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## New Mexico's Obligations and Compliance under the Rio Grande Compact

The Rio Grande Compact was signed in Santa Fe, New Mexico in 1938 following more than a decade of negotiations and four decades of controversy regarding the relative shares of this desert river by three states and two countries. The controversies regarding use of water from the Rio Grande prior to the Compact resulted in the "Rio Grande Embargo" by the Secretary of the Interior in 1896, a treaty with Mexico requiring delivery of 60,000 acre-feet annually at Juarez signed in 1906, an interim compact which froze water development in 1929, and a United States Supreme Court lawsuit by the State of Texas against New Mexico and the Middle Rio Grande Conservancy District in 1935. The Rio Grande Compact became law in 1939 when it was approved by the legislatures of the three signatory states and the United States Congress.

The Compact was developed for the purposes described in its introduction:

- "to remove all causes of present and future

controversy among these States and between the citizens of one of these States and citizens of another State with respect to the use of the waters of the Rio Grande above Ft. Quitman, Texas"

- "for the purpose of effecting an equitable apportionment of such waters"
- "for interstate comity"

The Rio Grande Compact apportionment of water reflects uses at the time it was being negotiated. Large-scale irrigation systems were developed in the San Luis Valley in Colorado in the late 1800s. By 1890, most large canal and ditch systems now in use had been constructed. Colorado lands irrigated from the Rio Grande totaled more than 600,000 acres prior to the Rio Grande Compact. The Rio Grande Project—including Elephant Butte Reservoir, which was completed in 1916—was developed by the Bureau of Reclamation to serve more than 155,000 acres of irrigated land in New Mexico and Texas. (The majority of this irrigated land—57percent—is in New Mexico.)

In contrast, acequias in the Middle Rio Grande in New Mexico were irrigating approximately 40,000 acres, far less than Colorado and the Rio Grande Project. The Middle Rio Grande Conservancy District began construction in 1930 to consolidate most of the acequia systems and provide flood control and drainage services. At the time the Rio Grande

Compact was being negotiated, much of the formerly irrigated land had been abandoned due to water-logging. Subsequent reclamation and irrigation system development activities in the Middle Rio Grande between Cochiti Dam and Elephant Butte Reservoir irrigated a maximum of perhaps 80,000 to 90,000 acres of the approximately 123,000 acres that were permitted by the State Engineer. Middle Rio Grande total irrigated land today may be about 60,000 acres.

Major features of the Rio Grande Compact include the following:

- Colorado is required to deliver water to New Mexico at the state line. Colorado's annual delivery obligation is based on the annual

flow of the Rio Grande at Del Norte and the flow of three tributaries. New Mexico's annual water allocation reaches a maximum of 405,000 acre-feet of the flow of the Rio Grande measured at the Otowi index gage plus the inflow to the Rio Grande between the Otowi gage and Elephant Butte Dam.

- New Mexico is obligated to deliver the remaining portion of the annual Otowi gage inflow to below Elephant Butte Dam. In an average year, when 1.1 million acre-feet of Rio Grande water flows past the Otowi gage, New Mexico is entitled to consume 393,000 acre-feet of that amount (see Figure 1).

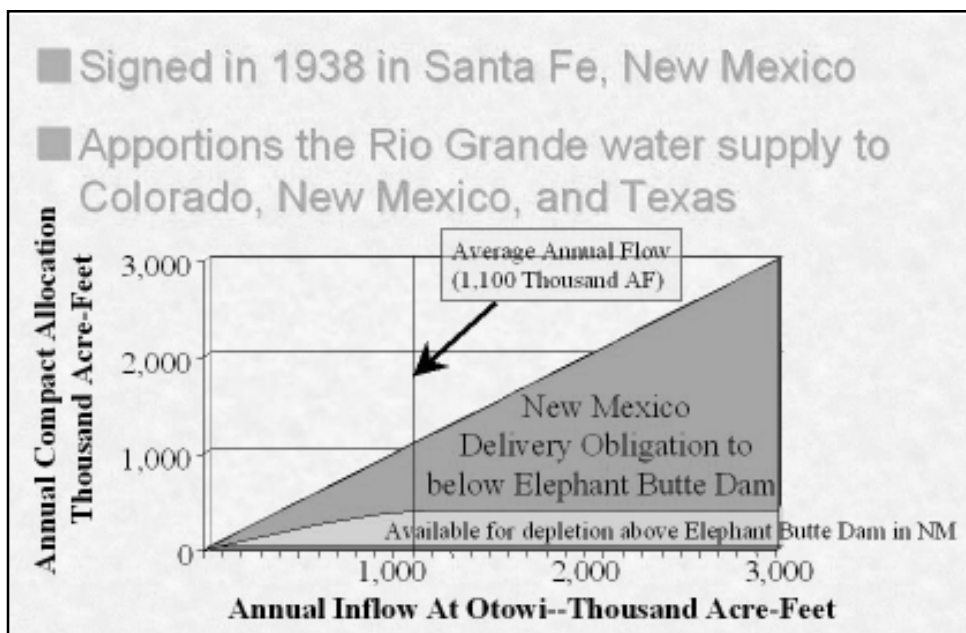


Figure 1. In an average year, when 1.1 million acre-feet of Rio Grande water flows past the Otowi gage, New Mexico is entitled to consume 393,000 acre-feet of that amount.

- When the annual flow of the Rio Grande at the Otowi gage is very low, New Mexico may consume 43% of that water and must deliver the remaining 57% to below Elephant Butte Dam.
- When the annual flow of the Rio Grande at the Otowi gage is very high, New Mexico may consume only 13% of that water and must deliver the remaining 87% to below Elephant Butte Dam.
- New Mexico's deliveries are measured as the releases from Elephant Butte Dam plus the change in storage in Elephant Butte Reservoir.
- Evaporation from Elephant Butte Reservoir is accounted against New Mexico's Compact allocation of Rio Grande water.
- New Mexico is also allowed to consume all of the highly variable tributary inflows to the Rio Grande between the Otowi gage and Elephant Butte Dam. This includes flows from the Rio Jemez, the Rio Salado, the Rio Puerco, Galisteo Creek, and the Santa Fe River. In an average year, tributary inflows total about 100,000 acre-feet plus an unknown and small amount from minor ungaged tributaries.
- If depletion of Rio Grande flows in New Mexico above the Otowi gage change, the Otowi "index" flow is adjusted accordingly. No adjustments of this nature have been needed.
- The Compact requires annual water accounting and provides for a system of annual debits and credits.
- Colorado may accumulate up to 100,000 acre-feet of debits in its deliveries to New Mexico. New Mexico may accumulate up to 200,000 acre-feet of debits in its deliveries below Elephant Butte Dam.
- Water must be retained in storage in reservoirs constructed after 1929 to the extent of each state's respective debits and cannot be used. It must be released upon demand by the downstream states under conditions specified in the Compact. Reservoirs constructed after 1929 in New Mexico include El Vado Reservoir, owned by the Middle Rio Grande Conservancy District, and Nichols and McClure reservoirs, which provide a large portion of the Santa Fe municipal water supply.
- If storage in Elephant Butte Reservoir is less 400,000 acre-feet, neither Colorado nor New Mexico may increase the amount of water stored in reservoirs constructed after 1929.
- Spills from Elephant Butte and Caballo reservoirs are an important element of the Compact. Credit water spills first. Debits are reduced as the reservoirs approach full capacity to the point of elimination when the reservoirs are completely full.
- Normal total releases from Elephant Butte Dam and Caballo Dam are defined as 790,000 acre-feet per year. Releases in excess of that amount affect the calculation of spills.
- Water imported from the Colorado River Basin, including the San Juan-Chama Project supply, is not subject to Rio Grande Compact apportionment.
- The Rio Grande Compact does not affect the obligations of the United States to Indian Tribes or impair their rights.  
Figures 2 and 3 illustrate New Mexico's historical annual water supply under the Rio Grande Compact. Figure 2 shows the variability in the amount of the flow of the Rio Grande at the Otowi index gage that New Mexico has been entitled to deplete. Figure 3 adds two other sources of water—that yielded by the tributaries between Otowi and Elephant Butte and the San Juan-Chama Project deliveries past the Otowi gage.  
It should be emphasized that the Rio Grande Compact, and the State Engineer's duty to see that New Mexico complies with it, not only is an interstate commitment but also a commitment by New Mexico to see that New Mexicans living below Elephant Butte Dam receive their apportioned share of the river. The Compact provides an allocation of Rio Grande water inflows to New Mexico, not between New Mexico and Texas, but among water users in New Mexico above Elephant Butte Dam and water users in New Mexico and Texas downstream from the dam. However, it is the Texas Compact Commissioner who will see that the Compact is enforced if New Mexico does not comply with its obligations. That was the case when the State of Texas sued the State of New Mexico in the United States Supreme Court in 1951.  
Figure 4 illustrates New Mexico's historical compliance with its Rio Grande Compact delivery

New Mexico's  
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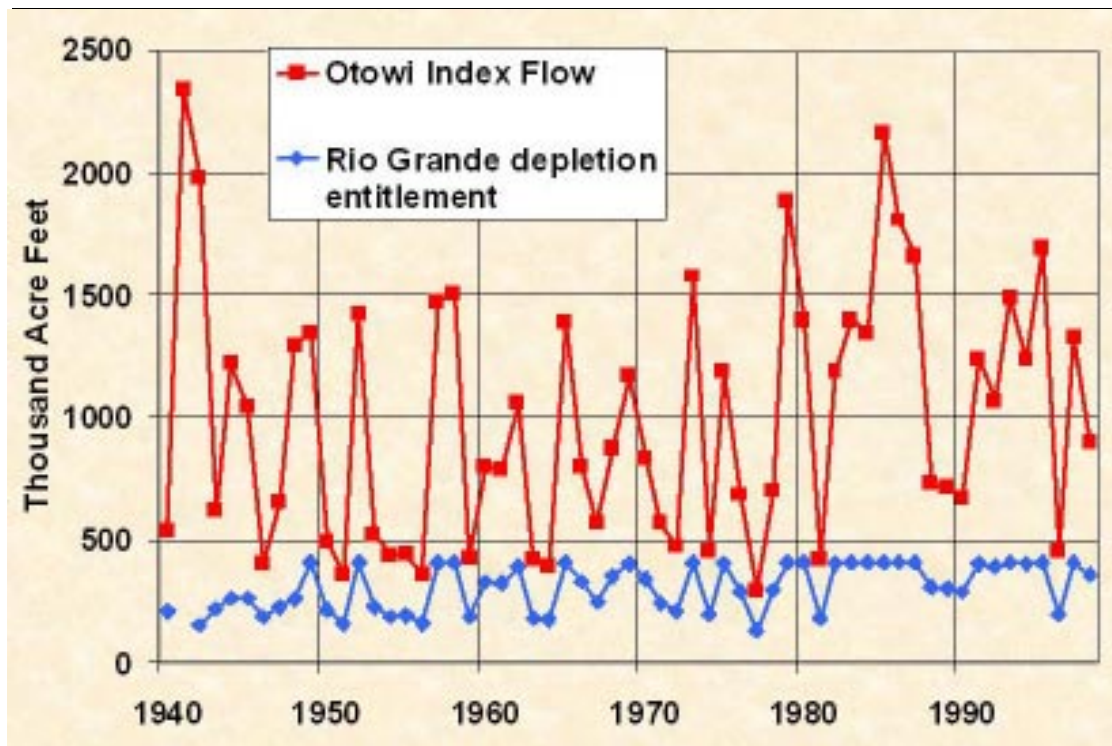


Figure 2. New Mexico's Share of the Rio Grande at Otowi

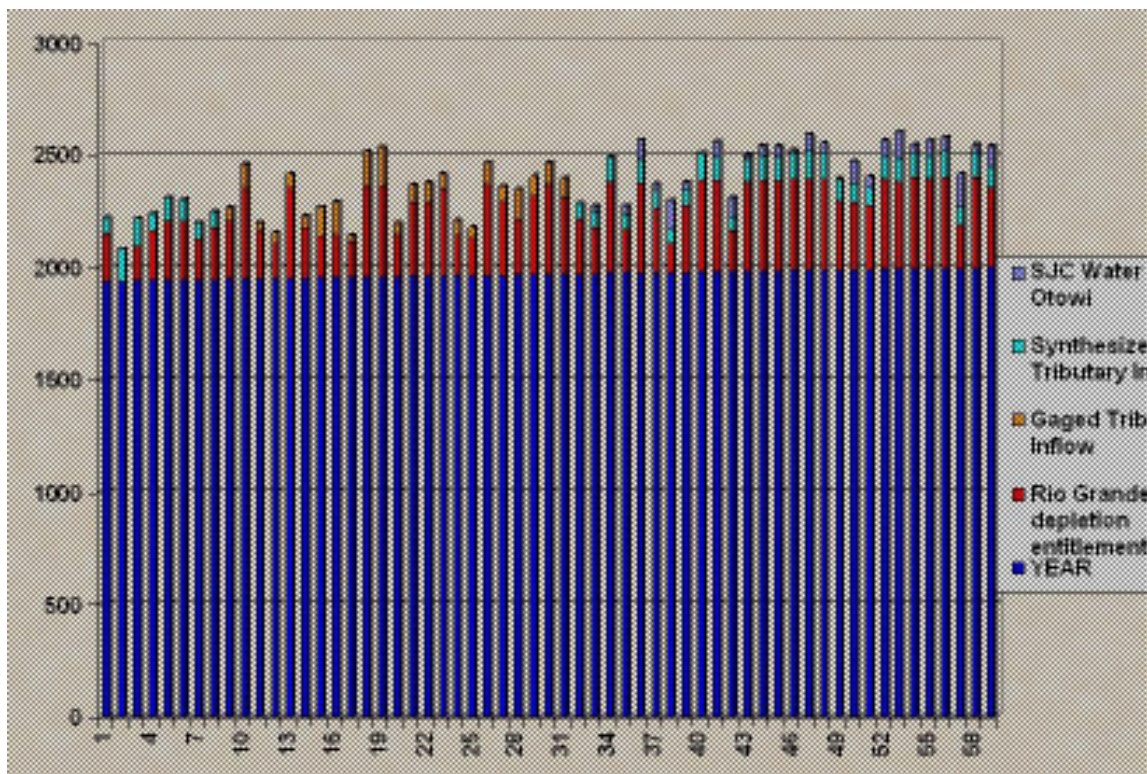


Figure 3. Rio Grande plus Tributaries and San Juan/Chama

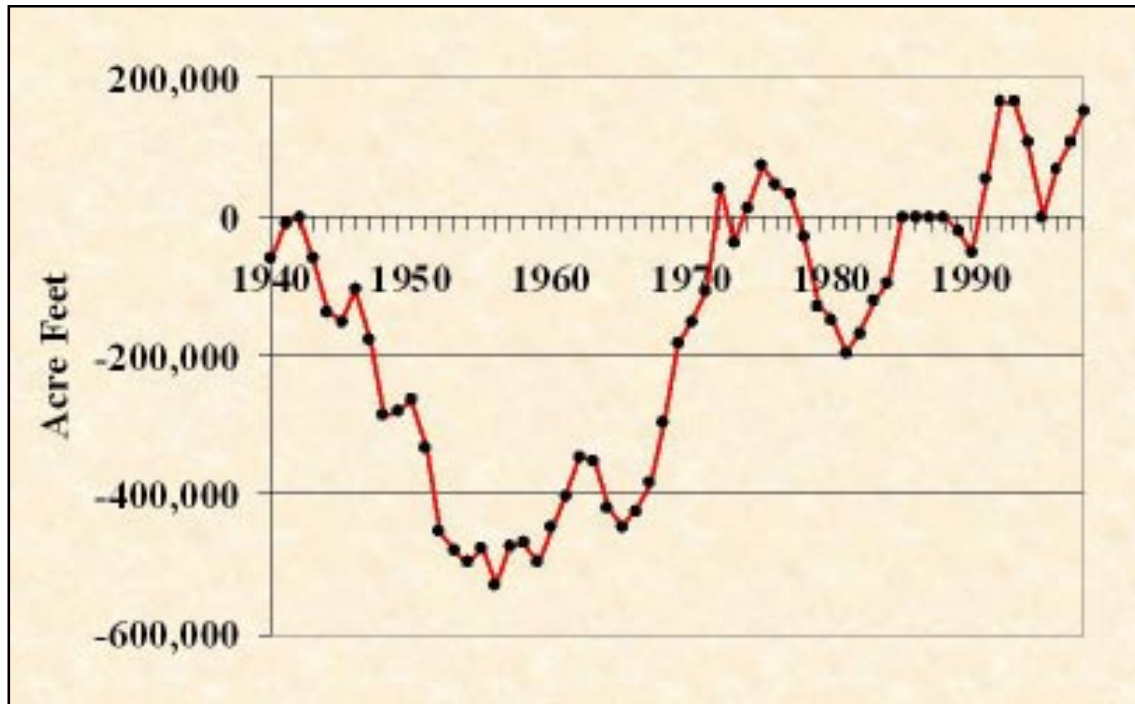


Figure 4. New Mexico's Rio Grande cumulative compact delivery

obligations expressed as cumulative debits and credits. New Mexico is currently in a net credit situation, but that is not the usual historical condition. The largest single factor in New Mexico's compliance has been the control of "natural" depletions. This has involved control of evapotranspiration from riparian vegetation, construction and maintenance of drains to "salvage" water that otherwise would be lost to evapotranspiration, maintenance of the river channel, and construction and use of man-made channels to deliver water downstream with fewer losses and depletions than transmission via the natural river channel. Conveyance of water via these more efficient channels has been an essential component of New Mexico's compact compliance.

Casual observers may think that New Mexico's compliance with the Compact is seemingly unmanaged and without effort. Nothing could be further from the truth. Major federal projects, including the Joint Middle Rio Grande

Project and the Low Flow Conveyance Channel, have been and continue to be essential to New Mexico's recent and contemporaneous compliance. The Interstate Stream Commission has sponsored and provided funding for major water salvage and drainage projects that have contributed substantial amounts of water for beneficial uses and Compact deliveries. Ongoing river channel maintenance activities are essential to water delivery downstream and to reduce depletions of that water.

New Mexico's activities associated with its compliance of the Rio Grande Compact deliver obligations also have been highly controversial. Major litigation and legislative initiatives resulted from State Engineer Reynold's decision in 1956 that the effect of groundwater pumping on the river must be offset by the retirement of equivalent surface water uses. Supreme Court litigation brought by Texas during the drought of the 1950s and the associated Texas demand for release of water from the post-Compact El Vado Reservoir

was complicated by Middle Rio Grande Pueblo water rights and issues and ultimately was resolved by the federal projects cited above.

“Natural” evapotranspiration of water dominates the depletions in the Middle Valley supplied from New Mexico’s Compact share of the Rio Grande. In 1947, the Bureau of Reclamation concluded that riparian vegetation, wetted sands, and the river were losing more than 300,000 acre-feet annually to evapotranspiration. Water budget information from a 1992 Reclamation study indicates non-crop evapotranspiration, including evaporation from the river and the associated irrigation infrastructure, was about 250,000 acre-feet per year, compared to crop water depletions of about 130,000 acre-feet per year. “Natural” depletions charged against New Mexico’s apportioned share of the Rio Grande also include evaporation from Elephant Butte Reservoir, which has averaged about 100,000 acre-feet per year over its history but has been much higher recently, about 180,000 acre-feet per year over the past 15 years.

This is very different from the situation in Colorado and the Rio Grande Project area below Elephant Butte Dam. Irrigated crop water depletions are predominant in those areas and reservoir evaporation is much lower.

Two factors in New Mexico’s recent history of annual Compact delivery credits include augmentation of the river flows from (1) municipal pumping of groundwater and discharge of some of that mined groundwater to the Rio Grande as treated wastewater effluent, and (2) increased return flows from irrigation diversions that have been substantially augmented by San Juan-Chama project supplies. Neither of these will continue indefinitely into the future. Figure 5 shows cumulative losses and gains in three reaches of the Middle Rio Grande during the winter season when neither irrigation diversions nor riparian evapotranspiration is taking water from the river. The San Felipe to Bernardo reach shows significant changes from the pre-1972 flow regime that may be associated with return flows from municipal and industrial groundwater pumping in the metropolitan Albuquerque area and from return flows associated with irrigation applications of San Juan-Chama Project water. The San Acacia to San Marcial reach shows reduced depletions over the 1960s and 1970s that are associated with the full operation of the Low Flow Conveyance Channel in comparison with the earlier and later periods before the channel was constructed and diversions to the channel ceased in the mid-1980s.

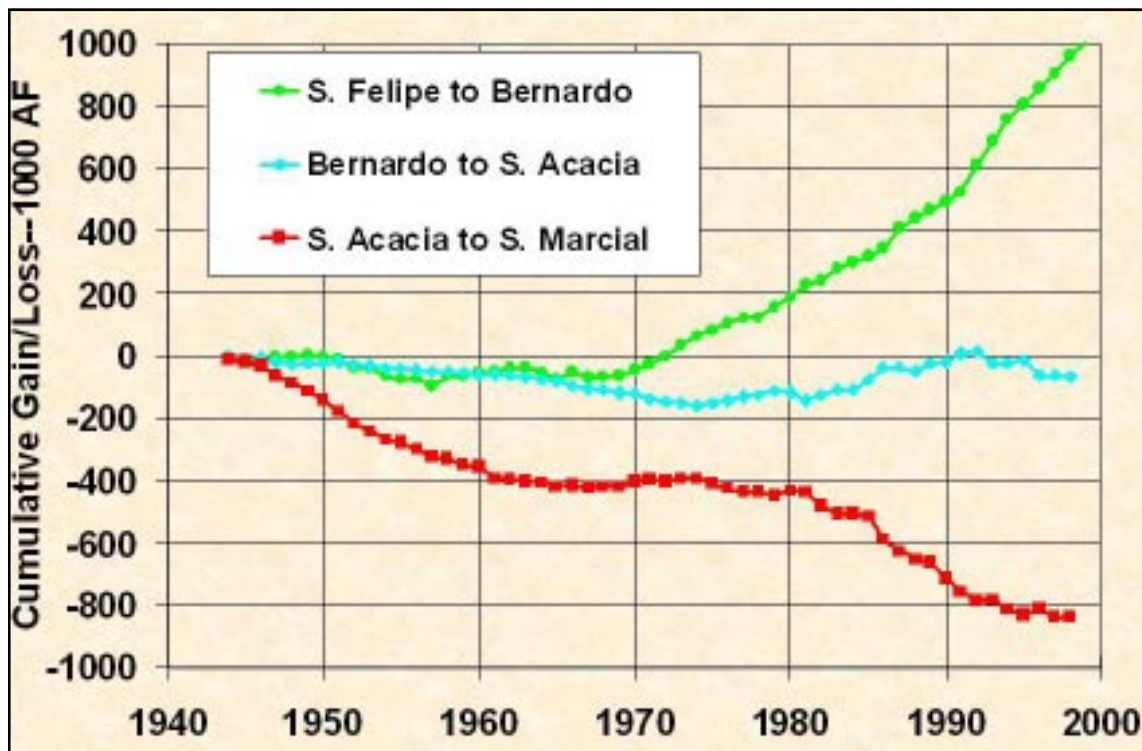


Figure 5. Middle Rio Grande Winter Accretions and Losses

Albuquerque and Santa Fe originally intended complete consumptive use of their allocations of San Juan Chama water associated with pumping groundwater interconnected with the Rio Grande. Both cities now plan to construct facilities for direct diversions of their allocations associated with the recent scientific conclusions regarding the ability of their wells to divert river water that can be offset with release of San Juan-Chama Project water.

New Mexico's contemporaneous compliance with its Rio Grande Compact delivery obligations will be challenged by drought, planned municipal direct use of San Juan-Chama water, or the water demands of the Rio Grande silvery minnow and avoidance of adverse impacts to its declared critical habitat. If silvery minnow demands are satisfied by conservation of existing irrigation losses and use of that conserved water in a manner that converts existing losses, which remain in the hydrologic system, to new depletions, New Mexico may not remain in compliance.

Non-compliance is an outcome that New Mexico must strive to avoid. Under-delivery resulting in net debits as allowed by the Compact will lock-up water in reservoirs constructed after 1929 upon which the Middle Valley and the City of Santa Fe depend. Debits exceeding the 200,000 acre-feet cumulative amount allowed by the Compact will land New Mexico in the United States Supreme Court. Texas officials in recent conversations with the State Engineer and with me have made that very clear.

"Active River Management" is the term State Engineer Turney has used to describe the general system of water use measurement and controls that New Mexico must define and implement.

This system must:

- recognize the limits and variability of New Mexico's Compact-apportioned share of the river;
- effectively utilize the system of debits and credits the Compact provides; and
- maximize average water supply through conjunctive use of ground and surface water and the continued control of natural depletions.

As I see it, Active River Management has three main components:

- measurement and forecasting of annual river flows, New Mexico's depletion entitlement that can be taken from those river flows, and the portion of those river flows that must be delivered through New Mexico to downstream water users
- management and control of depletions, including the depletion of river flows caused by pumping groundwater that is hydrologically connected to the river and the depletions of river flows due to natural causes
- markets that work to transfer New Mexico's finite supply of water to new uses

The first two components require metering of water. River-flow forecasting is dependent upon measurement of river flows. The State of New Mexico's current 50 percent cooperative funding program for essential New Mexico stream gaging is not achieving as much actual measurement due to federal expense increases and federal funding curtailment. Some gages that would have provided needed information today have been abandoned. For example, tributary inflows to the Middle Rio Grande are much less thoroughly measured now than they were 30 years ago, even though our need for water and dependence on those tributary inflows is increasing.

Management of water depletions is essential. In the Middle Rio Grande, natural depletions are predominant. The State of New Mexico has controlled water depletions through water drainage, salvage, and construction, operation and maintenance of "efficient" water conveyance facilities. Continued control of natural depletions with these or other equivalently effective tools is imperative to New Mexico's compliance with its Compact obligations.

In her opening remarks for this conference, New Mexico Riparian Council President Andrea Linderth-Hummel said that "riparian equals water." That is certainly true. Actually, to be more precise, riparian equals depletion of water. Andrea said, "we need to know how much water is being used where" and we need to know "how much is needed for this habitat which is so near and dear," referring to the Middle Valley's bosque. I couldn't agree more. Additionally, we need to determine how we will allocate New Mexico's limited Compact share of water between natural depletions and beneficial uses.

New Mexico must also manage and limit depletions for human uses, both in the Middle Rio Grande and in the Lower Rio Grande. This will require metering of diversions of water, deliveries to farms, and return flows. I know this is controversial in areas where metering has not been required. However, in river basins such as the Pecos and with users including Carlsbad Irrigation District and the Pecos Valley Artesian Conservancy District, metering is accepted completely and viewed as necessary to ensure that users of a common but limited water supply receive their due share.

Another element of Active River Management to limit total uses of water to New Mexico's allocation is, by law, priority administration. The priority system requires junior users to be cut off when the supply is insufficient to meet senior water rights. An effective system of enforcement will be required, at least initially.

Several speakers at this conference have described how Middle Rio Grande water supplies are highly variable. Contemporaneous supplies are higher than historical averages. The Rio Grande is visited routinely by severe drought. Planning is needed to determine the most effective conjunctive use of groundwater and New Mexico's Compact allocation of surface water, along with San Juan-Chama water, to meet water demand in years when the supply is limited.

Finally, an effective market is essential for transfer of water from water right owners who forego their use of water to those who have insufficient, junior, or no water rights but need water. Water user categories requiring additional water might include farms with high water-use crops requiring more water than available water rights will allow; growing municipalities; new industries contributing to economic development; and environmental users. However, markets cannot supply new uses of water without foregoing an equivalent amount of water use elsewhere. The capital of these markets must be wet water and specifically must not be dormant and unused water rights.

I was directed by the Interstate Stream Commission at its last meeting to prepare a plan for the Commission's use of accumulated balances in the two permanent income funds that it controls, subject to appropriations by the Legislature, to improve stream gaging and

diversion and return-flow metering throughout the state over the next few years. The plan will be presented to the Legislature at its next session. The Interstate Stream Commission has requested substantial appropriations to address inadequate flow measurement in the Middle Rio Grande and to perform a detailed evaluation of current water depletions associated with beneficial uses and natural causes.

Thank you for the opportunity to speak to you regarding these critically important matters.