

PHREATOPHYTE CONTROL OPERATIONS
IN NEW MEXICO

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I would like to express my pleasure at this opportunity to discuss the more important phreatophyte control operations in New Mexico. While technically these operations may not come under our conference theme, essentially all of them have developed or improved the procedures and techniques used in phreatophyte control. Thus, they have contributed greatly to the available store of knowledge.

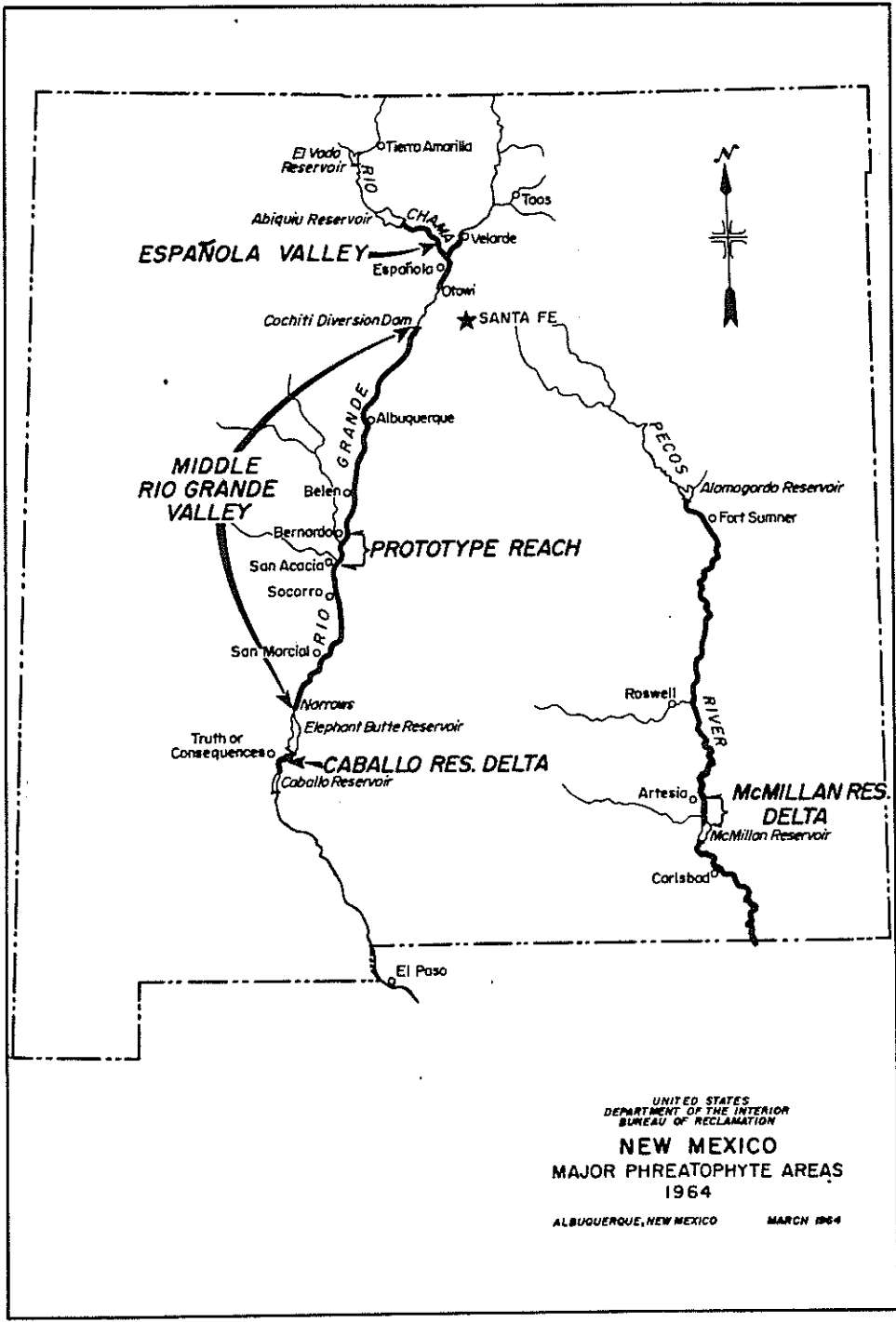
In my brief discussion I will simply outline the two general areas of the state where water loss by nonbeneficial phreatophytes is the most serious, describe the more significant of the activities that are providing some measure of control, and point out the remedial action presently under consideration. The location of these features is shown on the sketch map, Major Phreatophyte Areas.

I believe all who have studied the problem will agree that the two areas in New Mexico that offer the greatest opportunity for phreatophyte control are the Pecos River Basin from the New Mexico-Texas State line upstream to Alamogordo Dam, and the Rio Grande Basin from the Narrows of Elephant Butte Reservoir upstream to Velarde on the main stem, and to Abiquiu Dam on the Rio Chama. This area in the Rio Grande consists of what is commonly known as the Middle Rio Grande and Espanola valleys. In both basins, the areas outlined are located in the broad flood plains of main rivers, and consist of dense vegetative growth in relatively large blocks.

In the Pecos Basin area, there were some 38,000 acres of phreatophytes in 1960, primarily salt cedars. They were estimated to be consuming an average of about 118,000 acre-feet of water annually. Considerable study has been made of this area. However, the hydrologic factors involved are quite complicated and there has yet been no agreement on the control measures that might be effective or the amount of water that might be salvaged.

One engineering feature, a low-flow channel through the McMillan Delta, is reducing consumptive waste in this area. It was initiated in 1948 by the Carlsbad project, to permit the passage of river flows through the salt cedar-choked delta. It gradually has been enlarged and extended upstream, with the help of the Bureau, to the vicinity of Artesia Bridge. It likely is preventing average losses of from 10,000 to 15,000 acre-feet annually.

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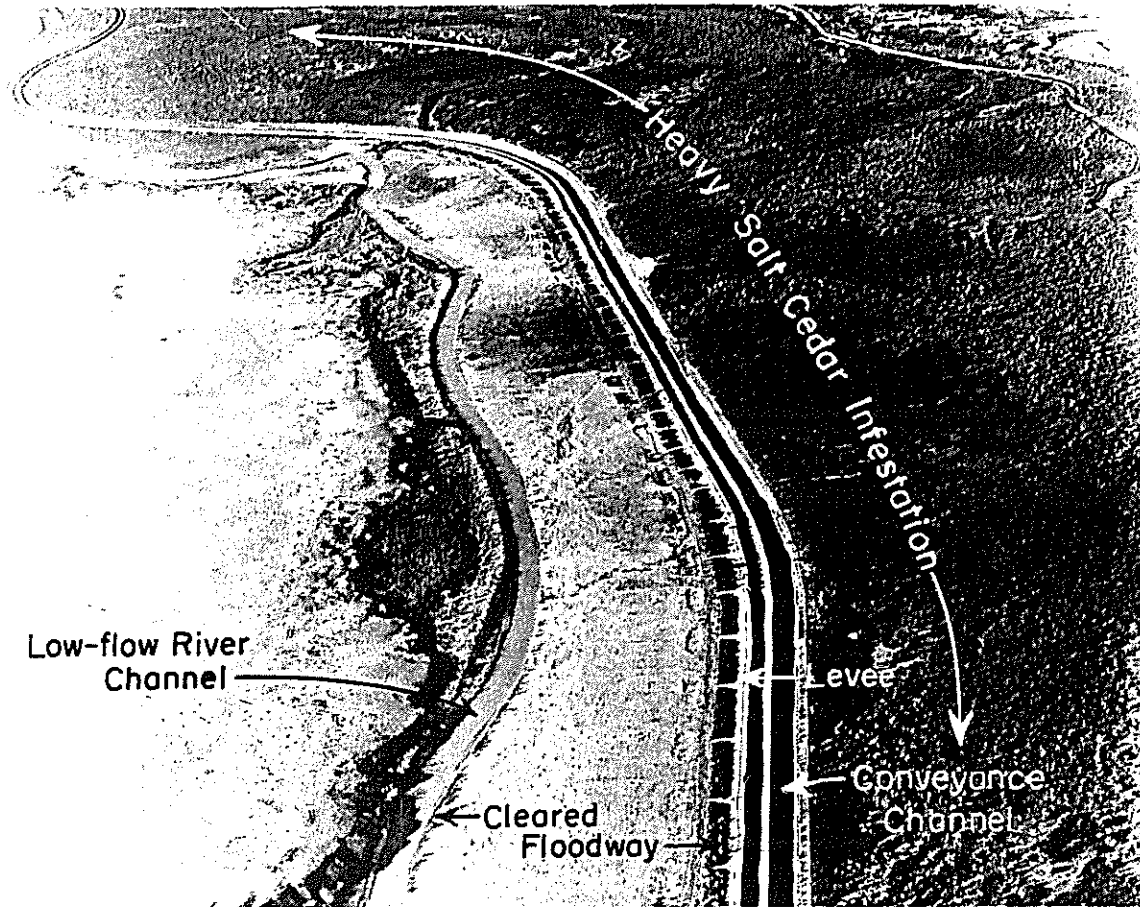
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 MAJOR PHREATOPHYTE AREAS
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In the Middle Rio Grande and Espanola valleys, a reconnaissance study in 1960 indicated there were about 48,000 acres of phreatophytes consisting mainly of salt cedars, cottonwoods, willows, and Russian olive. These plants are wasting an average of about 200,000 acre-feet of water annually. While all of this waste cannot be prevented, it is likely that at least 60,000 acre-feet could be salvaged annually by phreatophyte removal and control.

There are two projects in this portion of the basin that are important as control operations. The state is participating financially in both. The first is the multiple-purpose Middle Rio Grande project which extends throughout the Middle Valley from Cochiti diversion dam on the north to the Narrows of Elephant Butte on the south, a distance of almost 200 river miles. One of the important phreatophyte control features is a cleared floodway, containing a low-flow river channel along the full 200 miles of the river. The cleared floodway varies from 600 to 1,000 feet in width. The channel and floodway are controlled and protected by fields of Kellner jetties and are under constant maintenance by the Bureau. These features provide both flood control and water salvage. Water use is reduced on more than 15,000 acres of phreatophytes that were cleared in constructing this feature.

Another feature, the most important from the phreatophyte control standpoint, is the 75-mile-long levee and conveyance channel from the San Acacia diversion dam to the Narrows. The levee restricts all high river flows to the eastern 2,000 feet of the valley and prevents these flows from spreading through some 20,000 acres of dense vegetation on the flood plain. The conveyance channel transports all low flows through the phreatophyte infested areas and into the reservoir. Some 50 miles of the levee, as well as the 75-mile conveyance channel, are new construction specifically for water salvage. The conveyance channel, averaging some 10 feet deep, has lowered the water table throughout this river reach. Thus, water is salvaged in four ways: first, by keeping surface flows out of the sandy river channel where it would be lost through evaporation and deep percolation; second, by keeping it from spreading over the phreatophyte infested area; third, by lowering the water table and reducing the use by plants; and, fourth, by clearing and maintaining the cleared floodway. Our analyses show we have salvaged almost 700,000 acre-feet of water in the Middle Rio Grande Basin since the start of construction, and have averaged more than 62,000 acre-feet a year over the last 10 years.

The other activity in this area is the water salvage investigation which we initiated in fiscal year 1961, in compliance with P.L. 858, to determine feasible ways and means of reducing non-beneficial consumptive use in the Rio Grande Valley. In carrying out this investigation, we have selected a prototype reach extending from U. S. Highway No. 60 at Bernardo to the San Acacia diversion dam 16 miles downstream. We have instrumented this area and obtained a three-year record of water use while it is infested with phreatophytes.



Typical view of cleared floodway, levee, and conveyance channel along the Rio Grande in the vicinity of San Marcial. Bureau of Reclamation photograph. View looking downstream from an elevation of 7,000 feet.

We are now clearing the area, a total of some 6,400 acres, and will continue with the measurements of water use for at least a two-year period while the area is being maintained free of regrowth.

Three methods are being used to determine water use, the inflow-outflow method, the transpiration well method, and the evapotranspiration tank method. Soil moisture measurements are obtained at each well installation with a neutron moisture meter. We are hopeful that the difference in water use before and after clearing--the actual water salvaged--can be satisfactorily measured. The results will then be expanded over the entire Middle Rio Grande and Espanola valleys in the development of a plan for water salvage in the Rio Grande Basin.

The remaining significant control project is the clearing and maintenance of some 5,500 acres in the Caballo Reservoir Delta. This is a cooperative effort of the Rio Grande Project and the State, initiated in 1957. It is the only project in which clearing has been done solely to salvage water, and is justified on the basis of an estimated average annual water savings amounting to about 15,000 acre-feet. A number of experiments on both mechanical and chemical control measures have been carried out on this project. Moreover, it has proven the most satisfactory from the standpoint of natural revegetation with useful grasses.

In summarizing, it should be noted that, to date, water salvage has been accomplished primarily by engineering works that control the water supply. Clearing has been relatively minor in comparison. Nevertheless, we have cleared and are maintaining more than 25,000 acres free from phreatophytes, and have used all known methods of clearing and of maintenance, except the large Le Tourneau tree crusher. None of these are entirely satisfactory and I am hoping that some new method will be perfected by research, possibly some application of the Lazer beam.

As for the future--when water becomes more valuable, control programs will be intensified. The phreatophyte problem is so acute in the Pecos Basin now that the Pecos River Commission has secured the introduction in Congress of Senate Joint Resolution No. 49, providing for the control of nonbeneficial vegetation from the headwaters in New Mexico to Girvin, Texas. This bill has passed the Senate and hearings have been scheduled by the House for next week.

A great deal of effort and money is already being put into control programs in the Rio Grande Basin. These, no doubt, will be continued. The demands for water, however, are constantly increasing and some of the additional supplies which will be needed within the next 10 to 20 years could logically come from a water salvage program. The study we are now making will result in a plan for such a program. We hope we can develop a plan that is both economically and financially feasible. The study is scheduled to be completed in fiscal year 1968.