John M. Stomp III is a registered professional engineer in New Mexico and has been the Water Resources Manager for the City and now the Albuquerque Bernalillo County Water Utility Authority for more than eleven years. John was born and raised in New Mexico and has bachelor's and master's degrees in civil engineering from UNM. As the Water Resources Manager, he is responsible for water conservation, water reuse and reclamation, and implementation of the Drinking Water Project. He is also responsible for compliance issues related to the new drinking water standard for arsenic including the construction of a new arsenic treatment facility on Albuquerque's westside. John has more than 20 years of experience dealing with water and wastewater issues in New Mexico and throughout the southwestern U.S.

Overview of Albuquerque's Vision and Projects

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Thank you for having me here today, and it's a pleasure to be in Albuquerque. We started these talks about 10 years ago, not really knowing where we were headed or where our water resources management strategy would take us. We started with five paragraphs back in 1997, when the city council adopted about a 220-word statement that instructed us to start projects like the diversion of San Juan-Chama water.

It's been 10 years since that time and we've been blessed with people like Karl Wood and Bobby Creel from the Water Resources Research Institute. Yesterday people attended the conference tour, and it was a lot of fun to show what we have been doing in the last four or five years during project construction. Today I'm going to talk about our next step as we bring the Drinking Water Project online.

The impetus for this project was a 1993 report that redefined our understanding of water resources in the Middle Rio Grande, but it actually started many years before that. I'd like to remind you of Kelly Summers, a groundwater hydrologist who worked for the City of Albuquerque in 1987. Kelly looked at wells and when wells were turned off in winter, he measured drawdown and compared the results to the Office of the State Engineer's (OSE) predictive models. He found that we had significantly more drawdown than expected. He continued his research and was subsequently fired for bringing his findings to the attention of the City's administration because his findings contradicted what they wanted to hear. Administration did not want to face up to the reality of the water situation in the Rio Grande. Luckily, we have been blessed with an administration, such as Mayor Chavez, that has not been afraid to step out in front of people and not only admit to the problem but also has vowed to find a solution. So in honor of Kelly Summers, we named the road after him that leads out to the water pump station down by the river. We will dedicate the station in the next few months and we will honor the man who stood up to city government at a time when it was not popular to do that, and he got fired for that stand.

Figure 1 shows the cone of depression that has resulted primarily from our own heavy pumping. In the late 1990s, we would have shown this figure and you would not have seen the cone of depression on the west side nor the impact from Rio Rancho. Now we have a cone of depression from Rio Rancho, one on the west side near the Taylor Ranch Community Center, and the largest on the east side centered around Los Altos Golf Course. The goal of our Water Resources Management Strategy is to stop sole reliance on the aquifer and transition to renewable water resources, namely our San Juan-Chama water.

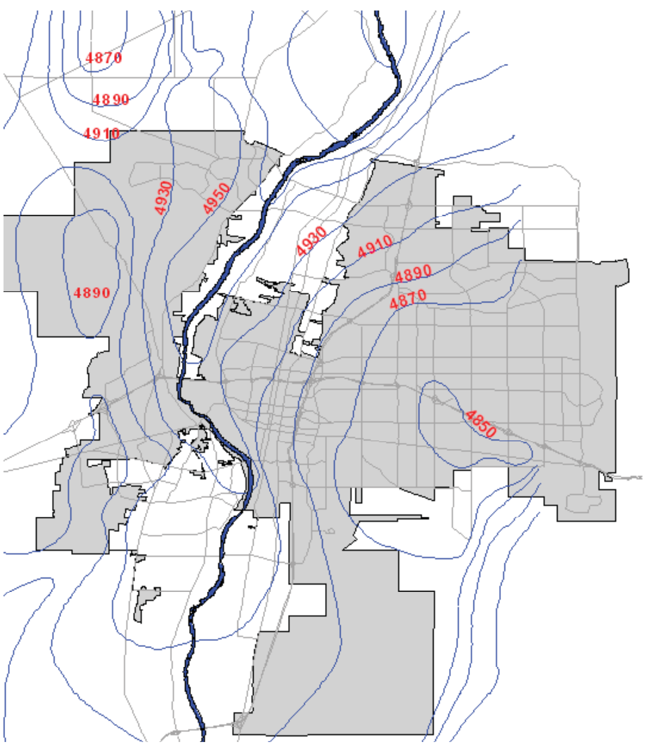

Figure 1. Albuquerque Groundwater Levels Show Huge Declines. Pumping Cone of Depression in 2002.

We have been working with the USGS for more than 10 years and have spent several million dollars studying the water resources of Middle Rio Grande. One of these studies was to determine the extent at which ground water pumping would cause land surface subsidence. We also looked at the difference in land surface comparing both winter and summer months and to see if there is a difference. The color change on the map in Figure 2 shows the changes: the land shifts down in summer as we pump heavily, coming back in winter when pumps are turned off. This is known as elastic land surface subsidence; inelastic land surface subsidence occurs when the land goes down from pumping and does not return when pumping is reduced or stopped. Thirteen years ago we were seeing this change in the land as a response to our pumping, and it is a good thing that the land surface still comes back up. This is a very real phenomenon. Tucson has experienced this; their downtown area has dropped about 6 inches in the last 20 years. In southern California, there are actually signs along the road indicating how much land is expected to drop in the next 40 years as a result of excessive groundwater pumping. Obviously we don't want that to happen here.

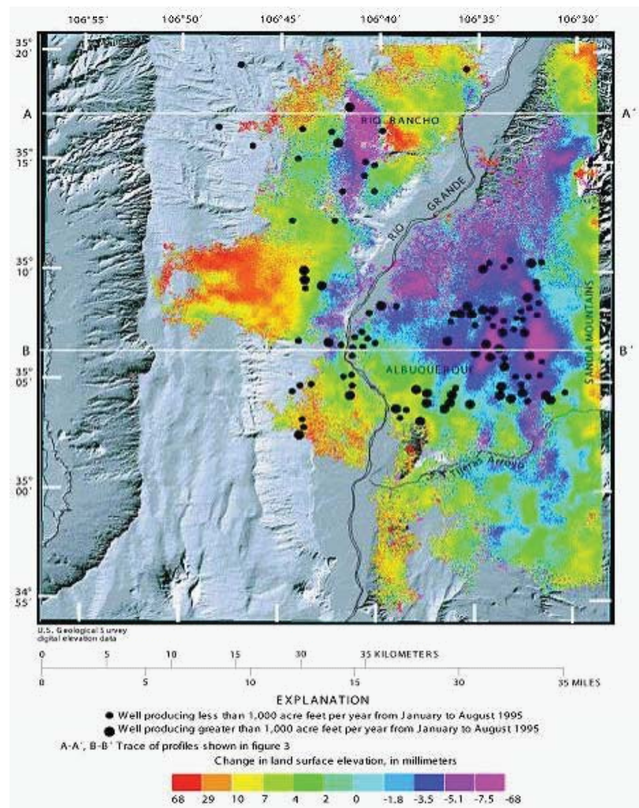

Figure 2. USGS - Land Surface Subsidence Estimate

The City of Albuquerque purchased rights to 48,200 acre-ft per year of San Juan-Chama water back in 1963, and thank goodness we did. The Albuquerque Tribune called it a boondoggle at the time, because they couldn't figure out why the City would buy water when the idea back then was that Albuquerque was sitting on an aquifer the size of Lake Superior. Here we are in 2008 and we have an actual project that consists of three diversions from the southern Colorado, namely the Rio Blanco, Little Navajo, and Navajo Rivers. The last structure is a 26-mile long, 12-foot diameter tunnel that goes under the continental Divide and brings in about 100,000 acre-ft of water per year, about half of which is for us (Figure 3).

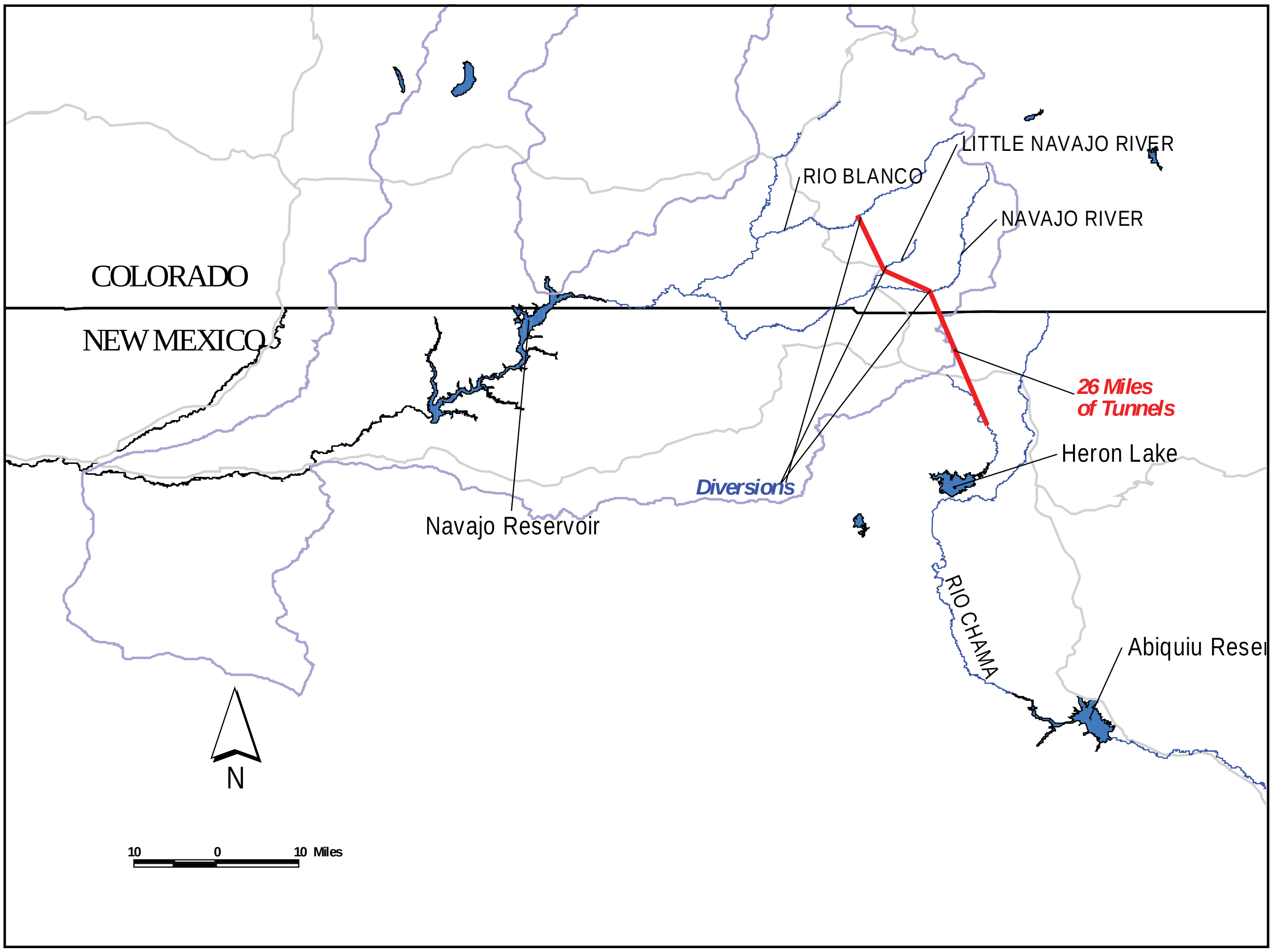

Figure 3. San Juan-Chama Project area.

Figure 4 depicts our water resources plan, a very conceptual, simple plan that provides for transition away from the aquifer. Once we bring the Drinking Water Project online, we will have a significant reduction in groundwater pumping. In the future, our water supply needs will be met more by surface water – although we will always rely somewhat on groundwater – and through reuse and recycling we will meet total water needs. We never want to pump more than 60,000 acre-ft a year, which is the predicted natural recharge, although it may change over time, but we will not pump more than the aquifer can replenish.

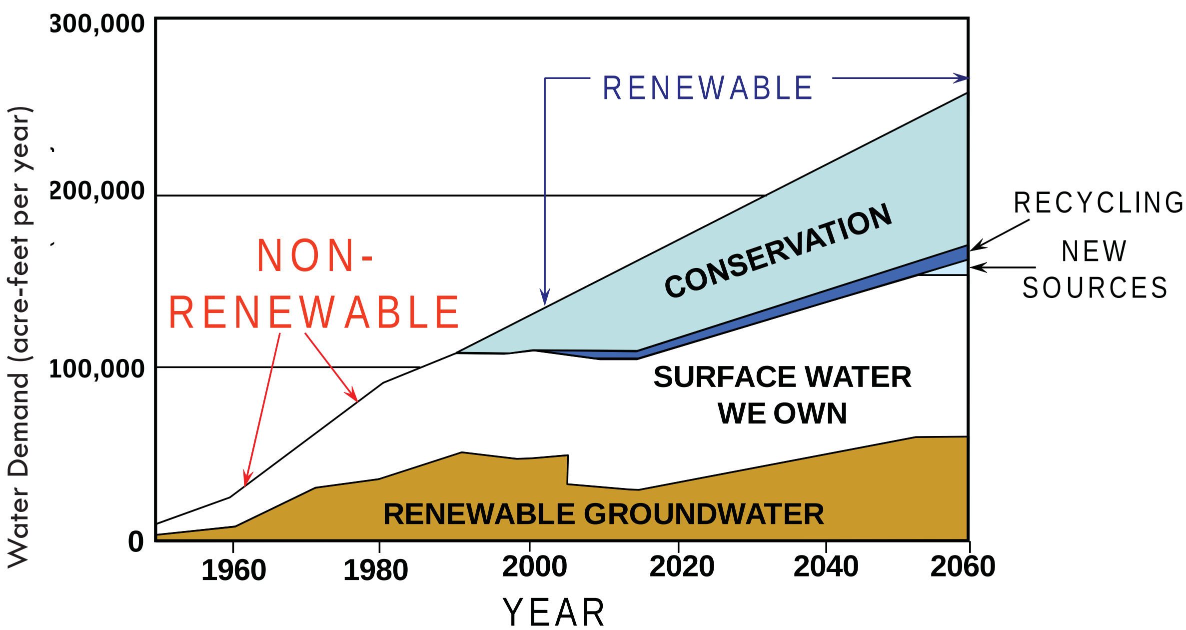

Figure 4. Albuquerque's Projected Water Demand and Available Supplies

For the next few years, the Water Authority will be working on developing new sources of water supply and these new sources are another part of meeting our future water needs. Conservation is the cornerstone of our planning and really is the basis where all water planning efforts start. We started with a per person per day water use of 250 gallons in 1995, which has been reduced to 167 gallons/person/day currently, which was over our 30 percent reduction goal to be completed by 2005. Now the Water Authority's goal is to reduce overall usage to a total of 40 percent reduction to 150 gallons/person/day by 2014. Our permit for the Drinking Water Project requires that we achieve a overall use goal of 155 gpcd by 2040. Therefore, we have time to reach these OSE permit goals, but we are trying to reach them sooner.

Figure 5 shows our big Drinking Water Project, a $385 million project that includes a diversion and a pipeline along the river and Paseo del Norte, a new water treatment plant, with 38-miles of transmission pipelines to connect the purified surface water to seven existing reservoirs on the east and west sides. The construction of the infrastructure is complete. Over the past several months, we have successfully moved ground water pumped from the eastside of town to the westside to supplement supplies and to comply with the new drinking water standard for arsenic. This may not be good over a very long-term, but it works in the short-term during the summers or during droughts. We also have a new treatment plant on the westside that is capable of treating 5 million gallons per day of high arsenic water to water that has no detectable arsenic that can be used for blending and drinking water.

The diversion dam south of Alameda was built by a contractor from Colorado who specializes in construction in rivers; they knew what they were doing and they were organized. They first moved the river to the east side and built on the west side; they waited until summer passed, and then moved the river back to the west side and subsequently went back and built on the other side, finishing the dam. The dam was built during two consecutive winters with no complications, which is really remarkable.

The dam has 21 sections across the river that can be raised and lowered independently or altogether. The use of different segments is a way to deal with sediment management; if we increase the velocity through small areas, we can push large amounts of sediment through quickly. A fish passage channel allows for free movement of silvery minnows. The dam has two intake structures and each can divert 120 million gallons a day. There are 3 mm openings in grates on intake structures for free movement of fish eggs.

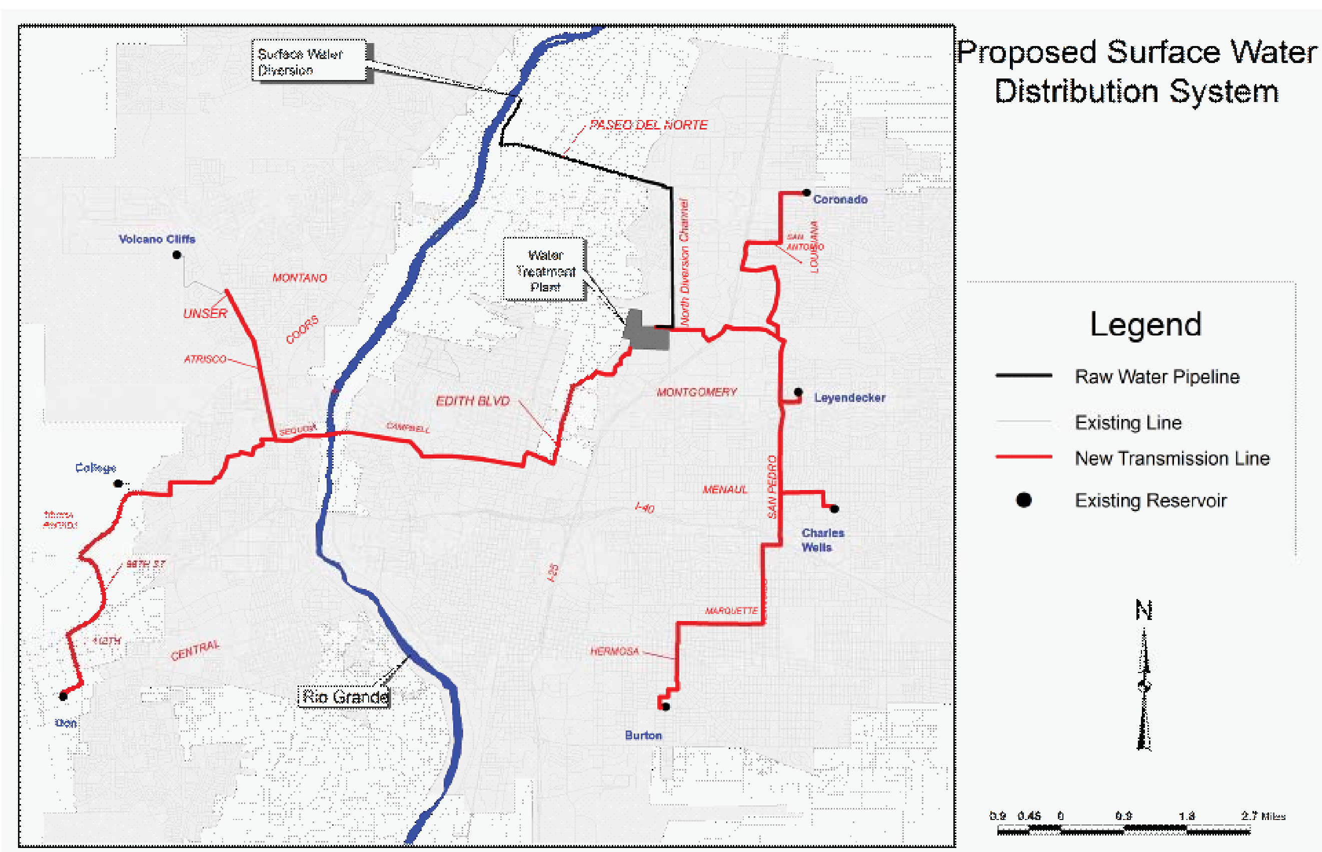

Figure 5. Proposed Surface Water Distribution System

The water pump station has a capacity of 240 million gallon/day, with each side pumping 120 million gallons/day. The building was designed to look like an old Spanish style church. Most people did not want a pump station in their neighborhood, but now people really like it, and we joke about when church services are starting.

After lots of research, we designed the water purification process at the new water treatment plant to meet water quality challenges posed by upstream development and also regulatory issues that could be implemented by EPA over time. Figure 6 shows the water treatment process, which is a very robust, state-of-the-art treatment process. We also have room to grow with UV treatment, or any other necessary changes based on regulations, standards, or customer feedback. The facility is located on over 90 acres. All the solids are handled on one side of the facility so we can recycle them. For example, we have a lot of iron in the solids removed from the process and those will be blended with our compost to create a ironite of sorts for our customers.

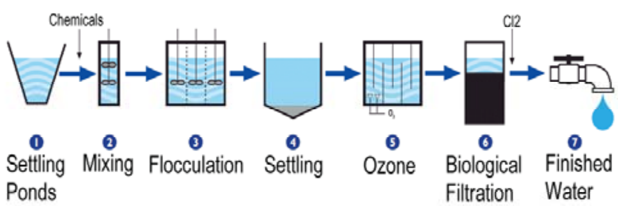

Figure 6. Water Treatment Process

The construction of the water treatment plant is complete and we are working to complete the final testing of the ozone system. After the 10-day performance test, the plant will be turned over to us, and we'll practice a little and bring the system online the first week of December 2008. We want to avoid the situation Tucson had with the immediate changeover from ground water to surface water. We are looking at providing 25 percent of our daily demand from surface water in 2009, 50-percent in 2010 and make the full transition in 2010 or 2011 after we determine what reactions and feedback are during the transition period.

So what is next with our water plans? If we look at a bell shaped curve of water use over time (Figure 7), we start in January with lower demand, and run the plant at full capacity storing water underground during winter, then use the aquifer to make up the difference during the summer when demand increases. The steady horizontal line represents a treatment capacity of 84 million gallons/day.

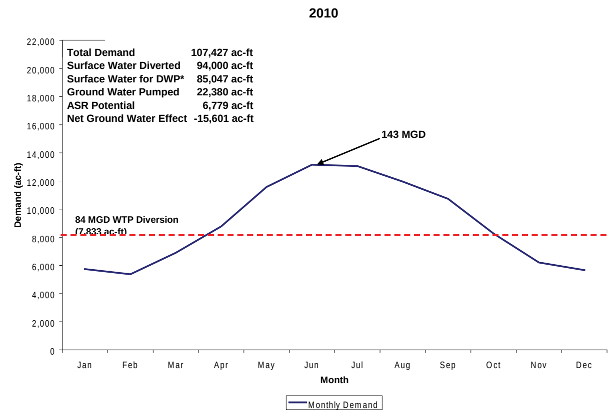

Figure 7. Water Use Over Calendar Year 2010

As demand increases with population growth, the ability to store water during the winter decreases; about 7,000 acre-ft is projected to be available to store in winter 2010 and 5,000 acre-ft in winter 2020 (Fig. 8). The more conservation we can achieve in the winter months, the more aquifer storage and recovery we have – it is almost a 1:1 ratio; as much as we reduce demand, we can increase aquifer storage.

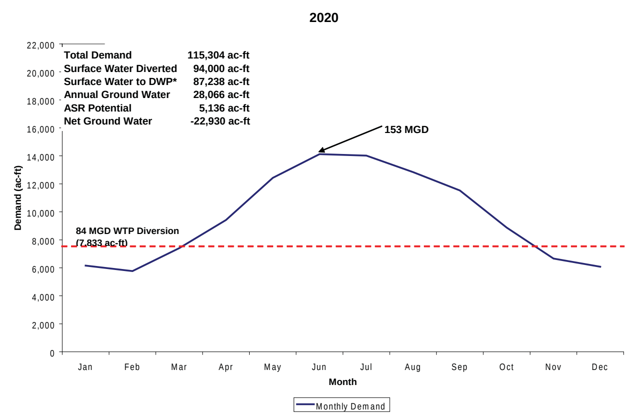

Figure 8. Water Use Over Calendar Year 2020

Figure 9 shows groundwater demands over time increasing as population grows. In dry years when we are totally dependent on groundwater, we have an increase in return flows. Our transition to San Juan-Chama water use over time is going to increase return flows, providing us with opportunities in the future to use return flows as a water source. Golf courses, for example, are a potential reuse site that will use excess return flows on large turf areas on the west side, just like on northeast side (Fig. 10).

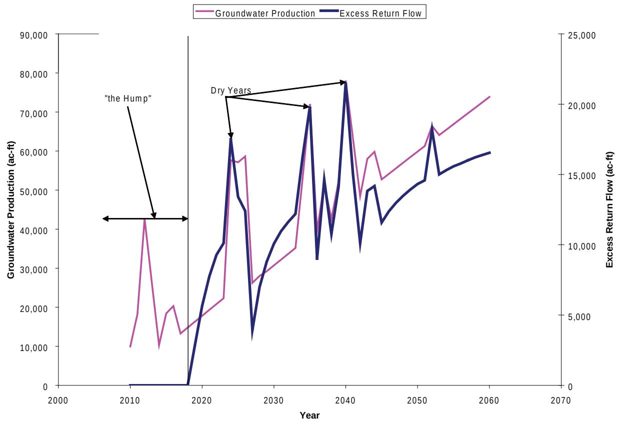

Figure 9. Groundwater Demand Over Time.

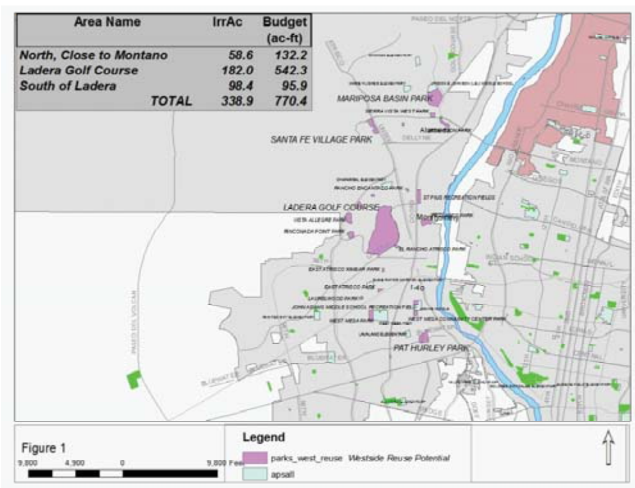

Figure 10. Westside Reuse Potention

Water reuse and recycling is a key issue in our future, much like aquifer storage and recovery, not only today but 40 years from now by reducing use can still store San Juan Chama. Desalination also is a potential new source. There are a lot of projects on the west side, and the big question is: Are desalination projects connected to the local aquifer? We need to characterize the brackish water sources in the Middle Rio Grande and sources outside the Middle Rio Grande. The New Mexico State Engineer has no jurisdiction over some wells; the only way to resolve a potential infraction on our water rights is to go to District Court, which is a problem because the judicial system does not always have the technical expertise needed, and this can lead to a battle of "dueling experts."

For the large scale ASR project, we will be constructing infiltration ponds on the 90-acre water treatment plant site and then applying the water and allowing the water to infiltrate into the aquifer. If we are able to store 10,000, 20,000 or even 30,000 acre-ft per year, and monitor it, such as how fast it reaches the aquifer, which is really the next step in our project, then it will help us understand the possibilities and opportunities for future use of that water.