



RRCA groundwater irrigation recharge plan of study
Kansas Discussion Draft: July 25, 2005

Note: In response to the Engineering Committee's encouragement to make the study purpose as clear as possible, the study effort has been renamed from a study of irrigation efficiency to a study of groundwater irrigation recharge.

Background/Scope of issue:

During the development of the RRCA groundwater model, each state used independent approaches to the development groundwater pumping and recharge datasets based on the best data available for each state (see *Republican River Compact Administration, Ground Water Model*, June 30, 2003). In many cases, that data was limited, esp. for the historic period of record.

- Colorado developed its groundwater irrigation pumping estimates based primarily on estimates of irrigated acreages, crop distributions, and crop irrigation requirements with additional reductions for observed deficit irrigation. Values used for irrigation recharge are based on these pumping estimates and assumed irrigation efficiencies by system type, with reductions for spray loss. Since 2001, Colorado has used these methods and will likely continue.
- Kansas developed its estimates of groundwater irrigation pumping using a combination of approaches, reported water use for the recent record (1989 to 2000) and an approach similar to Colorado for the earlier record. Kansas' method for estimating recharge from groundwater irrigation is currently the same as Colorado, except recharge rates were different. Since 2001, Kansas has relied exclusively on reported water use to derive its pumping estimates. Recharge estimates are based on systems types and assumed system efficiencies with adjustments for spray loss. These methods will continue to be used until better methods can be developed.
- Nebraska's estimates of groundwater pumping were based largely on power records although they also utilized meter records from the Upper Republican NRD. Pumping rates were based on well registrations, which were further complicated by the addition of co-mingled lands. Historically, estimates of groundwater irrigation recharge in Nebraska have trended from 30% (up to 1970) to 20% (year 2000), reflecting the shift in irrigation systems and practices. Since 2001, Nebraska has estimated irrigation recharge at 20% of pumping, with an increasing reliance on metered pumping.

In reviewing the resulting estimates of recharge by state, there is a significant disparity, with Nebraska's current recharge estimates being significantly higher. The need to address these differences is reinforced at this point with new controls in Nebraska, which provide for multi-year allocations, likely resulting in higher application efficiencies and more frequent deficit irrigation, both are expected to reduce irrigation recharge.

Proposal

The RRCA will create a groundwater irrigation recharge committee to review this issue over the coming year and bring recommendations to the RRCA at the next annual meeting. In addition to members of the engineering committee, each state will recruit one or more experts in irrigation systems (likely from their universities extension and research staff) to assist in the study effort. This committee will be charged as follows:

- Review the methods of estimating groundwater irrigation pumping and recharge used in the development of the RRCA groundwater model and currently used in the annual updates with emphasis on current practices.
- Survey the current literature and consult with irrigation management specialists to determine methods to estimate irrigation recharge. This review shall include but not be limited to, methods based on irrigation efficiencies by system type. A range of reasonable values shall be developed by the committee.
- Make recommendations on recharge rates to estimate groundwater irrigation recharge in the RRCA groundwater model.