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.

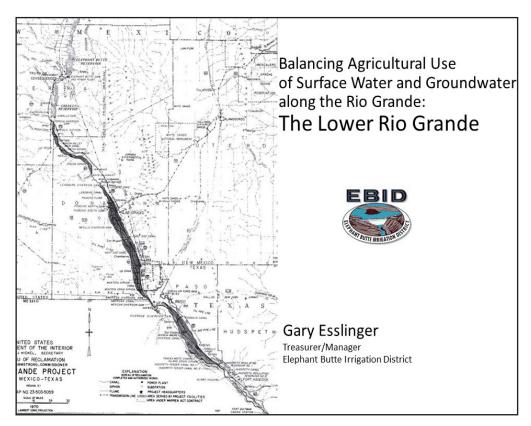


Figure 1. Introduction.

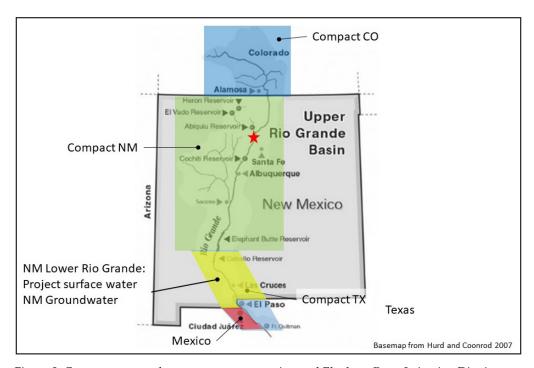


Figure 2. Compact states - three states, two countries, and Elephant Butte Irrigation District.

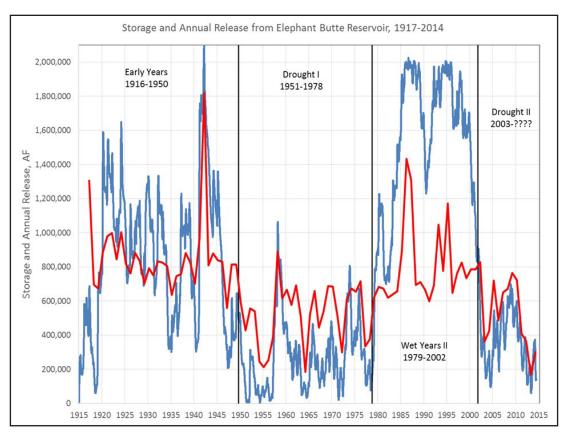


Figure 3. Storage and annual release from Elephant Butte Reservoir.

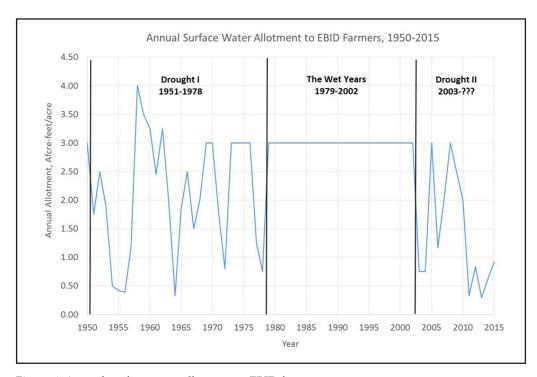


Figure 4. Annual surface water allotment to EBID farmers.

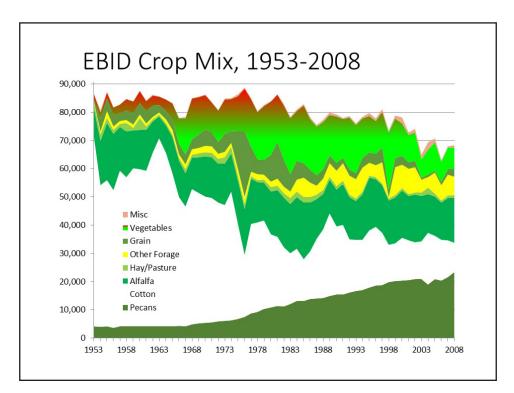


Figure 5. EBID crop mix composition from 1953-2008.

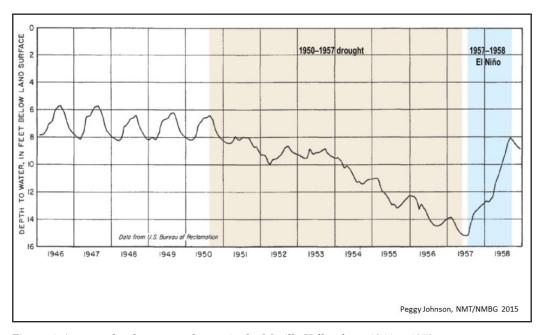


Figure 6. Average depth to groundwater in the Mesilla Valley from 1946 to 1958.

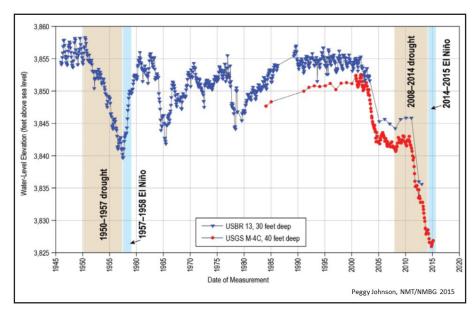


Figure 7. Groundwater elevation in the Mesilla Valley from 1946 to 2015.

LRG Climate trends, 1950s to Present



- Now significantly more days per year over 90°, 100°, 105°F, fewer days under 32°, 25°, 15°F – Higher daily potential evapotranspiration
- Now significantly earlier last frost and later first frost – Longer growing season
- Increasing seasonal crop water use – higher yields, higher depletions

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

External Stimuli

- Natural persistent swings in headwaters water supply exceed buffering capacity of Elephant Butte Reservoir
- Change to a more arid climate reduces mean water supply, increases variability
- Rio Grande Compact may exacerbate downstream effects
- Growing M&I depletion of hydrologically connected groundwater
- Changing crop markets



Figure 9. External stimuli.



Internal Responses to Scarcity by Ag Users

- Development of groundwater to replace surface water supply in shortage
- Delivery system improvements - flow measurement and telemetry, channel lining and piping
- Improved flood irrigation laser leveled fields, high flow turnouts, irrigation scheduling
- Pressurized application systems - drip, sprinkler
- Higher value crops



Figure 10. Internal responses to scarcity by agricultural users.

Potential Solutions for Structural Deficit

Conservation

- Most conservation measures focus on non-consumptive "losses"
- Low water use crops, need market motivation
- Fallowing of land already under way
- Desalination of plentiful brackish water
 - Expensive but reliable replacement for M&I use

Storm water capture

- · Highly variable in time and space
- Inadequate flood control infrastructure

Intersectoral transfers - Ag to M&I

- Surface water supply is very unreliable
- Investment in surface water treatment infrastructure is problematic
- Depletion basis for transfer?

Figure 11. Potential solutions for structural deficit.