1958-59 budget for California's Dep't. of Water Resources . . . . $76,976,927
Percent of California budget for water studies . . . . . . . . . 3.9%
Per capita expenditure by California for water studies . . . . . $0.52
Cost of Feather River Project to be financed by California . . . $1,600,000,000

1958-59 budget for Colorado's Water Conservation Board . . . . . $407,896
Percent of Colorado budget for water studies . . . . . . . . . 1.0%
Per capita expenditure by Colorado for water studies . . . . . $0.25

**Colorado Water Congress**

Interstate compacts: Colorado is a party to eight of them. Why? Because water from the high mountains of Colorado flows out in all directions into adjoining states and beyond. Result: Complex interstate water relationships which can be resolved in one of two ways . . . by the U. S. Supreme Court or by interstate compacts.

Colorado took a trimming on the North Platte at the hands of the U. S. Supreme Court. She took an even worse trimming on the Laramie. It has taken years of effort to overcome these deficits . . . deficits which occurred because of our own ineptitude.

Compacts are generally a **better way** to settle interstate water troubles. But compacts do not always work out as intended.

It happened in 1922 on the Colorado River. It happened again in 1938 on the Rio Grande . . . What happened? Simply this: Colorado entered into a water compact in good faith and she is now in trouble. She agreed to make deliveries of water to other states on a fixed basis rather than on a percentage-of-available-flow basis.

Why? . . . In each case it's a long story. There is no simple answer. On the Colorado much of the trouble appears to be related to an attempted breach of faith by Southern California . . . a deliberate effort to twist the meaning of compact to serve her own purposes. On the Rio Grande the trouble appears to be mostly of our own making.

So what? Let the lawyers and the engineers take care of it? . . . They can't do the job by themselves. There has to be informed public opinion to translate technical knowledge into action, if Colorado's dwindling water supply is to be protected and utilized.
Your Water Congress Newsletter would like to take you to the San Luis Valley this issue and introduce you to some of the Valley's water problems . . . particularly the Rio Grande Compact.

Will you come along? Busy friends, take time to look at our interstate water problems. See how we have backed into these problems . . . stumbling at times over complex interstate water relationships which were too difficult for us to handle with merely good intentions.

We don't know where or when the next time will be. It could happen out your way. In the water business, there is no substitute for eternal vigilance based upon broad understanding and current information.

Come along to the San Luis Valley, the oldest irrigated area in the state. Understand the problems of the people in the Valley. Profit by their experiences.

The San Luis Valley is an 8,000-foot high former bed of vast, ancient lake. Following a geologic upheaval, the lake overflowed and cut a river channel to the south. Through it has flowed the Rio Grande, meandering southerly through New Mexico and then southeastwardly forming the international border from El Paso, Texas to the Gulf.

The 1,800 mile Rio Grande is the Nile of the Southwest. It nourishes potatoes in Colorado and citrus groves in southern Texas. Midway lie the cotton fields of southern New Mexico and southwestern Texas. Irrigation diversions from the Rio Grande developed early, with 40,000 acres irrigated by 1860. There is a ditch in the San Luis Valley that has been in continuous operation for over 100 years. It has an 1851 priority . . . the oldest water right in Colorado.

Downstream shortages in Texas and Mexico also developed early. In 1906 the U. S. signed a treaty with Mexico which divided waters of the Rio Grande between the two nations and provided for construction of storage on the Rio Grande to prevent recurrence of severe water shortages. This opened the way for the Rio Grande project . . . one of the first to be constructed by the young U. S. Reclamation Service.

The Rio Grande project is a modern miracle of irrigation crop production valued at over $45 million a year. A capital investment of about $30 million has created a crop value of over $700 million during the past 54 years. Backbone of the project: Elephant Butte Reservoir, completed in 1916.
Elephant Butte is named after a big black rock that resembles a kneeling elephant.

- **Location:** Southwestern New Mexico, about 120 miles above El Paso, Texas. **Capacity:** 2,200,000 acre feet. **Job:** Irrigation, flood control, power. It irrigates 155,000 acres of some of the most fertile land in the world. Elephant Butte spilled before it was completed. Then it went 27 years without a spill.

- **Shortages threatened** on the Rio Grande in 1919 and in 1935 but did not actually occur. But there were plenty of water apportionment problems. Texas sued New Mexico in the early thirties. In 1936, a fact-finding investigation of the Rio Grande was undertaken jointly by seven federal agencies and Colorado, New Mexico and Texas. **Cost:** $400,000 of which Colorado paid $18,333. **Result:** Engineering facts, presented in a comprehensive report. They became the basis for the **Rio Grande compact.**

- **Key men** behind the compact: Royce Tipton, Denver consulting engineer; M.C. Hinderlider, former state engineer for Colorado; Raymond Hill, Los Angeles consulting engineer employed by Texas; and engineer John Bliss of New Mexico.

- **What did the compact do?** It resolved the Texas-New Mexico lawsuit, at least for a time. It obligated Colorado to deliver near the Colorado-New Mexico state line an annual amount of water related to the amount passing certain inflow index gaging stations in the San Luis Valley. It obligated New Mexico to make specified deliveries at the head of Elephant Butte Reservoir. And it specified a normal annual release from Elephant Butte Reservoir.

- **Compact objectives:** To protect established irrigation uses in the basin. To permit construction and operation of additional reservoirs above Elephant Butte. To insure a 790,000 acre foot average annual release from Elephant Butte. And to avoid long and costly interstate litigation.

- **How would the compact function for Colorado?** By use of technical relationships found to exist between annual flow into, and annual flow out of, the San Luis Valley during the 10-year period 1928 through 1937. A schedule of deliveries was provided for the tributary Conejos River and for the mainstream Rio Grande. The two schedules combined, less 10,000 acre feet, defined Colorado's delivery obligation.
The compact provided for a system of accounting whereby deviations from scheduled deliveries were set up as debits or credits. If less water is delivered than required by the schedules, Colorado is debited with the deficiency... and vice versa.

Colorado credits are limited to a maximum of 150,000 acre feet a year. If Elephant Butte spills, accumulated credits are reduced by the amount of the spill.

Colorado's total debits may amount to as much as 100,000 acre feet without violating Colorado's obligation to meet her schedule of deliveries at the state line. Larger debits are allowable only if compensated for by holdover storage in Colorado reservoirs. Compact studies indicated that 50,000 acre feet was enough operational allowance for debit accumulations... on the basis of historical data.

Total Colorado and New Mexico debits may be reduced to the amount of the minimum unfilled capacity of Elephant Butte Reservoir in any year. If Elephant Butte spills, all of the accumulated debits of Colorado and New Mexico are wiped out.

Enforcement: The Rio Grande Commission by unanimous action may authorize the release from storage of any amount of accrued debits. Neither Colorado nor New Mexico can store additional amounts in reservoirs constructed after 1929 if there is less than 400,000 acre feet of usable water in project storage, except under certain conditions.

Note this: The compact was based upon the assumption that additional storage would be built. It didn't provide for enforcement in the event this additional storage wasn't built.

In pre-compact discussions it was proposed that a watermaster be empowered to act in place of state engineers on the Rio Grande. He would see that water got through to Elephant Butte when it was supposed to. Colorado objected and this provision wasn't written into the compact.

The Rio Grande compact was signed at Santa Fe, New Mexico on March 18, 1938 by representatives of Colorado, New Mexico and Texas. It was ratified by the respective state legislatures, consented to by the Congress, and became effective in 1940.

About 1940, a 24,300 KW powerplant was installed at Elephant Butte. Afterbay storage space and flood control space were provided 25 miles downstream in 340,000 acre foot
Project power was allocated to use in Texas and New Mexico on a 50-50 basis.

In 1940, the Bureau of Reclamation found the San Luis project feasible and recommended construction of storage facilities. The storage: Wagon Wheel Gap Reservoir near Creede. Capacity: Originally 1 million acre feet. Reduced to 500,000 acre feet in 1955. Also: Two reservoirs on the Conejos River southwest of Alamosa with a combined capacity of 100,000 acre feet.

The San Luis Project was estimated to cost $17 million, of which $7 million would be non-reimbursable (flood control). The remainder would be repaid by water users on 400,000 acres of developed land around Monte Vista in need of supplemental irrigation water. Congress subsequently authorized the project.

Wagon Wheel Gap Reservoir was not built. Why not? The war interfered. But chalk it up mostly to dissentions within the San Luis Valley. In spite of assurances, some feared that construction of this reservoir would take away their opportunity to divert water in the spring for sub-irrigation (irrigation by raising and lowering ground water levels.) They insisted that their method of sub-irrigation was actually a groundwater reservoir operation and that they didn't need a surface reservoir.

Some said there would be no water to fill the reservoir. Others wanted the Corps of Engineers to build it with non-reimbursable funds. Taking sides: Water-wise, rugged individualists.

Current outlook for Wagon Wheel Gap Reservoir: Only fair. As long as Colorado has a large, accumulated debit, any water stored would be subject to call by Texas for use on the Rio Grande Project. The Bureau of Reclamation does not show much interest in Wagon Wheel Gap.

But there is a gimmick which may help out. Soon to be voted on is an amended repayment contract for Platoro Reservoir on the Conejos River. It consists of a variable repayment formula under which water users would pay for only the water they actually receive from the reservoir. If this principle could be applied to Wagon Wheel Gap, repayment contracts could be obtained. Without it, water users would have to pay for water
that had to be delivered to the Rio Grande project under the compact.

In 1944, a treaty with Mexico re-allocated Rio Grande flows, along with waters of the Colorado and the Tijuana. Result: Division of Rio Grande waters below Fort Quitman about equally between the U.S. and Texas even though about 70 percent of the water originates in Mexico. To the U.S.: 350,000 acre feet annually.

The Mexican Treaty was designed to settle long-standing differences on water rights. The Rio Grande part of the Mexican Treaty seemed satisfactory to everyone except California. Californians asserted that the treaty represented a trade of 1,500,000 acre feet of Colorado River water in return for 350,000 acre feet of water from Mexican tributaries of the Rio Grande for use in Texas.

Consulting Engineer Hinds of Los Angeles had this to say: "That a trade did occur is obvious and apparent to the affected California interests by the insistence of the Mexican representatives in a treaty to settle the water problems of both rivers".

California also objected to the powers granted by the treaty to the International Boundary and Water Commission. In spite of strong objections by California and Nevada, the Mexican Treaty was ratified in 1945.

In 1951, Texas sued New Mexico again in the U.S. Supreme Court. The high court dismissed the case because it considered the United States an indispensable party in the case due to involvement of Indian lands . . . and the U.S. wouldn't consent to be sued. Note this: There are no Indian lands along the Rio Grande in Colorado.

Platoro Dam, which takes its name from Spanish words for gold and silver was completed in 1952 as a part of the San Luis project. Located high on the Conejos at 10,000 feet, Platoro's 60,000 acre storage capacity was designed for flood control and to provide supplemental irrigation water for 91,000 acres in the Conejos River Valley.

In 1952, Colorado got in the hole on Rio Grande Compact deliveries and she has been in the hole ever since. Colorado's 1952 debit: 154,000 acre feet. In 1957, another big debit: 136,000 acre feet. In 1958, Colorado showed a small credit . . . her first credit year since 1949. Colorado's present accumulated debit: 492,000 acre feet!
During the drouth years, Colorado diverters received about two-thirds of their
average diversion during the 1928-37 period. Texas got around 40% and dropped to 25%
in some years. Elephant Butte Reservoir went dry.

Platoro Reservoir, operating under Rio Grande compact deficit conditions was unable
to supply any irrigation water to the Conejos lands. In 1953, Texas and New Mexico agreed
to let Conejos irrigators have 20,000 acre feet of Platoro water in view of their desperate
need. New Mexico was also given some water.

* * *

What is it that has put Colorado deep in debt on Rio Grande compact deliveries?
The Colorado legislature asked this question after Colorado chalked up its big debit in
1952. It appropriated $10,000 to find the answer. Result: A technical report by con-
sulting engineer Royce Tipton in January 1955. Conclusions: The large debit in 1952
was not unusual. It was the combination of drouth years since 1952 that was unusual.
Tipton also concluded that conditions on the Conejos has changed since 1937 to the extent
that compact deficiencies on the Conejos amounting to 20 to 25 thousand acre feet a year
could now be expected. Tipton suggested that part of the trouble on the Conejos may be
attributed to groundwater withdrawals, principally from the artesian zone, which caused
a reduction in the contribution of artesian flow to the Conejos.

Many people outside of the San Luis Valley generally sum up the trouble in one word:
WELLS! Well development has been rapid in the San Luis Valley in recent years. In 1928
one shallow well in the Valley was used for irrigation. In 1936 there were 176 pumping
plants in operation. In 1952: Estimated 1,300 pumping wells yielding up to 500,000
acre feet a year and 7,500 flowing wells yielding 300,000 to 400,000 acre feet a year.

The well theory is frequently voiced, particularly by Texans. It goes something like
this: Groundwater supplies are diverted into the closed basin and they don't return to
the Rio Grande. Some of the pumped artesian water which normally feeds the Rio Grande is
lost through consumptive use. The great quantity of groundwater used on the Conejos,
particularly, results in high consumptive losses. These are all fighting words in the
San Luis Valley.
Groundwater in the San Luis Valley is greatly depleted during a dry year. Substantial diversions are required the following year to rebuild groundwater levels for sub-irrigation. Recharge from application of surface water for irrigation in the San Luis Valley in 1952 amounted to at least 135,000 acre feet in an area of 291 square miles.

There are other theories on what went wrong with the Rio Grande Compact. Chalk it up to increased yields per irrigated acre due to land leveling and use of commercial fertilizers. Increased potato yields mean greater consumptive use and less return flow.

Occasionally you hear this: The Rio Grande compact is a good example of why engineers shouldn't write compacts. And this: What do you expect, with only ten years of record? That's too short a time to establish reliable flow relationships. Furthermore, inflow-outflow is not a straight line relationship.

There are optimists: Just one real good water year is all it takes. Spill at Elephant Butte will wipe out Colorado's indebtedness. Even if there is no spill, Rio Grande project storage will some day increase to the point where Colorado's indebtedness can be reduced under the minimum unfilled capacity criterion. If we can't reduce the debt, so what... Texas is not going to take our water away from us.

And pessimists: The odds are stacked heavily against a spill at Elephant Butte. This reservoir has spilled only once since 1916. Odds against, Colorado are increasing each year as new wells are drilled. It's a losing game for Colorado. Don't under-rate Texas. She is aggressively moving to solve her water problems. And she has strength in Congress.

Inside the San Luis Valley: Mostly optimists. Outside the Valley: Mostly pessimists.

Is the debit situation serious? Your Water Congress believes it is serious... How serious remains to be seen. The compact provides no means of enforcement under present conditions, other than through control of Platoro storage. If Colorado and New Mexico don't make an effort to reduce their indebtedness to the Rio Grande project, a lawsuit initiated by Texas appears inevitable.
Compromise? Texas helped out in 1957 and has agreed in principle to a different method of operation for Platoro which gives Colorado a better chance to get water to her. Colorado's Compact Commissioner, State Engineer Whitten, has attempted to persuade San Luis Valley irrigators to make at least a token reduction of about 10% in their diversions to help out on compact deliveries. But they won't do it. San Luis Valley irrigators seem to feel that the Rio Grande compact sold them down the river.

Where does Texas stand? Texas claims she has accumulated 1,800,000 acre feet of credit at Elephant Butte. She says the compact specifies an average annual release of 790,000 acre feet a year. She says that's like the 7.5 million acre foot average annual delivery requirement at Lee Ferry under the Colorado River compact.

Texas arithmetic: Multiply 790,000 acre feet by the number of years the compact has been in effect. Subtract the total amount of water Texas has received from Elephant Butte during the same period. Result: Credit of 1.8 million acre feet.

Colorado says NO! The compact doesn't say this. You can't figure both credits and debits. Colorado is debited 492,000 acre feet for under-deliveries. New Mexico currently is debited 469,000 acre feet. Total debit: 961,000 acre feet.

New Mexico has her own formula. She figures the credit at Elephant Butte to be about 800,000 acre feet. Compact commissioners have been going round and round on this controversy in recent sessions.

Where does New Mexico stand? She's been in debt on water deliveries almost every year since she signed the Rio Grande compact. She is in a divided position, having interests on both sides. Her interests below Elephant Butte are identical to Texas. Above Elephant Butte: Identical to Colorado.

New Mexico wants the Corps of Engineers to build 700,000 acre foot Cochiti Reservoir on the Rio Grande. Also 200,000 acre foot Galisteo Reservoir on a tributary. Both above Elephant Butte. She's striving for more liberal compact interpretations for the operation of these reservoirs. But Texas says No on re-interpreting the compact.
Colorado's stake in Cochiti: Changed interpretations of the compact might help Wagon Wheel Gap Reservoir but . . . if Colorado isn't careful, one of the compact gimmicks for reducing her indebtedness (minimum unfilled capacity limitation) could go down the drain.

Another problem bothering compact commissioners: Colorado wants compact credit for trans-basin diversions from the Colorado into the Rio Grande. Not much water . . . but an important principle. Texas recently made a big concession. She's willing to give compact credit if Colorado can show adequate factual basis for her claims. The Colorado Water Conservation Board is working on it.

Is there a way out in sight for Colorado on her Rio Grande compact difficulties? The San Luis Valley snowpack is currently below normal. Mountain soils are dry. Rio Grande and Conejos flows are expected to be about 70 percent of normal. Extensive use of groundwater is anticipated. Very little chance of spill or help from the minimum unfilled capacity provision.

Possible help: Colorado has contributed $25,000 for a cooperative federal-state groundwater investigation which includes a study of a drain in the San Luis sump area which would get water back into the Rio Grande. Salinity is a problem. It might be solved by location of one of the federal government's proposed water de-salting plants in the sump area. But: Some of the local people aren't interested in the sump drain idea.

What can be done about these water problems in the San Luis Valley? Your Water Congress believes that there may be adverse interpretations of the Rio Grande compact which are subject to correction, and which have been applied for years to the detriment of Colorado. Some feel that the short history used as a basis for the compact included so many serious mutual mistakes of fact that the compact schedules cannot be enforced in court. A joint engineering-legal investigation should be made for the purpose of collecting information. Find out how the compact provisions have been applied, why the compact hasn't worked, and what can be done about it. If nothing can be done, Colorado can use the results of the study to prepare for a lawsuit in the U.S. Supreme Court--with the hope that it never happens.

Don't you agree: Something should be done about the serious water problems of the San Luis Valley!