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## Hydrology and Key Accounting Components of the Compact

Thank you kindly for the introduction. The organizers of this conference have given me fifteen minutes to cover all the material in my topic. I'm glad that everybody before me has already covered the information. Now I can talk about some other things that I feel really need to be covered.

The first part of this presentation will be devoted to some hydrology issues of the Rio Grande Basin. I will present yearly flows at different locations, some key accounting components of the Compact, and summaries of water use by the states. Most of the information comes from past reports. Some of you will have seen the information before. Some have glanced at the data. However, most of you have not read the

reports at all. My presentation will use a different type of visual aid to show the importance of information from previous reports.

The first data are from the Rio Grande Project during 1943 to 1951. Norman Gaume provided some of this information earlier in a different manner. I will also discuss the help that Reclamation requested in 1945. My presentation will discuss the Rio Grande Operation Re-evaluation Study in 1989 and highlight some interesting points from the final report. I will also look at 1998 Rio Grande Compact accounting, which Steve Vandiver and others have already talked about earlier. My comments on the accounting components of the Compact will lead into discussion of the next steps that are needed in the Basin.

Figure 1 summarizes water demands of the Rio Grande Project (waters below Elephant Butte) from 1943 to 1951. The total usable water released in those years is provided in the second row. According to the Rio Grande Compact, the "normal" Rio Grande Project water released is 790,000 acre-feet per year. The figure also shows the accrued departure from "normal" releases for

those years provided. The total useable water releases ranged from a high of 913,000 acre-feet in 1943 to a low of 471,000 acre-feet in 1951. Again, the “normal” release is to be 790,000 acre-feet. In 1945, the accrued departure from “normal” was 247,000 acre-feet. Eventually the deficits, or the accrued departures from “normal,” did in fact become positive from 1949 through

during the 19-year period was 41% (or an average of 700,000 acre-feet). Colorado’s use of the water during this period was around 38% (or an average of 667,000 acre-feet) and New Mexico’s total use during these 19 years was 21% (or an average of 368,000 acre-feet). All these demands were made in accordance with the delivery rules of the Compact.

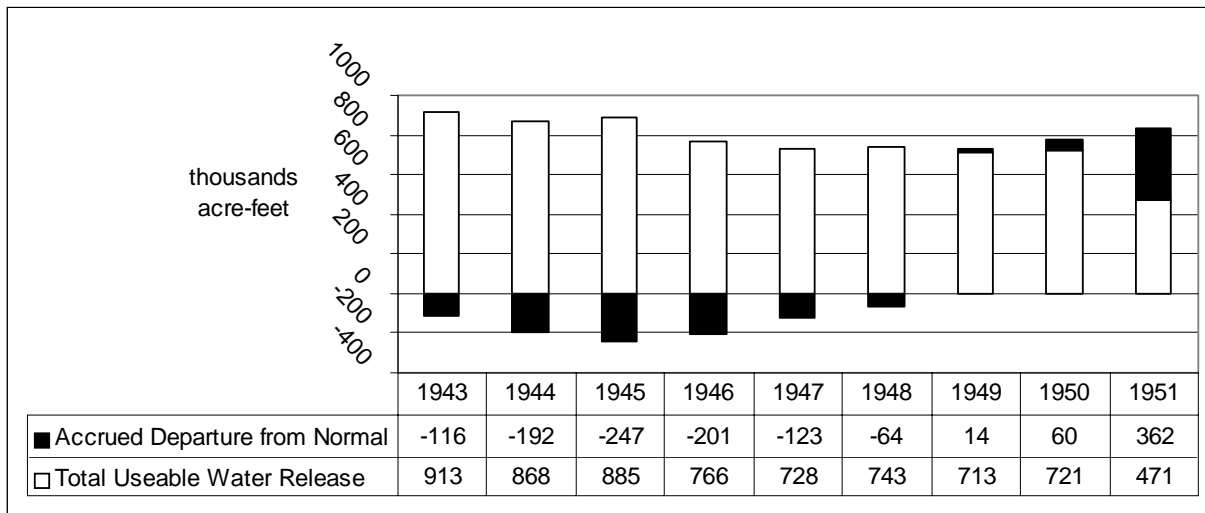


Figure 1. Water deliveries of the Rio Grande Project below Elephant Butte from 1943-1951.

1951.

On May 10, 1945, the Superintendent of the Rio Grande Project presented a publication to the public, in which he asked for help. Reclamation indicated there was a need to solve the serious water supply problem—accrued departure from “normal” was a large negative in Compact accounting for 1945. The Superintendent described the need to look toward the future security of the Project. Reclamation encouraged ways of using less water during the next few years. This meant using less than the “normal” release designed for the Project.

I’d like to discuss briefly the Rio Grande Basin Operation Re-evaluation in 1989. The Corps and others looked at flood control and optimum beneficial uses of waters in the basin. They also provided information about average water demands over a period of a few years and the storage capacity at Abiquiu, Cochiti, and Jemez Canyon reservoirs.

Figure 2 shows water deliveries for 1968 to 1986 in acre-feet. The pie chart shows that Texas’s Compact water percentage of total use

Now, one can look at the states’ deliveries associated with what was measured. Figure 3 shows the average percentage of returns to the river during the same period. Colorado returned an average of 18% of the 667,000 acre-feet (or 120,060 a-f) to the river from the usage in Colorado. New Mexico returned 34% of their delivered waters of 368,000 acre-feet (or 125,120 a-f) back to the river, and Texas returned 23% of the 700,000 acre-feet (or 161,000 a-f), which went out the bottom end of the Compact area.

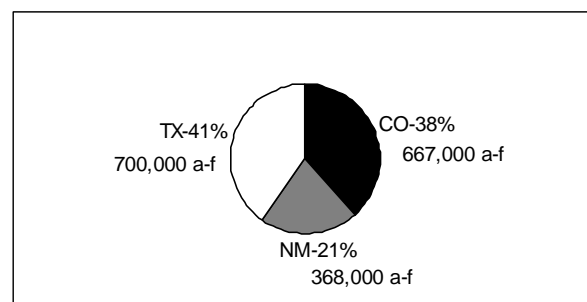


Figure 2. Water deliveries for 1968-1986 for Texas, Colorado and New Mexico.

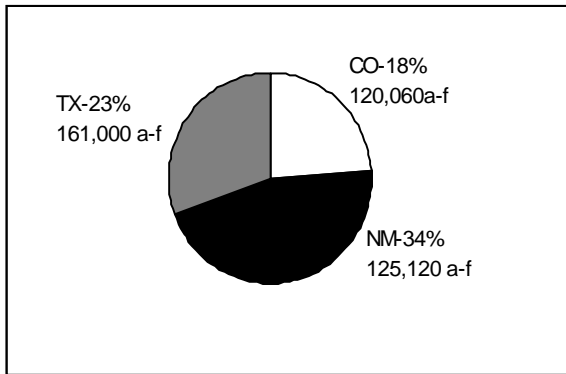


Figure 3. Average return flows by Colorado, Texas and New Mexico for the period 1968-1986.

Figure 4 comes from the same Corps of Engineers' studies in 1989. It shows the amount of reservoir storage in Colorado, New Mexico, and Texas. You will note that flood control in Colorado is minimal at about 6,000 acre-feet per year, and conservation space is about 54,000 acre-feet per year, for a total of 60,000 acre-feet per year. In New Mexico, there is about 1,874,000 acre-feet of total space and that includes flood, conservation, and other types of pools. Elephant Butte and Caballo reservoirs—the Texas reservoirs—provide the total space of 2.441 million acre-feet each year. The authorized storage is shown by percentages, which for Colorado with 1%, New Mexico with 43%, and Texas with 56% of the total available space.

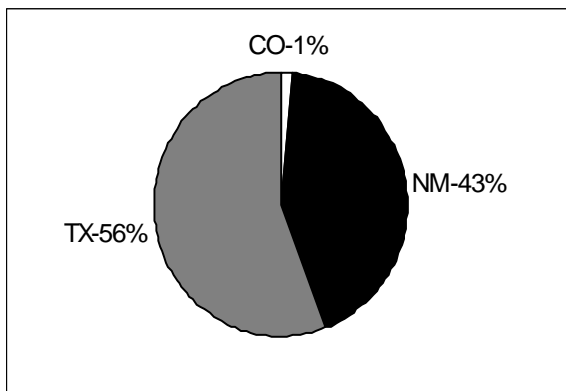


Figure 4. 1989 Rio Grande authorized reservoir storage in Colorado, New Mexico and Texas.

Reser- voir	Flood	Conser- vation	Recre- ation	Sedi- ment	Total
CO	6	54	-	-	60
NM	1,067	581	50	226	1,874
TX	100	2,341	50	-	2,441
Totals	1,173	2,976	100	226	4,375

(in thousands acre-feet)

Figure 5 provides us with the 1998 accounting of waters between the two portions of the basin in Colorado. The values come from the 1998 Annual Report of the Compact. Rio Grande waters are represented at the back of the figure in black. Conejos water is represented in the foreground by white bars. The supply out of the Conejos in 1998 was around 267,000 acre-feet. The Conejos delivery by Colorado at the New Mexico/Colorado state line was around 80,000 acre-feet. Usage in the Rio Grande portion of the Upper Basin, or the back bars, was about 578,000 acre-feet. The Rio Grande delivery to New Mexico was around 160,000 acre-feet. These amounts were in accordance to the rules of the Compact and, in fact, during 1998, Colorado accrued credits in Elephant Butte Reservoir.

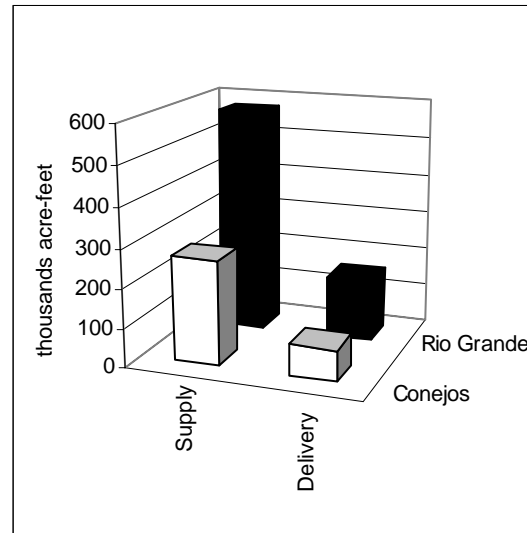
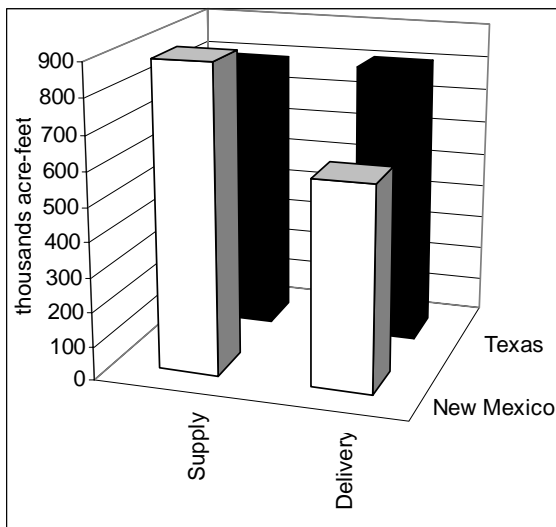


Figure 5. Accounting of Conejos River and the Rio Grande.

Figure 6 shows New Mexico and Texas supplies and deliveries. Texas values are represented by the black bars. The supply for Texas was to be 790,000 acre-feet, the normal release per year. However, the actual delivery in 1998 was 810,000 acre-feet. New Mexico had a supply of about 893,000 acre-feet, and the release from storage for Texas was about 597,000 acre-feet. In 1998, the rest, or about 296,000 acre-feet was used in New Mexico.

The next step, in my opinion, is almost underway. An agreement is being considered in conjunction with the Upper Rio Grande Basin Water Operations Review and Environmental Impact Statement. Colonel Fallin will talk about this tomorrow. The work is scheduled to take place between 2000 to 2004. I believe we should consider the use of available flood control space for additional conservation space at all reservoirs. This can be done according to the Compact and its authorizations. However, some changes to one or two authorizations may be appropriate for a given space in one of the reservoirs in New Mexico.



What does all this mean? If you compare the flood control space in New Mexico with the available conservation space, you find there definitely is adequate flood control space for most years. Reservoirs with adequate space, particularly at Abiquiu and Cochiti, were built after or during the 1950s. Many of the flooding problems occurred before that time. Likewise, Abiquiu Reservoir can be used for future water supplies if and when everyone agrees to such.

Furthermore, the Rio Grande Compact does not need to be changed to accommodate this use. The reservoir authorizations can be changed from time to time, if better water management is needed. In fact, the 1960 Flood Control Act created various ways to protect all Middle Rio Grande Project reservoirs. This Federal Act allows the reservoirs to be operated at all times in "conformity with the Rio Grande Compact." The Act also allows water management to be modified with the advise and consent of the Rio Grande Compact Commissioners.