

Arkansas River flows: the Compact, the current situation in the valley, options to improve

For the Upper Arkansas RAC

July 14, 2016

David Barfield, Chief Engineer, DWR



Arkansas River Compact

- Decades of litigation and dispute over waters of Arkansas River, starting in 1902. Kansas lost these cases in the first half of the twentieth century, allowing Colorado to continue to develop (approx. 80% of the reliable supply of the basin in Colorado).
- 1943—U.S. Supreme Court encouraged States to enter into an interstate compact
- Compact agreed to on December 14, 1948
- Major purposes (Article I):
 - “Settle existing disputes and remove causes of future controversy...”
 - “Equitably divide and apportion...” Arkansas River waters and the benefits of John Martin Reservoir

Major provisions

- Compact Article IV-D – Colorado can continue to develop in the basin but with such development “**the waters** of the Arkansas river, as defined in Article III, **shall not be materially depleted in usable quantity or availability for use** to the water users in Colorado and Kansas under this Compact by such future developments or construction.”
- Approx. 40% of the benefits of storage in John Martin Reservoir to Kansas.

1985-2007 Litigation

- *Kansas v. Colorado*
 - 1985—Kansas filed suit; included complaint concerning post-compact depletion of river flows by irrigation wells drilled along the Arkansas River
 - Kansas prevailed on above point; resulted in U.S. Supreme Court finding Colorado in violation of the Compact
 - States negotiated a decree; entered by the U.S. Supreme Court in March 2009

Kansas v. Colorado decree

- *Decree* specifically provides that Colorado comply with Article IV-D and sets out the following:
 - To prevent Groundwater Pumping in excess of the pre-compact pumping allowance of 15,000 acre-feet per year without Replacement of depletions to Usable Stateline Flow in accordance with this Decree
 - To enforce the Colorado Use Rules with respect to groundwater pumping, unless John Martin Reservoir is spilling and Stateline water is passing Garden City, Kansas; and
 - To enforce the Colorado Measurement Rules with respect to Groundwater Pumping.

Kansas v. Colorado decree

- Determination of Compact compliance:
 - annual updates to H-I Model
 - annual accounting
 - moving ten-year compliance period
- Offset account in John Martin to allow us to improve our use Colorado's replacements for well depletions
- 2010--Colorado adopted surface water irrigation improvement rules
- 2011--States agreed to model change that recognized groundwater irrigation system improvements
- Monitoring compliance:
 - accounting reviews
 - field investigations

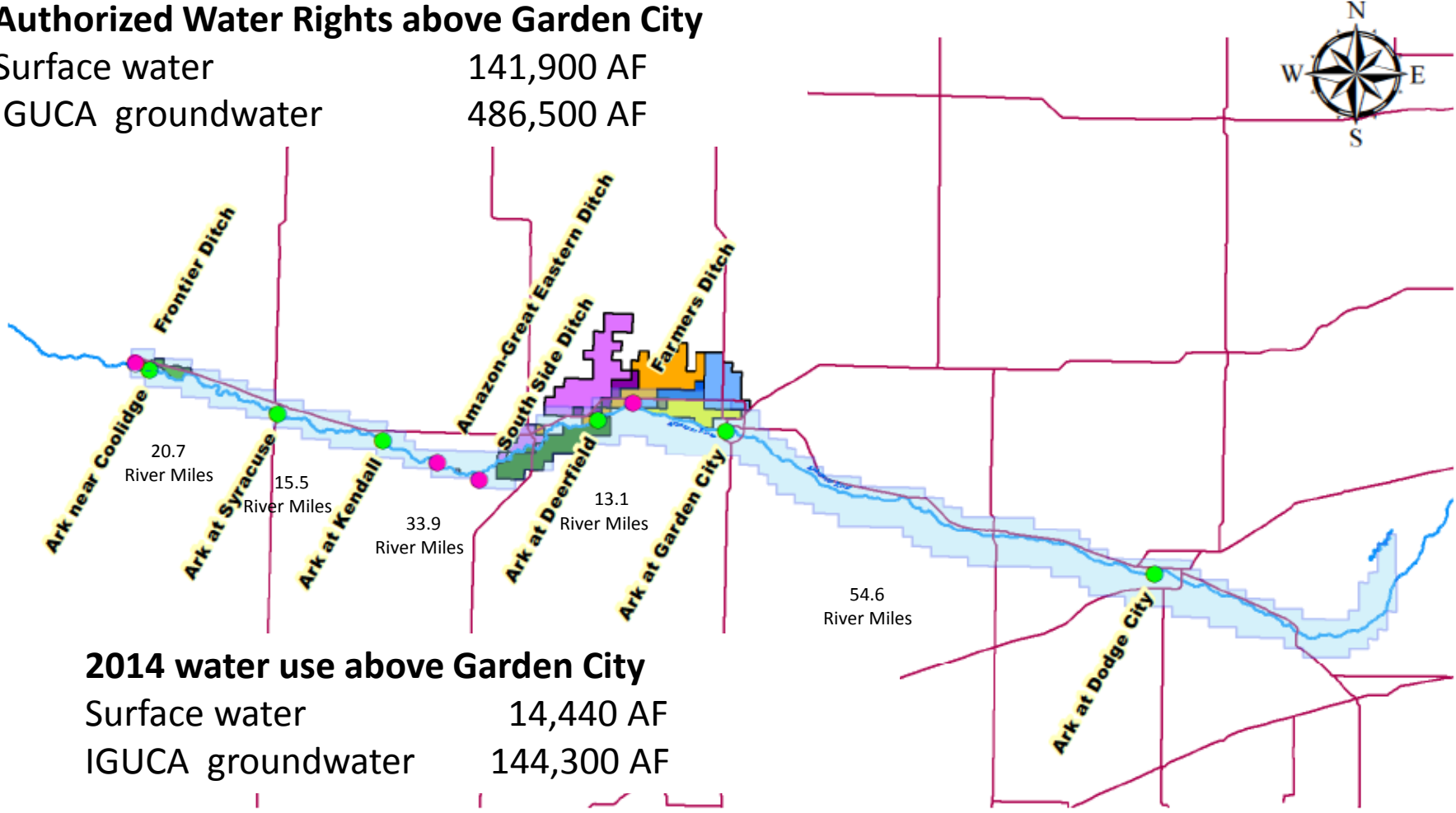
What happens to Kansas share of Arkansas River water?

- Used by the senior water rights of the River.
- Recharge to:
 - the alluvial aquifer between the state line and some point above Garden City and
 - the Ditch Service area.

Arkansas River gages, Kansas Ditch Service Areas, IGUCA

Authorized Water Rights above Garden City

Surface water 141,900 AF
 IGUCA groundwater 486,500 AF



2014 water use above Garden City

Surface water 14,440 AF
 IGUCA groundwater 144,300 AF

Legend

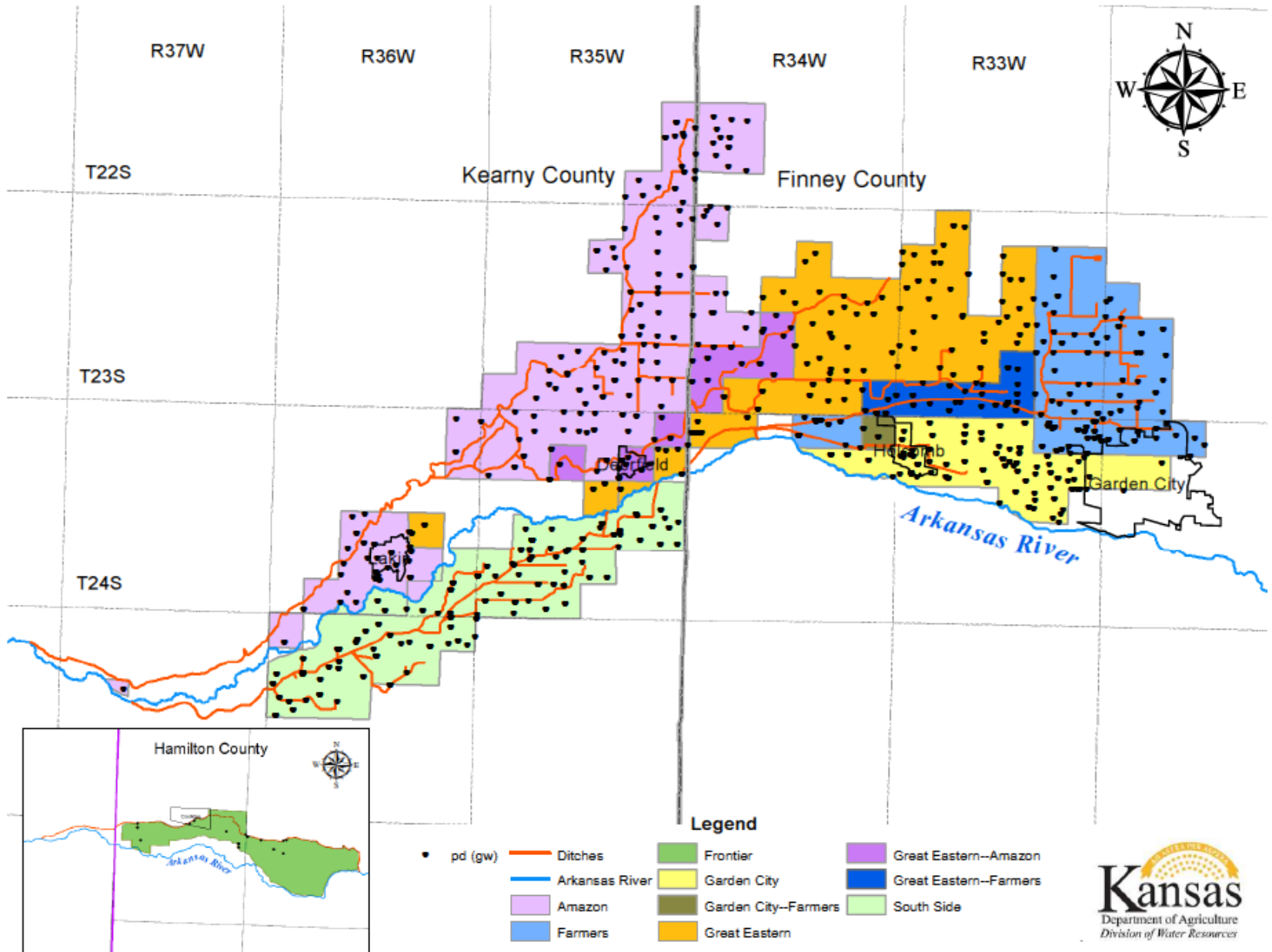
● Ditch Diversion Points	IGUCA_Ark	Amazon	Garden City	Great Eastern--Amazon
● Arkansas River gages	Kdot_highways	Farmers	Garden City--Farmers	Great Eastern--Farmers
— Arkansas River	Frontier	Great Eastern	South Side	



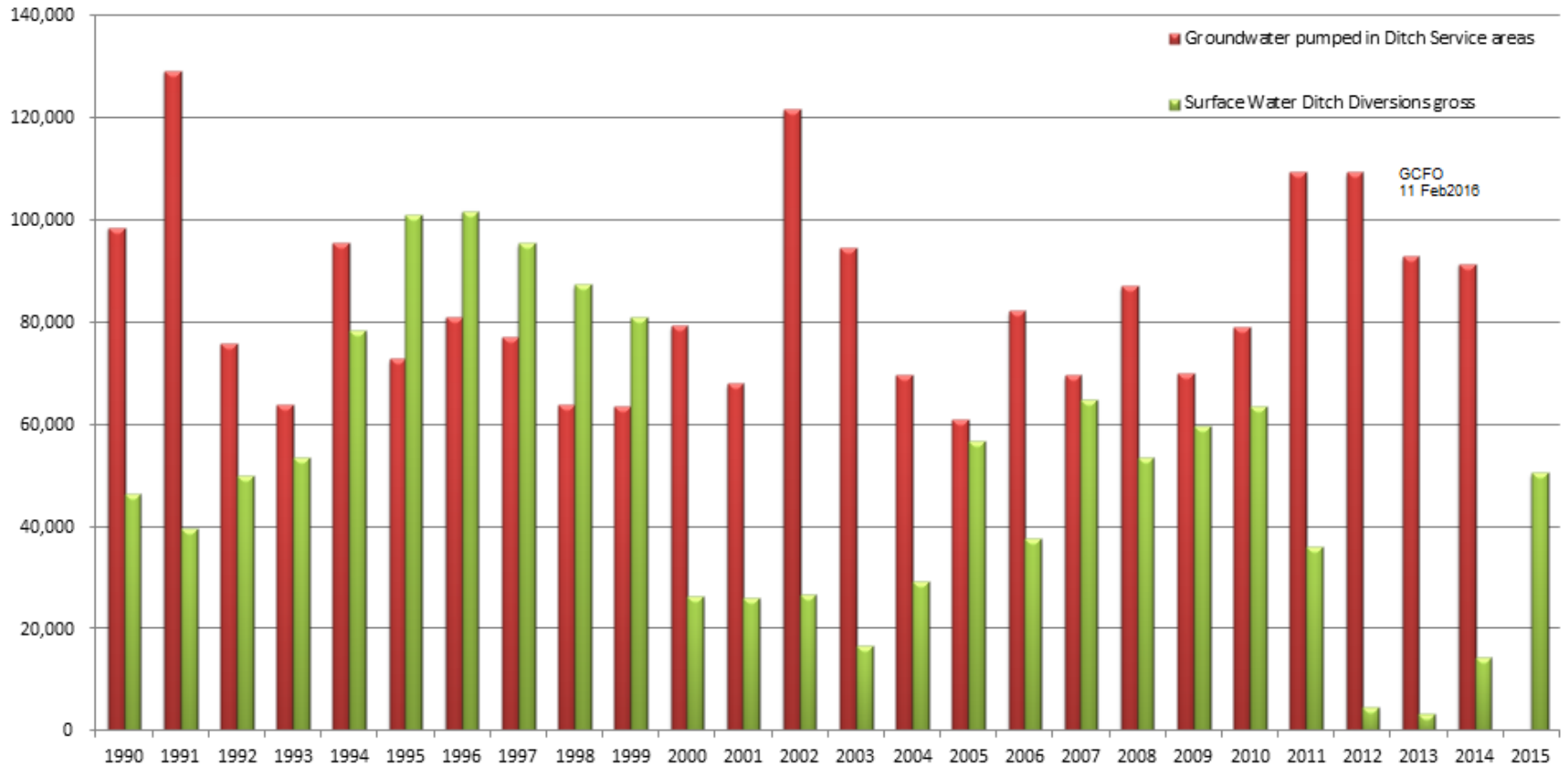
The Water Rights of the Associated Ditches

Ditch	Water Right	Authorized diversion rate (cfs)	Authorized Quantity (AF)	Acres
Frontier	HM 36	55	5,000	2,413
Ft. Aubrey	HM 26	35	1,946	---
Amazon	KE 79	200	31,000	15,500
Great Eastern	KE 77	354	60,000	27,087
South Side	KE 78	200	20,000	10,000
Farmer's	KE 76	263	20,000	10,000
Garden City	FI 217	33	4,000	2,000
		1,140	141,946	67,000.0

Kansas Ditch Service Area



Surface Water and Groundwater diversions within the Associated Ditches Service Area



	Authorized Quantity (AF)	Average Use 1990-2001 (AF)	Average Use 2001-2014 (AF)
Surface Water Rights (Associated Ditches)	141,946	69,144	35,265
Groundwater rights in Ditch Service Areas	~373,000	81,868	86,098

Water rights of the area

- The Arkansas River is a renewable source of irrigation water, in its absence groundwater pumping would be used to meet irrigation demands. Authorized quantities:
 - Surface water rights: 141,946 AF
 - Includes storage in Lake McKinney
 - Groundwater rights in ditch service: ~373,000 AF
 - Groundwater rights in IGUCA: ~763,000 AF

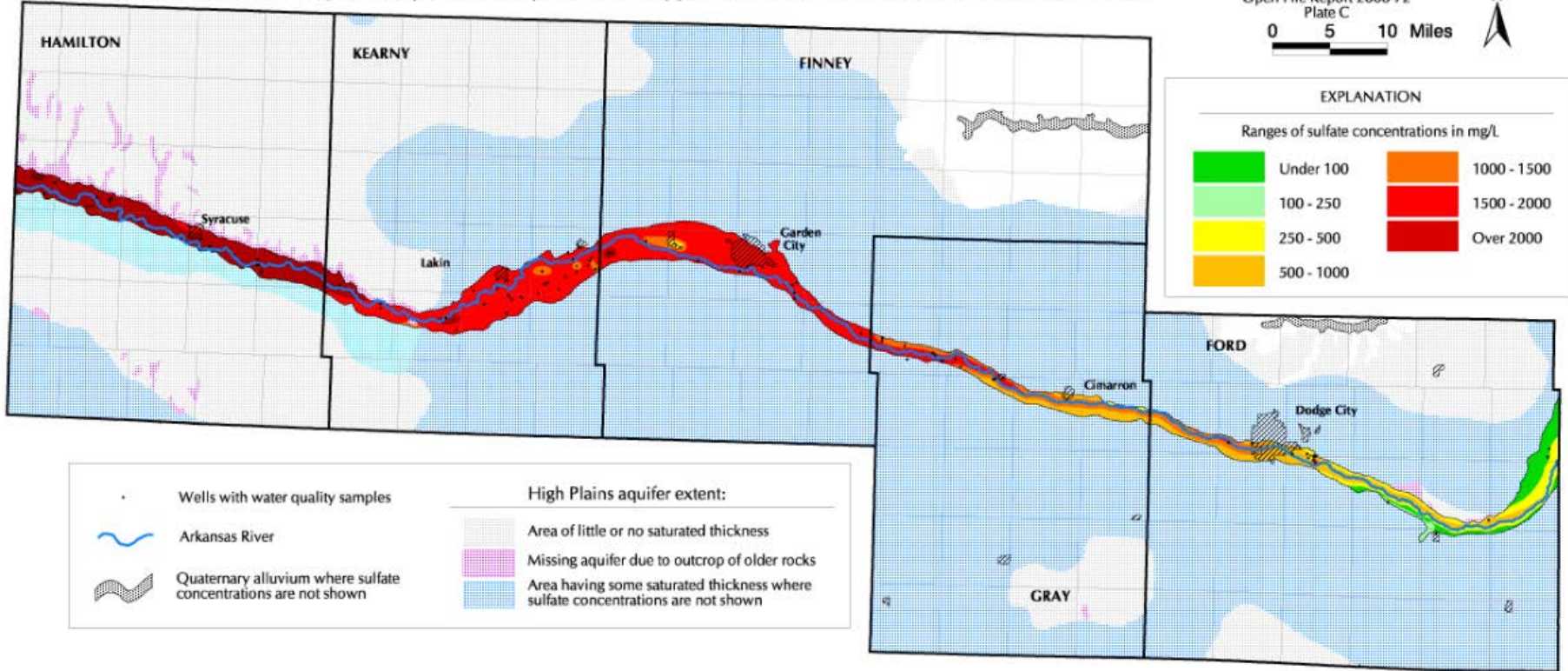
(groundwater pumping determined by summing authorized pumping allocation from pd table)

Recharge to the River

Sulfate Concentration for the Quaternary Alluvial Aquifer in the Upper Arkansas River Corridor in Southwest Kansas

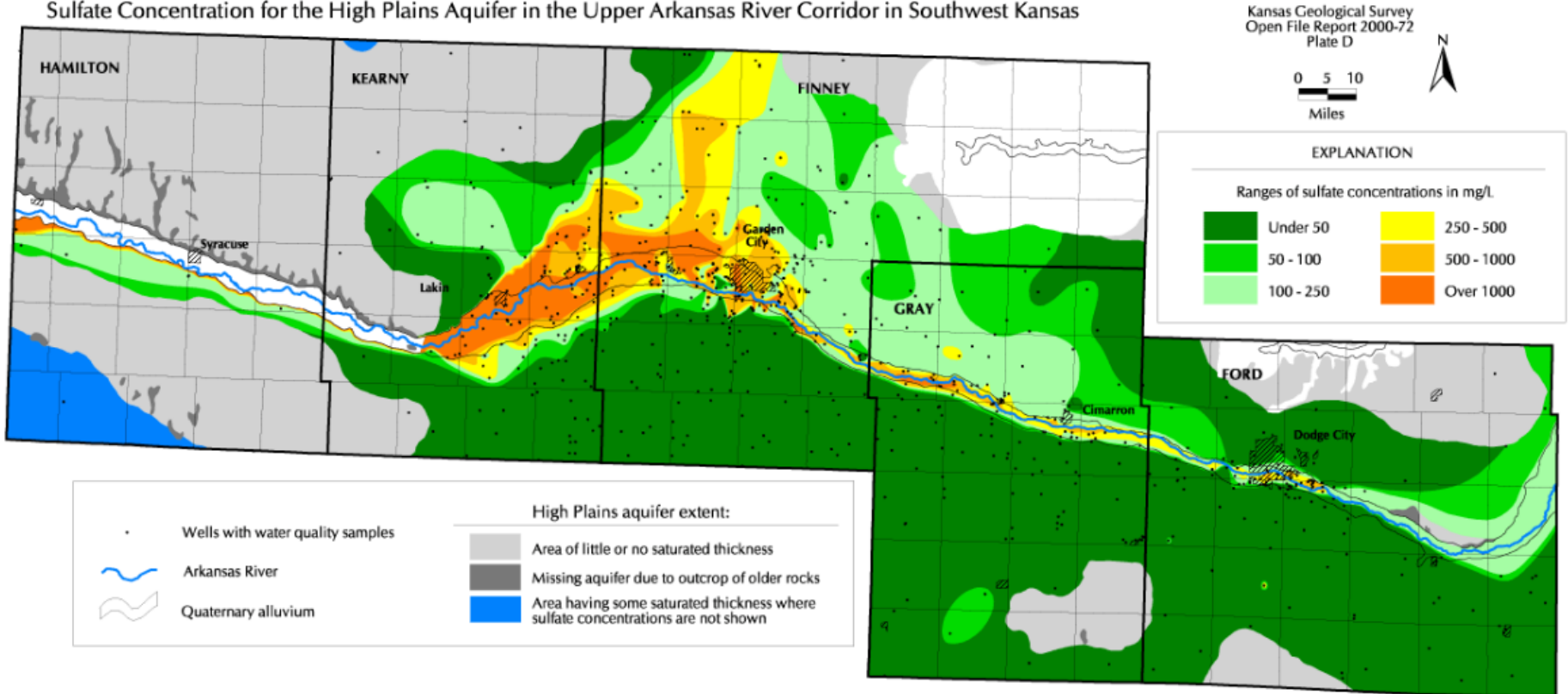
Kansas Geological Survey
Open File Report 2000-72
Plate C

0 5 10 Miles



Recharge to the Ditch Service Area

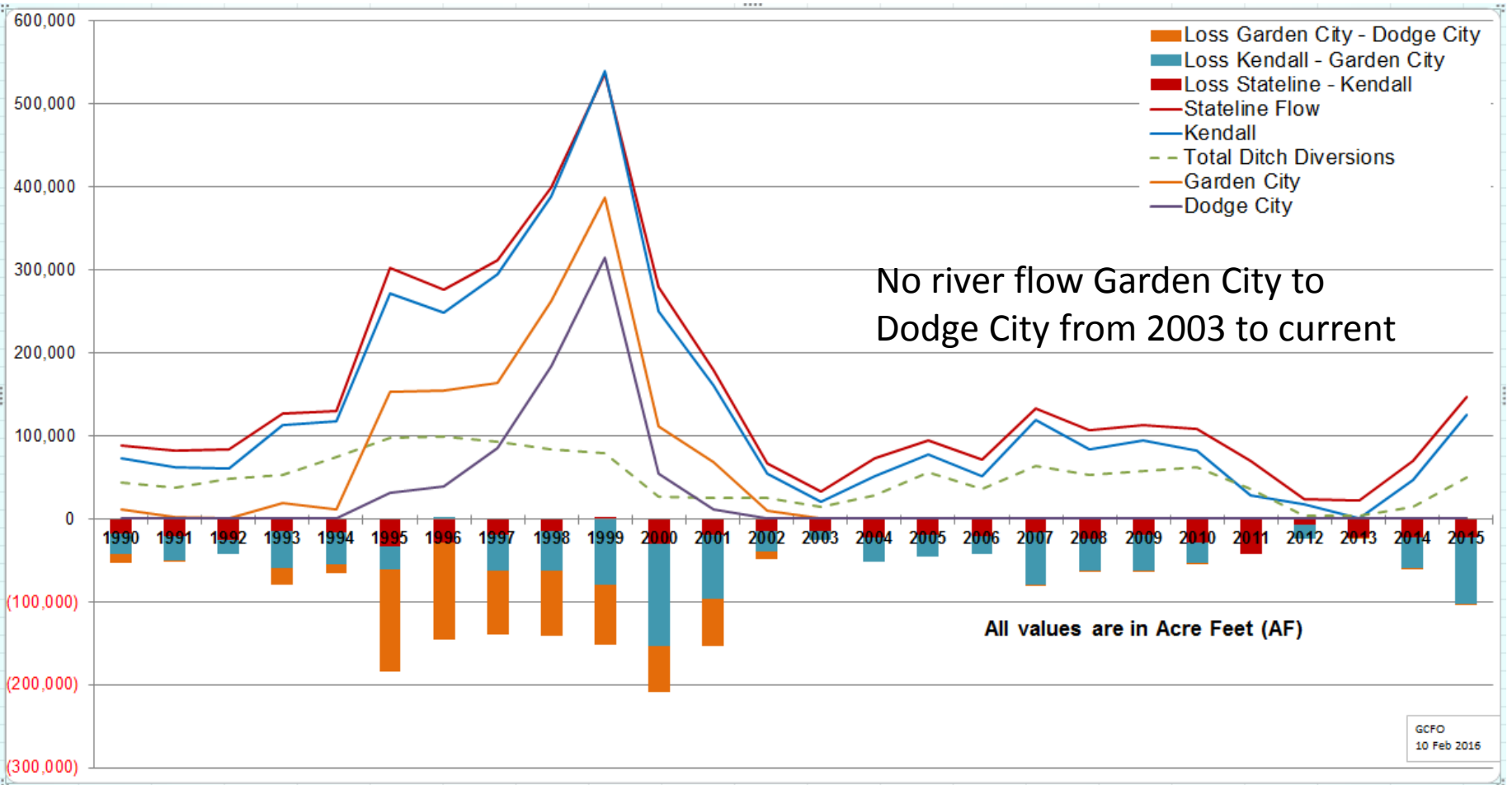
Sulfate Concentration for the High Plains Aquifer in the Upper Arkansas River Corridor in Southwest Kansas



What about high flows?

- Almost all of the water received at Garden City and below are from John Martin spill events

Arkansas River Flows and Losses



The period of 1993-1999 was a relatively wet period.

The period of 1999-2015 was a relatively dry period.

High flows (continued)

- The compact is relatively silent on flood flows (its focus is requiring Colorado to not further depleting flows and on dividing the benefits of **storage** in John Martin
- Kansas has objected to several of Colorado's accounting practices during spill events.
- More discussion is needed with Colorado on high flows.