	36,880	N/A
Average	39,480	35,505	35,315	N/A
Total	78,960	71,005	141,265	N/A

Notes:

- a. Columns 2 and 3 show Nebraska overuse above Guide Rock (subject to Water-Short Year accounting for 2005 and 2006).
- b. Columns 4 and 5 show Nebraska statewide overuse above Hardy (subject to five-year accounting for all years, starting in 2003).
- c. All values in column 2 and the 2006 value in column 4 are as determined by Kansas as shown in Kan. Exh. 1, Attachments 1 and 2 (1/20/2009) in Nonbinding Arbitration before Karl J. Dreher.
- d. All values in column 3 are as determined by Nebraska as shown in the RRCA Compact Accounting spreadsheet for 2005 without non-federal reservoir evaporation below Harlan County Lake and the value determined by Nebraska for 2006 as shown in Neb. Exh. 8, Table 1, at 5 (2/17/2009) in Nonbinding Arbitration before Karl J. Dreher.
- e. 2003 - 2005 values in column 4 are as shown in RRCA, 45th Annual Report, Eng'g Comm. Rep., Table 3C: Compact Accounting with non-federal reservoir evaporation below Harlan County.
- f. Values in Column 5 are as shown in RRCA, 45th Annual Report, Eng'g Comm. Rep., Table 3C: Compact Accounting without non-federal reservoir evaporation below Harlan County.
- g. N/A = not available.