

5-2013

Middle Rio Grande Project

Andrew H. Gahan
Bureau of Reclamation

Follow this and additional works at: https://digitalrepository.unm.edu/uc_rio_chama

Recommended Citation

Gahan, Andrew H.. "Middle Rio Grande Project." (2013). https://digitalrepository.unm.edu/uc_rio_chama/86

This Article is brought to you for free and open access by the The Utton Transboundary Resources Center at UNM Digital Repository. It has been accepted for inclusion in Law of the Rio Chama by an authorized administrator of UNM Digital Repository. For more information, please contact amywinter@unm.edu, lsloane@salud.unm.edu, sarahrk@unm.edu.

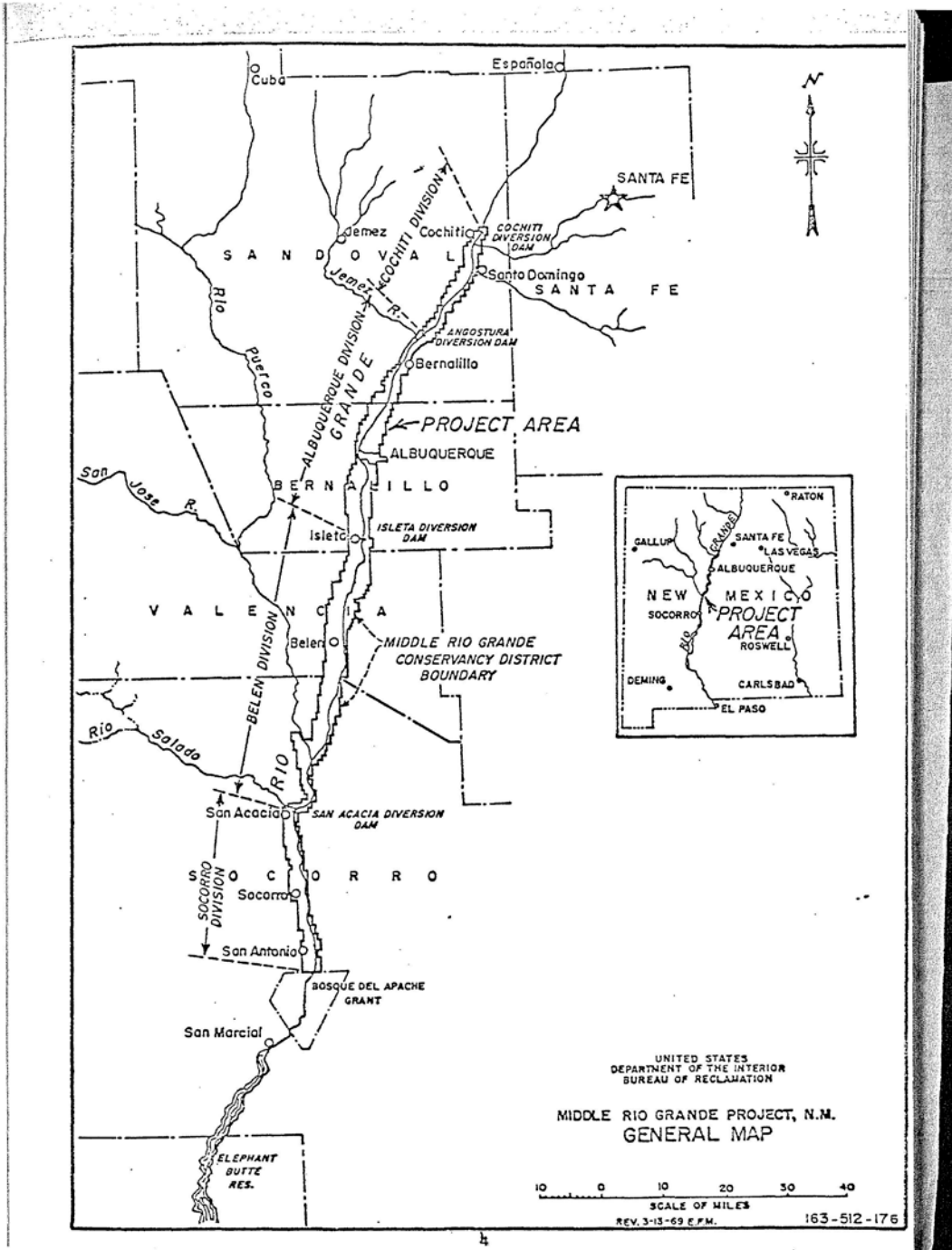
Middle Rio Grande Project

Andrew H. Gahan
Historic Reclamation Projects
Bureau of Reclamation
May 2013

Table of Content

Table of Content	i
Middle Rio Grande Project	1
Introduction	1
Project Location	1
Historic Setting.....	2
Project Authorization	8
Project Construction.....	12
Post Construction	17
Use of Project Water	19
Conclusion.....	23
Bibliography	25
Primary Sources	25
Government Documents.....	25
Secondary Sources	27

Middle Rio Grande Project New Mexico



Middle Rio Grande Project

Introduction

In 1951 the Bureau of Reclamation began construction on the Middle Rio Grande Project in New Mexico to rehabilitate both existing irrigation features and the river channel. Over many years, agricultural, mining, and industrial development caused increasing amounts of sediment to enter the river, aggrading the river bed and raising the water table. This condition along with depletion in water flows throughout the Rio Grande basin created a situation that threatened agricultural production in the Middle Rio Grande Valley. The Middle Rio Grande Project was in essence a flood control and river rehabilitation project. For Reclamation at the time, the project was novel in that it did not consist of any large dam, powerplant, or canal construction. It contained large Indian irrigation features because of the presence of Pueblo Indian communities with significant Rio Grande water rights. The project also involved the often complicated and contested issue of water rights of Indian and non-Indian water users. Among the issues was rehabilitation of middle valley irrigation facilities within the confines of the Rio Grande Compact between the states of Colorado, New Mexico, and Texas.

Project Location

Located in the north-central part of New Mexico, the Middle Rio Grande Valley extends from the Colorado-New Mexico state line to the backwaters of Elephant Butte Reservoir. Elevations within the Rio Grande drainage area vary from over 14,000 ft. to 4,100 ft., while annual precipitation varies from 4 to 18 inches. Project lands of the Middle Rio Grande Project are located within the boundaries of the Middle Rio Grande Conservancy District (MRGCD). District property runs north-south along the Rio Grande for 145 miles and varies in width from one to five miles. The district encompasses 277,760 acres with 123,000 acres of irrigable land, of which roughly 60,000 acres are irrigated. The project is located in Bernalillo, Sandoval,

Socorro, and Valencia counties and includes the major urban center of Albuquerque.

Conservancy district responsibilities also consist of delivering water to six Pueblo communities: Cochiti, Santo Domingo, San Felipe, Santa Ana, Sandia, and Isleta, serving over 8,000 irrigable acres.¹

Historic Setting

Archeological and historical records suggest that the valley of the Rio Grande is the longest settled area in the continental United States. Native Americans, living along the nation's fourth or fifth longest river, practiced irrigation agriculture for centuries before the arrival of Europeans. This activity was most prominent along the Rio Grande in the middle valley of New Mexico where, according to one source, "the Pueblo Indians had been farming in the valley of the Rio Grande, developing the oldest irrigation system in the United States." Pueblo irrigation practices primarily utilized flooding farm lands and simple diversions from the river along open ditches to cultivate corn, beans and squash. Although each pueblo was independent, they "shared a broad common culture based on intensive agriculture and a rich religious ceremonialism."²

First information of Pueblo people to Europeans came from reports of Alvar Nuñez Cabeza de Vaca in 1528 and narratives from the 1540-1541 expedition of Francisco Vásquez de Coronado. Early descriptions of Pueblo agriculture noted the abundance and diversity of crops

¹ Neal W. Ackerly, David A. Phillips, Jr., and Kevin (Lex) Palmer, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District: A Historical Overview* (Albuquerque, New Mexico: SWCA, Inc. Environmental Consultants, June 1997), 1-5; United States Department of the Interior, Bureau of Reclamation, "Chapter 1: Introduction and General," Middle Rio Grande Project: Project History, Vol. I, 1951, 6 in RG 115, Records of the Bureau of Reclamation, Entry 10, Project Histories 1902-1932, Box 259; USDO, BR, "Middle Rio Grande Project, Albuquerque, New Mexico," Vol. I, 1951, 6, in RG 115, Records of the Bureau of Reclamation, Project Histories, Middle Rio Grande Project 1951-1958, Accession No. 8NN-115-90-011, Box 215, National Archives and Record Administration, Denver, Colorado; hereafter cited as RG 115.

² Charles T. DuMars, Marilyn O'Leary, and Albert E. Utton, *Pueblo Indian Water Rights: Struggle for a Precious Resource* (Tucson, Arizona: University of Arizona Press, 1984), 1; USDO, BR, "Chapter 1: Introduction and General," 8, in RG 115 Entry 10, Project Histories 1902-1932, Box 259; Howard R. Lamar, editor, *The New Encyclopedia of the American West* (New Haven & London: Yale University Press, 1998), 926.

and the industriousness of the Indians. One report stated, “The people devote themselves to agriculture, growing maize, beans, calabashes, fine melons, and watermelons. Some of their fields are irrigated by means of ditches, others depend on seasonal rains.” The Pueblo pattern of irrigated agriculture fit well with the Spanish occupiers and settlers of New Mexico who brought their own irrigation practices and techniques from Spain. Nevertheless these similarities did little to mask the conflict of occupation and the harsh establishment of Spanish rule. In 1680 the Pueblos revolted and in a unified effort expelled the Spanish from New Mexico. Pueblo independence, however, was short lived as Spanish forces reasserted their authority in 1692.³

In terms of water use, or water rights, Spanish and Pueblo traditions were not that far apart. According to James Vlasich, in *Pueblo Indian Agriculture*, “It was fortunate for the Pueblo that the colonists shared with them centuries of experience in the practice of irrigation. Riparian water rights were not a major factor for either the Indians or the Spaniards in New Mexico.” Thus it seems that both Spanish and Pueblo farmers shared a vague understanding of the concept of prior appropriation and the idea of applying water to land for beneficial use. Both cultures also embraced the notion of communal sharing of this resource as irrigation ditches, or acequias, brought the community together for common purposes. These beliefs remained in force after Mexico gained its independence from Spain in 1821. The newly established Mexican government kept Spanish laws regarding water rights, and more importantly, the rights of Pueblo communities to put water to the land. As Vlasich explains, “Pueblos could distribute waters to

³ Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 199; Marc Simmons, “History of Pueblo-Spanish Relations to 1821,” in *Handbook of North American Indians*, Volume 9, Alfonso Ortiz, editor, pp. 178-93 (Washington, D.C.: Smithsonian Institution, 1979), 179; James A. Vlasich, *Pueblo Indian Agriculture* (Albuquerque: University of New Mexico Press, 2005), 30-5; Ira C. Clark, *Water in New Mexico: A History of Its Management and Use* (Albuquerque: University of New Mexico Press, 1987), 6-7.

lands not adjacent to the water. The Pueblo right superseded the rights of individual appropriations and riparian owners along the stream.”⁴

Having no outside markets to sustain large-scale agriculture, farming in New Mexico under Spanish and Mexican rule was primarily for subsistence with no markets for excess products. Irrigation water was provided by a main canal, or *acequia madre*, with laterals and turnouts constructed for individual plots. Similar to Pueblo practices, farmers were obligated to help maintain both the main canal and their supply ditches. Farmers irrigated their fields by gravity flow from rivers with few permanent structures, such as diversion dams or wing dams. Researchers suggest that by 1800 there were over 160 acequias throughout New Mexico. What this manner of farming created in New Mexico was an agricultural culture of small family farms supported and maintained by communal cooperation.⁵

When the United States gained control of New Mexico in 1848 after the war with Mexico, it encountered a well-established tradition-orientated agriculture based on irrigation. Moreover, the Treaty of Guadalupe Hidalgo recognized land and water rights of former Mexican citizens and Pueblo Indians living in the territory. In the years following the Mexican-American War, Anglo-American settlement of New Mexico increased, with the major industries being mining, ranching and farming. Over time the territorial government embraced traditional uses of water and the doctrine of prior appropriation. These concepts were eventually codified in the 1907 territorial water laws and later “incorporated in New Mexico’s state constitution.”⁶

During the 1890s the New Mexico territorial government sought means and procedures to better organize and utilize water resources. The territory’s actions were in response to declining flows in the Rio Grande caused by increased diversions in Colorado and protests made by the

⁴ Vlasich, *Pueblo Indian Agriculture*, 46, 74.

⁵ Clark, *Water in New Mexico*, 16.

⁶ Vlasich, *Pueblo Indian Agriculture*, 93, 152; Clark, *Water in New Mexico*, 24-5.

Republic of Mexico to the U.S. Department of State over the hardship Mexican farmers faced as a result of upstream diversions. In 1896 at the request of the State Department to determine the validity of Mexico's claims, civil engineer W. W. Follett produced a comprehensive survey of irrigation systems in New Mexico for the Corps of Engineers. The survey examined all irrigation enterprises throughout the Rio Grande basin from Colorado to Texas. In the middle valley Follett's survey showed "50 spatially distinct acequia systems in operation along 200 km (124 miles) stretch of the Rio Grande between Cochiti and San José." Follett also noted that the location of irrigation systems averaged 2.5 miles in length, serving an average of 466.2 acres per acequia.⁷

Follett's survey revealed the intense competition for Rio Grande water throughout the basin. The conflict with Mexico was slowly becoming an international crisis and, in December 1896, at the urging of the secretary of state, the secretary of the interior directed the General Land Office "to suspend action on any and all applications for right of ways through public lands for the purpose of irrigation by using the waters of the Rio Grande or any of its tributaries, in the State of Colorado or in the Territory of New Mexico, until further instructed by this Department." In 1906 the United States and Mexico signed a "convention" allotting 60,000 acre feet of Rio Grande water to the Republic of Mexico. A year later Congress appropriated one million dollars toward construction of Elephant Butte Dam and the Rio Grande Project and extended the 1902 Reclamation Act to Texas. The Rio Grande Project was designed to store

⁷ Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 10; Clark, *Water in New Mexico*, 93; for a review of Follett's complete report see United States Senate, *Equitable Distribution of the Water of the Rio Grande: Message from the President of the United States, transmitting, in Response to Resolution of the Senate of February 26, 1898 Reports from the Secretary of State, the Secretary of War, the Secretary of the Interior, with Accompanying Papers, relative to the Equitable Distribution of the Waters of the Rio Grande River*, S. Doc 229, 55th Cong., 2nd sess., April 7, 1898, 47-108.

waters for irrigation in southern New Mexico and west Texas and fulfill U.S. treaty obligations to Mexico.⁸

By 1910 another investigation of irrigation patterns in the middle valley revealed an increase, noting that the location of the average diversion was every 2.3 miles along the Rio Grande serving 571.1 acres per canal system. These systems of “about 70 smaller and older community irrigation systems” were still made up of a loose conglomerate of individual farmers maintaining canals and ditches using traditional methods. Traditional irrigation practices, however, led to other problems of which the most important were seepage and an aggraded river bed. In an effort to coordinate water use in the valley and mitigate the system’s long neglect, valley irrigators formed the Middle Rio Grande Conservancy District (MRGCD) in 1925. The conservancy district included Sandoval, Bernalillo, Valencia, and Socorro counties and the Pueblo communities of Cochiti, Santo Domingo, San Felipe, Santa Ana, and Isleta. In regards to Indian lands, New Mexico’s congressional delegation secured legislation that authorized the federal government to pay the Indians’ share of the district’s water development. Valley irrigators had high hopes the district could solve a long list of problems. District organizers stated that they would develop “flow protection measures,” regulate “the channel of the Rio Grande, and stream flows,” eliminate “flood hazards,” reclaim and drain wetlands, and construct “delivery facilities to provide irrigation water.”⁹

⁸ Richard Olney, Department of State, to the Secretary of the Interior, November 30, 1896, in RG 115, Entry 3, General Administrative and Project Records 1902-1919, Box 9, folder, New Mexico, Water Appropriations, Rio Grande Project, Thru 1910; D. R. Francis, Secretary, to the Commissioner of the General Land Office, December 5, 1896, in RG 115, Entry 3, Box 9, folder, General Corres. re Right of Way Applications With the Rio Grande Drainage Basin, Suspension of Approval on Account of International Negotiations, Thru 1907; Clark, *Water in New Mexico*, 93.

⁹ Clark, *Water in New Mexico*, 209-10; DuMars *et al*, *Pueblo Indian Water Rights*, 108-9; Vlasich, *Pueblo Indian Agriculture*, 166; Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 20-1.

Almost from the very beginning the Middle Rio Grande Conservancy District encountered difficulties. Farmers faced a confusing repayment structure which was further exacerbated by falling agricultural prices and the general economic collapse of the Great Depression. For a while the only work being done was on Indian lands, because these were paid for by the federal government. According to one source non-Indian farmers were reluctant “to pay their assessments, in part because the irrigation system remained unfinished and ... canals began to deteriorate the moment they were built.” In 1932 the MRGCD received a reprise when the Reconstruction Finance Corporation provided funding and work resumed on project facilities. On September 1, 1935, the district had completed the project, including the construction of three diversion dams—Cochiti, Angostura, and San Acacia—and one storage dam: El Vado Dam and Reservoir on the Chama River.¹⁰

Despite completion of the project, the district’s funding woes continued. According to Ira Clark, the whole financial premise of farmers’ assessments was unworkable. “High benefit lands,” Clark explains, “initially expected to shoulder a major share of project costs, [but] were unable to bear the burden, and by 1944 title to 34,000 of 97,300 acres of irrigable non-Indian lands had passed to the state because of delinquencies in taxes and district assessments.” To compound the problem the district’s lack of funding resulted in it falling behind on project maintenance which led to deterioration of project facilities. Canals and ditches, overgrown with weeds, and clogged drainage works raised the water table and destroyed crops. A 1947 Bureau of Reclamation inspection of the project found that, because of the accumulation of brush and sediment, district canals “operated at a fraction of their original capacities.” Reclamation

¹⁰ Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 24.

proposed cleaning out 676 miles “of main, lateral, and third-order canals as part of taking over operation of the MRGCD.”¹¹

Project Authorization

The Bureau of Reclamation’s relationship with the Middle Rio Grande Valley began in 1916. Reclamation Service Director A. P. Davis met with the New Mexico state engineer and valley farmers to discuss strategies for securing assistance from the federal government. This conversation also included drafting an appeal to the New Mexico legislature to support the proposal. New Mexico legislators responded by creating the Rio Grande Commission and appropriating \$25,000 “for a cooperative state-federal investigation, and with a memorial requesting Congress to donate three million acres of public lands to assist the state in carrying out the work.” In 1921 the commission entered into an agreement with Reclamation to conduct a study and issue a report of recommendations. Reclamation’s report, written by Homer J. Gault, called for a “comprehensive plan for drainage, water storage, flood control, river rectification, river-bank protection, diversion dams, and a series of main canals between San Felipe and San Marcial.” Gault estimated the project cost at \$8 to \$9.5 million which included the selection of two reservoir sites: El Vado on the Chama River and another a few miles north of the Colorado state line. Nothing ever came from this report, but MRGCD integrated many of Reclamation’s proposals into its plans.¹²

In 1948 the Bureau of Reclamation and the Corps of Engineers released a joint report proposing a plan for a complete overhaul of flood control and irrigation works on the middle Rio Grande. Corps responsibilities included construction of three flood control and sediment

¹¹ Clark, *Water in New Mexico*, 387; Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 26.

¹² Clark, *Water in New Mexico*, 206; Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 20.

retention dams: Chamita Reservoir (later renamed Abiquiu Reservoir) on the Chama River; Chiflo Reservoir on the Rio Grande 20 miles south of the Colorado state line; Jemez Canyon Reservoir on Jemez Creek two miles above its confluence with the Rio Grande. The Corps was also to strengthen mainstem levees for flood control. Reclamation's responsibilities included rehabilitation and extension of MRGCD irrigation and drainage systems. Reclamation was also slated to rehabilitate El Vado Dam and reservoir and re-channelize the middle Rio Grande main stream, which included Hot Springs and Espanola valley "channel improvements and dredging from near the southern boundary of the Middle Rio Grande Conservancy District into the backwater of Elephant Butte Reservoir."¹³

Release of Reclamation's Middle Rio Grande Project report resulted in comments and concerns from other water interests throughout the Rio Grande basin. The state of Colorado voiced misgivings about the proposed storage capacity for the three flood control dams, arguing that these dams threatened "the proper operations of the San Luis Valley project" in southern Colorado. Comments from the state of Texas also expressed concern about the flood control dams and the possibility of injuring other parties to the Rio Grande Compact. Nevertheless Texas also saw how plans to rehabilitate middle valley water facilities might allow New Mexico to better fulfill its compact obligations by lowering groundwater levels and generally produce stable water flows into Elephant Butte Reservoir. Naturally New Mexico representatives favored the report and reaffirmed their commitment to the Rio Grande Compact, regarding it as the law of the river. In response to the concerns of its two basin neighbors, New Mexico stated its

¹³ USDOJ, BR, "Middle Rio Grande Project, Albuquerque, New Mexico," Vol. I, 12-13, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215; U.S. Department of the Interior, Bureau of Reclamation, Albuquerque Area Office, "2006 Middle Rio Grande Annual Operating Plan Report," 2006; "Middle Rio Grande Project Approved," *Reclamation Era*, 34 (January 1948): 19; *Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior*, reprinted for the *Annual Report of the Secretary of the Interior*, for the fiscal June 30, 1948, (Washington, D.C.: United States Government Printing Office, 1948), 43; Clark, *Water in New Mexico*, 387-8.

interpretation of the compact and maintained that both New Mexico and Colorado were entitled to waters “which have been or may be spilled from project storage.” It went on to assert, “New Mexico feels that neither State is entitled to all of the water, but that each should put to use all it can without material injury to others.” This dialogue among Rio Grande basin states, found in a 1950 House report, revealed that the Middle Rio Grande Project encountered understandable concerns from basin water interests unsure of the impact future development might have on their own ambitions for an already over-appropriated river.¹⁴

The overriding issue was how the Middle Rio Grande Project might affect the Rio Grande Compact. Signed in 1939 the compact was an agreement among the states of Colorado, New Mexico, and Texas on the division of Rio Grande water. Discussions about the need for a compact arose when irrigators in Texas and southern New Mexico began to notice diminishing river flows during the late 1890s. Flow decreases were the result of diversions taking place in the San Luis Valley of southern Colorado. Negotiations on a compact began in 1928, with a temporary compact signed in 1929, but talks continued in order for the states to reach agreement on “a permanent compact for equitable apportioning of the waters.” The only highlight of the 1929 compact was a five-year moratorium on further storage or diversion. Nevertheless, the states reached an agreement on March 3, 1938, and Congress approved the compact May 31, 1939. The compact stipulates that Colorado supply New Mexico a prescribed amount of water based on flow measurements “at several gauging station the quantity of water which, with depletions through existing usage, should reach the point of delivery to New Mexico.” New Mexico made a similar commitment to Texas. The compact allowed for upper states to receive either credits or debits on their deliveries based on seasonal water supply. Of particular

¹⁴ United States House of Representatives, *Middle Rio Grande Project: Letter from the Secretary of the Interior, transmitting a Report and Findings on the Middle Rio Grande Project*, H. Doc. 653, 81st Cong., 2nd sess. (Washington, D.C.: United States Government Printing Office, 1950), 10, 34, 79-80.

importance to the Middle Rio Grande Project, “The compact ... forbade Colorado and New Mexico from increasing upstream storage in reservoirs constructed after 1929 whenever there was less than 400,000 acre-feet of usable water at Elephant Butte.”¹⁵

Reclamation estimated the cost of the Middle Rio Grande Project proposal at \$95,499,000. Because the plan contained a large flood control element, over \$75 million of the estimated cost was non-reimbursable. Other non-reimbursable actions included \$670,000 for Fish and Wildlife, National Park Service, and Geological Survey programs. Reclamation proposed that the cost of reimbursable features for non-Indian water users was \$16,766,000. For the project to run smoothly, Reclamation felt that it was necessary for the federal government to acquire “the existing works of the conservancy district; the proceeds accruing to the district from this purchase by the Government would be used to retire the outstanding indebtedness of the district, which now amounts to \$7,426,280.” Finally the plan stipulated the priority of allocations to project water users: “first, to the rights of Indian lands; second, to the rights of the State of new Mexico under the Rio Grande compact; third, to the rights of other Federal reclamation projects on the same stream; and fourth, to vested rights of private citizens under New Mexico State laws and decrees.”¹⁶

On June 30, 1948, Congress authorized the Middle Rio Grande Project as part of the Flood Control Act of 1948. In its authorization Congress provided an initial appropriation of \$3,500,000 and eliminated Chiflo Dam from the project. Congress also directed the secretary of the interior to acquire the conservancy district’s debt and take possession of agricultural lands within the project owned by the state to be sold or leased to settlers for agricultural purposes.

¹⁵ Clark, *Water in New Mexico*, 218-21; “Rio Grande Compact,” in United States Department of the Interior, Bureau of Reclamation, *Federal Reclamation and Related Laws Annotated*, Volume I through 1942, Richard K. Pelz, editor (Washington, D.C.: United States Government Printing Office, 1972), 622-31.

¹⁶ U.S. House, *Middle Rio Grande Project*, 148-9, 215.

New Mexico Senator Dennis Chavez inserted an amendment stating that the federal government gives preference “to former owners who had lost title by reason of tax sales, their children, or war veterans.” To emphasize the idea that the Middle Rio Grande Project was a water conservation effort, Congress directed Reclamation to find methods of controlling or eliminating invasive plant species “to reduce nonbeneficial consumption of water.” The legislation also included a proviso that the operation of project works conform to the Rio Grande Compact.¹⁷

Project Construction

Construction of the Middle Rio Grande Project began in the late summer of 1951 when Reclamation awarded a \$940,115.00 contract to McGinnis Bros., Inc., for channelization of the Rio Grande from Elephant Butte Narrows to San Marcial. Prior to starting construction, Bureau of Reclamation officials met with the Corps of Engineers to develop a policy for coordinating studies of the Rio Floodway Project. Reclamation also met with representatives from the Bureau of Indian Affairs “to discuss the extent of their participation in the project, and to arrange a future meeting to consider agreements concerning contract items with regard to Indian lands.” As a final piece to the preconstruction picture, a repayment contract between Reclamation and the conservancy district was signed on September 24, 1951.¹⁸

Reclamation divided its portion of the project into four divisions: Cochiti Division, Albuquerque Division, Belen Division, and Socorro Division. The Cochiti Division extended 22 mile from Cochiti Diversion Dam south to Angostura Diversion Dam. There are two canals in this division serving 12,675 acres of both Indian and non-Indian lands. The Albuquerque

¹⁷ United States Department of the Interior, Bureau of Reclamation, *Federal Reclamation and Related Laws Annotated*, Volume II of three through 1958, Richard K. Pelz, editor (Washington, D.C.: United States Government Printing Office, 1972), 901-4; *Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior*, reprinted for the *Annual Report of the Secretary of the Interior*, for the fiscal June 30, 1950 (Washington, D.C.: United States Government Printing Office, 1950), 56; Clark, *Water in New Mexico*, 388.

¹⁸ USDOl, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. I, 1951, 1, 3, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215; Garfold L. Wilkinson, “Rounding Up the Rio,” *Reclamation Era*, 38 (May 1952): 115.

Division extended 41 miles south from Angostura to Isleta Diversion Dam. This division consists of four main canals serving 34,933 acres of irrigable lands. The Belen Division ran 64 miles from Isleta Diversion Dam to the confluence of the Rio Puerco and the Rio Grande. According to one source, “Lands in this division are served by the Belen Highline and Peralta canals. Irrigable lands in this division total 21,000 acres.” Finally the Socorro Division extends south from the mouth of the Rio Puerco to the entrance of the Bosque Del Apache Grant and includes the San Acacia Diversion Dam. The Socorro Main Canal supplies irrigation water to about 8,500 acres.¹⁹

For the first few years of construction, Reclamation’s efforts focused on channelization. This task was an attempt to repair damage to river flows brought on by decades of sediment entering the river and increasing upstream diversions. One contemporary observer noted that these conditions “resulted in raising the bed of the Rio Grande until now it is higher than downtown Albuquerque,” which in turn raised underground water levels, water logging agricultural lands. Re-channelization took the highest priority because completion of flood and sediment control dams was well into the future. Reclamation officials estimated that 143,000 acre feet of water was lost as a result of the aggraded river channel and vegetation growth “between the south boundary of Bosque Del Apache and the Narrows of Elephant Butte Reservoir” alone. Nevertheless project histories noted that during 1952 contractors had completed 21 miles of channelization work, and by 1953, sixty-nine percent of the second 10-mile reach of river channelization was completed, saving estimated 84,800 acre feet of water.²⁰

¹⁹ Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 1-5.

²⁰ Wilkinson, “Rounding Up the Rio,” 113-4; USDOJ, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. I, 1951, 18-19, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215; USDOJ, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. II, 1952, 12, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215; USDOJ, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. III, 1953, 10, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215.

By 1954 Reclamation had made significant progress, and the overall work effort had become fairly routine. Contractors were nearing completion of rehabilitation work on El Vado Dam and Isleta Diversion Dam, along with nearly 140 miles of drainage works. In 1955 new work began on siphon and canal structures in the Socorro, Belen, and Albuquerque divisions. Also that year Reclamation, at the request of MRGCD, took over control of all district operation and maintenance obligations. This agreement made Reclamation responsible for ensuring compliance with the Rio Grande Compact. Coincidentally, the Southwest was experiencing drought conditions which severely limited water allocations from El Vado Reservoir. Reclamation reported, “Under the terms of the tri-state compact ... the Middle Rio Grande Conservancy district is not now permitted to store water in El Vado Reservoir except that necessary for Indian lands.” The drought also forced water rationing among district water users wherein “water available is divided between Divisions in accordance with supply available.”²¹

The following year Reclamation reported the completion of rehabilitation work on El Vado and Isleta dams, while it accelerated work efforts on San Acacia Diversion Dam and the rehabilitation of canal and lateral structures. At the same time the Corps of Engineers was making significant progress on levee construction, completing “approximately 27 miles of river levees through the Albuquerque Division.” Progress on invasive vegetation was also made when Reclamation signed a cooperative agreement with the state of New Mexico for reducing non-beneficial consumption of water. Drought conditions continued forcing similar measures in water conservation and allocation as the year before. However, Reclamation noted that

²¹ USDOl, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. IV, 1954, 3, in RG 115, Project Histories, Middle Rio Grande Project 1951-1988, Accession No. 8NN-115-90-011, Box 215; USDOl, BR, “Middle Rio Grande Project, Albuquerque, New Mexico,” Vol. V Annual Project History, 1955, 19, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 132.

improvements in drainage works proved invaluable in supplying supplemental water, alleviating some shortages for water users.²²

In 1957 rehabilitation work on San Acacia Diversion Dam was complete and work began on Angostura and Cochiti diversion dams. Reclamation also reported completion of all project drainage works. On the Socorro Division contractors began working on rehabilitating laterals, acequias, and canals along with channelization of four sections of the river. Similar progress was made on irrigation features for the Belen and Albuquerque divisions. In 1958 Reclamation completed rehabilitation work on Angostura Diversion Dam and began operations for “enlargement of the Rio Grande channel and installation of jetties for levee protection at and above Angostura Diversion Works.” The Angostura channel work was just part of a larger effort on channelization throughout the project where Reclamation was overseeing over fifty miles of channel improvements.²³

By the end of 1959 almost eighty-nine percent of irrigation rehabilitation and eighty percent of channelization work had been completed. These accomplishments included work on the Angostura Diversion Works, which entailed enlarging the “Rio Grande channel upstream and downstream” from the works. Work on San Acacia Diversion Dam resumed when Reclamation identified necessary repairs to the downstream apron. That same year Reclamation and the Corps of Engineers reached an agreement on channelization responsibilities to better organize construction efforts. Initially, Corps responsibilities called for it to construct protective levees, while Reclamation built the 600-foot channel. To increase efficiency, they agreed to each take

²² USDOl, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. VI, 1956, 10, 13, 35, 41, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 45.

²³ USDOl, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. VII, 1957, 12-13, 21, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 45; USDOl, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. VIII, 1958, 16-23, 26-27, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 102; *1958 Annual Report Secretary of the Interior for the Fiscal Year ended June 30, 1958: Sound Use of Our Natural Resources* (Washington, D.C.: United States Government Printing Office, 1958), 32.

responsibility for levee upgrades and channel construction on separate reaches of the river.

Reclamation's first task under this agreement was the reach on the Rio Grande from Los Lunas Bridge to Isleta Diversion Dam. By the end of 1960, ninety-five percent of the rehabilitation of irrigation features and eighty-six percent of channelization had been completed.²⁴

From 1961 to 1964 construction activities on the Middle Rio Grande Project continued to run smoothly. During project construction the Bureau of Reclamation conducted sedimentation studies to define channel widths "which will be compatible with hydraulic and sediment transportation requirements under future conditions." Reclamation used these studies and elimination of invasive phreatophytes for the long-term water conservation efforts on the project. Reclamation noted that construction activities were already increasing supply for water users claiming, "Water savings between Cochiti and Elephant Butte for calendar 1961 amounted to an estimated 71,000 acre-feet bring the total accumulation total, for the period 1951 to 1961, to 552,000 acre-feet." In 1964 the final channelization job on the Belen Unit was completed, bringing the entire project's major construction to an end.²⁵

Construction activities as part of the Bureau of Reclamation's operation and maintenance responsibilities continued after major project construction ended. Project resources were active in constructing new outlet works at El Vado Dam on the San Juan-Chama Project, which included an agreement "with the Corps of Engineers ... to store water for Indian lands in Abiquiu Reservoir [one of the Corps' flood control dams substituted for the Chamita site]."

²⁴ USDOl, BR, "Annual Project History: Middle Rio Grande Project, New Mexico," Vol. IX, 1959, 9-10, 25, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 102; USDOl, BR, "Annual Project History: Middle Rio Grande Project, New Mexico," Vol. X, 1960, 11, 20, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 102; Fred A. Seaton, *1960 Annual Report Secretary of the Interior for Fiscal Year ended June 30, 1959: Resources for a Growing Population* (Washington, D.C.: United States Government Printing Office, 1959), 18.

²⁵ USDOl, BR, "Annual Project History: Middle Rio Grande Project, New Mexico," Vol. XI, 1961, 46, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 103; USDOl, BR, "Annual Project History: Middle Rio Grande Project, New Mexico," Vol. XIV, 1964, 14, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 6.

Reclamation continued to handle the operation and maintenance of approximately 200 miles of river channelization as a separate unit of the Middle Rio Grande Project with annual funds appropriated by Congress. In March 1974 Reclamation Commissioner Gilbert Stamm “authorized actions leading to the turnover of O&M responsibilities to the District.”

Reclamation, however, maintained control of “reserved works” which included El Vado Dam and Reservoir, San Acacia Diversion Dam, and the flood protection works assigned to the conservancy district by the Corps of Engineers. In September 1977 the Bureau of Reclamation transferred O&M of San Acacia Diversion Dam to MRGCD.²⁶

Post Construction

The Bureau of Reclamation dealt with a plethora of issues concerning management of the Middle Rio Grande Project. It had to maintain and comply with the often convoluted reservoir storage restrictions stipulated in the Rio Grande Compact. As on most projects throughout the West, Reclamation attempted to resolve the ever-growing demands for Rio Grande water from not only traditional water users—irrigators and Indian pueblos—but meeting the needs of municipal, industrial, recreational, and environmental customers. Despite all efforts to reconstruct the Rio Grande, sedimentation and channel aggradation remained constant problems requiring continual efforts.

In 1975 the responsibilities of the Middle Rio Grande Project office became much more complicated. Not only was the project supervisor given responsibility for directing Reclamation activities regarding Rio Grande channelization features, but also assumed responsibility for completing features of the San Juan-Chama Project and “accounting for San Juan water

²⁶ Clark, *Water in New Mexico*, 533; USDO, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. XVI, 1966, 18, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 33; USDO, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXIV, 1974, 2, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 132; USDO, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXVII, 1977, 5, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 270.

introduced into the Rio Grande Basin.” The project office also coordinated with the U.S. Fish and Wildlife Service and the conservancy district as part of the continuing water conservation and salvage program within the Sevilleta National Wildlife Refuge in 1977. Recognizing that sediment and seepage remained a major concern, Reclamation recommended concrete-lining sections of the Cochiti East Side Canal and the Sili Main Canal. Likewise inspections of the operations and maintenance of Angostura, Isleta, and San Acacia diversion dams found numerous problems due to lack of maintenance on important features at each site. According to Reclamation inspectors, these maintenance issues should be attributed to increasing water table levels and allowing silt to accumulate in the main channel.²⁷

During the late 1970s and early 1980s, the Bureau of Reclamation found itself dealing with water shortages and the water needs of multiple interests. In 1977 low spring runoffs resulted in insufficient water in El Vado Reservoir to meet the irrigation needs of the Middle Rio Grande Conservancy District. Reclamation helped broker an agreement between the district and the city of Albuquerque that allowed the district to borrow “the City’s San Juan-Chama water ... to supplement the natural flow to meet the District’s requirements.” Reclamation also became involved in a water dispute between the Pueblo Indians and the MRGCD. According to the project history, “The Pueblos have alleged that the portion of the MRCD irrigation and drainage system within their lands were not operated properly and subsequently resulted in a negative impact on their lands.” In 1984 the Bureau of Reclamation signed a memorandum of understanding with the Bureau of Indian Affairs to conduct a comparative study of the irrigation

²⁷ USDOl, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXV, 1975, 2, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 132; USDOl, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXVII, 1977, 8, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 270; USDOl, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXXII, 1982, 11, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-93-213, Box 99.

and drainage systems operated by the district and those operated by the Indians. These episodes are examples of the changing role the Bureau of Reclamation as it moved away from construction to water management during these years.²⁸

Use of Project Water

Because the Middle Rio Grande Project was primarily an effort to rehabilitate existing irrigation facilities, water use on project lands saw little change. The principle crops grown on the project are alfalfa, cereal crops, fruits, and vegetables. Over time the project witnessed an increase in production of forage crops. Farming practices also changed as valley farmers moved from subsistence farming to commercial production. According to a study sponsored by the Bureau of Reclamation,

Between 1884 and the present [1997], the middle Rio Grande Valley has seen a shift from many small farms (prior to and immediately after the formation of the MRGCD) to fewer, larger farms (since World War II). The shift probably reflects the emergence of the agribusiness sector, rather than being due to the MRGCD itself.

The valley itself has experienced a demographic shift with the growth of large urban centers and the spread of suburban areas. Despite this growth, Reclamation records indicate that irrigated lands within the district remained fairly consistent at around 60,000 acres. As old lands were sold to make way for expanding communities, new lands were put into production.²⁹

This transformation of the middle valley of the Rio Grande is best represented by the phenomenal growth of the city of Albuquerque since the end of the Second World War.

Albuquerque's growth, similar to many western urban centers, was the result of an expanded

²⁸ USDOJ, BR, "Project History: Middle Rio Grande Project, New Mexico," Vol. XXVII, 1977, 20, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-92-130, Box 270; USDOJ, BR, "Project History: Middle Rio Grande Project, New Mexico," Vol. XXXIV, 1984, 31, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-93-213, Box 99.

²⁹ Ackerly, *et al*, *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District*, 84, 95; USDOJ, BR, "Annual Project History: Middle Rio Grande Project, New Mexico," Vol. IX, 1960, 42, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 102.

federal presence in the West. In 1956 the Reclamation project history observed the duality of agricultural and urban expansion. “The size of farm operating units in the Socorro and Valencia Counties continue to increase while suburban and commercial development continues to encroach upon arable lands in the vicinity of towns, particularly in the Albuquerque vicinity.” Helping to lead the way in this metamorphous were the federal reservations of Kirtland Air Force Base and the Sandia Base. Project officials continued to detail this transformation of the valley noting, “The use of agricultural lands for urban and suburban residential, commercial, and industrial use continues and this acreage increased by 578 acres in 1960. The subdivision and removal of lands from agricultural use ... can be expected to continue into the future.” What these changes foreshadowed was a reassessment of water use in the middle valley as diverse interests jostled for scarce water resources.³⁰

In spite of the efforts of the Bureau of Reclamation to improve water distribution and salvage, valley water users often faced shortages and restrictions. Because project water use must observe Rio Grande Compact provisions, the project is limited by constraints on its upstream storage capabilities. The compact restricts the ability and amount of district storage in El Vado Reservoir. Article VII of the compact “dictates storage in reservoirs that were constructed after 1929.” It states “that if usable water in Rio Grande Project storage is less than 400,000 ac-ft., no storage of Rio Grande water can take place at El Vado Reservoir except to satisfy Native American needs.” These limitations, then, allow the district to only take water diversions directly from the Rio Grande. Other than the 23,000 acre feet of supplemental

³⁰ USDOL, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. VI, 1956, 43-4, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 45; USDOL, BR, “Annual Project History: Middle Rio Grande Project, New Mexico,” Vol. IX, 1960, 42, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-88-053, Box 102.

irrigation water the district receives from the San Juan-Chama Project, valley irrigators rely solely on the unpredictable flows of the Rio Grande during drought conditions.³¹

Recreational and environmental needs have also placed a tremendous burden on water use in the middle Rio Grande valley. For example, On July 12, 1985, the Santa Fe County district attorney “filed a civil action against the Bureau of Reclamation and the Corps of Engineers for water storage in Abiquiu Reservoir and the alleged ruination of a 2 ½-mile portion of the Rio Chama protected under the Scenic and Pastoral River Act.” The case was eventually dismissed in March 1986 but revealed the ever-increasing contested nature of water use. Another more complex and long lasting controversy arose in 1994 when the U.S. Fish and Wildlife Service listed the Rio Grande silvery minnow as an endangered species. Fish and Wildlife maintained that the designation of the silvery minnow, which was “once one of the most widespread and abundant species in the Rio Grande basin,” was the result of dam construction, water diversions, channel rectification, and removal of “aquatic plants and snags.” In other words all the “improvements” accomplished by the Middle Rio Grande Project for the benefit of valley water users. These followed years of litigation and negotiation attempting to bring competing uses of Rio Grande water into harmony.³²

During the late 1990s, the Rio Grande basin was in the middle of a severe drought creating water shortages. These conditions led to a drastic reduction in the number of silver minnow. In 1999 the secretary of the interior issued a Rio Grande silvery minnow Recovery Plan wherein the Fish and Wild Life Service designated a critical habitat for the silvery minnow

³¹ “2006 Middle Rio Grande Annual Operating Plan Report,” 2; Clark, *Water in New Mexico*, 509.

³² USDOJ, BR, “Project History: Middle Rio Grande Project, New Mexico,” Vol. XXXV, 1985, 3, in RG 115, Middle Rio Grande Project Histories 1951-1988, Accession No. 8NN-115-93-213, Box 100; U.S. Fish and Wildlife Service, “Rio Grande Silvery Minnow (*Hybognathus amarus*) Draft Recovery Plan,” June 2007, 10; Susan Kelly, “The Rio Grande silvery minnow: Eleven years of litigation,” The Utton Center, 2011, 1, http://uttoncenter.unm.edu/pdf/Silvery_Minnow_litigation.pdf (accessed 5/1/2013).

consisting of 163 miles of the Rio Grande's mainstem from Cochiti Dam south to Elephant Butte Reservoir. In November environmental groups filed suit against the Bureau of Reclamation and the Corps of Engineers over their role in diversion and storage of Rio Grande water, under the name *Rio Grande Silvery Minnow et al v. Keys*. The environmentalists claimed that "federal defendants" failed "to consult with FWS as required by the ESA [Endangered Species Act] jeopardized the extinction of the minnow." A major issue in the case was the release of San Juan-Chama Project water to raise sustainable flows, which the environmentalists demanded, and Reclamation refused on the grounds that water "was not native to the Rio Grande Basin, and the endangered species is in the Rio Grande." As the litigation continued to drag on, Congress passed legislation restricting the use of San Juan-Chama water to meet ESA obligations on the Rio Grande.³³

In the meantime, Reclamation worked with basin water interests and other federal agencies to help in sustaining the silvery minnow population. Efforts continue to be made in restoring minnow habitat and creating sanctuaries. Reclamation introduced measures to purchase water from willing sellers in order to maintain sustainable water flows. In 2002 Reclamation signed a memorandum of understanding with multiple state and federal interests, including the conservancy district, "to strive for the survival and recovery of threatened and endangered species in the Middle Rio Grande while simultaneously protecting existing and future water users in compliance with state and federal laws, including compact delivery obligations." This program, the Middle Rio Grande Endangered Species Act Collaborative Program, seeks to prevent extinction by improving habitat and conducting scientific analysis,

³³ Kelly, "The Rio Grande silvery minnow," 2-5; John W. Keys III, *Oral History Interview*, Transcript of tape-recorded Bureau of Reclamation Oral History Interviews conducted by Brit Allan Storey, senior historian, Bureau of Reclamation, from 1994 to 2006, in Denver, Colorado; Boise, Idaho; Washington, D.C.; and Moab, Utah, Edited by Brit Allan Storey, 323-4; Michael Coleman, "Domenici Plan Cuts Minnow Option," *Albuquerque Journal*, July 17, 2003; Michael Coleman, "Deal Keeps San Juan-Chama Water from Fish," *Albuquerque Journal*, November 7, 2003.

while developing “flexible” methods of water use that serve to protect endangered species under the ESA and still serve current water users. Program projects include the Albuquerque Biological Park Refugium for rearing and breeding minnows, widening river channels, clearing bosque vegetation, and developing designs in diversion dams to aid fish migration upstream.³⁴

Conclusion

The silvery minnow controversy is a microcosm of the intense competition for water resources throughout the West. Water use on the Rio Grande reflects these divergent interests and the growing pressures for water on an over-appropriated river. Still the silvery minnow problem is just one representation of multiple issues concerning the Rio Grande. As Ira Clark wrote in his masterful tome on the history of New Mexico water in 1987, the issue is multifaceted:

Resolution of the problems of the Middle Rio Grande ... would impinge upon virtually every controversial water-use issue. It could arouse smoldering interstate and international conflicts over the use of the river’s water, and the potentially explosive interstate rivalry between the Middle Rio Grande and Elephant Butte Irrigation District. Existing appropriative and community ditch rights, and those of the Middle Rio Grande pueblos, would have to be reconciled to the overall development plan. Urban and rural interests, and a wide variety of competing uses, would be pitted against one another in shaping that plan.

As Clark’s statement points out, multiple issues and interests encompassed Rio Grande water development. In the middle valley, the Bureau of Reclamation encountered a well-entrenched irrigation culture that goes back over 300 years. In essence, the Middle Rio Grande Project was an attempt to rectify problems those long years of irrigation practices produced.³⁵

³⁴ Tania Sousan, “Farmers Could Get Paid for Their Water,” *Albuquerque Journal*, September 7, 2003; Bureau of Reclamation, “Middle Rio Grande Endangered Species Act Collaborative Program: Overview,” 2003, www.usbr.gov/uc/albuq/ (accessed 5/6/2013); Subhas Shah, “The Middle Rio Grande Conservancy District: Sustaining the Middle Valley for Over 70 Years,” *New Mexico Water Resources Research Institute*, December 2000, 6-7; “Bill Would Aid Species Act Requirement,” *Albuquerque Journal*, July 20, 2005; United States Department of the Interior, Bureau of Reclamation, “Middle Rio Grande Endangered Species Collaborative Program,” August 2011, www.usbr.gov/rivers/doc (accessed 5/6/2013)

³⁵ Clark, *Water in New Mexico*, 205.

By the time major project construction ceased, Reclamation had made major improvements to the water flows in the Rio Grande's middle valley. Yet also at that time new demands for water were coming from growing urban centers and a fledgling environmental movement. Reclamation's task today is to discover ways to accommodate these competing interests, evidenced by its participation in the Middle Rio Grande Endangered Species Act Collaborative Program.

Bibliography

Primary Sources

- RG 115. Records of the Bureau of Reclamation. Entry 3. General Administration and Project Records 1902-1919.
- RG 115. Records of the Bureau of Reclamation. Entry 10. Project Histories 1902-1932, Box 259.
- RG 115. Records of the Bureau of Reclamation. Project Histories, Middle Rio Grande Project 1951-1958. Accession No. 8NN-115-90-011, Box 215; Accession No. 8NN-115-92-130, Boxes 6, 19, 33, 47, 62, 76, 88, 117, 132, 270, 273; Accession No. 8NN-115-88-053 Boxes 45, 102, 103; Accession No. 8NS-115-93-213, Boxes 99, 100; Accession No. 8NN-115-85-019, Box 2.

Government Documents

- 1955 Annual Report Secretary of the Interior for the Fiscal Year ended June 30.* Washington, D.C.: United States Government Printing Office, 1955.
- 1956 Annual Report Secretary of the Interior for the Fiscal Year ended June 30.* Washington, D.C.: United States Government Printing Office, 1956.
- 1958 Annual Report Secretary of the Interior for the Fiscal Year ended June 30, 1958: Sound Use of Our Natural Resources.* Washington, D.C.: United States Government Printing Office, 1958.
- 1959 Annual Report Secretary of the Interior for the Fiscal Year ended June 30, 1959: Resources for a Growing Population.* Washington, D.C.: United States Government Printing Office, 1959.
- Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior,* reprinted for the *Annual Report of the Secretary of the Interior,* for the fiscal June 30, 1948. Washington, D.C.: United States Government Printing Office, 1948.
- Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior,* reprinted for the *Annual Report of the Secretary of the Interior,* for the fiscal June 30, 1950. Washington, D.C.: United States Government Printing Office, 1950.
- Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior,* reprinted for the *Annual Report of the Secretary of the Interior,* for the fiscal June 30, 1951. Washington, D.C.: United States Government Printing Office, 1951.
- Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior,* reprinted for the *Annual Report of the Secretary of the Interior,* for the fiscal June 30, 1952. Washington, D.C.: United States Government Printing Office, 1952.

Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior, reprinted for the *Annual Report of the Secretary of the Interior*, for the fiscal June 30, 1953. Washington, D.C.: United States Government Printing Office, 1953.

Annual Report of the Commissioner Bureau of Reclamation to the Secretary of the Interior, reprinted for the *Annual Report of the Secretary of the Interior*, for the fiscal June 30, 1954. Washington, D.C.: United States Government Printing Office, 1954.

Seaton, Fred A. *1960 Annual Report Secretary of the Interior for Fiscal Year ended June 30, 1959: Resources for a Growing Population*. Washington, D.C.: United States Government Printing Office, 1959.

Udall, Stewart L. *Resources for Tomorrow: 1961 Annual Report for the Fiscal Year ended June 30*. Washington, D.C.: United States Government Printing Office, 1961.

———. *1962 Annual Report for the Fiscal Year ended June 30, 1962*. Washington, D.C.: United States Government Printing Office, 1962.

———. *1963 Annual Report for the Fiscal Year ended June 30, 1963*. Washington, D.C.: United States Government Printing Office, 1963.

United States Bureau of Reclamation. “Middle Rio Grande Endangered Species Act Collaborative Program: Overview,” 2003. www.usbr.gov/uc/albuq/ (accessed 5/6/2013).

United States Department of the Interior, Bureau of Reclamation. *Federal Reclamation and Related Laws Annotated*, Volume I through 1942. Richard K. Pelz, editor. Washington, D.C.: United States Government Printing Office, 1972.

———. *Federal Reclamation and Related Laws Annotated*, Volume II of three through 1958. Richard K. Pelz, editor (Washington, D.C.: United States Government Printing Office, 1972).

———. Harold E. Robbins, Regional Director, Region 5. “Middle Rio Grande Project, Rio Grande Basin, New Mexico.” September 1951.

———. “Middle Rio Grande Endangered Species Collaborative Program,” August 2011. www.usbr.gov/rivers/doc (accessed 5/6/2013)

United States Fish and Wildlife Service. “Rio Grande Silvery Minnow (*Hybognathus amarus*) Draft Recovery Plan,” June 2007.

United States House of Representatives. *Middle Rio Grande Project: Letter from the Secretary of the Interior, transmitting a Report and Findings on the Middle Rio Grande Project*, H. Doc. 653, 81st Cong., 2nd sess. Washington, D.C.: United States Government Printing Office, 1950.

United States Senate. *Equitable Distribution of the Water of the Rio Grande: Message from the President of the United States, transmitting, in Response to Resolution of the Senate of February 26, 1898 Reports from the Secretary of State, the Secretary of War, the Secretary of the Interior, with Accompanying Papers, relative to the Equitable Distribution of the Waters of the Rio Grande River*, S. Doc 229, 55th Cong., 2nd sess., April 7, 1898.

Secondary Sources

Ackerly, Neal W., David A. Phillips, Jr., and Kevin (Lex) Palmer. *The Development of Irrigation Systems in the Middle Rio Grande Conservancy District: A Historical Overview*. Albuquerque, New Mexico: SWCA, Inc. Environmental Consultants, June 1997.

“Bill Would Aid Species Act Requirement.” *Albuquerque Journal*. July 20, 2005.

Bristol, Ralph. “Defeating the Rio Grande Drought.” *Reclamation Era*, 38 (June 1952): 139-40.

Clark, Ira C. *Water in New Mexico: A History of Its Management and Use*. Albuquerque: University of New Mexico Press, 1987.

Coleman, Michael. “Domenici Plan Cuts Minnow Option.” *Albuquerque Journal*. July 17, 2003.

———. “Deal Keeps San Juan-Chama Water from Fish.” *Albuquerque Journal*. November 7, 2003.

DuMars, Charles T., Marilyn O’Leary, and Albert E. Utton. *Pueblo Indian Water Rights: Struggle for a Precious Resource*. Tucson, Arizona: University of Arizona Press, 1984.

Kelly, Susan. “The Rio Grande silvery minnow: Eleven years of litigation.” The Utton Center, 2011. http://uttoncenter.unm.edu/pdf/Silvery_Minnow_litigation.pdf (accessed 5/1/2013).

Keys III, John W. *Oral History Interview*. Transcript of tape-recorded Bureau of Reclamation Oral History Interviews conducted by Brit Allan Story, Senior Historian, Bureau of Reclamation, from 1994 to 2006, in Denver, Colorado; Boise, Idaho; Washington, D.C.; and Moab, Utah. Edited by Brit Allan Storey.

Lamar, Howard R., editor. *The New Encyclopedia of the American West*. New Haven & London: Yale University Press, 1998.

Metz, Leon C. “Rio Grande.” *Handbook of Texas Online*. <http://tshaonline.org/handbook/online/atricles/rnr05> (accessed April 2013).

“Middle Rio Grande Report Approved.” *Reclamation Era*, (January 1948): 19.

Shah, Subhas. "The Middle Rio Grande Conservancy District: Sustaining the Middle Valley for Over 70 Years." *New Mexico Water Resources Research Institute*, December 2000.

Simmons, Marc. "History of Pueblo-Spanish Relations to 1821," in *Handbook of North American Indians: Southwest*. Volume 9. Alfonso Ortiz, editor. pp. 178-93. Washington, D.C.: Smithsonian Institution, 1979.

Sousan, Tania. "Farmers Could Get Paid for Their Water." *Albuquerque Journal*. September 7, 2003.

Vlasich, James A. *Pueblo Indian Agriculture*. Albuquerque: University of New Mexico Press, 2005.

Wilkinson, Garfold L. "Rounding Up the Rio." *Reclamation Era*, 38 (May 1952): 113-6.