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The Administration of the Middle Rio Grande Basin: 1956-2002

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ABSTRACT

The Middle Rio Grande Administrative guidelines issued in 2000 by the New Mexico Office of the State Engineer mark an important milestone in the management of the water resources of New Mexico's most populated region. The basin was originally declared in 1956, and the State Engineer relied on hydrologic principles to craft a management plan that allowed for expanded use of groundwater pumping in addition to existing use of the fully appropriated Rio Grande surface water. New Mexico courts upheld the authority of the State Engineer to exercise broad jurisdiction over the appropriation of ground water and to make technical decisions about the proper management of individual basins. The new guidelines add key components to administrative planning. They close important segments of the basin to new appropriations and change the conditions that apply to pending groundwater permits; applicants are now required to obtain surface water rights to offset groundwater use prior to the granting of a permit. Through an examination of the original plan and a description of the hydrologic principles upon which the plan was founded, the new guidelines can be viewed as an essential component of the original plan to temporarily allow expanded water use in the basin, and then gradually curtail use as surface water rights are retired to offset the impacts to the river of groundwater pumping.

INTRODUCTION

In September 2001, hearing examiners from the New Mexico Office of the State Engineer (OSE)[1] issued a report and recommendation preventing the rapidly growing city of Rio Rancho, New Mexico, from expanding its groundwater pumping right until it had obtained surface water rights equal to the amount of additional consumptive use proposed by the city. The order was the first application of administrative guidelines for the Middle Rio Grande issued in September 2000. The guidelines mark

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1. Known as the State Engineer's Office prior to 1997.

the closure of the Middle Rio Grande Administrative Area[2] to new groundwater appropriations, an action that was foreseen as eventually inevitable at the time the groundwater basin was declared in 1956. Approval of applications filed prior to the adoption of the guidelines, including the Rio Rancho application, will be conditioned on the applicant having surface rights in hand that are equal in amount to the proposed consumptive use of ground water prior to the commencement of pumping.[3] This requirement departs significantly from the previous administrative practice, which allowed for surface water rights to be gradually acquired in small increments. Rather than indicating a change in policy, the September decision reveals long-term continuity of water management in the Middle Rio Grande.

Seeking to manage growing water use in the most populated area of the state, in 1956 the OSE declared the Middle Rio Grande groundwater basin. The declaration focused on maintaining a sustainable level of water use while insuring adequate surface flows of the Rio Grande. The OSE developed a plan to manage the growth of groundwater use while protecting surface water rights and ensuring that New Mexico would meet its delivery obligations under the Rio Grande Compact. This plan recognized the hydrologic realities of the basin: all ground water pumped from the aquifer eventually comes from the Rio Grande, and there is a finite amount of water that can be consumed in a sustained way.

Delayed impacts associated with large-scale groundwater development have begun to surface. The next decade is likely to see increased competition for the remaining surface water rights as parties seek to acquire rights to offset the effects of groundwater pumping. The 2000 guidelines represent an essential development in the administrative structure for the basin, as it is now necessary for the OSE to control water use more and more aggressively. A review of the history of the administration of the Middle Rio Grande basin reveals that the current guidelines are an anticipated component of the original plan to manage the water resources of the region.

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2. The Middle Rio Grande Administrative Area extends from Cochiti Pueblo, south of Santa Fe, to Socorro County. *See* N.M. STATE ENGINEER MIDDLE RIO GRANDE ADMINISTRATIVE AREA GUIDELINES FOR REVIEW OF WATER RIGHT APPLICATIONS 3, Guideline 1(a), Figure 1 (2000).

3. In the Matter of the Application of the City of Rio Rancho for Permit to Appropriate Water and Drill New Wells, Hearing No. 97-004, N.M. State Engineer, OSE File No. RG-6745–RG-6745-S-34, 21-22 (2000) [hereinafter Application of the City of Rio Rancho].

ADMINISTRATION OF THE MIDDLE RIO GRANDE BASIN: THE EARLY YEARS

In New Mexico, the first half of the twentieth century was marked by a dramatic increase in the dependence upon groundwater resources. In 1930, roughly 15 percent of the 527,000 acres of irrigated land in the state used ground water.[4] At this time state law had just begun to regulate ground water through a law enacted in 1927.[5] The legislature had enacted this law due in part to declining water levels in the Roswell artesian basin.[6] The 1927 law was held to be unconstitutional and was replaced with the New Mexico Underground Water Law in 1931.[7] This law extended the principles of the surface water code to ground water, authorizing the state engineer to administer "the waters of underground streams, channels, artesian basins, reservoirs, or lakes, having reasonably ascertainable boundaries."[8] These underground waters were declared to "belong to the public and to be subject to appropriation for beneficial use."[9]

By 1955, ground water irrigated more than half of the 873,000 acres of agricultural land in New Mexico.[10] This increased development of and dependence upon ground water prompted the state engineer to devote more time to investigating ground water. These studies allowed the state engineer to reasonably ascertain the boundaries of the resource, and thus declare the basins and administer the water.

Problems caused by increased groundwater development emerged simultaneously with interstate compact problems. In the 1950s, New Mexico was not meeting its delivery obligations to Texas.[11] Under the Rio Grande Compact, New Mexico is required to deliver a certain amount of water to Elephant Butte Dam. The amount due is determined annually by the surface flow at Otowi gage in northern New Mexico. As of December 31, 1956, New Mexico had accrued a debit of 529,400 acre-feet despite the efforts of the Bureau of Reclamation to maximize water delivery to Elephant Butte.[12] New

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4. IRA CLARK, WATER IN NEW MEXICO 296 (1987).

5. N.M. STAT. ANN. § 151-201 (1929).

6. S.E. REYNOLDS ET AL., COORDINATED ADMINISTRATION OF SURFACE AND GROUND WATER UNDER THE DOCTRINE OF PRIOR APPROPRIATION 3 (1967) (on file with author).

7. *Id.* at 3.

8. N.M. STAT. ANN. § 151-201 (Supp. 1938).

9. *Id.*

10. CLARK, *supra* note 4, at 296.

11. Jim Williams, *Rio Grande Underground Water Basin Declared*, 44 WATER RESOURCES RES. INSTITUTE 1-2 (1999), *available at* http://wrri.nmsu.edu/publish/watcon/proc/proc44/williams.pdf.

12. In 1908, the U.S. Reclamation Service (now the U.S. Bureau of Reclamation) reserved all unappropriated water of the Rio Grande for the use of the Rio Grande project. The Rio Grande project was undertaken to engineer the movement of the river to minimize losses as

Mexico water managers were concerned that a federal water master could be appointed to administer the Rio Grande, in response to federal lawsuits filed beginning in 1951 by Texas against New Mexico and the Middle Rio Grande Conservancy District.[13]

The Office of the State Engineer was faced with a crisis. The surface water of the Rio Grande was already over appropriated, yet the demand would continue to grow.[14] Water managers knew that groundwater pumping would deplete more and more surface water over time. Population projections indicated that future domestic and industrial demand for water would grow significantly. In addition to population growth, in early 1956 the Office of the State Engineer learned of a private developer's plan to make 50,000 to 100,000 acres of new land available for irrigation.[15] The developer would divert new irrigation water from the alluvial aquifer underlying the Rio Grande, increasing annual consumptive use by an estimated 100,000 to 200,000 acre-feet per year.[16]

Declaring the Basin: The Process

To adequately respond to this crisis the state engineer needed to assert control over the basin. This required that he declare the basin. Prior to the declaration of a basin, anyone could drill a well without seeking permission from the state engineer. By officially declaring an underground basin, the state engineer gained jurisdiction over the appropriation of ground water and invoked the procedures prescribed by the statute in issuing permits to appropriate water.[17] The declaration gave the state engineer the necessary authority to protect prior appropriations, to monitor the beneficial use of water, and to govern the "orderly development of the water resource."[18]

The first step towards asserting control over a basin was to perform hydrologic resource studies to provide the state engineer with adequate information with which to administer a basin. After such studies had been performed, the state engineer could use administrative judgment to

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the water travels south and thus maximize delivery to Texas in furtherance of the Compact objectives. Memorandum Decision of the State Engineer, Applications to Appropriate Underground Waters of the Rio Grande Underground Water Basin, Application Nos. RG-960, RG-961, RG-962, RG-963, 12 (Nov. 4, 1957) [hereinafter Memorandum Decision of the State Engineer].

13. Williams, *supra* note 11, at 1.
14. Williams, *supra* note 11.
15. Reynolds, *supra* note 6, at 5.
16. *Id.*
17. N.M. STAT. ANN. § 72-12-1 (Michie 1978).
18. Reynolds, *supra* note 6, at 3.

precisely decide the surface boundaries of the underground basin.[19] Studies performed prior to 1956 revealed an aquifer underlying the Rio Grande from north of the New Mexico–Colorado state line southward through New Mexico and into Texas.[20] The aquifer was found to be composed of unconsolidated, semi-consolidated and consolidated gravel, sand, and clay eroded from the mountains and was bounded by the topographic boundaries of the watershed. The sediments included the older Santa Fe group, from which most groundwater diversions in the valley were made, and the more recent alluvial material that overlies the Santa Fe group in the floodplains of the Rio Grande and its tributaries.

In 1956, the Rio Grande was estimated to gain 128 cubic feet per second (cfs), or 93,000 acre-feet per year, between the Colorado–New Mexico boundary to below the mouth of the Red River in Texas.[21] At that time in the Albuquerque area, the water table sloped from the east down to the Rio Grande and continued to slope westward to a low point six miles west of the river.[22] Groundwater flow at the low point was to the south, entering the river further downstream. It was also well known that groundwater pumping would reduce the amount of water in the Rio Grande either by capturing groundwater flow that would have otherwise gone to the river or by capturing surface water flow directly from the river.[23]

This collection of information, including the dimensions and characteristics of the aquifer and the nature of the stream/aquifer interaction, permitted the OSE to exercise jurisdiction to prevent impairment of existing rights, to provide for orderly development of groundwater resources, and to more closely manage depletion of surface water flow.[24] Such management was essential to insuring that the Compact obligation was met.

The Plan to Administer the Basin

Then State Engineer Steve Reynolds signed an order on November 29, 1956, declaring the Middle Rio Grande an administered basin.[25] By the time of the declaration, many of the major basins in New Mexico had already been declared. The Rio Grande basin was one of three basins

19. CLARK, *supra* note 4, at 297.
20. Memorandum Decision of the State Engineer, *supra* note 12.
21. Reynolds, *supra* note 6, at 5.
22. Memorandum Decision of the State Engineer, *supra* note 12.
23. *Id.*
24. *Id.* at 9-10.
25. S.E. Reynolds, N.M State Engineer, Memorandum Declaring the Middle Rio Grande Basin (Nov. 29, 1956).

declared by Reynolds in 1956, and one of 15 he declared during his tenure as state engineer.[26] In the memorandum that accompanied the declaration, Reynolds sought to identify for inclusion "those valley lands on which wells of significantly large yields probably can be obtained—wells whose production would appreciably affect the flow of the Rio Grande within the next few decades."[27] This resulted in the designation of an area that extended from the New Mexico/Colorado state line south to Elephant Butte Reservoir. The basin designation varied in width east to west, roughly ten miles or less on the northern and southern boundaries and broadening to approximately 40 to 50 miles through the Bernalillo–Albuquerque–Belen reach.

Reynolds' memorandum declaring the basin focused on preserving the surface flows of the Rio Grande. The memorandum recognized that the surface waters of the Rio Grande were fully appropriated, and Reynolds thus closed the surface water basin with this declaration to any new surface water appropriations.[28] Because any appropriation of ground water would affect surface flows, Reynolds required that all new permitted groundwater appropriations offset the effects of pumping by acquiring surface water rights.[29]

Strong opposition to the declaration of the basin surfaced in the agricultural and municipal services communities, where there was concern that the declaration would result in a dramatic curtailment of economic growth.[30] In order to "soften the blow" of the declaration and make it more politically palatable, Reynolds relied upon basic hydrologic principles to develop a method for administering the basin.[31] The method allowed groundwater appropriators to gradually offset their effects on the river as they occurred.

It generally takes years for the first effects of groundwater pumping to reach a river, and the impacts slowly accumulate after the first minimal effects occur. However, the instant pumping commences, the groundwater system is affected and an impact to the surface flows of the river, albeit delayed, is certain. Because the focus of the management effort was maintaining surface flows, Reynolds' primary concern was insuring that effects to the river were offset and flows were maintained. Reynolds therefore applied these hydrologic principles to create an administrative

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26. CLARK, *supra* note 4, at 298.

27. Reynolds, *supra* note 25, at 4.

28. *Id.*

29. *Id.* at 4-5.

30. Interview with Jim Williams, Rio Grande Underground Basin District I Manager, in Albuquerque, New Mexico (Mar. 2002). Mr. Williams served as District Supervisor in Albuquerque of the Rio Grande Underground Water Basin from 1956–1978.

31. *Id.*

scheme that capitalized on the lag period between the commencement of pumping and the delayed depletion of the river due to the pumping. Appropriators could acquire rights to offset the effect of their groundwater pumping gradually over time, as the pumping affected the river.

The plan was to allow groundwater development to proceed while requiring groundwater users to acquire surface water rights to offset the effects of pumping on the river. Because the effects of groundwater pumping on the river are delayed, total water use in the basin could grow for several decades as groundwater use increased and traditional surface water use continued. As surface water depletions grew, groundwater users would acquire surface water rights and surface water use would decrease. OSE would eventually have to limit groundwater pumping to the amount that could be offset. As surface depletions became fully manifested, total water use in the basin would return to 1956 levels, with surface water use largely retired and replaced by groundwater use.

This arrangement relieved the burden on the appropriator of acquiring all the surface rights at the time of appropriation. An appropriator would generally have many years to acquire, bit-by-bit, surface rights equivalent to the full amount of water consumptively used. Jim Williams, Albuquerque District water manager with the Office of the State Engineer from 1956–1978, described the plan as follows:

> The administrative policy developed for the basin was different from those of other declared basins. The idea was to protect the river, but still permit mining of the groundwater reservoir as long as the effects on the river were offset by the retirement of valid existing water rights. In theory this was a good idea and it lessened some of the criticism directed toward the state engineer.[32]

Reynolds explained the plan at an Albuquerque Chamber of Commerce meeting held in early January 1957. He stated that the administrative rules would permit increased water use above 1956 diversion levels "for a number of decades."[33] At the time of the declaration, Reynolds envisioned that agricultural water use would ultimately be retired to support industrial and municipal uses.[34] "It is anticipated that the temporary increased supply will be used largely for municipal and industrial purposes and that when usage is stabilized at about the 1956 rate

32. Williams, *supra* note 11, at 1-2.

33. Wayne S. Scott, *Underground Water District Draws Fire*, ALBUQUERQUE J., Jan. 4, 1957, at 1.

34. *Id.*

the net effect will be a transfer of water rights from present irrigation purposes to new municipal and industrial applications."[35]

The expected shift in water use is qualitatively illustrated on Figure 1. Total water use would grow as traditional surface water diversions continued and new groundwater appropriations were made. As surface water depletion due to groundwater use grew, surface water use would be decreased as rights were bought and retired, leaving river flows intact. When groundwater use reached a level equal to the amount of surface water rights that can be obtained for offset, the groundwater basin would be closed and pumping maintained at a constant rate.

The need for groundwater appropriators to acquire surface water rights was complicated by the addition of return flows to the river. Municipal and industrial users typically return about half of the water pumped to the river, and they are only required to offset the net effect to the river, *i.e.* the impact to the river of pumping minus the amount of return flow. The effect of return flow is illustrated in Figure 2. Until stream system depletion caused by groundwater pumping exceeds return flow, the net effect of groundwater appropriation is to increase river flows. Thus, groundwater appropriators would typically have several decades before having to acquire any offset rights, and the OSE has a temporarily increased supply of water to meet Compact delivery obligations.

Return flow comprises an essential element of the 1956 plan and underscores the plan's key objective: to maintain the Rio Grande surface flows. Steve Reynolds did not consider the issue of declining water tables or limited groundwater supplies to be pressing. Instead, "the difficulty arose out of the fact that any withdrawals from the underground source would result not only in a decrease in the amount of water in storage underground, but also in a diminution of the fully committed Rio Grande flows."[36] Thus, supplementing surface flows with a portion of the groundwater pumping satisfied all the important aspects of Reynolds' plan by postponing the date that groundwater appropriators would need to purchase offset rights and providing additional water to meet the Rio Grande Compact.

Public Reaction to the Basin Declaration

In 1956 the reaction of the Middle Rio Grande community to Reynolds' declaration was swift and passionate. The basin order had its supporters, most notably outgoing Governor Sims and Governor-elect Edwin L. Mechem. In late 1956, Mechem publicly supported the plan by

35. REYNOLDS ET AL., *supra* note 6, at 9.
36. *Id.* at 1.

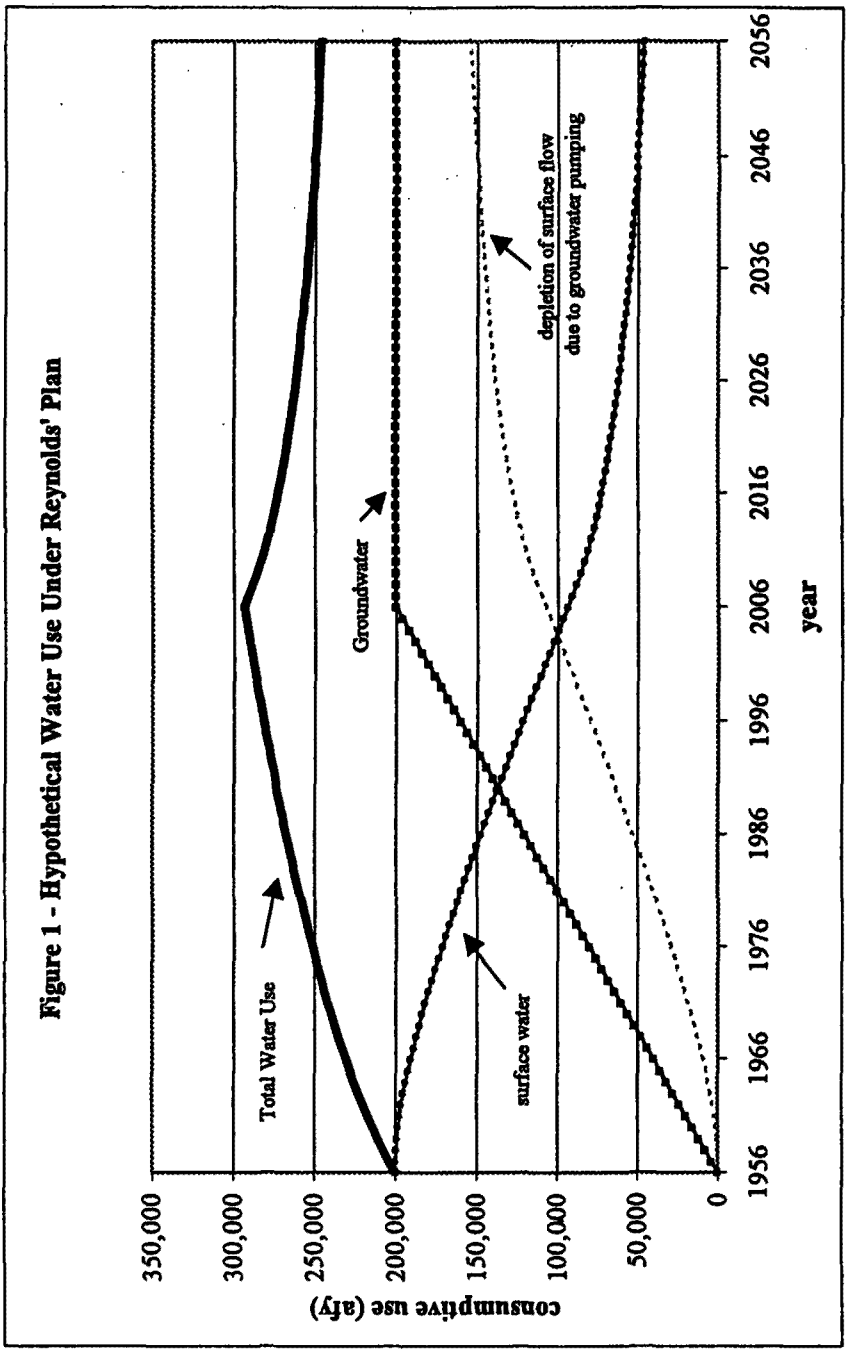
Figure 1 - Hypothetical Water Use Under Reynolds' Plan
consumptive use (afy)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
1956
1966
1976
1986
1996
2006
2016
2026
2036
2046
2056
year
Total Water Use
Groundwater
surface water
depletion of surface flow
due to groundwater pumping

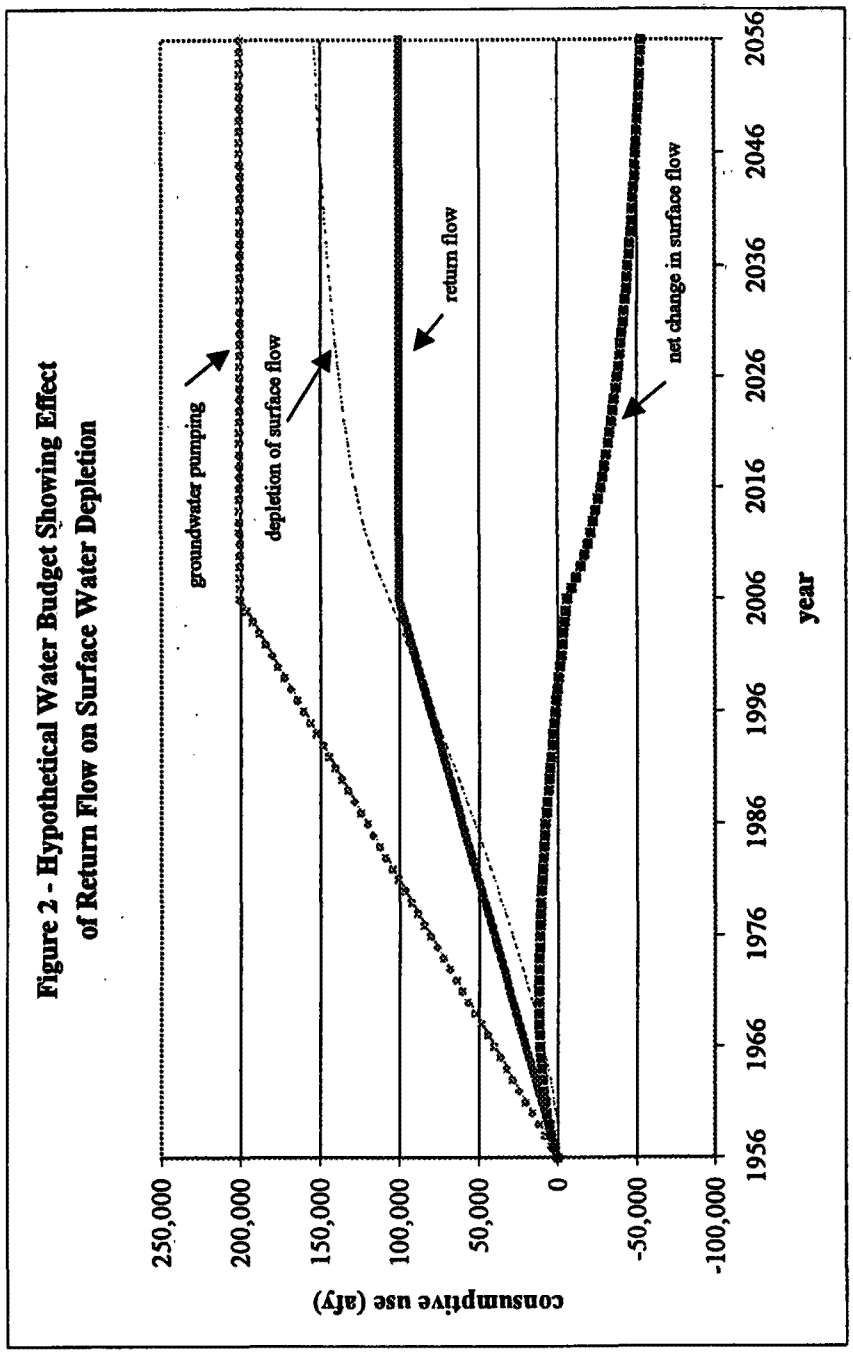

Figure 2 - Hypothetical Water Budget Showing Effect of Return Flow on Surface Water Depletion

deferring to the findings of experts that the only source of recharge to the valley was runoff from snow or rain that enters the stream system.[37] His support also focused upon the plan's protection of existing water rights. "People have established rights of long standing. They are entitled to have those rights honored and protected."[38] Mechem spoke of conserving the supply available to the valley and emphasized the security that a well-managed water rights system could provide. "Industry is having to pay for water almost everywhere and...it should be glad to know that it can establish rights which will prevent another industry from drilling and using the same supply of water."[39]

However, the plan's detractors were far more fervent and vocal. Maurice Sanchez, chairman of the Albuquerque City Commission in 1956, was adamant in his view that the closure of the basin would stifle both economic and municipal growth. "I do believe very strongly this order already has done irreparable damage to the city and to industrial expansion here and will continue to do so unless remanded (*sic*)."[40] Sanchez also felt that the city of Albuquerque had a prior right to all the water it needed, and that this right should be established through court action.[41]

Martin Threet, attorney for the Middle Rio Grande Conservancy District, publicly challenged the legality of the basin declaration and the requirement that groundwater appropriators purchase offsetting surface water rights. Threet asserted that the law gave the state engineer only limited authority: to determine the existence of unappropriated water when new well applications were presented, and to determine whether impairment of existing rights would occur.[42] Thus, declaring administrative rules for the management of the basin was, in Threet's view, beyond the statutory authority granted to the state engineer.

The most formidable challenger to the Reynolds plan turned out to be the Bernalillo-Sandoval County Farm and Livestock Bureau. Ernest Alary, president of the Livestock Bureau, announced the first definite plan to seek the official invalidation of the basin order.[43] The group planned a two-pronged legal and legislative strategy to invalidate Reynolds' plan.[44] The legal plan involved litigation to obtain a declaration that Reynolds

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37. *Water Basin a Necessity, Mechem Thinks*, ALBUQUERQUE J., Dec. 23, 1956, at 1.

38. *Id.*

39. *Id.*

40. Wayne S. Scott, *Albuquerque Can Claim All Water, Says Chairman.* ALBUQUERQUE J., Dec. 19, 1956, at 1.

41. *Id.*

42. Scott, *supra* note 33.

43. Wright Van Deusen, *Farm Bureau Plan Court Attack on Water Basin Order*, ALBUQUERQUE TRIB., Jan. 7, 1957, at 1.

44. *Id.*

exceeded his authority in issuing the plan.[45] The legislative plan was to enact a law invalidating Reynolds' basin order. Both plans went into effect almost immediately.

Legal plan to defeat the declaration of the basin

The legal strategy took shape first through the case of *State of New Mexico v. Myers and Hoard*.[46] Dr. John Myers, an Albuquerque physician, operated a sanatorium in the city. On January 31, 1957, just two months after the basin order had been issued, Dr. Myers contracted with E.T. Hoard to deepen and repair a well. The well was used by Dr. Myers to supply the facility and an on-site nursery.[47] Neither Dr. Myers nor Mr. Hoard secured a permit for the work as required by the new basin order. Dr. Myers was charged with illegal drilling or cleaning of a well; Mr. Hoard was charged with drilling a well or cleaning a well without obtaining a permit from the state engineer.[48]

Backed by the Farm Bureau, Myers and Hoard planned to attack the legality of the basin order and thus the state engineer's authority over the well activities. Appealing from an adverse lower court ruling upholding the Engineer's authority, the appellants argued to the state supreme court that the state engineer did not properly designate the underground basin. Essentially they maintained that because the northern and southern boundaries of the basin were political instead of hydrogeologic (the northern boundary coincides with the New Mexico/Colorado state line and the southern boundary coincides with Elephant Butte Reservoir), the OSE had not demarcated an underground basin in a manner consistent with the statute.[49]

Appellants offered no evidence of Middle Rio Grande hydrogeology but instead asked the court to take judicial notice that the political boundaries could not encompass an underground basin. The court rejected this invitation because the boundaries of an underground hydrologic basin are not generally known and must be established by evidence. The court went on to state, "in this case, we must presume that the action of the state engineer is correct."[50] Thus, the acts and orders of administrative bodies such as the Office of the State Engineer would be presumptively correct, unless proven otherwise.

The second, more important legal challenge to Reynolds' basin order came from the City of Albuquerque. In April of 1957, the city

45. *Id.*
46. State v. Myers, 326 P.2d 1075 (N.M. 1958).
47. CLARK, *supra* note 4, at 298.
48. *Stage Is Set for Court Test of Water Order*, ALBUQUERQUE TRIB., Feb. 8, 1957, at 1.
49. *Myers*, 326 P.2d at 1079.
50. *Id.* at 1080.

commission decided to drill wells in the city's new Love well field without seeking permits required by the basin order.[51] The city also decided that they would file suit, seeking a declaratory judgment concerning the authority of the state engineer to declare the Middle Rio Grande basin and the rights and obligations of the city.[52] The district court rejected the city's plea on the grounds that a suit against the state engineer was a suit against the state of New Mexico, which maintained sovereign immunity.[53]

The city then filed four applications with the state engineer to appropriate a total of 6000 acre-feet of ground water per year in the Rio Grande basin. The City claimed that as the successor to the Pueblo de Albuquerque y San Francisco Xavier, "it had the absolute right to the use of all waters, both ground and surface within its limits," for the use of its inhabitants.[54] (The applications to the state engineer to appropriate ground water did not waive this ancient right to all the water in the basin.) In addition, the transmittal letter that accompanied the city's permit applications made clear that the city did not intend to pledge or retire any surface water rights in connection with the applications.[55]

On November 4, 1957, the state engineer held a hearing on the applications and subsequently issued findings and an order declaring that the proposed appropriation would "impair existing rights to the use of the waters of the Rio Grande River and that the city had refused to take the steps required by him to offset the adverse effect upon the rights of such users."[56] He denied the permits for the wells.

The City appealed this finding and order to the district court of Bernalillo County. The district court received evidence concerning the pueblo water right claimed by the City, but did not hear any evidence concerning the availability of unappropriated water, the geohydrology of the system, or impairment to other appropriators. In 1960, the court entered its judgment "granting to the city the absolute right to appropriate and apply to beneficial use such underground water of the Rio Grande Underground Water Basin as it may need from the four wells in question."[57] The court ruled that the City need not comply with the conditions specified by the state engineer to offset effects of development, namely that the City retire surface rights, as the state engineer had no jurisdiction to impose conditions on the City.

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51. *City to File Suit in Water Ruling*, ALBUQUERQUE J., May 16, 1957, at 1.

52. *Id.*

53. *Judge Turns Down City's Plea in Case on Rio Grande Basin*, ALBUQUERQUE J., May 30, 1957, at 1.

54. City of Albuquerque v. Reynolds, 379 P.2d 73, 75 (N.M. 1962).

55. *Id.* at 78.

56. *Id.* at 75.

57. *Id.*

The state engineer appealed the ruling to the Supreme Court of New Mexico. The supreme court reversed the district court, finding that the district court had no jurisdiction to hear the claim of pueblo water rights because the claim did not fall within the statutory framework developed for permits.[58]

The court then examined the authority of the state engineer to impose conditions upon groundwater appropriators, specifically the requirement that appropriators offset resulting river depletions. The district court had found that the state engineer had exceeded his statutory jurisdiction by requiring the retirement of surface rights as a condition of appropriating ground water because the law did not allow for such an interrelation of surface and ground water. With little discussion, the court acknowledged the findings of the state engineer that ground water contributes substantially to the flows of the Rio Grande and development of ground water therefore impacts surface water. The court recognized that ground water and surface water are derived from the same source.[59]

Much of the supreme court's discussion of the inseparability of ground water and surface water focused upon water rights.[60] The court cited a long series of cases holding that a prior surface water appropriator can enjoin a groundwater appropriator who is intercepting water owed to the surface water appropriator.[61] Because ground water and surface water are interrelated, protection of vested rights requires that the two resources be managed conjunctively. Treating ground water as a separate entity would expose senior surface water rights holders to impairment as the effects of groundwater pumping were manifested in the stream. Despite differences in the administrative procedures for securing surface and groundwater rights, the Supreme Court held that the substantive rights themselves are identical.[62] The city's argument that the state engineer should only consider impairment to other groundwater appropriators was therefore rejected. In its conclusion, the court stated,

> We feel constrained to hold that the state engineer adopted the only known plan to avoid impairment to existing rights and that his requirement, that surface rights be retired to the

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58. Charles T. DuMars, *Changing Interpretations of New Mexico's Constitutional Provisions Allocating Water Resources: Integrating Private Property Rights and Public Values*, 26 N.M. L. REV. 367, 371 (1996).

59. City of Albuquerque v. Reynolds, 379 P.2d 73, 77 (N.M. 1962).

60. *Id.*

61. *See* El Paso & R.I. Ry. Co. v. District Court of Fifth Judicial District, 36 N.M. 94 (1931); Carlsbad Irr. Dist. v. Ford, 8 P.2d 1064 (N.M. 1942); Pecos Valley Artesian Conservancy Dist. v. Peters, 173 P.2d 490 (N.M. 1946); Chavez v. Gutierrez, 213 P.2d 597 (N.M. 1950); Templeton v. Pecos Valley Artesian Conservancy Dist., 332 P.2d 465 (N.M. 1958).

62. *City of Albuquerque*, 379 P.2d at 79.

> extent necessary to protect prior stream appropriators as a condition of the granting of an application to appropriate from the basin, is within the lawful power and authority of the state engineer.[63]

Through the *Myers* and *City of Albuquerque* cases, the New Mexico Supreme Court clearly established the authority of the state engineer to protect prior appropriators of Rio Grande surface water from impairment resulting from the development of groundwater resources. Additionally, the state engineer had the authority to "impose suitable conditions to insure that pumping granted by permits will not impair existing rights."[64]

Legislative plan to defeat the declaration of the basin

The Farm Bureau's legislative strategy for overturning the declaration of the basin had a shorter lifespan but a similar outcome. House Bill 198, sponsored by the City of Albuquerque in the 1957 legislature, was intended to nullify the basin order by placing the power to administer ground water in the hands of the court.[65] In February 1957, the House Agricultural Committee Substitute for House Bill 198 passed in the New Mexico State House of Representatives by a vote of 48 to 6.[66] In early March, the State Senate, in a 17-to-15 vote, rejected the bill. But two days later the senate reversed itself when Lieutenant Governor Joe Montoya entered a vote in favor of the bill to break a 16–16 tie.[67] However, the bill received a pocket veto by Governor Mechem and was never revived.

The declaration of the basin had survived its legal challenges. In the process, the courts had validated the Office of the State Engineer as a powerful regulatory agency with the authority to make technical decisions. The state engineer now had to settle in for the challenges of regulating water appropriation in the fastest growing segment of New Mexico, along the middle Rio Grande, including the city of Albuquerque and its suburbs.

ADMINISTERING THE WATER OF THE MIDDLE RIO GRANDE

The Rio Grande is a renewable source of water to the valley and provides the opportunity to adopt a sustainable approach to water management. This approach has been implicit in the management of the

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63. *Id.* at 81.
64. *Id.*
65. *See* An Act Relating to Underground Water, H.B. 198, 23rd Leg. (N.M. 1957).
66. House Journal, Feb. 22, 1957 (on file with author).
67. G. Emlen Hall, *Steve Reynolds–Portrait of a State Engineer as a Young Artist*, 38 NAT. RESOURCES J. 537, 544 (1998).

basin from the time it was declared. In his 1956 memorandum accompanying the basin declaration, State Engineer Reynolds stated that

> (s)upplemental wells will take water from the ground-water reservoir at times when the surface-water supply is limited and the ground-water reservoir will be recharged when the surface water supply is plentiful. The average annual surface-water supply is adequate to permit this utilization of the ground-water reservoir without impairment of existing rights.[68]

This option was only available because a perennial source of significant recharge is present. In other basins where there is no significant source of recharge, the state engineer administers the basin under entirely different criteria.[69]

Sustainable management for the Middle Rio Grande is intended to protect existing water rights and preserve compliance with the Rio Grande Compact. Protection of existing water rights is accomplished by requiring groundwater users to acquire surface water rights to offset effects on the river. Compliance with the Compact is achieved by limiting total groundwater use to a level that can be offset, thus preventing surface water depletions beyond those occurring in 1956.

Adopting a sustainable management approach to the Middle Rio Grande thus required an understanding of both the timing of future impacts and the total amount of water available for consumption. As such, the key questions for the state engineer in the Middle Rio Grande concerned the effects of groundwater pumping on river flows over time and the total amount of groundwater pumping that could be offset by purchase of surface water rights. A brief description of how those effects are estimated helps to explain the issue.

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68. Reynolds, *supra* note 25, at 6.

69. The Lea County Underground Water Basin in southeast New Mexico is a non-recharging basin, unlike the Rio Grande basin. In 1952, the state engineer developed a 40-year management plan permitting withdrawal of two-thirds of the water in storage. The permitted use of 350 acre-feet per year by Texaco was challenged because of the effect of Texaco's pumping on other appropriators, including increased pumping costs and a shortened life of the aquifer. The supreme court upheld the trial court and deferred to the authority of the state engineer to recognize that any water use would result in some impairment, and to thus set a finite planning horizon and declare a portion of the available water "unappropriated." The state engineer determined that although Texaco's use would cause drawdown, in this particular basin it was not "impairment" as defined by the statute. *See* Mathers v. Texaco, 421 P.2d 771 (N.M. 1966).

Estimating the Effects of Groundwater Pumping over Time

Pumping ground water from a geological formation that is hydrologically connected to a river will eventually deplete the river. Depletion occurs in two ways, depending upon whether a stream is gaining water or losing water. In the first case, a gaining stream is recharged by the local groundwater system. Groundwater pumping can intercept water that was flowing towards the river and diminish the amount of recharge the river would otherwise receive. In the case of a losing stream, surface water recharges the local aquifer. Groundwater pumping will induce water from the river into the aquifer and towards the well to replenish the water taken from aquifer storage. During the course of sustained groundwater pumping, an adjacent gaining stream can become a losing stream as the water table is continually drawn down.

When a well is first pumped, the water level close to the well is lowered and water is taken from ground water stored in the immediate area. As pumping continues, the water level is drawn down at greater and greater distances and a cone of depression forms. The cone of depression is centered at the well, where drawdown is greatest. The size and shape of the cone depends on pumping rate, time pumped, the permeability of aquifer materials, and how much water the materials hold in storage. The lowered water levels inside the cone induce water to flow towards the well.[70]

The cone of depression expands until it reaches either an impermeable boundary, such as a geologic formation with a very low hydraulic conductivity, or a source of recharge, such as a river. Along the Rio Grande, wells pumping ground water in the permeable alluvium surrounding the river intercept water flowing down from the eastern mountains that would otherwise discharge into the river, decreasing surface flow. In addition, surface water already flowing in the river may be drawn into the aquifer and toward the well. In a system like the Middle Rio Grande where most of the water either flows to or from the river, depletion of surface flow will ultimately be equal to the groundwater pumping rate.[71]

The effects of groundwater pumping are not immediate and can often take many years to deplete surface flows. The management approach adopted by the OSE involved determining how rapidly the effects of a groundwater diversion would reach the river, and then developing an appropriate schedule whereby the appropriator was required to offset the effects of pumping as they gradually manifested on the river. Appropriators could offset through a retirement or dedication process, requiring the

70. For a general discussion of aquifer response to pumping, see R. ALLAN FREEZE & JOHN CHERRY, GROUNDWATER 313-34 (1979).

71. GROUND WATER AND WELLS 20-23 (Edward E. Johnson, Inc. ed., 1966).

applicant to acquire and retire the specified amount of surface water rights in the Rio Grande. The retirement or dedication process was declared unlawful by the New Mexico Attorney General in 1994, because the water rights to be retired were not identified at the time of the permit and therefore could not be evaluated for impacts to the conservation of water or public welfare.[72] Subsequently, the process was modified by the OSE to require a permit for acquiring the surface rights, including public notice and opportunity to protest.[73]

Analytical techniques have been developed that yield an estimate of the rate at which groundwater pumping depletes a nearby stream. To develop a schedule of when, and in what amounts, an appropriator's pumping would affect the river, the OSE applied a technique developed by Glover and Balmer[74] that is based on a groundwater flow equation developed by C.V. Theis in 1941.[75] The Glover-Balmer equation estimates river depletion based on pumping rate, time of pumping, distance from the river, and the properties of aquifer materials.

A sample schedule based upon an appropriation of 1000 acre-feet per year five miles from the river was developed using the Glover-Balmer solution and was presented by Reynolds in the memorandum accompanying the declaration of the basin,[76] as follows:

Time period elapsed from start of pumping	Stream depletion
1 year	90 acre-feet
5 years	210 acre-feet
10 years	290 acre-feet
15 years	370 acre-feet
20 years	420 acre-feet
25 years	460 acre-feet
30 years	500 acre-feet

72. N.M. Op. Att'y Gen. 94-07 (Dec. 23, 1994) *at* http://www.ago.state.nm.us/pdf/OP-NO-94-07.pdf.

73. *Id.*

74. Robert E. Glover & Glenn G. Balmer, *River Depletion Resulting from Pumping a Well Near a River*, 35 AM. GEOPHYSICAL UNION TRANSACTIONS 468 (1954).

75. Memorandum Decision of State Engineer, *supra* note 12.

76. Reynolds, *supra* note 25, at 5.

It is important to note that even if pumping ceases, the effects of the pumping continue. River depletion is computed using the Glover-Balmer equation for a hypothetical groundwater diversion lasting 30 years, shown on Figure 3. River depletion continues to increase for one-to-two years after pumping stops and then gradually decreases.

With the accumulation of hydrologic and geologic information on the Middle Rio Grande and the advent of computer modeling technology, it became possible to develop a much more accurate assessment of the effects of groundwater pumping. Beginning in the 1980s, a numerical model of groundwater flow in the Middle Rio Grande was developed,[77] culminating in a 1999 model used to evaluate groundwater drawdown and surface water depletions under the 2000 Office of the State Engineer Middle Rio Grande Guidelines. For 2000, the model estimates river depletions due to groundwater pumping at about 95,000 acre-feet per year.[78]

Estimating the Total Amount of Surface Water Available for Offset

Another important inquiry for the state engineer is how much groundwater pumping to permit before closing the basin to further groundwater appropriations. In 1956, the surface water of the Rio Grande was considered fully appropriated. More precisely quantifying this use and determining the total surface water rights available to offset groundwater appropriations would take many years. This determination was left to a successive state engineer, several decades into the future.

THE YEAR 2000 GUIDELINES—CLOSURE OF THE MIDDLE RIO GRANDE ADMINISTRATIVE AREA

As anticipated by State Engineer Reynolds in the original plan for the basin, groundwater pumping in the Middle Rio Grande increased significantly during the period of 1956–2000. Groundwater use was steadily approaching the maximum amount of water for which surface offset rights exist. In 1956, groundwater pumping in the basin was under 30,000 acre-feet per year.[79] By 2000, existing rights to appropriate water had grown to about

77. JOHN MICHAEL KERNODLE ET AL., U.S. GEOLOGICAL SURVEY, SIMULATION OF GROUNDWATER FLOW IN THE ALBUQUERQUE BASIN, CENTRAL NEW MEXICO, 1901–1994, WITH PROJECTIONS TO 2020 (1995).

78. Projections were evaluated with the OSE groundwater flow model documented in PEGGY BARROLL, OFFICE OF THE STATE ENGINEER TECHNICAL DIVISION, DOCUMENTATION OF THE ADMINISTRATIVE GROUNDWATER MODEL FOR THE MIDDLE RIO GRANDE BASIN, HYDROLOGY BUREAU REPORT 99-3 (Apr. 1999).

79. *Id.*

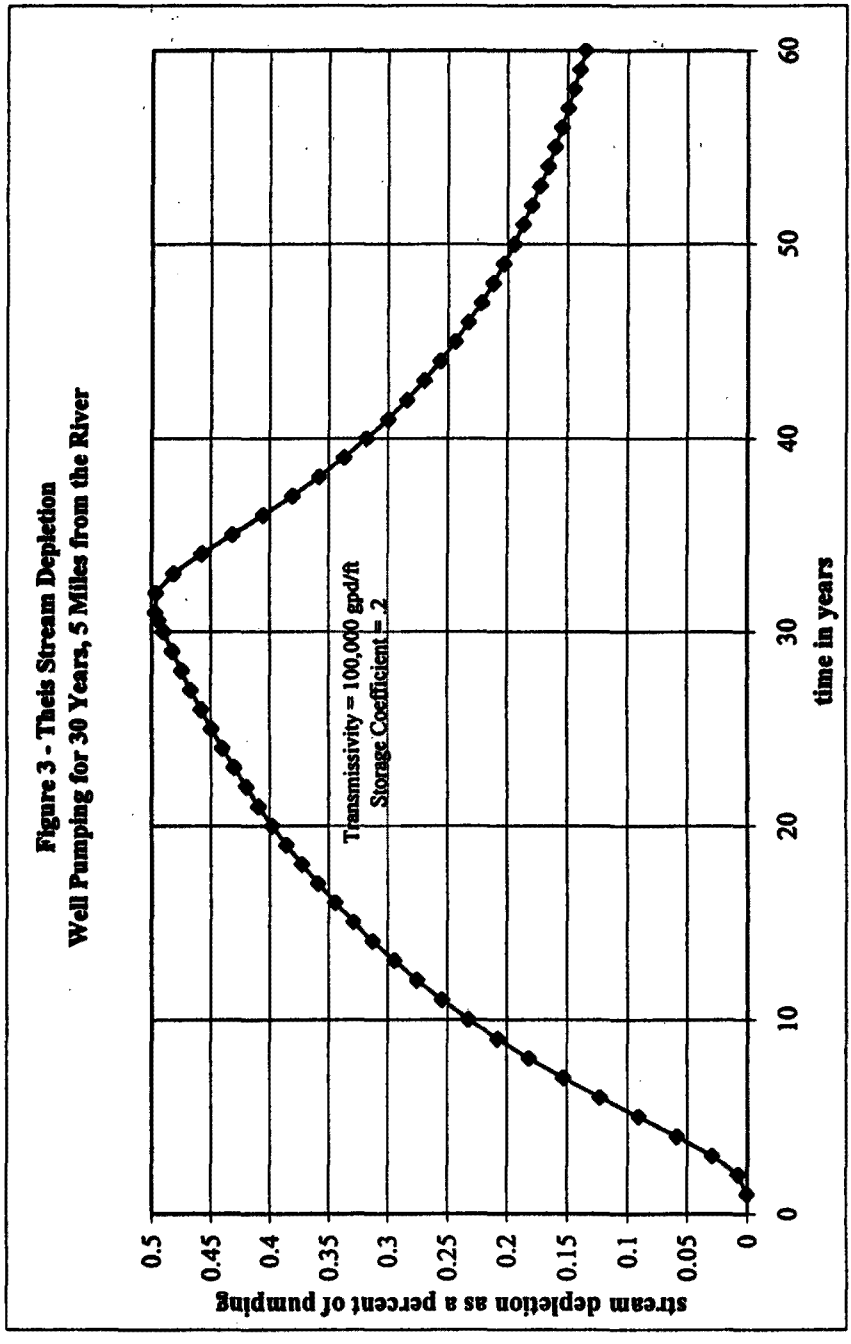
Figure 3 - Theis Stream Depletion
Well Pumping for 30 Years, 5 Miles from the River
Transmissivity = 100,000 gpd/ft
Storage Coefficient = .2
stream depletion as a percent of pumping
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40
50
60
time in years

217,600 acre-feet per year.[80] Approximately 157,000 acre-feet per year were actually being diverted and return flows totaled roughly 69,000 acre-feet per year.[81]

More than 40 years after the original declaration of the basin, new guidelines for administering water rights in the Middle Rio Grande basin were issued by the Office of the State Engineer.[82] The Middle Rio Grande Administrative Area Guidelines for Review of Water Right Applications closed the populous areas through Sandoval, Bernalillo, Valencia, and part of Socorro counties to any new groundwater appropriations. The guidelines state that in this area all new applications to appropriate ground water will be rejected.[83] This development is a critical component of the original plan to insure that groundwater appropriation is limited by the amount of surface water rights available. The closure also helps to insure that surface flows to meet compact obligations are maintained and impairment to existing water rights holders is prevented.

The new guidelines carefully delineate the areal extent of the Middle Rio Grande alluvial aquifer that is hydrologically connected to the Rio Grande. Any groundwater withdrawals from this alluvial aquifer will eventually deplete the surface flow of the Rio Grande and will require strict management if surface flows and Compact compliance are to be sustained. This area is smaller than the original area declared in 1956 and is more focused to capture the aquifer with the closest hydrologic connection to the river.[84] It also encompasses the major population center of the Albuquerque region, including Belen to the south of Albuquerque, Rio Rancho to the northwest, and Bernalillo to the north (see Figure 4).

The guidelines specify that with the exception of domestic wells, new applications to appropriate ground water will be rejected.[85] The guidelines therefore only apply to pending water rights applications within the administrative area that were filed prior to the adoption of the guidelines, including Rio Rancho's and the City of Albuquerque's application to appropriate an additional 23,000 acre-feet per year of ground water.[86] Permits for these applicants will only be issued to allow groundwater diversions equal to "valid consumptive use surface water rights held and designated for offset purposes by the permittee plus any

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80. S.S. Papadopulos & Associates, Middle Rio Grande Water Supply Study, Figure 5.17, 2000, *at* http://www.seo.state.nm.us/water-info/mrgwss/.

81. *Id.* Table 5.3, Figure 5.17.

82. *See generally* ADMINISTRATIVE AREA GUIDELINES, *supra* note 2.

83. *Id.* at 3. Domestic wells, as defined by N.M. STAT. ANN. § 72-12-1 (Michie 1978), are not included in this restriction.

84. ADMINISTRATIVE AREA GUIDELINES, *supra* note 2, at 1.

85. *Id.*

86. Application of the City of Rio Rancho, *supra* note 3, at 3.

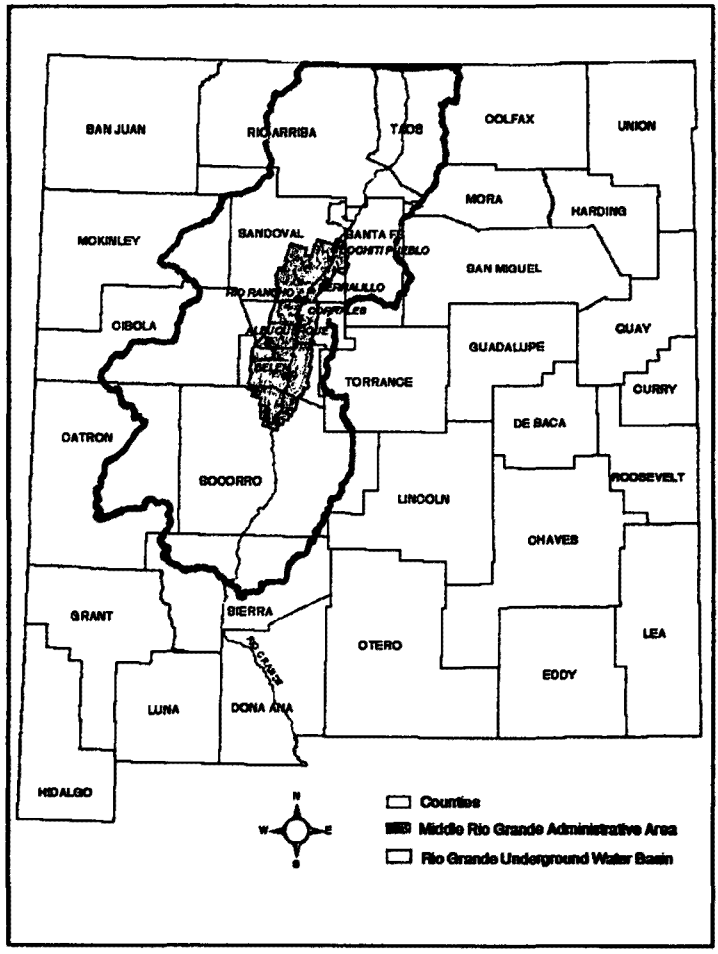

Figure 4 – Rio Grande Basin and Middle Rio Grande Administrative Area
New Mexico Office of the State Engineer *at* http://www.seo.state.nm.us/doing-business/mrgbasin/mrgbasin.html

State Engineer approved flow returned directly to the Rio Grande."[87] Thus, the burden upon these final applicants is now significantly greater than in the early days of the administration of the basin, when appropriators were able to gradually acquire surface rights to offset the effects of groundwater pumping.

The guidelines enumerate four primary management objectives of the OSE: (1) to ensure compliance with the Rio Grande Compact, (2) to

87. ADMINISTRATIVE AREA GUIDELINES, *supra* note 2, at 4.

prevent impairment to existing rights, (3) to limit the rate of decline of groundwater levels to extend the life of the aquifer, and (4) to minimize land subsidence.[88] These objectives underscore the continuity in approach from the initial management scheme developed by Reynolds in 1956, namely managing the basin to ensure that effects to the river are offset by the retirement of rights held by surface water appropriators, and protecting prior appropriators from impairment while allowing maximum development. Underlying these explicit objectives is the recognition that the total amount of groundwater pumping is approaching the sustainable limit; no new applications to appropriate water can be accepted.

The focus of the 2000 guidelines, as with the earlier management scheme, is maintaining flow in the river. However, the new approach allows potential appropriators far less time and flexibility. In order to acquire a permit to appropriate ground water, an applicant must have filed an application prior to September 13, 2000, and hold valid consumptive use surface water rights designated for offsetting purposes.[89] This requirement was introduced to provide certainty that an applicant "will be able to obtain and transfer all necessary valid surface water rights to prevent adverse effects upon the flow of the Rio Grande."[90] This is a necessary condition as competition for the remaining surface water rights is growing. Large communities along the Rio Grande that have committed to purchase surface water rights to offset the growing impacts of municipal groundwater pumping, such as Rio Rancho, will continue to seek willing sellers of a finite number of surface rights.

Rio Rancho, New Mexico

The city of Rio Rancho became the first groundwater permit applicant to be evaluated under the new guidelines.[91] In 1993, Rio Rancho applied to increase its permitted appropriation from 12,000 to 24,000 acre-feet per year for domestic, commercial, and industrial purposes.[92] Twelve thousand acre-feet per year is a significant amount of water, comprising roughly 7.5 percent of the total amount of groundwater pumping recorded by the OSE from the underground basin in 2000.[93] Rio Rancho projected that

88. *Id.* at 1.

89. *Id.* at 4.

90. *Id.* at 3.

91. *See* Application of the City of Rio Rancho, *supra* note 3.

92. The original application was filed by Rio Rancho Utilities Corporation. On August 21, 1996, ownership of the water right was transferred from Rio Rancho Utilities Corporation to the City of Rio Rancho. *Id.* at 3.

93. Projections were evaluated with the OSE groundwater flow model documented in BARROLL, *supra* note 78.

its population would increase threefold during the 40-year planning horizon, from 51,250 people in 2000 to 151,970 in 2040, and the total existing and applied for rights would meet demand until 2033. Rio Rancho proposed to divert the water using 23 existing wells and 12 new wells.[94]

In addition to demonstrating beneficial use of the new groundwater diversions, Rio Rancho showed its ongoing commitment to water conservation. Between 1995 and 1999, the city decreased its per capita water usage by nine percent. Rio Rancho also projected that conservation measures would continue to be successful, lowering per capita demand by three-quarters of a percent every five years. The water delivery infrastructure was also found to be efficient, with low transmission losses of 8.6 percent.[95] The city fulfilled the statutory requirement that the appropriation of water be consistent with the resource conservation goals of the state.[96]

Future projections based upon the pumping scenario proposed by Rio Rancho indicate that drawdown of the water table would not exceed the annual drawdown limits set by the OSE.[97] In addition, OSE found that the estimated level of drawdown should not impair neighboring wells.[98] However, any new groundwater appropriation will eventually deplete the river. The OSE noted that Rio Rancho did not have the surface water rights to offset the effects of the pumping, and, furthermore, the city had presented no evidence that the requisite surface rights would be obtained.[99]

OSE ultimately approved Rio Rancho's permit application. This approval, however, is subject to Rio Rancho transferring valid consumptive use surface water rights equal to the amount to be pumped, minus return flow, prior to the start of pumping. At this time Rio Rancho does not have the surface rights. In addition to seeking offset rights for the newly applied for 12,000 acre-feet per year diversion, the city also is responsible for gradually acquiring rights to offset the effects of the current diversion of approximately 12,000 acre-feet per year according to the permit conditions issued under the previous guidelines. Thus, Rio Rancho will only be able to augment its supply as valid surface rights are obtained and transferred. The City of Rio Rancho is appealing the decision in state district court.[100]

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94. Application of the City of Rio Rancho, *supra* note 3, at 2.
95. *Id.* at 5.
96. N.M. STAT. ANN. § 72-12-3 (1978).
97. Application of the City of Rio Rancho, *supra* note 3, at 12.
98. *Id.* at 13.
99. *Id.* at 14.
100. *City of Rio Rancho Appeals State Engineer's Decision Requiring Purchase of Offset Water Rights before Groundwater Pumping Affects River*, Western Water Law and Policy Report, December 2001, *at* http://www.argentco.com/htm/f_ww_20011201.209605.htm.

Prior to September 2000, the key inquiry by the state engineer was one of time, to determine when the effects of groundwater pumping would reach the river. A schedule for the appropriator to acquire offset surface rights was then developed, corresponding to the time scale on which river depletions due to groundwater pumping were expected to occur. The new guidelines change the time inquiry by requiring surface water rights to be acquired in advance of effects on the river. The guidelines allow acquired surface rights to be leased out until they are needed to offset effects of groundwater pumping. The lease-back provisions provide that, although an appropriator must have all of the offset rights they will ever need in hand prior to the start of pumping, the appropriator may lease back surface rights until they are necessary to offset the depletions in a given year.[101] The state engineer will develop a stream depletion schedule similar to that developed under the old guidelines and allow the holder to lease back surface rights in successively smaller amounts as the river is depleted by the groundwater pumping.

Authority of the State Engineer to Impose Conditions on Permit Applications

Not only are the new guidelines an essential element of the original 1956 plan, they are well within the jurisdiction and authority of the state engineer. *City of Albuquerque v. Reynolds* established the broad authority of the state engineer to impose conditions on appropriations to protect existing rights.[102] The court reiterated the findings of the state engineer concerning the interrelationship between ground water and surface water, and the accumulating effects of groundwater pumping on river flows, and then went on to reject the argument that municipalities should be exempted from the regulations. The court examined New Mexico Statute 75-11-3,[103] which requires an application to the state engineer from "[a]ny person, firm, or corporation" who wants to appropriate water. The court concluded that the term "corporation" embraced municipal corporations.[104] With this ruling, the court recognized that an administrative scheme for managing a limited resource could not be effective if the major users were not participating.

Most of the cases reaffirming the authority of the state engineer to condition permits involve applications to change the point of diversion and purpose or place of use of water. Six years after *City of Albuquerque*, the New Mexico Supreme Court upheld a decision by the state engineer to approve

101. ADMINISTRATIVE AREA GUIDELINES, *supra* note 2, at 5.
102. 379 P.2d 73, 81 (N.M. 1962).
103. N.M. STAT. ANN. § 75-11-3 (1953).
104. *Id.* at 83.

an application to change the place and use of a water diversion. Pursuant to state law, the Office of the State Engineer evaluated the application and found that it would not impair existing rights.[105] The approval of the application capped the total annual amount of water that could be diverted. The purpose of the cap was to prevent impairment of other users.

The court called attention to the protection this condition afforded the W.S. Ranch, an adjacent water user. "[W]e fail to understand how the conditions imposed do anything except give W.S. Ranch added assurance that its water rights will be protected."[106] This reminder to the protester is reminiscent of Gov. Elect Edwin Mechem's stance taken during the declaration of the basin, that current water users would be the beneficiaries of an administrative system that protected their rights.

One year later the court again affirmed the discretion of the state engineer to impose conditions on groundwater pumping permits. In *City of Roswell v. Berry*, the city of Roswell applied to the state engineer to change "the location of wells and the place and purpose of use of water from the wells."[107] During the administrative hearing, Roswell and Carlsbad entered into a stipulation: Roswell agreed to permanently retire and abandon 1500 acre-feet of valid water rights if the state engineer would approve Roswell's application.[108] The state engineer further specified where a portion of the 1500 acre-feet was to originate.

In response to an appeal from Mr. Berry of the Carlsbad Irrigation District, the court stated, "In deciding the issue of impairment, the State Engineer is not limited to either an approval or rejection of the application *in toto*. In order to prevent an impairment of rights, he had authority to approve an application subject to conditions."[109] The court clarified further that the state engineer's authority extends to specifying how imposed conditions were to be met.[110] A number of cases followed, reaffirming the authority and jurisdiction of the state engineer to condition permits when impairment to the rights of others would result.[111] These cases reinforce the proposition that technical decisions concerning water allocation and management will not be made in the courts. Judgments concerning the

105. N.M. Stat. Ann. §§ 75-5-22, 75-5-23 (1953) (current version at N.M. Stat. Ann. § 72-12-1 (1978)).

106. W.S. Ranch Co. v. Kaiser Steel Corp., 439 P.2d 714, 718 (N.M. 1968).

107. City of Roswell v. Berry, 452 P.2d 179, 181 (N.M. 1969).

108. *Id.* at 181.

109. *Id.*

110. *Id.* at 183.

111. *See* State of New Mexico *ex rel.* Reynolds v. Molybdenum Corp. of America, 570 F.2d 1364 (10th Cir. 1978); State *ex rel.* Reynolds v. Aamodt, 800 P.2d 1061 (N.M. 1990); Reynolds v. City of Roswell, 654 P.2d 537 (N.M. 1982); *In re* Sleeper, 760 P.2d 787 (N.M. Ct. App. 1988).

measurement and distribution of water are best made by the state engineer, and the courts will defer to those judgments.

Another important facet of *City of Albuquerque* and its progeny is that they establish the power of the state engineer to not only condition a permit for unappropriated water but also to define unappropriated water itself. New Mexico law provides that the state engineer must grant an application to appropriate water if, inter alia, unappropriated water exists.[112] The OSE is required to evaluate applications regarding the availability of unappropriated ground water or the impairment of existing water rights.[113] New Mexico statutes do not define "unappropriated water," but they require that the state engineer determine how much unappropriated water is available.[114] As a result, "unappropriated water" has come to be defined by the state engineer as water that may be appropriated without exceeding particular impairment conditions set forth by the OSE.[115] "Unappropriated water" does not have a static definition but is dependent upon the hydrogeologic setting and public welfare concerns in a particular basin.

For example, unappropriated water in Lea County in southeastern New Mexico has been defined differently than unappropriated water in the Middle Rio Grande. The Lea County Underground Water basin receives no appreciable recharge and is thus considered a non-recharging basin. In 1952, the state engineer developed a 40-year management plan permitting withdrawal of two-thirds of the water in storage. The state engineer determined the portion of the water resource that was "unappropriated" and accordingly permitted Texaco to pump 350 acre-feet per year. Despite the fact that granting a new appropriation in the non-recharging basin would result in lower water levels and shortened well life for existing appropriators, the court upheld the authority of the state engineer to evaluate the hydrogeologic conditions specific to a basin and define the amount of unappropriated water available.[116]

In contrast, the Middle Rio Grande receives significant recharge from the river. In the Middle Rio Grande Administrative Area the state engineer has evaluated the hydrogeologic conditions of the basin and developed a method for determining the amount of unappropriated water present, based on long-term sustainable use and compliance with the Rio Grande Compact. The state engineer has determined that the applications

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112. N.M. STAT. ANN. § 72-12-3.E (Michie 1978).

113. N.M. STAT. ANN. § 72-5-7 (Michie 1978).

114. N.M. CONST. art. XVI, § 2; N.M. Stat. Ann. §§ 72-4-15, 72-5-6, 72-5-7, 72-14-43 (Michie 1978).

115. *Interview with* Fred Allen, OSE Hearing Examiner, *in* Albuquerque, New Mexico (Mar. 2002).

116. Mathers v. Texaco, 421 P.2d 771 (N.M. 1966).

currently on file will claim the remaining unappropriated water in the basin. In addition, the state engineer has defined three conditions that the current applications must meet in order to be approved:

1) The Rio Grande is fully appropriated, so new groundwater appropriations cannot have a detrimental effect upon the river.[117]
2) The proposed appropriation combined with other existing water diversions cannot exceed 2.75 feet per year of drawdown in non-critical zones.[118]
3) The proposed appropriation combined with other existing water diversions cannot exceed 2.5 feet per year of drawdown in critical zones.[119]

The court in both *City of Albuquerque v. Reynolds* and *Mathers v. Texaco* did not focus on the physical definition of unappropriated water but instead granted the state engineer leeway to articulate broad management schemes that account for long-term impacts. Water claimed by other users may be granted to an applicant based on the planned life of a non-recharging aquifer. Conversely, water that may be described as "unappropriated" at a particular instant may be denied to the applicant because of the inevitable and unavoidable impacts that will eventually manifest themselves both on neighboring appropriators and upon the river.

The court in *City of Albuquerque* addressed this point directly when responding to the city's statutory argument that if unappropriated water existed and impairment to other groundwater users would not result, the state engineer was required to grant a permit for groundwater diversion. In essence, the city was arguing that the state engineer had no legislative authority to protect prior stream appropriators from impairment.[120] In rejecting this argument, the court noted the connection between ground water and surface water and the "unconscionable burden of time and expense of litigation on prior stream appropriators" and refused to narrowly construe the statute.[121] The current management decision to close the middle portion of the Rio Grande basin is congruent with the earlier decision to conjunctively manage surface and groundwater appropriations, as it is arguably the "only known plan to avoid impairment to existing rights."[122]

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117. ADMINISTRATIVE AREA GUIDELINES, *supra* note 2, at 1.

118. *Id.* at 6.

119. *Id.* Critical Management Areas are those with excessive water level declines. Large segments of northeast and southeast Albuquerque, east of the Rio Grande, are designated as such. See map (figures 6(a) and 6(b)) included with Guidelines. *Id.*

120. City of Albuquerque v. Reynolds, 379 P.2d 73, 80 (N.M. 1962).

121. *Id.* at 80.

122. *Id.* at 81.

PRESENT DAY CHALLENGES OF THE MIDDLE RIO GRANDE BASIN PLAN

State Engineer Steve Reynolds' plan to allow a period of increased water use in the Middle Rio Grande provided many positive benefits for the region, most notably sustained agriculture and great economic growth. However, the plan left a number of significant challenges to future administrators.

Enforcement of the retirement policy is difficult. It would be hard—perhaps impossible—to curtail pumping by groundwater appropriators providing utility service to municipal or industrial users if they were unable to retire surface rights. Growing communities are dependent upon this water to supply their most basic needs. Likewise, enforcement of priority rights under this system is almost impossible. In times of shortage, junior groundwater users cannot simply stop pumping to provide senior surface water users with their full allotment. Shutting off a groundwater diversion will not free additional water for senior surface water appropriators. In addition, the effects of the pumping will continue to propagate, drawing water from the river after pumping has stopped.[123]

Perhaps most importantly, the plan foresees a dramatic change in the historic landscape of the Rio Grande valley. The plan assumes that agricultural diversions will be replaced by municipal and industrial water uses.[124] This ultimately means that a fundamental part of New Mexico history and culture—irrigated agriculture—would be at least partially replaced by new urban uses.

Water transfers from agricultural applications affect rural communities in two ways. Neighboring irrigators may be impacted physically when one irrigator stops diverting water through the loss of system carriage water and local return flow. Rural communities are also impacted economically when pockets of agriculture cease production. Declining agricultural production will cause demand for traditional goods and services to fall, negatively affecting the financial support to the community.[125] Furthermore, New Mexicans do not want to dry up rural communities in support of urban growth.[126] Surveys and regional water plans indicate that New Mexicans value preserving the rural lifestyle and economy and do not favor transferring water away from rural areas to meet

123. ALLETTA BELIN ET AL., TAKING CHARGE OF OUR WATER DESTINY: A WATER MANAGEMENT POLICY GUIDE FOR NEW MEXICO IN THE 21ST CENTURY 13 (2002).

124. *See* Reynolds, *supra* note 6.

125. BELIN ET AL., *supra* note 123, at 33.

126. *Id.* at 33-34.

urban demands.[127] Thus, the original plan placed a large responsibility upon future administrators to balance regional water use, protect existing rights, and preserve cultural values held by many New Mexicans.

CONCLUSION

Nearly 50 years after the declaration of the Middle Rio Grande Basin, the anticipated basin closure has arrived. Management of this closed basin will be more complex. As originally anticipated, growing municipal and industrial water uses have coexisted with agricultural uses to enable growth and prosperity in the valley. However, groundwater depletions now exceed return flows,[128] and the region has entered a drought cycle. The time is rapidly approaching when surface flows necessary to fulfill New Mexico's Compact obligation will not be available if the impacts of pumping on surface flows are not offset with the retirement of surface water rights. As originally anticipated when the basin was declared in 1956, a gradual reduction in consumptive water use is necessary to avoid impairment to existing appropriators and to meet the Compact obligation.

The administrative guidelines issued in 2000 are an essential first step in this process because they prevent any new non-domestic appropriations. However, they are only a first step; comprehensive and effective management of the Middle Rio Grande will require additional measures. Tribal water rights remain unquantified. Individuals asserting pre-basin declaration water claims may one day add to those currently diverting water from the basin,[129] and the total withdrawal from domestic wells remains unquantified. In addition, New Mexico is a state that rarely enforces its prior appropriation system, even during drought years. New Mexico has already established its leadership among western states by applying the best available science to manage its water; it must now continue this tradition by more aggressively enforcing its policies.

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127. *Id.*
128. Papadopulos & Associates, *supra* note 80, Figure 5.26.
129. *See* Reynolds v. Mendenhall, 362 P.2d 998 (1961).