NEW WATER FOR NEW MEXICO:

THE ECONOMIC, POLITICAL, AND SOCIAL CONNECTIONS

R. Keith Julian

Retired Earth and Environment Scientist

Member, NM Desalination Association Board of Directors

NEW MEXICO'S ECONOMIC BASELINE

- NM Gross Domestic Product (GDP) in 2024: $112.8 billion
- NM Annual GDP Growth Rate (2010-2020): 0.3%
- U.S. Annual GDP Growth Rate (2010-2020): 2.9%
- NM Annual Population Growth Rate (2010-2020): 0.2%
- U.S. Annual Population Growth Rate (2010-2020): 0.6%
- NM Median Family Income (2024): $44,858
- U.S. Median Family Income (2024): $71,280
- NM's Economic Ranking in US (2024 Median Family Income): 49th out of 50

CONTRIBUTION TO NM'S GDP BY ECONOMIC SECTOR

- Government services and enterprises: $22.2 billion (20 % of total GDP)
- Finance, insurance, real estate: $14.7 billion (14%)
- Professional and business services: $13.8 billion (13%)
- Mining, minerals, and oil/gas production: $12.9 billion (12%)
- Wholesale and retail sales/trade: $11.6 billion (10%)
- Manufacturing and industrial R&D: $6.2 billion (6%)
- Construction: $4.8 billion (4.4%)
- Transportation and warehousing: $3.6 billion (3.3%)
- Utilities/power generation and transmission: $3.2 billion (3.1%)
- Agriculture (irrigated crops, dairy, livestock)*: $1.5 billion (1.4%)

* sector with greatest demand for water

WHAT IS "CONVENTIONAL WATER" AND WHERE DOES IT COME FROM?

NEW MEXICO'S CONVENTIONAL WATER SUPPLY (ANNUAL AVERAGE, 2015-2020)

- **Surface Waters (rivers, streams, lakes/reservoirs)**
  1.7 million acre-feet, ~48% of total supply
- **Shallow Groundwater (<2500 ft below surface)**
  1.8 million acre-feet, ~51% of total supply
- **Total Conventional Water Supply: 3.50 million a-f/yr**

*** One acre-foot (a-f) equals ~326,000 gallons or enough water for 2-3 NM families/year**

2020 WATER DEMAND/USE BY ECONOMIC SECTOR
(ACRE-FEET/YEAR AND PERCENTAGE OF TOTAL DEMAND)

- Irrigated Agriculture and Croplands—3,000,000 (78%)
- Public Water/Municipal Supply Systems—300,000 (8%)
- Evaporation from Surface Water Supply—282,000 (7.5%)
- Electric Power Generation—65,400 (1.7%)
- Commercial and Transportation Activities—57,000 (1.5%)
- Mining and Oil/Gas Activities—56,800 (1.5%)
- Livestock and Dairy Operations—38,500 (1%)
- Private Domestic Water Supply—30,000 (<1%)
- Manufacturing and Industrial Activities—8,600 (<1%)
- **Average Annual Water Demand/Use (2015-2020): 3.85 million a-f**

LIKELY FUTURE DEMANDS ON NEW MEXICO'S EXISTING WATER SUPPLY

- Decreased Water Resources Resulting From Climate Change and Prolonged Drought
- Pueblo/Tribal Prior-rights Claims (US Supreme Court's 1907 Winters Decision)
- Additional Interstate/International Claims and Revision of Colorado River and Rio Grande River Compacts By U.S. Bureau of Reclamation and U.S. Supreme Court
- Potential San Juan-Chama Water Reductions Impact Rio Grande Corridor Users
- Greater Demographic Demand (population growth, increased per capita consumption, etc.)

- Total Potential Decrease of Future Water Supply: 1 to 10 million a-f per year (as result of non-economic demands/legal settlements/climate change)

SOME BAD NEWS AND SOME GOOD NEWS FOR NM'S WATER FUTURE

- The Bad News: Future demand for New Mexico's conventional water resources will far exceed existing supplies.

- The Good News: Unconventional water resources can be explored, developed, and used to support future economic expansion and population growth.

NM'S EXISTING WATER STATUS (SUPPLY VS. DEMAND)

- **Average Annual Conventional Water Supply (2015-2020): 3.50 million acre-feet**
- **Average Annual Conventional Water Demand (2015-2020): 3.85 million acre-feet**
- **Approximate Average Annual Water Deficit (2015-2020): 350,000 acre-feet (~10% of supply)**
- **Potential Additional Non-economic Demand: 1-10 million acre-feet (0.3-3.0 x existing supply)**
- **Significant Imbalance Between Economic Sector Water Demand and Contribution to NM's GDP**
  (e.g., irrigated ag/livestock produces <2% of GDP but uses 79% of water supply; mining/petroleum extraction uses 1.5% of water but produces 12% of GDP; manufacturing/industrial uses 0.25% of water but produces 5% of GDP)
- **Existing Water Rights Value in New Mexico: ~$1000 to $45,000 per acre-foot and rising**

WHAT IS "UNCONVENTIONAL WATER" AND WHY DOES NEW MEXICO HAVE SO MUCH?

- **Brackish Groundwater (water with 1000-10,000 ppm TDS; found in groundwater aquifers throughout New Mexico)**

- **Produced Water (water naturally extracted from oil and gas formations as part of petroleum production activities)**

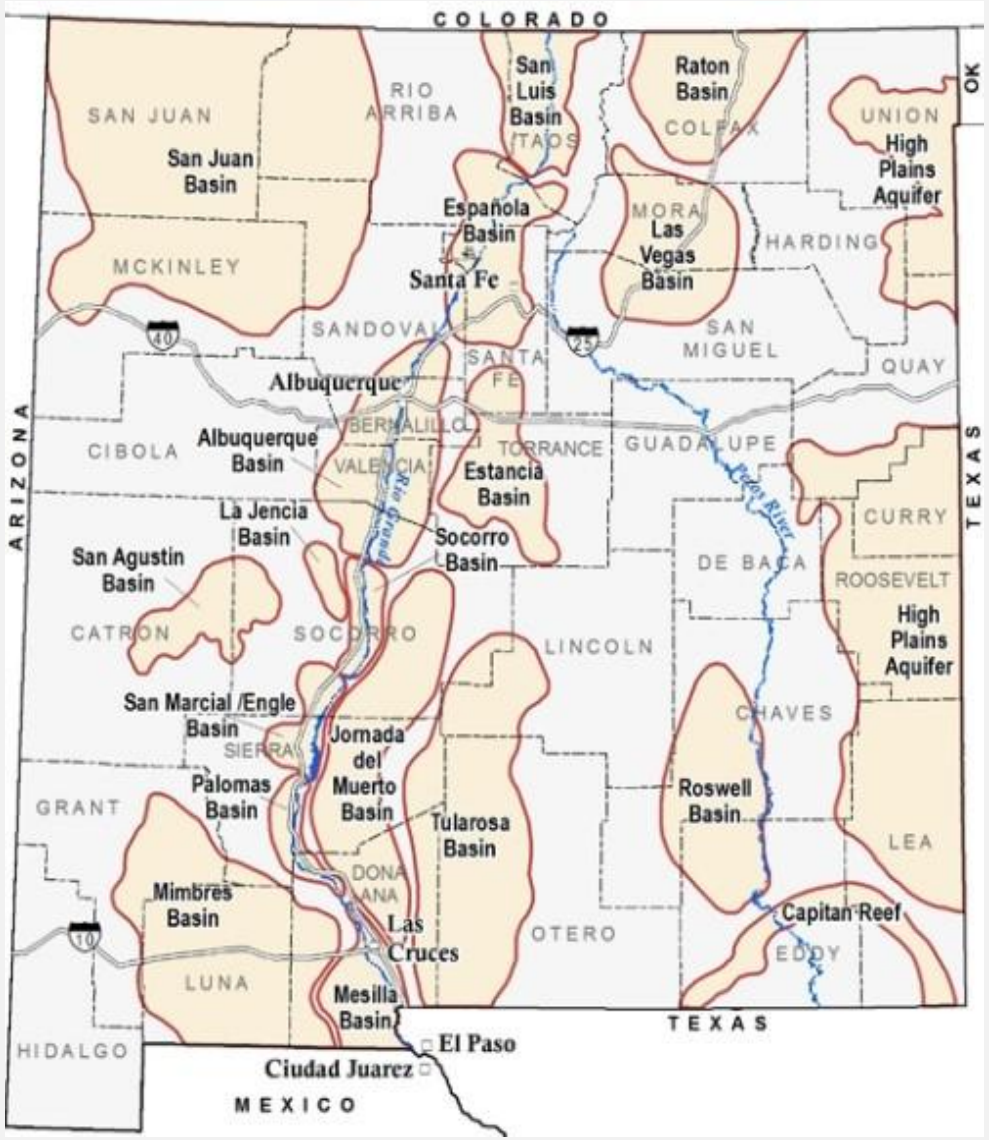
- **Reclaimed Water (municipal and industrial wastewater treated and recycled for domestic and irrigation uses)**

POTENTIAL SOURCES OF UNCONVENTIONAL "NEW" WATER FOR NEW MEXICO

(ADDITIONAL A-F OF UNTREATED WATER AVAILABLE PER YEAR)

- Extraction of Brackish Groundwater: >2,000,000 a-f
- Produced Water from Oil/Gas Extraction: ~300,000 a-f
- Reduce Surface Water Evaporation Via Groundwater Storage: ~200,000 a-f
- Reclamation/Reuse 0f Municipal and Industrial Water : ~100,000 a-f
- More Efficient Agricultural Application and Runoff Reuse: ~100,000 a-f
- Fallowing of Irrigated Cropland: ~100,000-500,000 a-f
- Increased Conservation of Existing Municipal/Industrial Uses: ~50,000 a-f
- **Total Unconventional/"New" Water Available: >3.0 million acre-feet/year**

WHY DOES BRACKISH GROUNDWATER(BGW) PROVIDE A POTENTIALLY MONUMENTAL RESOURCE?



- BGW is the "lowest-hanging fruit" and largest potential unconventional water resource to develop now
- U.S. Geological Survey estimated 2-10 billion acre-feet of brackish groundwater within New Mexico's basins
- Extracting only 3.85 billion acre-feet of GBW would provide 1000+ years of NM's annual water need/demand (at current levels)
- Statewide location of > 20 basins which contain BGW resources
- Most brackish groundwater basins located within Rio Grande Corridor population demand-centers for new water
- Brackish groundwater desalination requires much less energy (<10% on average) than needed for ocean desalination
- No new water-rights claims/determinations are needed to develop deep BGW (so long as it doesn't impact existing rights)
- Brackish groundwater and desalination facilities can be co-located near demand centers (ergo, minimal pipeline and power transmission lines needed to service demand centers)
- Even small-scale BGW desalination facilities (1-2 MGD) would offer low-risk, high-value benefits to local communities

WATER-DEPENDENT FIT-FOR-USE ECONOMIC DEVELOPMENT OPPORTUNITIES

- Export-base sale of "surplus water" produced from brackish groundwater to other states
- Support of Energy Production and Uses—data centers/AI processing; creation of "hydrogen hubs"; pumped-storage hydroelectric power generation/storage; carbon-sequestration
- Agriculture—increased production of high value crops (e.g., fruits/vegetables, cannabis), reduced use for water-intensive crops (e.g., hay/alfalfa), use of range-grazed livestock
- Mining and Extraction—in-situ critical mineral extraction (e.g., lithium, uranium, and rare earth production) from brine concentrate; use of produced and industrial wastewater
- Industrial/Manufacturing—fertilizer, cement, renewable energy components, next-generation micro-chips, metal and plastic recycling, chemicals, batteries
- Expanded Tourism Opportunities by Preserving Existing Surface Water Resources—for outdoor recreation, boating, water-camping, fishing, snow-making, river-rafting, etc.

NEW WATER: WHAT DETERMINES WHICH, WHERE, AND HOW MUCH?

- Supply and Demand Forces (the “free market” solution)
- Adjudication By Existing/Revised Water Law (the legal solution)
- Federal or State Legislative Actions (the political solution)
- New Technologies and Resource Economics (the technical solution)
- Most likely a combination of “all the above”

Or, if no action is taken:

- Ongoing climate change and “status quo” non-solutions will result in future economic decline and population loss for NM

WHAT NEEDS TO BE DONE NOW (AND IN THE VERY NEAR FUTURE)?

- Technical Investigations, Field Studies, Aquifer Characterization, and Sustainability Verification of Multiple Unconventional Water Sources--underway by NMBGeology
- Public Policy Support for Unconventional Water Development/Use—SWS Expansion
- Legislative Creation of “Unconventional Water Permanent Fund”
- Private-sector and Venture-capital Investment In “New Water” Sources
- Feasibility Demonstrations of Various Fit-for-use Desalination Technologies (BGNDRF)
- Full-scale Implementation of Projects on State-wide Basis
- Who Will Lead the Way and When?

EL AGUA ES VIDA—WATER IS LIFE!

QUESTIONS AND/OR COMMENTS

SOURCES USED FOR NEW MEXICO BASELINE AND PROJECTED "NEW WATER" DATA

- Bureau of Economic Analysis (BEA), U.S. Department of Commerce
- New Mexico Economic Development Department (NMEDD)
- New Mexico Environment Department (NMED)
- New Mexico Office of the State Engineer (NMOSE)
- New Mexico Water Resources Research Institute (NMWRRI)
- "NM Water Basics," Business Water Task Force
- "NM Water Use By Category, 2020" NMOSE Technical Report 56 (2024)
- "NM's Strategic Economic Plan–Empower and Collaborate" (2021)
- "NM 50-year Water Plan" (2024)
- "NM 360 Groundwater Report" (2025)