

FLOOD CONTROL AND RECLAMATION PROJECTS
PECOS RIVER BASIN, NEW MEXICO

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INTRODUCTION

The National Resources Planning Board in 1942 summarized the Pecos River Basin by saying ". . . For its size, the basin of the Pecos River probably presents a greater aggregation of problems associated with land and water use than any other irrigated basin in the western United States. These involve both quantity and quality of water supplies, the problem of salinity being particularly acute; erosion and silting of reservoirs and channels; damage from floods; and interstate controversy over the use of the waters. There is an abundance of good land so that the limit of development is the availability of water of satisfactory quality. The use of the water of the river has been fully appropriated . . ."

The United State Bureau of Reclamation, Corps of Engineers, Soil Conservation Service and the Pecos River Commission of New Mexico and Texas have played important roles in the development and control of the water resources of the Pecos River Basin.

The Bureau of Reclamation, originally known as the Reclamation Service, was established in June 1902 for the purpose of constructing irrigation works for the reclamation of arid lands. Over the years, as needs have developed, the Bureau's program has been expanded to supply water to industries and municipalities, to generate hydroelectricity, to provide water for recreation and to serve other beneficial uses. The agency has been active in New Mexico since 1903.

The water resource development program of the Army Corps of Engineers began in New Mexico in 1935. During that year the Conchas District Office was established to accomplish the necessary design work and supervise the construction of Conchas Dam on the Canadian River near Tucumcari. The water resource development program of the Corps of Engineers is chiefly concerned with flood and sediment control, municipal water supplies, and other allied purposes.

The Watershed Protection and Flood Prevention Program, administered by the Soil Conservation Service, which provides Federal assistance for multiple-purpose projects on small watersheds, has been active in New Mexico since 1955. Commonly known as Public Law 566, the Watershed Protection and Flood Prevention Act, became

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effective in 1954 and in the next year Congress authorized work on 60 small watersheds to serve as demonstration or "pilot" projects. Two of these pilot projects are in New Mexico. One -- upper Rio Hondo and Tributaries -- is in the Pecos Basin.

The Pecos River Compact was signed in December 1948 by representatives of New Mexico and Texas, was ratified by the respective state legislatures, and subsequently was approved by Congress, becoming law on June 9, 1949. A major purpose of the compact is to facilitate the construction of works for the salvage of water, the more efficient use of water, and the protection of life and property from floods.

The compact provides for the formation of a commission to administer its provisions. This administrative agency, known as the Pecos River Commission, has been instrumental in coordinating the work of the various Federal agencies and in obtaining legislation to carry out the major purposes of the compact.

In many instances the program of these agencies are complementary, especially when water-salvage, irrigation works or flood-protection works are needed. For example, the Brantley Dam and Reservoir near Carlsbad presently under study by the Bureau of Reclamation will provide replacement storage for irrigation, make possible the clearing of salt cedar from the McMillan delta for the salvage of water, and provide much needed flood control. In the planning of such projects, close coordination between the agencies often produces a dual or multipurpose facility which serves the needs of the area as well as single purpose projects, and at much smaller total cost.

HONDO PROJECT

The first Reclamation Service Project in New Mexico was the Hondo Project. The project was initiated in the middle 1880's by private interests and contemplated storage of flood waters of the Rio Hondo in an offstream reservoir about nine miles southwest of Roswell to irrigate some 10,000 acres of land. Financial difficulties and the disastrous floods of 1893 on the Pecos suspended construction. Late in 1902 the interests persuaded the newly organized Reclamation Service to take over the project. Surveys were started in 1903 and by 1912 the project works were essentially completed. The project was not successful; because of the leaky nature of the reservoir formation, the impounded water escaped rapidly through the floor of the reservoir.

FT. SUMNER PROJECT

Irrigation in the Ft. Sumner area dates back to 1862 when the U. S. Army established a reservation for Navajo and Mescalero Apache Indians. To make the reservation self-sufficient, Army troops built

a diversion dam and several miles of canal to irrigate some 2,600 acres. The venture was not successful and in 1868 the experiment was abandoned. The project was revived shortly after the turn of the century and was operated by several interests until 1919 when the Ft. Sumner Irrigation District was formed. The newly formed district was unable to obtain financing to do more than install temporary facilities until 1935 when the Public Works Administration advanced sufficient funds to construct a concrete diversion dam and about 14 miles of canal. Floods destroyed a portion of the diversion dam in 1941 and again in 1942 when a section about 250 feet long was washed out. Temporary earth fill repairs were made, but the entire system was in need of rehabilitation so the district appealed to the Secretary of Interior for aid. In 1948 the Bureau of Reclamation made emergency repairs to the works and in 1949 Congress authorized rehabilitation of the system. The work consisted of constructing a new concrete diversion dam, concrete lining about 16 miles of main canal and 8½ miles of high line canal, installing a new 20 cubic foot per second hydraulic pumping plant to lift water from the main canal to the highline canal, and rehabilitating the system's lateral and drainage system.

CARLSBAD PROJECT

In the Carlsbad area irrigation works to serve what is today known as the Carlsbad Project, or the Carlsbad Irrigation District, was started in the late 1880's by the Pecos Irrigation and Improvement Company. Eddy Dam (now known as Avalon Dam) and the supply canal to the project were completed in 1890 and 1891, with McMillan Dam about ten miles upstream being finished in 1893. In October of 1893, floods on the Pecos River washed out Eddy Dam and only by dynamiting a section of McMillan Dam was it saved from destruction. The damage to both dams was repaired and by the turn of the century more than 13,000 acres were under irrigation in the vicinity of Carlsbad.

In 1904 floods again washed out Eddy Dam and severely damaged other works of the project. During 1906 the Reclamation Service entered a contract with the local organization to rehabilitate the project works.

Avalon Dam was reconstructed with a reservoir capacity of 7,000 acre-feet. McMillan Dam, which formed a reservoir with a capacity of 90,000 acre-feet, was rehabilitated along with the supply canal and distribution system. This work was accomplished between 1907 and 1909.

Leakage from McMillan and Avalon Reservoirs and sedimentation continued to reduce the effectiveness of these reservoirs until in 1931 the Bureau of Reclamation proceeded with plans to construct a third dam -- Alamogordo Dam -- located about 16 miles northwest of Fort Sumner. Construction of the dam was begun in 1936 and completed in 1937. The dam is an earthfill structure 148 feet high

and 3,084 feet long, forming a reservoir with an original capacity of 157,000 acre-feet. The additional storage capacity provided by Alamogordo Reservoir did not solve all the problems. Water loss from the 236 miles of river between Alamogordo Dam and McMillan Dam was high and with the continuing spread of salt cedars along the river bottom, particularly in the McMillan Delta, these losses were increasing. By the early 1950's the combined capacity of the three reservoirs had been reduced from an original capacity of 254,000 acre-feet to about 165,000 acre-feet, and with increasing losses to saltcedar the shortage in the Carlsbad Project water supply was becoming critical.

In 1954 the Bureau of Reclamation issued a plan for salvaging waters lost to saltcedar in the McMillan Delta area. The plan contemplated construction of a low-flow channel about 16 miles long and a cleared floodway 2,000 feet wide through the McMillan Delta.

The low-flow channel was designed to pass 1,500 cubic feet per second -- a capacity adequate to carry normal river flows and small flood flows. Flows in excess of the channel capacity would be diverted into the floodway which would have a capacity of 40,000 cubic feet per second. The Bureau of Reclamation estimated the project would salvage about 25,000 acre-feet annually. The Bureau of Reclamation plan along with a report prepared by the Pecos River Commission was presented to the Congress in February 1958 and the project was authorized in the same year by Section 1 of Public Law 85-333.

The authorizing legislation recognized the Carlsbad Irrigation District's concern that if the saltcedar were removed from the floodway the storage capacity of McMillan Reservoir would soon be depleted as a result of increased sediment inflow. The saltcedar, while consuming large amounts of water, serve as an effective sieve to keep sediment out of McMillan Reservoir. The legislation provided that no money should be appropriated for, or no work commenced on, clearing of the floodway until provision had been made to replace any Carlsbad Irrigation District terminal storage which might be lost as a result of clearing the floodway.

To provide replacement storage for the Carlsbad Irrigation District, the Bureau of Reclamation investigated possible reservoir sites between McMillan and Avalon dams. Because of the cavernous nature of the underlying limestone formations, extensive geology studies were required to select an adequate site. In June 1960 the Bureau of Reclamation reported its findings on a location called the Brantley site, about 4 miles downstream from McMillan Dam. Following requests by the State of New Mexico and the Carlsbad Irrigation District a feasibility study of Brantley Dam and Reservoir was undertaken. The proposed dam and reservoir would provide terminal irrigation storage for the Carlsbad Irrigation District, space for 100 years of sediment deposition, flood protection for the City of Carlsbad, and fish and wildlife and recreation benefits.

While studies of possible replacement storage were being conducted, the Carlsbad Irrigation District undertook the construction of a low-flow channel through McMillan Delta where the saltcedar had encroached into the river channel and was restricting even the low flows of the Pecos River. Work has continued on the channel and now it extends from McMillan Reservoir to near Artesia. This channel, known as Kaiser Channel, has accomplished a part of the salvage contemplated in the McMillan Delta Project.

MALAGA BEND SALINITY PROJECT

Section 2 of Public Law 85-333 authorized the Malaga Bend Salinity Alleviation Project as a means of reducing the salinity of the Pecos River. In the area of Malaga Bend about 20 miles below Carlsbad, there were, prior to construction of the project, several springs and seeps which added about 420 tons of dissolved minerals daily to the Pecos River, about 370 tons of which were sodium chloride.

Construction of the project was accomplished by the Bureau of Reclamation and an evaluation program is being conducted by the U. S. Geological Survey.

The constructed project consists of a production well, about 220 feet deep and equipped with a 12-inch plastic casing, a pumping plant, and about two miles of 8-inch asbestos-cement pipe leading from the production well to an evaporation-disposal area.

Operation of the project started in July 1963 and by December of 1964 approximately 1,000 acre-feet of brine containing more than 300,000 tons of salt had been pumped into the disposal area. The head in the brine aquifer had been lowered as much as 8 feet and the brine inflow to the river had been reduced about 70 percent.

PUBLIC LAW 88-594 -- A CONTINUING PROGRAM TO REDUCE NON-BENEFICIAL CONSUMPTIVE USE OF WATER IN THE PECOS RIVER BASIN IN NEW MEXICO-TEXAS

The Pecos River Commission, Bureau of Reclamation, Geological Survey, and the State of New Mexico have been actively engaged in studies of the growth, water use, and possible salvage of water from saltcedar jungles in the Pecos Basin. As a result of these studies and in order to prevent further decrease in the supply of water in the Pecos Basin, Public Law 88-594 -- A Continuing Program to Reduce Non-beneficial Consumptive Use of Water in the Pecos River Basin -- was approved in September 1964. The law authorizes the Secretary of Interior to take such measures as he deems appropriate to carry out a continuing program to reduce the non-beneficial consumptive use of water by saltcedar and other phreatophytes.

There are between 60,000 and 70,000 acres of saltcedar along the Pecos River between Santa Rosa, New Mexico, and Girvin, Texas, with about 40,000 acres being in New Mexico. The largest concentration in New Mexico is in the 110-mile river section between the

Acme gage just above Roswell and McMillan Dam. In this section there are about 28,000 acres of saltcedar which thrives on river flows and the natural discharge of the Roswell Artesian Basin. It has been estimated that eradication and control of the saltcedar in this reach could salvage about 57,000 acre-feet of water annually.

Saltcedar in the Pecos River Basin infested the river bottom lands at a phenomenal rate. They were first noted in 1915 and by 1939 there were about 14,000 acres along the river between Alamogordo Dam and the New Mexico-Texas State line. The infested area in 1960 had increased to about 40,000 acres and estimates by the Bureau of Reclamation indicate that by the year 2010, unless corrective action is taken, some 75,000 acres will be infested.

Without a program such as is authorized by P.L. 88-594, within a few decades virtually the entire supply of the Pecos River could be depleted by these plants.

LOS ESTEROS AND ALAMOGORDO RESERVOIRS FLOOD CONTROL PROJECT

The Flood Control Act of 1938 directed the Secretary of War to make preliminary examination and surveys for flood control for several localities in the United States among which was the Pecos River Basin in New Mexico and Texas.

The Los Esteros - Alamogordo flood control project was included as a part of the Selected Plan of Improvement in the Corps of Engineers' 1951 report entitled "Pecos River and Tributaries, Texas and New Mexico".

To create an effective flood control project it is found necessary to use a part of the capacity of the existing Alamogordo Reservoir to control flood flows originating between the proposed Los Esteros dam site and Alamogordo Dam. For this reason the Corps of Engineer's plan included conservation storage capacity for the Carlsbad Irrigation District in the proposed Los Esteros Reservoir to compensate the district for that portion of Alamogordo Reservoir that was required for flood control.

Authorized by the Flood Control Act of 1954, the project provides for construction of a dam at the Los Esteros site about 7 miles upstream from Santa Rosa and for modification of existing Alamogordo Dam.

The proposed Los Esteros Dam would control floods from about 2,480 square miles of Pecos River drainage area and would have a total capacity of 597,000 acre-feet which is allocated to flood control, conservation, and sediment. The proposed dam would be an earthfill structure about 218 feet high and 1,865 feet long; in addition, a dike about 12 feet high and 1,420 feet long would be required to block a low-saddle extending from the left abutment.

Modifications to existing Alamogordo Dam would consist of raising the main embankment 10½ feet and constructing an emergency spillway about 500 feet long, along with modification of the existing operating spillway and outlet works. The project would be integrally operated for flood control and irrigation and would effect a reduction in flood damages along the Pecos River below the project.

The legislation authorizing the Los Esteros Project provides that no appropriations shall be made for constructing the project until satisfactory arrangements have been made by the State of New Mexico for transfer of part of the Carlsbad Irrigation District conservation storage from Alamogordo Reservoir to Los Esteros Reservoir. In order that the Carlsbad Irrigation District could analyze in detail the possible effect of the project on the district's water supply, the district requested that certain river-routing studies be made.

The studies were completed by the State of New Mexico and the results made available to the district. However at this time the district has not reached a decision in the matter and no appropriation to construct the project has been requested.

TWO RIVERS RESERVOIR PROJECT

Several destructive floods have occurred in the city of Roswell which is situated on the Rio Hondo, a tributary of the Pecos River. During 57 years of record, 47 flash floods have occurred in the Rio Hondo, causing damage in varying degrees. The most disastrous flood occurred in September 1941 with other major floods in 1915, 1937, 1949, and 1954.

As a part of the Pecos Basin survey the Corps of Engineers in 1952 issued a report entitled, "Interim Report on Survey for Flood Control, Rio Hondo at Roswell, New Mexico". This report presented two plans to alleviate flood damages in and adjacent to Roswell. One plan contemplated diverting the flows from the Rio Hondo and Rocky Arroyo into a drainage south of the Rio Hondo. The alternate plan was to construct two earthfill dams -- the Diamond A on the Rio Hondo and Rocky Dam on Rocky Arroyo.

The alternate plan was authorized as the Two Rivers Reservoir Project by the Flood Control Act of 1954. Pre-construction planning started in 1956 and construction was commenced in 1960.

The constructed project consists of two earthfill dams forming a common reservoir with a capacity of 168,000 acre-feet -- 18,000 acre-feet of which are allocated to sediment storage, and 150,000 acre-feet to flood-control storage.

The project was completed in 1963; it provides flood protection to the city of Roswell and Walker Air Force Base and incidental benefits along the Pecos River below the mouth of the Rio Hondo.

OTHER FLOOD CONTROL STUDIES

The Corps of Engineers currently is preparing reports to determine the advisability of improvements for flood control and allied purposes in the Pecos River Basin above Santa Rosa and along the Rio Hondo and Rio Felix and their tributaries.

The investigation for the area above Santa Rosa is being made to determine the feasibility of improvements for flood control, irrigation, municipal and industrial water supply, and fish and wildlife and recreation. Projects being considered include a reservoir on the Gallinas River above Las Vegas and channel improvements through the urban area of that town. Consideration also will be given to multi-purpose reservoirs and channel rectification work on the main stem of the river.

The Rio Hondo and Rio Felix studies include consideration of a) reservoirs on Berrendo Creek and Rio Felix, b) diversion of Rio Hondo and North Spring River to Berrendo Creek northwest of Roswell, and c) alternate channel improvements in Berrendo Creek, North Spring River, and Rio Hondo through Roswell.

PUBLIC LAW 566 PROGRAM

The Soil Conservation Service under the authority of Public Law 566 has completed two watershed protection projects in the Pecos River drainage; Zuber Draw and Upper Rio Penasco.

The Zuber Draw project in Chaves County was sponsored by the Hagerman-Dexter, Roswell, and Upper Hondo Soil Conservation Districts and was completed in 1960. The structural measures included in the plan consist of three floodwater-retarding structures having an aggregate capacity of about 5,000 acre-feet and about 11 miles of floodwater diversion dike to divert flood flows from Thirteen Mile, Zuber, and Greenfield Draws into the Rio Felix. The project provides flood protection to cropland, irrigation systems, canals, roads, and urban property in the town of Dexter.

The Upper Rio Penasco project in Otero County was sponsored by the Otero Soil Conservation District. The structural measures of the project consist of three floodwater retarding structures with a total capacity of about 500 acre-feet. The works provide protection to agricultural lands, irrigation systems, and roads. The structural measures of the plan were completed in 1960.

In addition to the two completed watershed projects, eight others are in various stages of planning or construction. They include

Avalon-Alacran in Eddy County
Cass Draw in Eddy County
Cottonwood-Walnut Creek in Chaves and Eddy Counties
Eagle-Tumbleweed Draws in Chaves and Eddy Counties
Hackaberry Draw in Eddy County
Lower Rio Penasco in Chaves and Otero Counties
North Spring River in Chaves County
Pecos Arroyo in San Miguel County

Flood protection for farm and ranch land, roads, irrigation systems and urban development are contemplated by these watershed projects.

OTHER IRRIGATION DEVELOPMENT

The foregoing portion of this paper has been devoted to a detailed description of the several federal projects. Accomplishments by private interests which accounts for about 75 percent of the irrigation development in the basin certainly should not be overlooked. These developments include the vast individual efforts of the people on their own lands and combined efforts such as the many community ditch systems in the headwaters area, the Storrie Project on the Gallinas River near Las Vegas, the Hagerman Irrigation Company in the Roswell Basin and the Hope Project on the Rio Penasco west of Artesia.

Other local and state agencies have also assisted in the development and rehabilitation of irrigation works and in water conservation.

SUMMARY

Water development in the Pecos River Basin has long been plagued with floods, sedimentation, salinity problems, and water shortages.

The projects in operation in the basin have helped alleviate many of these problems, and those authorized and being planned will further reduce the problems, but by no means will they all be solved. Continued planning and construction of water development and control projects will be required to make the best use of the land and water resources of the basin.