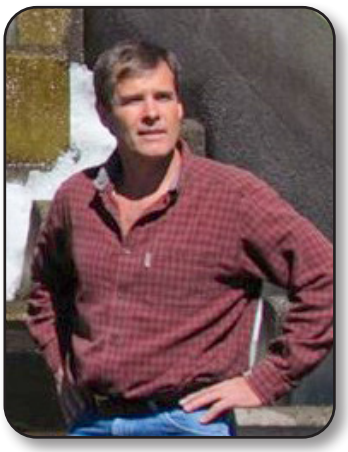
Balancing Agricultural Use of Surface and Groundwater Along the Rio Grande

Middle Rio Grande

David Gensler, Middle Rio Grande Conservancy District



David Gensler, Hydrologist and Water Operations Manager for the MRGCD. Just wrapping up my 20th season with the District. Trying to figure out where all the water comes form, and where it all goes (the answers might surprise some of you). Of course I primarily work with surface water in our canals, but before coming to the District I worked six years with a small groundwater engineering firm in Texas. I've presided over the last two decades of change at the District, as we moved from 19th century water delivery practices, to the 21st century, pretty much skipping right over the 20th! During that time District diversions have been nearly cut in half, equivalent to doubling our delivery efficiency. All part of learning to adapt to drought, endangered species, and increased competition for the Southwest most precious natural resource.

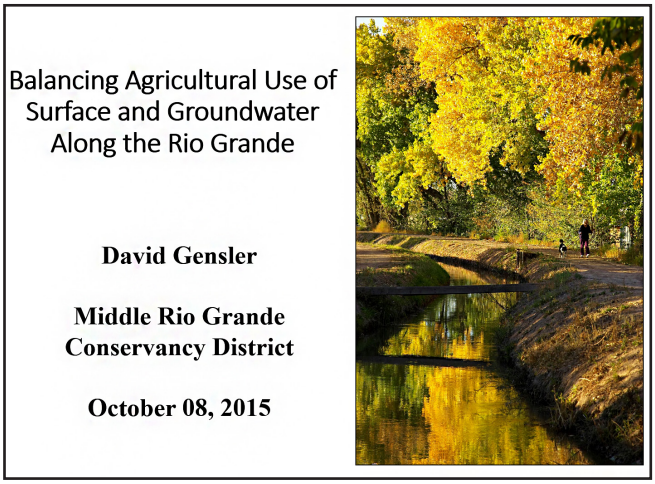


Figure 1. Introduction.

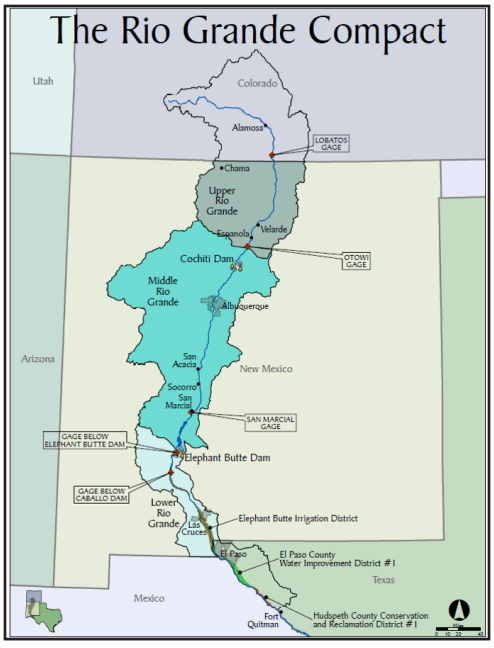


Figure 2. The Rio Grande Compact. The "Middle Rio Grande" (MRG) can be defined as a geographic area, and as a hydrologic unit with inflow, outflow, and uses. The Rio Grande Compact defines the MRG legally and lays out the rules for water depletions in the basin.

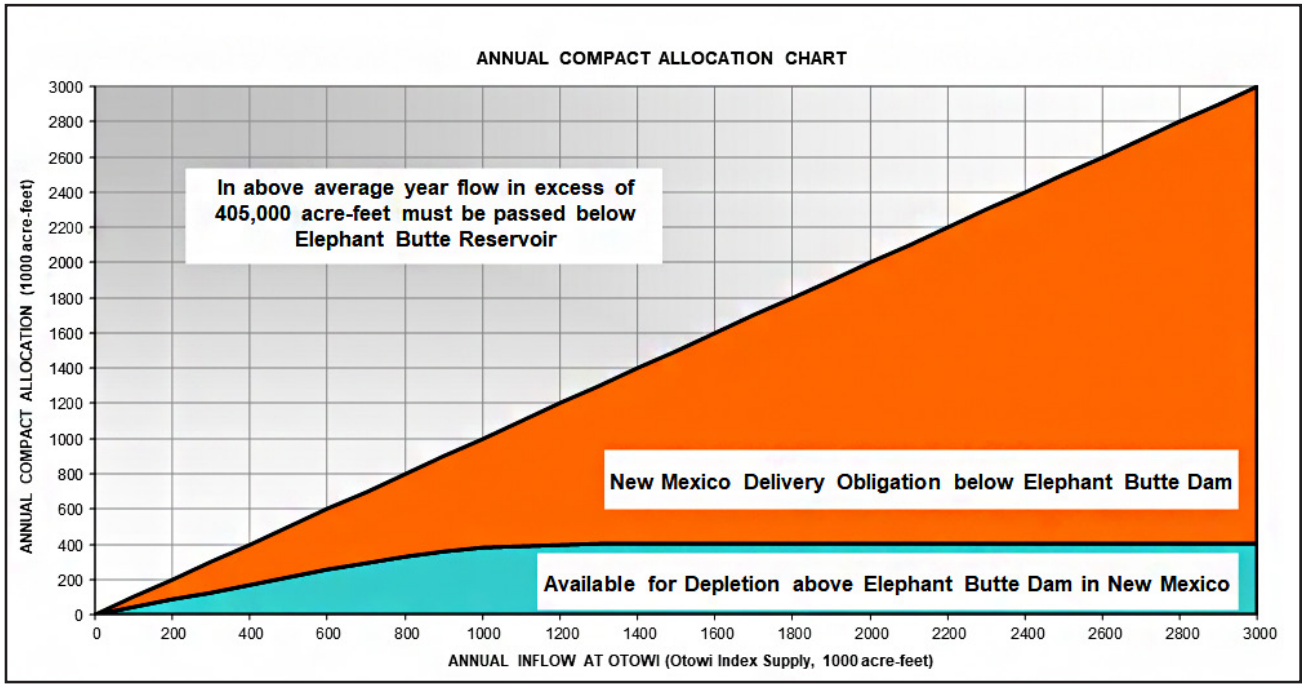


Figure 3. Rio Grande Compact allocation chart. MRG water consumption is effectively capped. If one use requires more water, it must come through reduction in some other use. The MRG has to live within its means, and doing so means doing more with less.

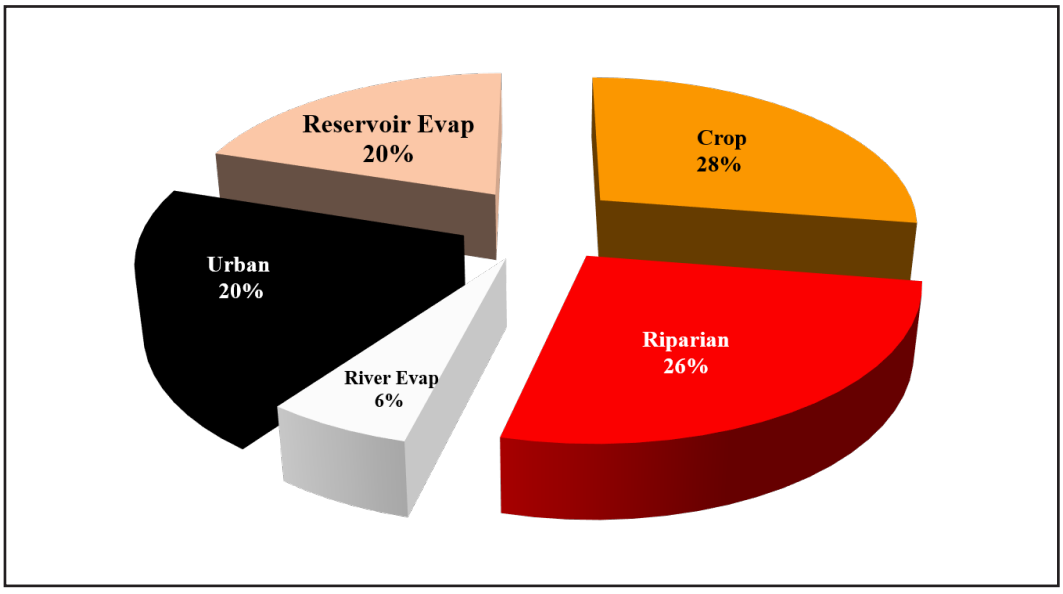


Figure 4. Estimated Middle Rio Grande water depletion (Cochiti to Elephant Butte Reservoir). Total estimated depletion of 500,000 acre-feet.

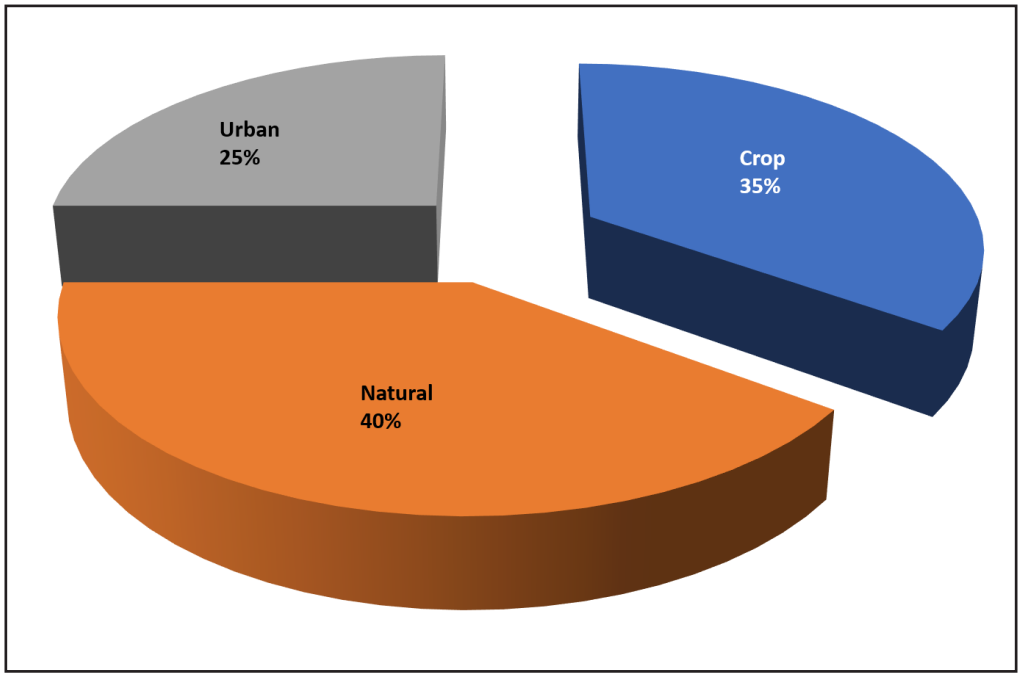


Figure 5. Estimated Middle Rio Grande water depletion (Cochiti to Elephant Butte Reservoir). Total estimated depletion of 400,000 acre-feet.

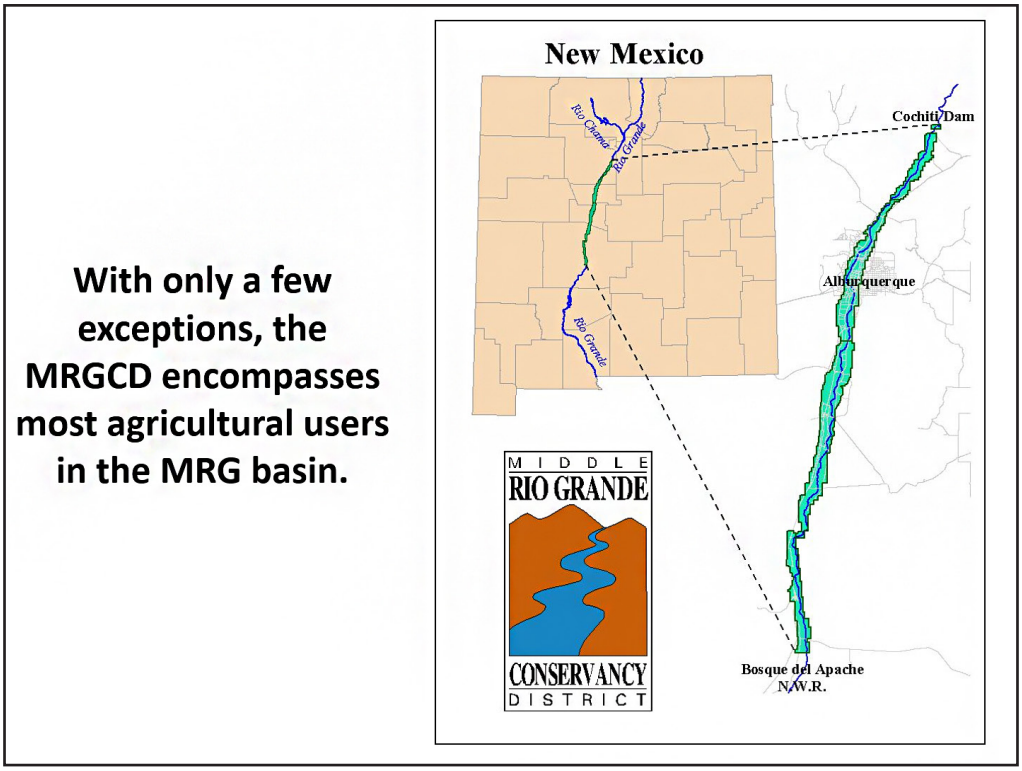


Figure 6. Middle Rio Grande Conservation District.

So, responding to change requires a different approach than areas supplied directly from reservoirs, precisely regulated, from which annual allocations are made. MRGCD must balance our uses with others.

New challenges (last 2 decades)

- Drought- Beginning in 1996, after decades of relative plenty
- And increased competition from urban users – new Albuquerque/Santa Fe surface water diversions, increased municipal groundwater pumping in suburbs
- And……..who knows how many private wells, every one of which takes a tiny cut from the agricultural water supply
- And……..the ICING ON THE CAKE

Figure 7. Balancing uses must consider basic nature of the system: run-of-the river - supplemental storage.

MRGCD currently a partner in an ongoing ESA consultation with USFWS. This started back in 1996, originally only with the Rio Grande Silvery Minnow

Figure 8. Rio Grande Silvery Minnow.

But now we also have to consider these:

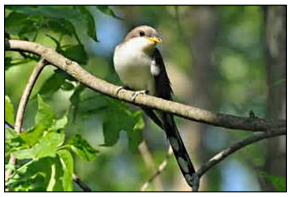



Figure 9. Rio Grande species.

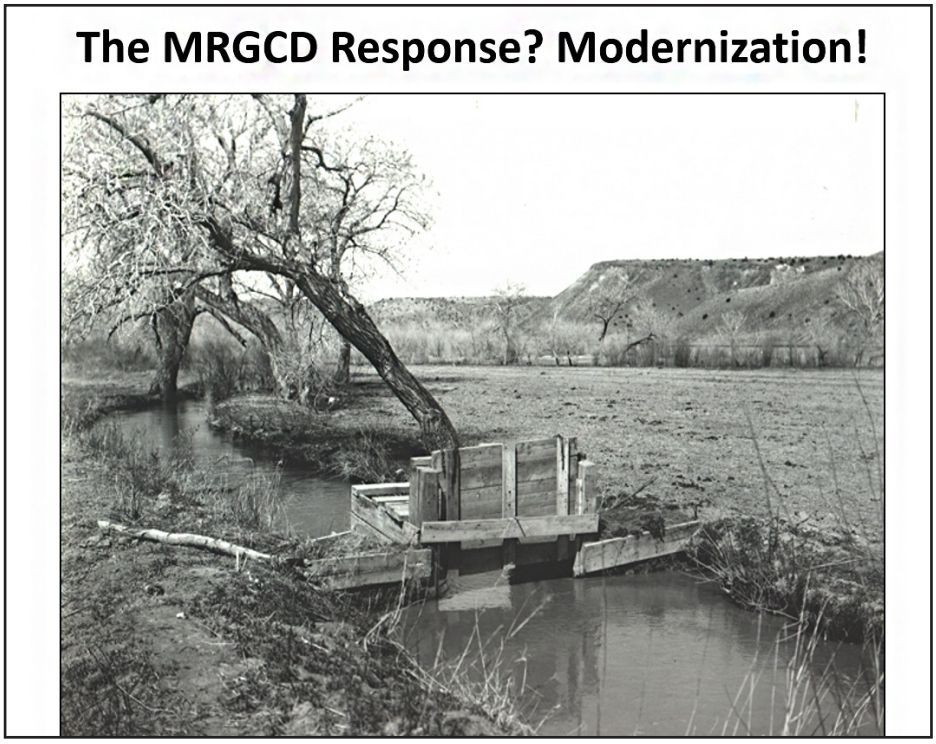


Figure 10. Middle Rio Grande Conservation District check structure at Algodones.

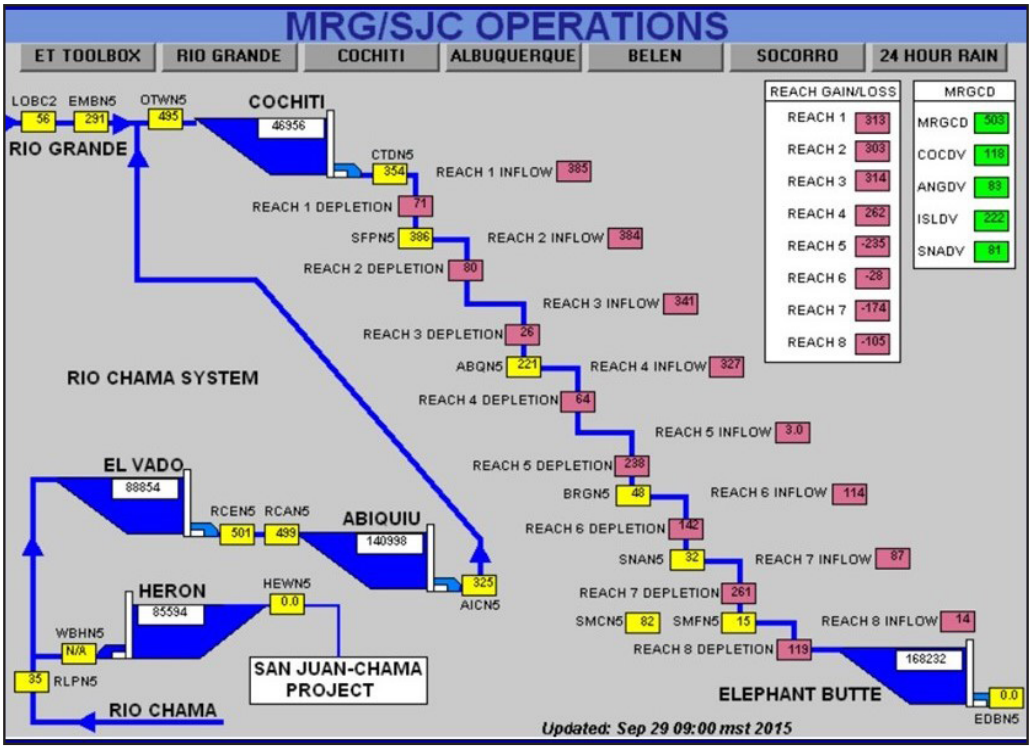


Figure 11. Daily water operations/managment/coordination.

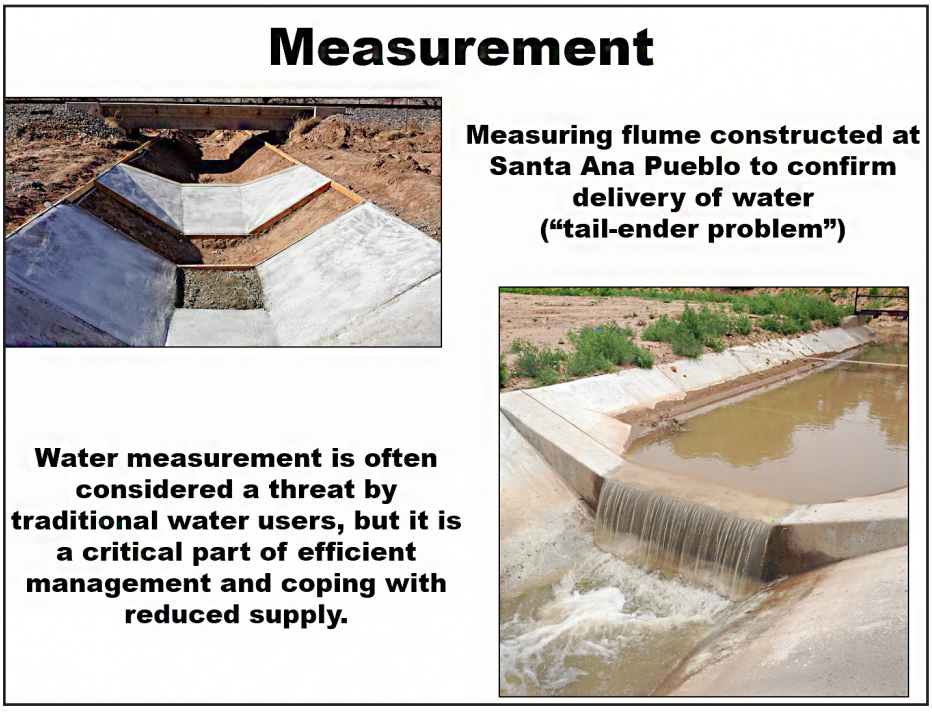


Figure 12. Santa Ana Pueblo flume measurement.

Figure 13. Santo Domingo flume measurement.

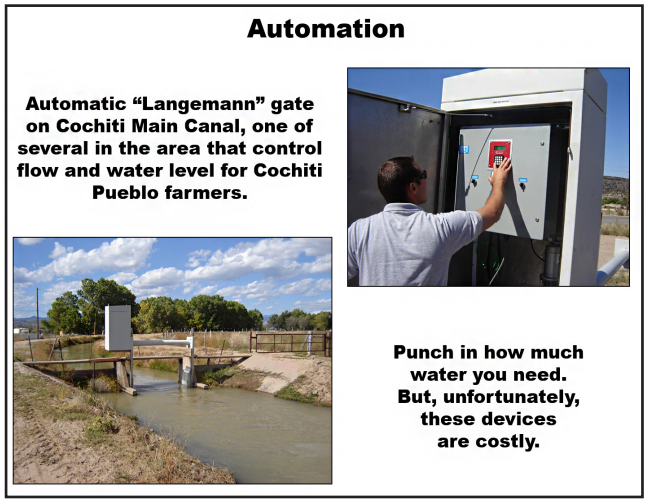


Figure 14. Automatic "Langemann" gate on Cochiti Main Canal.

Figure 15. Benefits of flume measurement.

Figure 16. The long-crested weir at Santa Ana Pueblo.

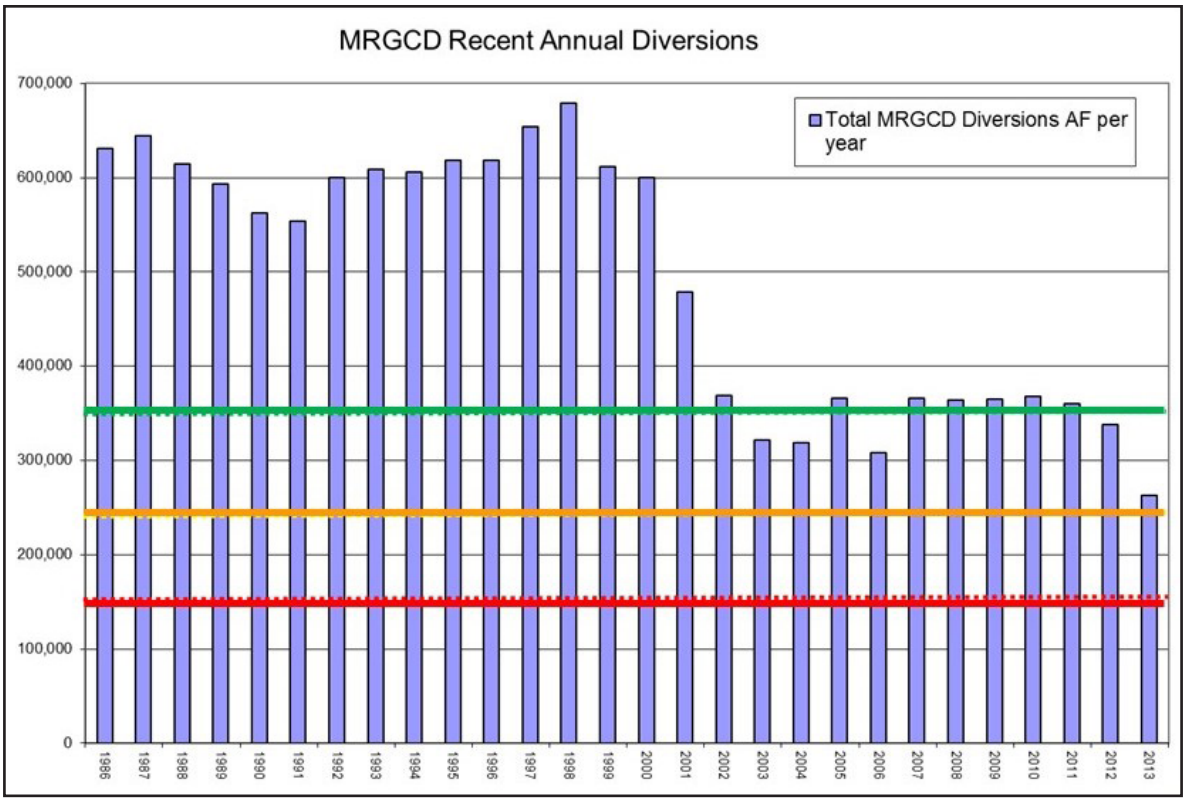


Figure 17. Middle Rio Grande Conservation District's recent annual diversions. The results: efficiency improvements have given us the capability to do more with less, but there are limits.

MRGCD Priorities

- **Meet irrigation demands while improving service and increasing system efficiencies**
- **Develop five to ten-year capital improvement plan, review and update policies and procedures, ongoing modernization**
- **Support and encourage on-farm agricultural efficiency, along with expanded agricultural production, profitability, regional food security.**
- **Active coordination of water operations with NMOSE/ISC to maintain positive Rio Grande Compact delivery status.**
- **ESA compliance through BO (2016), commitments of offsetting and conservation measures, cooperation with other Fed/Non-Fed efforts to move toward species recovery through adaptive management processes.**
- **MRGCD commitments include river flow management to assist with spawn and recruitment flows while minimizing river drying later in irrigation season.**
- **Improved intergovernmental relationships (Fed/NonFed/Tribal)**

Figure 18. Middle Rio Grande Conservation District's priorities.

Lower Rio Grande

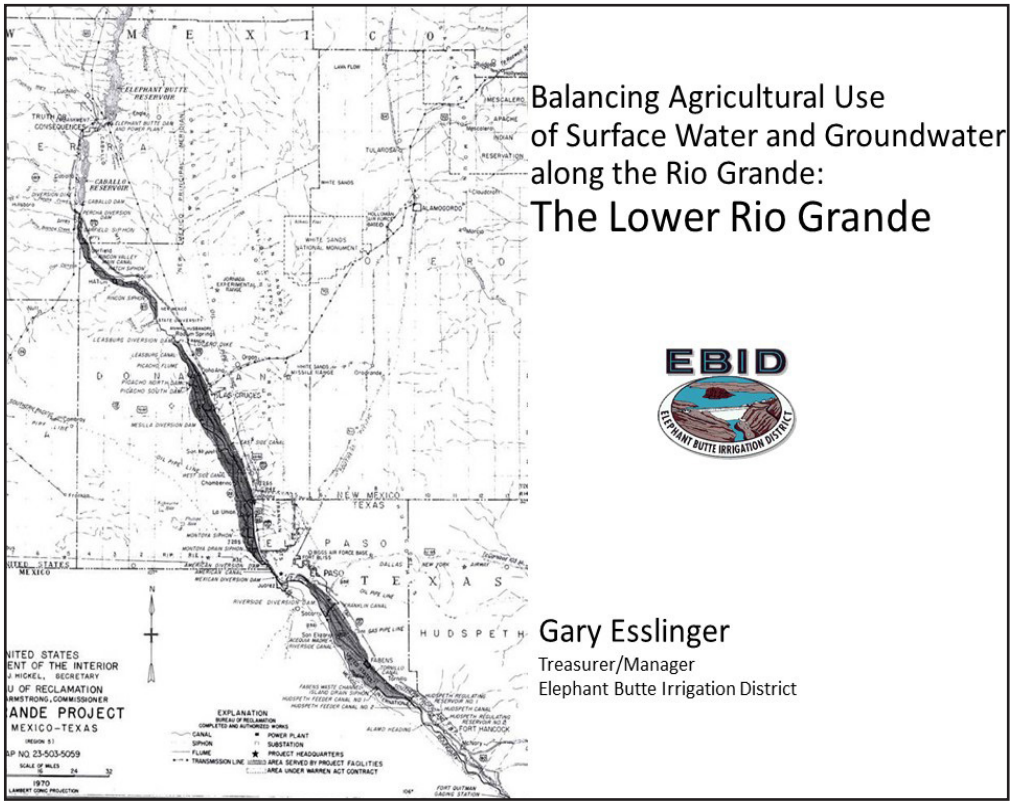
Gary Esslinger, Elephant Butte Irrigation District Treasurer/Manager

Gary L. Esslinger is the Treasurer-Manager of the Elephant Butte Irrigation District. Gary is a third generation member of a pioneer farming family living in the Mesilla Valley. He has kept his roots in farming as well as other agricultural based industry. After receiving a bachelor's degree in business administration from Northern Arizona University in 1973, he worked six years in Los Angeles for a large west coast flour milling corporation as office manager. After becoming tired of the city life, Gary returned to the Mesilla Valley and began working for EBID in 1978 where he has been for the past 24 years. Gary began his District career as Purchasing Agent and has held other organizational positions such as Maintenance Chief and Assistant Manager. Gary is, and has been for the past 15 years, the District's Manager and has been the District's Records Manager for the past 2 years. Gary lives in La Mesa on the family farm with his wife, Tina, and three daughters.

J. Phillip King, Elephant Butte Irrigation District

J. Phillip King is the John Clark Distinguished Professor and Associate Department Head in the Civil Engineering Department at New Mexico State University. His research includes river and groundwater system modeling and management, optimization and decision theory, basin-scale management and policy, and hydrologic forecasting. His activities also include projects to enhance the diversity of the country's STEM workforce. Phil is also Principal Engineer for King Engineering & Associates, a small New Mexico-based consulting firm. Phil has worked with government agencies, irrigators, municipalities, Native American tribes, and environmental groups to develop new and innovative approaches to water management and education. He served as a Peace Corps volunteer in Malawi, Africa, and as a Fellow of the American Association for the Advancement of Science at the National Science Foundation. Phil has a Ph.D. from Colorado State University, a B.S. from Berkeley, and an M.B.A. from NMSU. He is a registered Professional Engineer in New Mexico.

Editor's Note: The following presentation was prepared by Gary Esslinger, but due to last minute circumstances, Mr. Esslinger was unable to give the presentation, and J. Phillip King presented the talk on his behalf.



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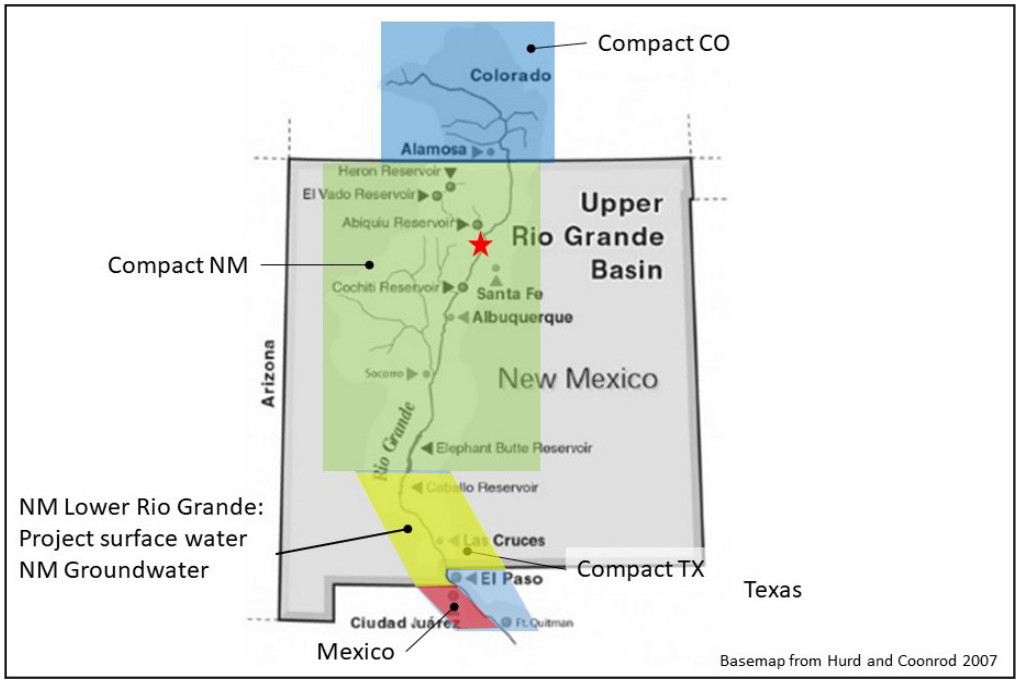

Figure 2. Compact states - three states, two countries, and Elephant Butte Irrigation District.

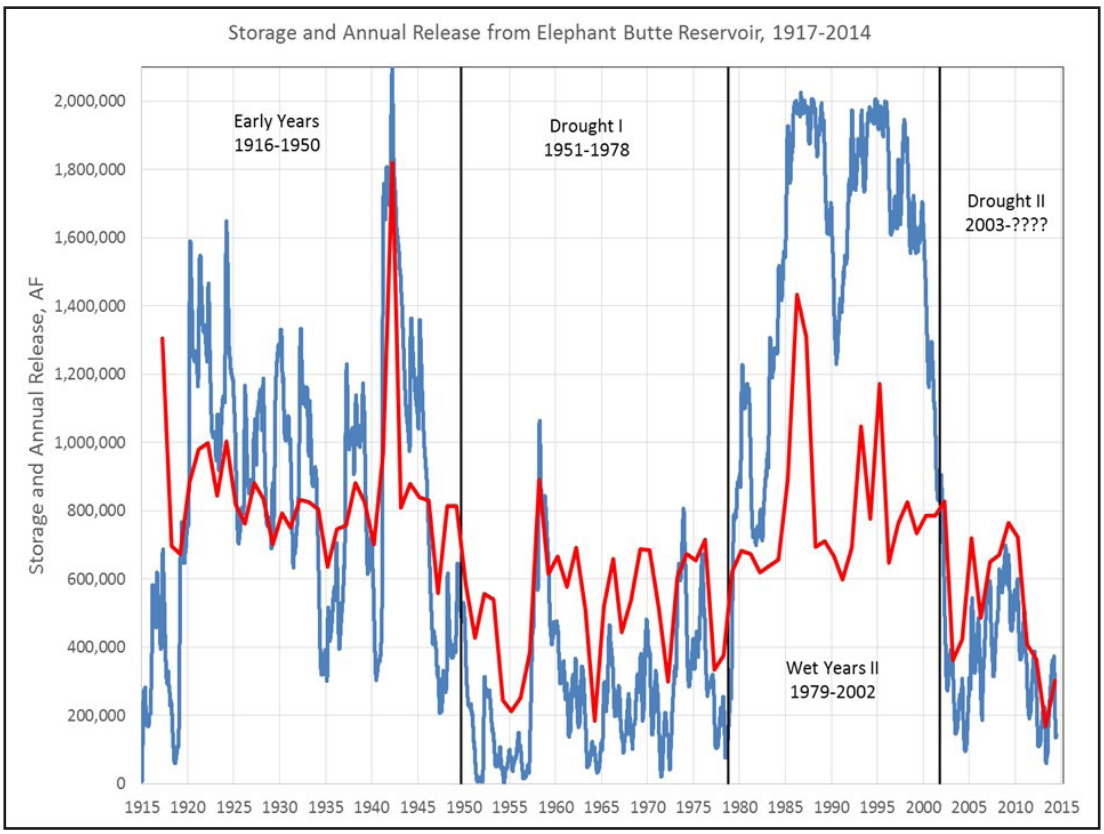

Figure 3. Storage and annual release from Elephant Butte Reservoir.

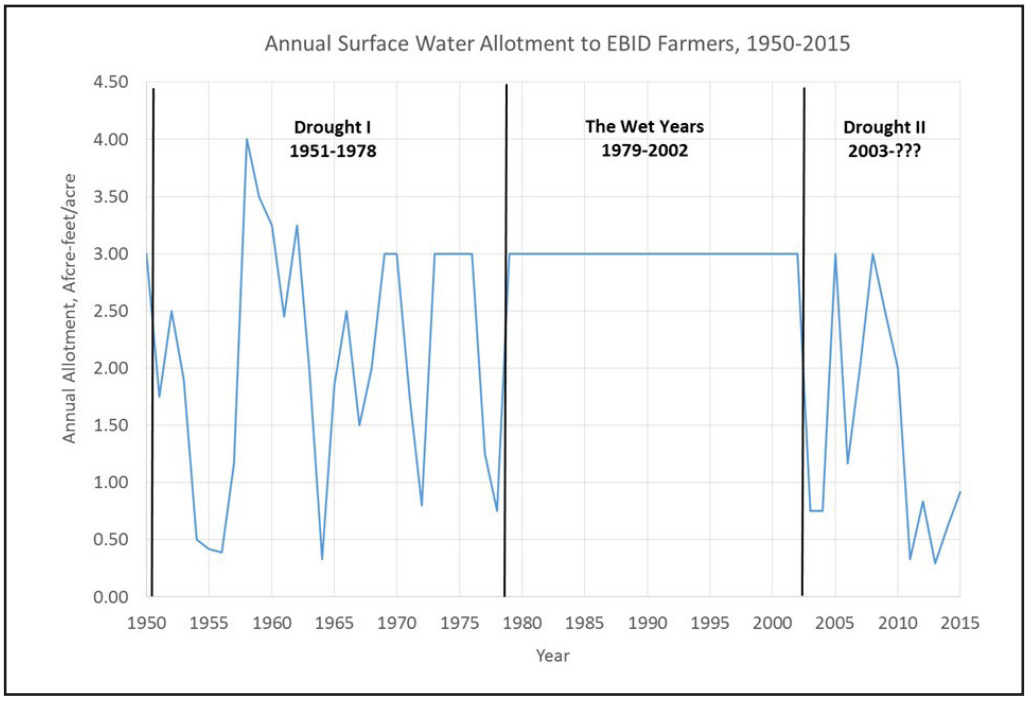

Figure 4. Annual surface water allotment to EBID farmers.

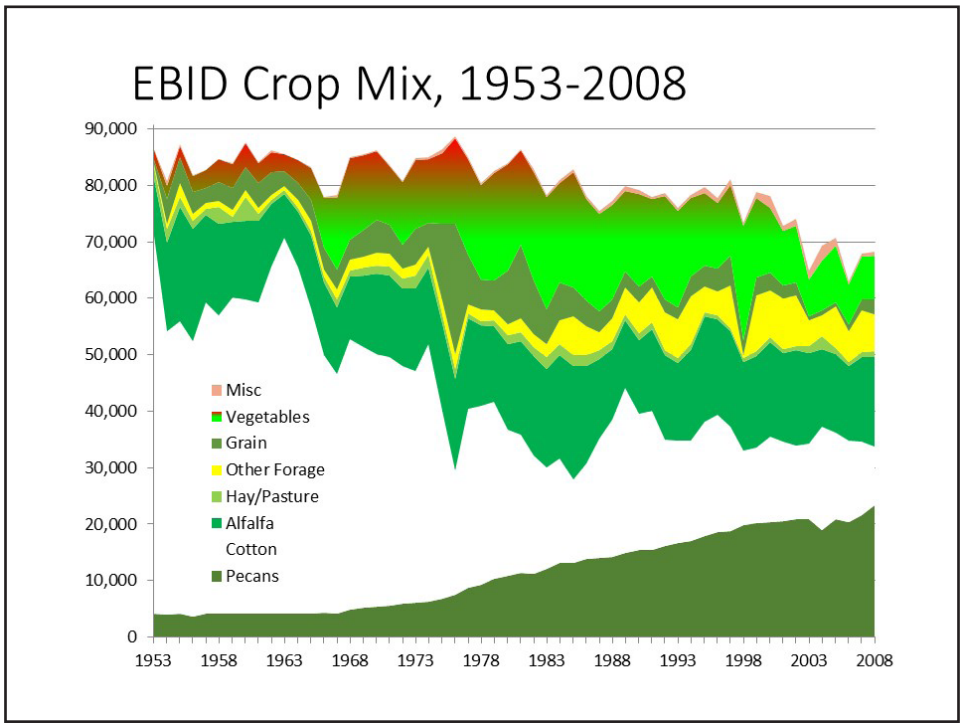

Figure 5. EBID crop mix composition from 1953-2008.

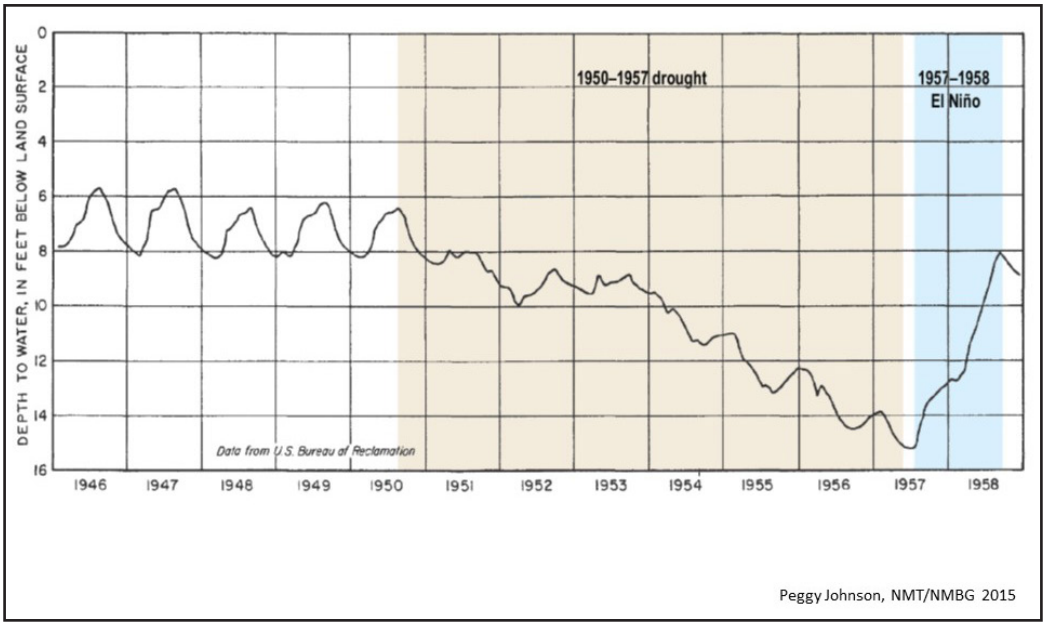

Figure 6. Average depth to groundwater in the Mesilla Valley from 1946 to 1958.

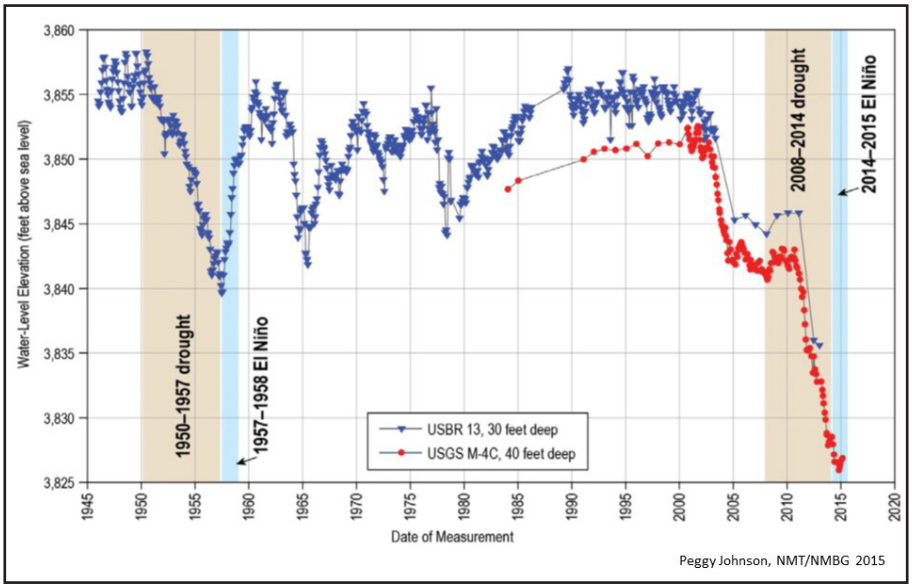

Figure 7. Groundwater elevation in the Mesilla Valley from 1946 to 2015.

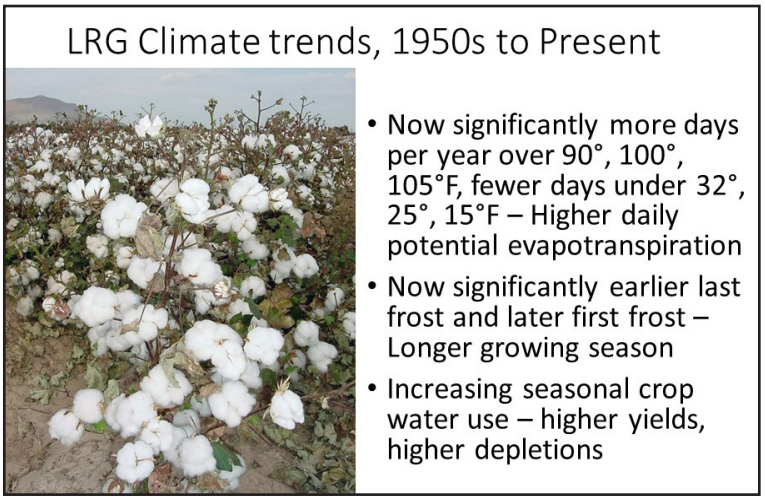

Figure 8. Lower Rio Grande climate trends from the 1950s to 2015.

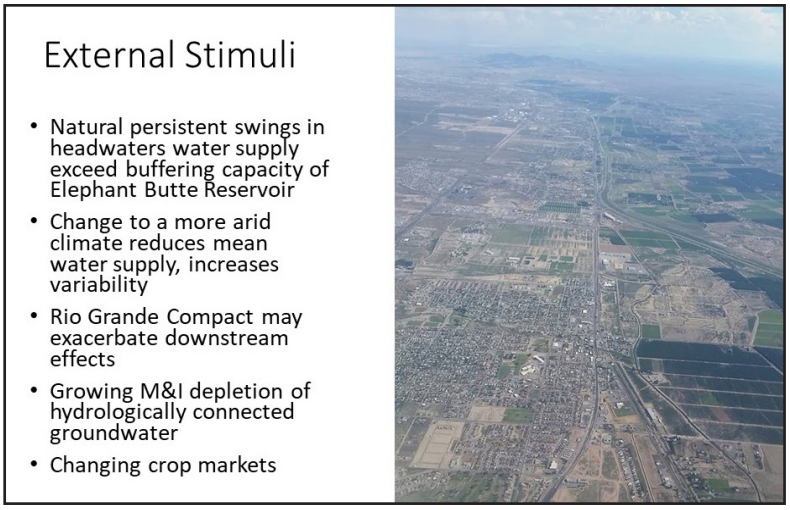

Figure 9. External stimuli.

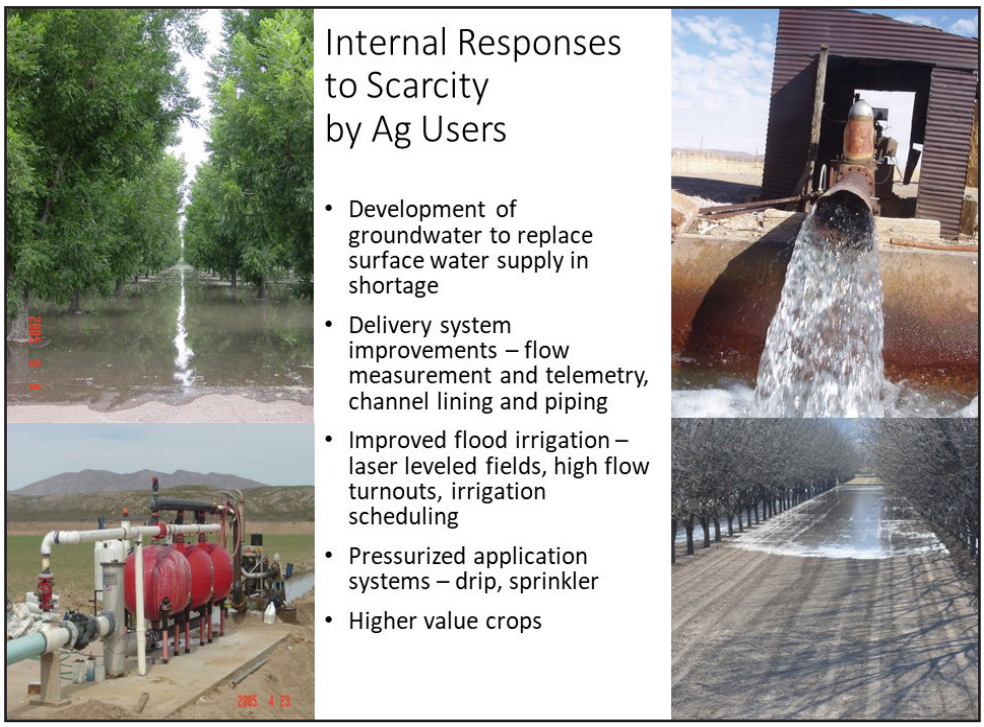

Figure 10. Internal responses to scarcity by agricultural users.

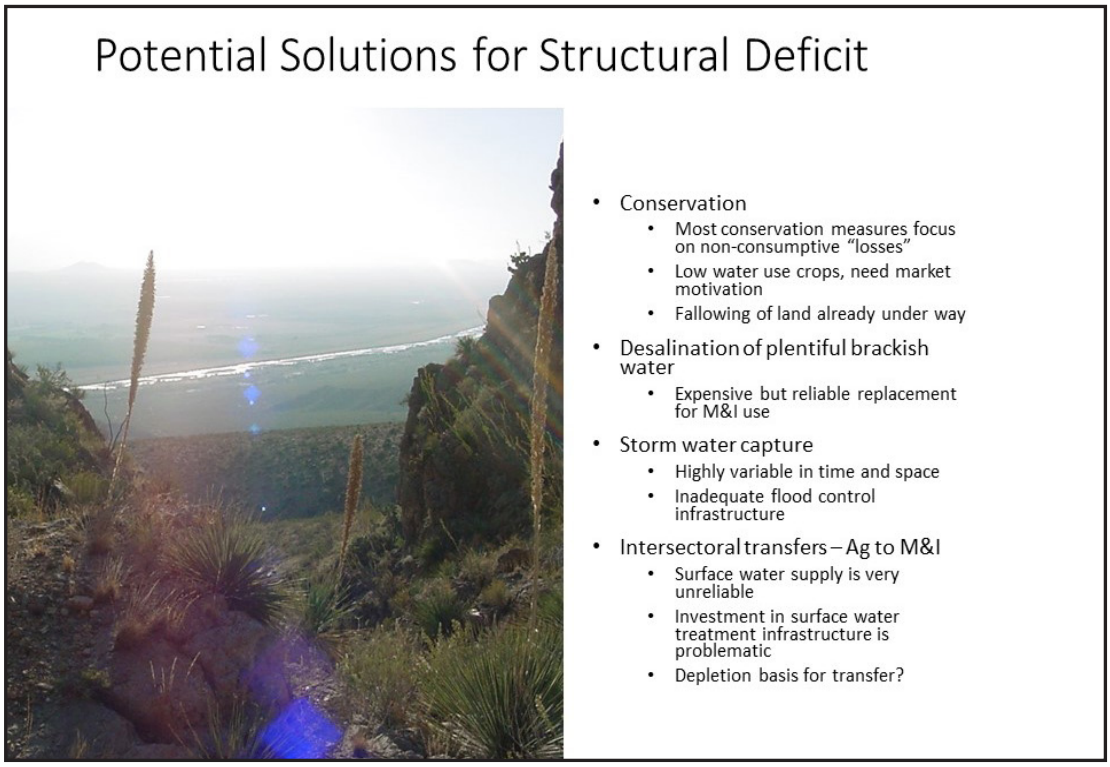

Figure 11. Potential solutions for structural deficit.