NM-123, Part 6

WESTERN CLOSED BASINS

BY

JAMES B. COOPER

DETAILED BASIN OUTLINE

Location

_____ basin is outlined on Figs. ____, ____. Sub-basins within this major drainage area are _____, _____, _____. Counties and parts of counties included within the area are _____, _____. The larger cities and villages in the area are _____, _____.

Description

Geography

Drainage areas

Stream systems

_____ river and tributaries

Topography and physiographic provinces

Topographic mapping

Geology

Sedimentary rocks

Igneous rocks

Minerals

Geologic mapping

Soils and vegetation

Soils

Vegetation

Hydrology

General (weather stations, temperature, precipitation)

Surface water

Streamflow measuring network

Water yield, annual runoff

Description

Hydrology (cont'd)

Surface water (cont'd)

Supply

Virgin flow

Regulation (by reservoirs and projects)

Floods — areas subject to flooding

Sedimentation

Monitoring network

Origin and deposition

Chemical Quality

Monitoring network

Quality of water

Ground water

Known and probable reservoirs (alluvial or bedrock)

Stream-connected aquifers

Non-connected aquifers

Supply

Chemical quality

Monitoring network

Quality of water

Ground-water studies

Areas investigated

Water-level measurements

(The above part of report to be written by USGS)

Population and Economy of the Area

Population

Urban

Municipalities

Rural

Industries and commerce

Commercial enterprises

Agriculture

Irrigated

Non-irrigated

Timber

Minerals

Transportation facilities

Roads, railroads, airlines

Power availability

Fish, wildlife and recreation

Cultural resources

(This part of the report to be of a general and somewhat historical nature in order to provide a setting for the next section of the report)

Water Development and Use

Beneficial uses

Municipal, industrial, military, and rural domestic

Power production

Recreation, fish and wildlife

Water Development and Use (cont'd)

Beneficial uses (cont'd)

Agriculture

Non-irrigated

(Items as dry-land, rangeland, livestock, land treatment, erosion control, etc)

Irrigated

(Items as project lands, crops, water requirements, drainage problems, etc.)

Other consumptive uses

Reservoir evaporation

Native vegetation and phreatophytes

Channel losses

Summary Table of water uses Item	Unit of use	Units	Surface water Diver.	C.U.	Ground water Diver.	C.U.	SW and GW Diver.	C.U.
Agriculture								
Municipal and Industrial								
Rural domestic and livestock								
Power production								
Recreation, Fish & Wildlife								

(Note: Under each item discussed, uses of surface water, ground water, and combinations thereof to be discussed and developed as appropriate)

Problems of the Area

Surface water

Available supplies and shortages

Streamflow regulation (conservation storage, sediment, and flood control)

Problems of the Area (cont'd)

Surface water (cont'd)

Competitive demands for water uses

Quality of water

Pollution abatement

Consumptive waste from beneficial uses

M & I

Agriculture

Irrigation practices

Drainage problems

Other consumptive
Non-beneficial losses

Reservoir evaporation

Vegetative losses (native and phreatophytes)

Basic data collection program

Ground water

Availability

Stream-connected aquifers

Non-connected aquifers

Quality of water

Saline encroachment

Other

Basic data collection program

Water Resource Programs and Activities by Governmental Agencies

Local

State

Federal

(Note: The parts "Population and Economy" through above section to be written by personnel of SEO Technical Division)

Water Management and Legal Considerations (by the logical breakdown between surface and ground water, and as applicable in the basin area, the following items are to be discussed)

Water rights acquisition and administration*

Interstate compacts

Declared underground water basins

Court decress and adjudication

Transfer of place and method of use

* Breakdown of claimed rights for use of water will be furnished by Technical Div.

(Note: The above section to be written by legal staff of SEO. Much of the legal gulations, etc. set forth in the state-wide summary will be applicable to all areas of the State and need not be repeated for each basin area. This section is intended to cover only those items directly applicable to the area itself, Example: Rio Grande Compact in the Rio Grande Basin).

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Albuquerque, New Mexico

Western Closed Basins

By

James B. Cooper

(A contribution for incorporation in a State Planning Report to be prepared by the New Mexico State Engineer Office.)

Prepared in cooperation with
the New Mexico State Engineer

December 1964

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Western Closed Basins

By

James B. Cooper

Description

The Western Closed Basins in west-central New Mexico are outlined on figure 1. The area consists of two major drainage areas, The

Figure 1 (caption on next page) belongs near here.

North Plains Basin (6-1), which is mostly in Valencia County but extends southward into Catron County; and the San Augustin Plains Basin (6-2), which is mostly in Catron County but extends eastward into Socorro County. Communities in the North Plains Basin are San Rafael, Paxton Springs, Trechado, Adams Diggings, Tres Lagunas, and Hickman. The communities in the San Augustin Plains Basin are Datil, Augustine, and Horse Springs.

Figure 1.--Drainage basins of New Mexico

Geography

The Western Closed Basins lie immediately east of the Continental Divide, which forms their western border. The North Plains includes an area of 1,325 square miles. It is bounded on the east by Cebolleta Mesa and on the south and southeast by resistant sedimentary rocks and by the sedimentary and volcanic rocks of the Datil Mountains. Sedimentary rocks dipping northeastward off the uplifted Precambrian mass of the Zuni Mountains rather loosely define the northern boundary of the basin. The San Augustin Plains, [covers] an area of 1,965 square miles, [It] is bounded on the east by the San Mateo and Gallina Mountains; on the north by the Gallinas and Datil Mountains; and on the south by the Elk, O-Bar-O, and Pelona Mountains.

The North Plains derives its name from a broad area of low relief that occupies the central and western parts of the basin. This area is mostly a grassy plain underlain at very shallow depths by basaltic lava flows. At low elevations in the north and east parts of the basin, lava beds cover the surface. The San Augustin Plains is a featureless grass-covered plain at the center of the San Augustin Plains Basin. This area in earlier geological times was occupied by pluvial Lake San Augustin which covered a maximum area of 255 square miles (Stearns, 1956, p. 539).

It is not definite that the North Plains basin is truly closed at its north end; here the basin is covered by lava flow, and it is possible that some water escapes northward from the basin through, or under, the lava beds, toward Rio San Jose. The San Augustin Plains basin is a closed basin having superficial internal drainage around its perimeter. The Western Closed basins have no permanent streams, and none of the intermittent streams are named. Generally waterways are dry and are poorly defined. Ephemeral streams that head in the bordering mountains occasionally carry flood waters into the basins. These flood flows spread out over the gravelly soil and soon disappear into the ground or evaporate. During periods of heavy precipitation, water is contained in several natural lakes in the western part of the North Plains and in a few small playas in the northeastern part of the San Augustin Plains. At the west end of the San Augustin Plains a large playa, which covers approximately 35 square miles, occasionally contains water.

The Western Closed Basins are in the Datil Section of the Colorado Plateau Province (Fenneman, 1931), which is characterized by lava flows, remnants of flows, and volcanic necks. The sides of the basins are rough and mountainous and are generally timbered. The surface of the North Plains slopes from altitudes of about 7,600 feet at its south end to altitudes of about 6,400 feet on the lava beds at the northeast end. The floor of the central part of the basin is at an altitude of about 7,200 feet. The flanks of Mount Sedgewick reach altitudes of as much as 8,800 feet. The center of the San Augustin Plains is at an altitude of about 6,800 feet. Around the perimeter of the basin altitudes are in excess of 10,000 feet on the higher peaks. Approximately half of the basin is over 7,800 feet in altitude.

Topographic mapping

Army Map Service maps are available for the area covered by the Western Closed Basins. These maps are on a scale of 1:250,000 and have a contour interval of 200 feet. Topographic mapping of 7½-minute quadrangles having a scale of 1:24,000 and a contour interval of 20 feet has been completed in the extreme northeast part of the North Plains. The extreme northern part is covered by 7½-minute quadrangles with a contour interval of 40 feet. Mapping is in progress along the southeastern border of the area. However, approximately 90 percent of the area has not been mapped on the 7½-minute scale. Approximately the western half of the ~~basin of the~~ San Augustin Plains has been mapped on a scale of 1:125,000, contour interval 100 feet. Mapping of 7½-minute quadrangles is now in progress in the northeastern third and the extreme western part of the area. Slightly more than half of the area remains to be mapped on the 7½-minute scale.(See fig. 2.)

Figure 2 (caption on next page) belongs near here.

Figure 2.--Status of topographic mapping in New Mexico.

[Even] though ~~each of~~ the Western Closed Basins ~~are~~ [is] quite similar in structural outline and each encloses a large plain, the character and age of the rocks which bound and lie beneath the central part of the North Plains are dissimiliar to those which bound and underlie the San Augustin Plains. A generalized stratigraphic section of the rocks within the basins is shown on table 1.

The North Plains is nearly continuously bounded by sedimentary rocks that range in age from Permian to Tertiary. At the north end of the basin rocks of Permian and Triassic age crop out on the flanks of the Zuni Mountains. Along the eastern edge rocks of Cretaceous age, and to a lesser extent rocks of Jurassic age, form elongated north-south patterns of outcrop. Rocks of Cretaceous age are also present on the Continental Divide along the western edge of the area. Within the southern half of the basin rocks of Tertiary age and irregular patches of Quaternary alluvium are present. Sedimentary rocks of Cretaceous age underlie the surficial deposits within the North Plains. The thickness of the Cretaceous deposits is not well known. Gadway (1959, p. 81) reports that in localities adjacent to the North Plains the maximum thickness of Cretaceous rocks range from 1,700 feet to 2,657 feet.

Sedimentary rocks are essentially absent in the San Augustin Plains except for the Quaternary sediments of the San Augustin Plains. The Quaternary sediments consist of bolson, pediment, windblown-sand, and high-level terrace deposits. The plains are underlain by more than 2,000 feet of these alluvial sediments as indicated by a 2,000-foot core hole that failed to reach the base of the deposit (Foreman and others, 1959, p. 117).

Lava beds of Quaternary age cover about 200 square miles of the surface in the northeastern part of the North Plains. Other lava beds underlie thin alluvium beneath the North Plains. The lava at the north end of the basin is about 50 feet thick, however a well near Trechado in the southern part of the basin penetrated 637 feet of basalt without reaching the underlying sedimentary rocks. At the northwest end of the basin, Precambrain granite crops out in the central core of the Zuni Mountains. On the east side of the basin basaltic rocks of Tertiary age cap Cebolleta Mesa and a small mesa to the north.

The highlands around the perimeter of the San Augustin Plains consist of volcanic rocks of Tertiary and Quaternary ages. The Tertiary rocks belong to the Datil Formation and consist of volcanic flows and pyroclastics and lesser amounts of alluvial clastic rocks composed of volcanic fragments. Rock types include andesite, basaltic andesite, rhyolite, latite, and pumiceous tuff and breccia. The Quaternary basalt and basaltic andesite flows overlie thick sequences of the Tertiary volcanics, especially on the south and west sides of the basin.

Only minor amounts of minerals of economic value are known to occur within the Western Closed Basins, and no mines are active. Minor amounts of gold, silver, copper, and fluorspar are present in the extreme northwest end of the North Plains near Mount Sedgewick. Gold is reported to have been mined at one time in the northeastern part of the San Augustin Plains in the highlands east of Augustine. The western part of the Datil Mountain Coal field and the southeastern part of the Gallup-Zuni Coal Basin extend into the North Plains Basin. Several oil test wells have been drilled in the North Plains; 3 of which penetrated the entire sequence of sedimentary rocks and reached the Precambrian. All test wells were unsuccessful as petroleum producers.

Geologic mapping

Only reconnaissance geologic mapping has been done in the Western Closed Basins. Even though nearly all of both basins has been covered, very little of the work has been published except as a part of the preliminary geologic map of New Mexico at a scale of 1:380,160. The geology of the North Plains and the northern part of the San Augustin Plains is shown on the Preliminary Geologic Map of the Northwestern part of New Mexico (Dane and Bachman, 1957). The geology of the southern part of the San Augustin Plains is shown on the Preliminary Geologic Map of the Southwestern part of New Mexico (Dane and Bachman, 1961).

The geology of the northeastern end of the North Plains is shown at a scale of approximately 1-inch to the mile by Gordon (1961, pl. 1). The geology of the extreme south end of the North Plains, and the north end of the San Augustin Plains, is shown at a scale of 1:126,720 by Willard (1957a) and Willard and Givens (1958). The geology of the southeastern part of the San Augustin Plains is shown at a scale of 1:126,720 by Willard (1957).

A geologic map index of New Mexico (Boardman and Others, 1956), published by the Geological Survey, indicates reports and maps available for New Mexico.

Soils and vegetation

The type of soils and vegetation within the Western Closed Basins are shown on figure 3 and figure 4 (North Plains 6-1; San Augustin

Figure 3 (caption on next page) belongs near here.

Figure 4 (caption on next page) belongs near here.

Plains 6-2).

Over most of the area medium-textured, moderately deep to shallow soils are interspersed with light-textured soils. These soils support grasslands in the lower altitudes of the basin. On the upland slopes is the woodland zone of juniper and pinyon, and on the higher altitudes of the mountainous highlands, ponderosa pine, limber pine, Douglas fir, and white fir are common.

Figure 3.--Soils resource map of New Mexico

Figure 4.--Vegetative-type map of New Mexico

Climatology

The Western Closed Basins are within the Southwestern Mountains climatologic zone. Weather stations in operation in the area are shown on figure 5. The precipitation averages about 15 inches annually

Figure 5 (caption on next page) belongs near here.

in both basins. Within the center of the basins, annual precipitation is 14 inches or less; in the surrounding highlands 16 inches or more is received annually.

Weather stations within the basins, with the exception of Augustine (7SW) in the San Augustin Plains, have not been in operation a sufficient time to establish long-term precipitation trends. The mean monthly precipitation for the period 1931-1955 at Augustine (7SW), according to records of the U.S. Weather Bureau (1959), is given in the following table (table 2):

Table 2.--Mean monthly precipitation at Augustine (7SW), Catron County, New Mexico

Month	Precipitation (inches)
January	0.46
February	.55
March	.55
April	.49
May	.53
June	.68
July	2.17
August	2.37
September	1.63
October	.75
November	.27
December	.57
Annual	11.02

Figure 5.--Weather stations and climatologic divisions in New Mexico.

Average annual temperatures within the Western Closed Basins is about 50°F. Average January temperatures range from about 26°F to about 30°F and average July temperatures range from about 64°F to 70°F.

Surface water

There are no records of streamflow within either of the Western Closed Basins. Surface water flows in the poorly defined waterways only during periods of intense precipitation, and then only for a short time. As no streamflow records are available, only estimates for the total surface-water supply can only be estimated on the basis of precipitation-runoff relationships. Using the figure of 15 inches of average annual precipitation within the basins the total water falling on the Western Closed Basins amounts to about 800 acre-feet per square mile. Probably less than one percent, or about 5 acre-feet per square mile, appears as surface flow. Surface flows near the surrounding highlands are estimated to average about 5 to 10 acre-feet per square mile of drainage; toward the middle of the basins the flows approach zero. Based on these estimates, the total annual surface flow in the North Plains would be approximately 7,000 acre-feet annually, and that in the San Augustin Plains would be about 10,000 acre-feet annually.

Aside from evapotranspiration, the only depletion and use of surface water within the Western Closed Basins is for livestock watering. No use of surface water for irrigation is known within the basins. In the North Plains, 57 stock tanks, which deplete about 171 acre-feet of water annually, are known to exist; 80 stock tanks, which deplete about 177 acre-feet of water annually, are known within the San Augustin Plains.

No investigations of the type and quantity of sediments transported by surface flows nor of the quality of the surface water within the Western Closed Basins have been made.

Known and probable aquifers within the Western Closed Basins are designated by asterisks on the stratigraphic section in table 1. The principal aquifer in the North Plains is the thick basalt of Quaternary age that underlies the North Plains and extends over half the total area of the basin. Some of the sandstones of Jurassic and Cretaceous ages, which are present in the highlands on the eastern side of the basin, might also yield water. The Zuni Sandstone of Jurassic age and the Dakota Sandstone and sandstones of the Mesaverde Group of Cretaceous age are usually dependable aquifers in adjacent areas. In the northern part of the basin the San Andres Limestone and Glorieta Sandstone, both of Permian age, are known to contain water.

The principal, and only dependable, aquifer in the San Augustin Plains ~~are~~ is the bolson deposits of Quaternary age that underlie the middle of the basin. Volcanic rocks of the Datil Formation of Tertiary age, which surround the basin, may contain small quantities of water in some localities. Some water may be present in the small patches of Gila Conglomerate and alluvium ~~of~~ Quaternary ~~age~~ which are widely scattered within the basin. It also seems possible that some water may be present in the basalt and andesite flows of Quaternary age which cover large areas on the south and west edges of the basin.

Large quantities of ground water must be present beneath the North Plains and San Augustin Plains. As these areas are within closed drainage basins, all [of] the precipitation (800 acre-feet per square mile annually) sinks into the ground except that which is evaporated, used by vegetation, or the small amount used for stock. The only known use of ground water in the North Plains is for domestic and stock purposes. As the area is sparsely populated, the total amount of water used annually for these purposes may be only a few tens of acre-feet. Similiar conditions apply also to the San Augustin Plains with the exception of an additional use of ground water to irrigate 160 acres of land. The direction of movement of the ground water within the Western Closed Basins is thought to be south and southwestward into the Lower Colorado River basin. (See fig. 6.)

Figure 6 (caption on next page) belongs near here.

Figure 6.--Drainage basins and streamflow map of New Mexico.

Much of the area of the North Plains is underlain with slightly saline water, but no saline water is known within the San Augustin Plains. Water analyses are available for a few wells in the northeastern part of the North Plains and the southwestern part of the San Augustin Plains. No data are available for other localities within the Western Closed Basins. No wells within the basins are monitored periodically to detect changes in chemical quality of the ground water.

The following partial analyses of water from two wells (table 3) within the Western Closed Basins appear to be typical of the chemical quality of the ground water within the basins.

Table 3.--Analyses of water from wells in the Western Closed Basins

Analyses by Geological Survey, United States Department of the Interior (Parts per million)

Area:	North Plains	San Augustin Plains
Location:	San Rafael	Six miles south of Horse Springs
Geologic source Aquifer:	San Andres Limestone	Sand and gravel
Depth of well:	148 feet	160 feet
Sulfate	248	7
Chloride	42	22
Hardness (as $CaCO_3$)	428	14
Specific conductance (micromhos at 25°C)	1,040	400

Ground-water investigations were made in the extreme northeastern part of the North Plains, and water-level measurements were made in about 10 wells, as a part of a study made by the U.S. Geological Survey in cooperation with the New Mexico State Engineer (Gordon, 1961). In the southwestern part of the San Augustin Plains water-level measurements were made in about 90 wells, and records of water wells, water analyses, and well logs were collected, by the New Mexico Institute of Mining and Technology (Bushman and Valentine, 1954). The depth to water in wells within the North Plains and the San Augustin Plains ranges from less than 50 feet to about 200 feet. The depth to water increases away from the middle of the basins and is 500 feet or more in the higher altitudes of the mountainous areas around the basins. No other ground-water investigations have been made within the Western Closed Basins, and there is no program for periodic monitoring of water-level changes in wells.

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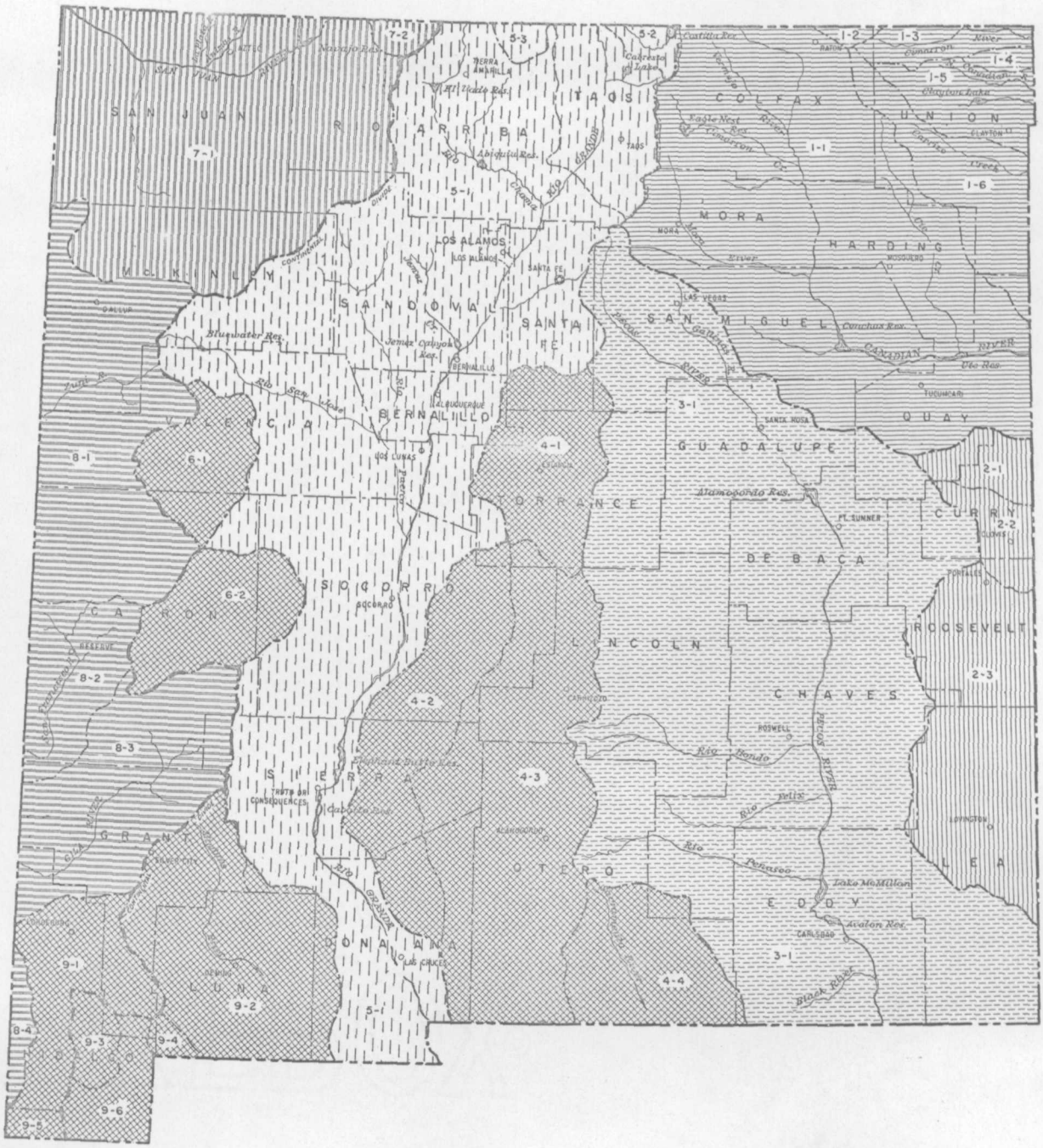

BASIN INDEX

ARKANSAS RIVER BASIN
1-1, CANADIAN RIVER
1-2, PURGATOIRE RIVER
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LOWER COLORADO RIVER BASIN
8-1, LITTLE COLORADO RIVER
8-2, SAN FRANCISCO RIVER
8-3, GILA RIVER
8-4, SAN SIMON CREEK.

SOUTHWESTERN CLOSED BASINS
9-1, ANIMAS BASIN
9-2, MIMBRES BASIN

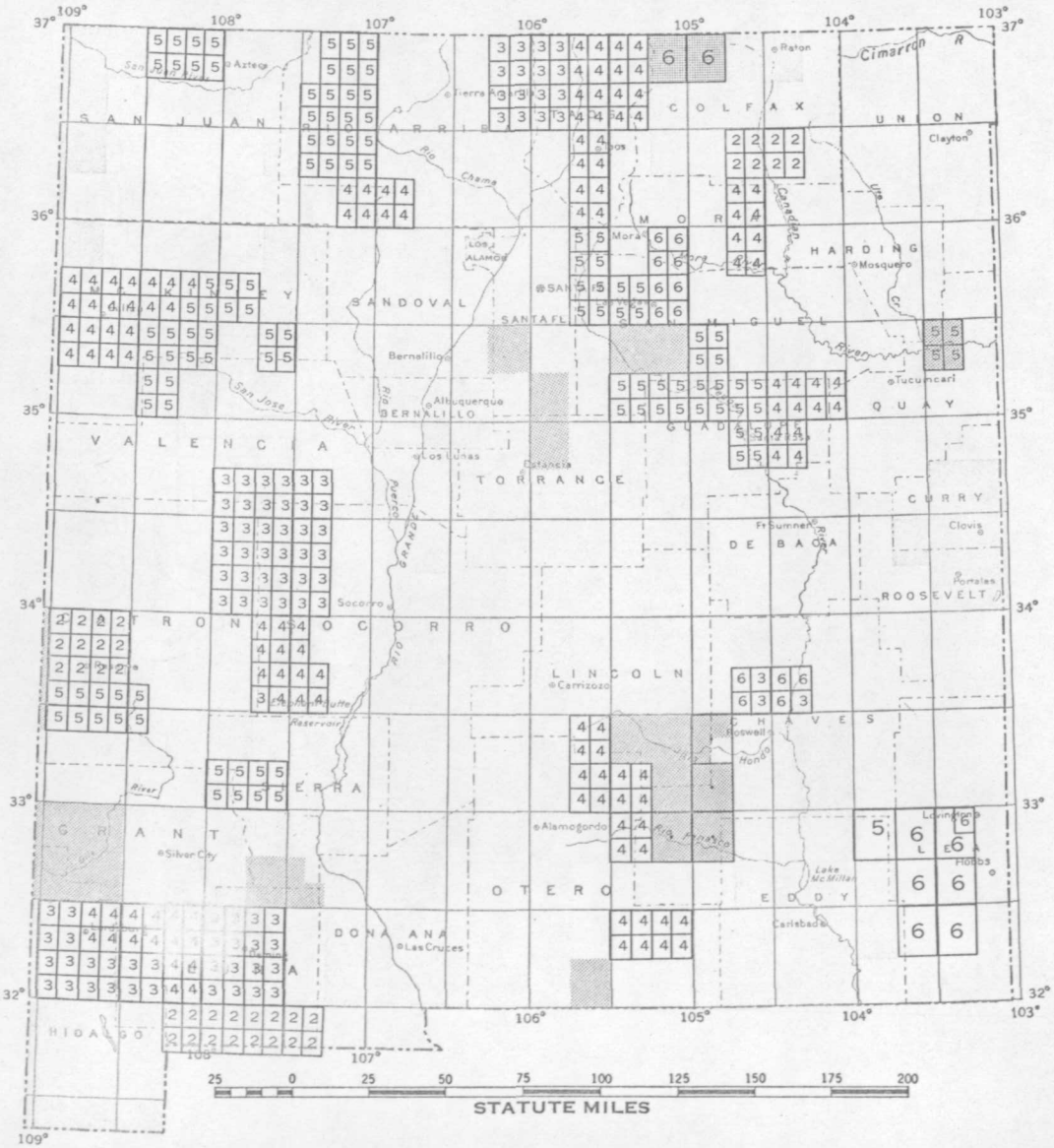
FIGURE I

DRAINAGE BASINS
OF
NEW MEXICO

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NEW MEXICO

TOPOGRAPHIC DIVISON
ROCKY MOUNTAIN AREA
DENVER, COLORADO
OCTOBER 1, 1964



ADVANCE MATERIAL AVAILABLE
FROM CURRENT TOPOGRAPHIC
MAPPING QUARTERLY EDITION

2 Aerial photography completed. Information available from U.S. Geological Survey, Topographic Division, Federal Center, Bldg. 25, Denver, Colorado, 80225, or Map Information Office, U.S. Geological Survey, Washington, D.C., 20242.

3 Basic horizontal and vertical control surveys completed. Descriptions and unadjusted coordinates and/or elevations are available. Price 50 cents for each 15-minute quadrangle horizontal or vertical control list. See notes.

P 4 Prints of manuscripts compiled from aerial photographs are available at 50 cents each. Contours are shown in areas suitable for stereocontouring. Letter "P" indicates quadrangles on which contouring is not complete and which will require fieldwork to complete the contouring. (If shaded, see explanation below.)

5 Field mapping and checking completed. One-color advance prints (without names) available for 50 cents each. (If shaded, see explanation below.)

6 Final drafting completed. Partially-edited one-color advance prints (with names) available for 50 cents each. (If shaded, see explanation below.)

· Maps published since latest edition of Index to Topographic Mapping— May, 1964. See statement below regarding published maps. (If shaded, see explanation below.)

EXPLANATION OF SHADING

Maps of areas shaded will be (or have been) published at 1:62,500 scale only. However, 1:24,000-scale advance prints in 7½-minute units (without names) are and will remain available, with accuracy and contour interval appropriate for that scale. Each 7½-minute print is 50 cents, or $2 for prints covering a complete 15-minute quadrangle.

NOTES

1. Send requests for control lists and advance prints to U.S. Geological Survey, Topographic Division, Federal Center, Bldg. 25, Denver, Colorado, 80225. Check, money order or draft in correct amount made payable to U.S. Geological Survey should accompany order. Please do not send stamps. No discount allowed.

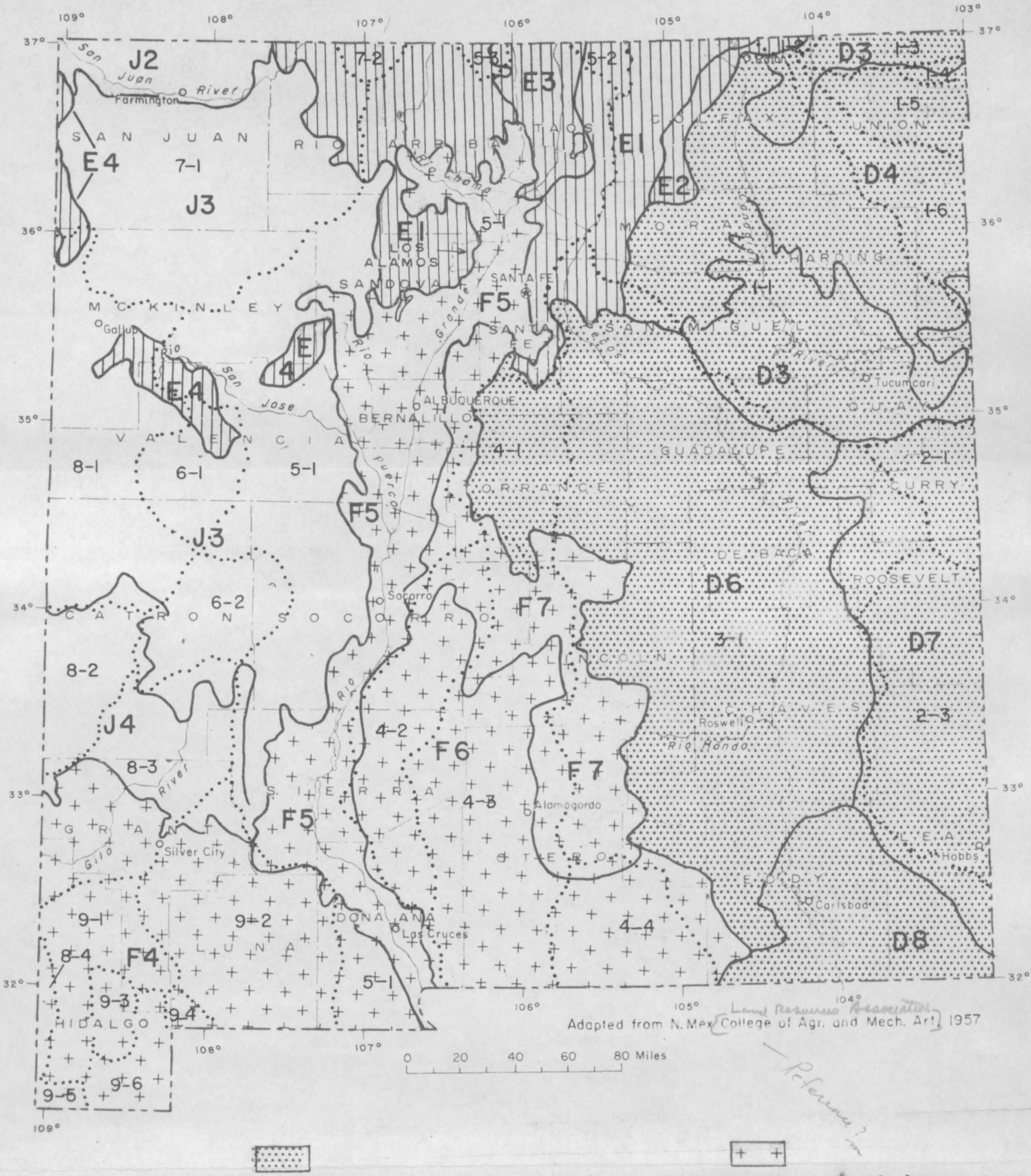
2. In ordering materials or requesting information, mark the area of interest on this index and forward it with your order. A new copy of the index will be returned to you for future use.

PUBLISHED MAPS

Published 7½′ or 15′ Quadrangles

State Index giving more detail available free. Published maps available at 30 cents each from U.S. Geological Survey, Denver Distribution Section, Federal Center, Bldg. 25, Denver, Colorado, 80225, or U.S. Geological Survey, Washington, D.C., 20242. On orders amounting to $10 or more a 20 percent discount is allowed; on orders amounting to $60 or more a 40 percent discount is allowed. Remittance may be made by check, money order or cash. Checks or money orders should be made payable to the U.S. Geological Survey.

Figure 2.--Topographic map index of New Mexico



Adapted from N. Mex. College of Agr. and Mech. Art., 1957

D_3 Generally shallow soils in steeply rolling and rough broken areas. Moderately deep and deep soils in valley bottoms and alluvial fans.

D_4 Largely moderately deep to deep, medium to heavy-textured soils interspersed with some areas of shallow soils; generally gently rolling topography.

D_6 Dominantly moderately deep to deep, medium-textured soils with rolling topography, interspersed with areas of shallow soils and deep sandy soils with dune-like topography.

D_7 Generally loose sandy soils with dune-like topography east of Pecos river, interspersed with areas of shallow to moderately deep, medium to heavy-textured soils west of Pecos river.

D_8 Similar to D-7, east of Pecos river, interspersed with areas of shallow to moderately deep, medium-textured soils west of Pecos river.

E_1, E_2, E_3, E_4 Largely shallow to moderately deep, light to medium-textured soils with rolling to mountainous topography. Generally shallow soils on escarpments and mountainous areas.

2-1 Outline of river basins

F_4 Generally light to medium-textured, deep and shallow soils with rolling topography, interspersed with low mountains. Dominantly shallow soils and rock outcrops in mountainous areas.

F_5 Large areas of light to medium-textured, shallow to moderately deep soils with gentle to moderate slopes.

F_6 Mesas, benchlands, and mountain slopes. Largely light to medium-textured, shallow to moderately deep soils on mesas and benchlands, and gravelly shallow soils on mountain slopes and foothills.

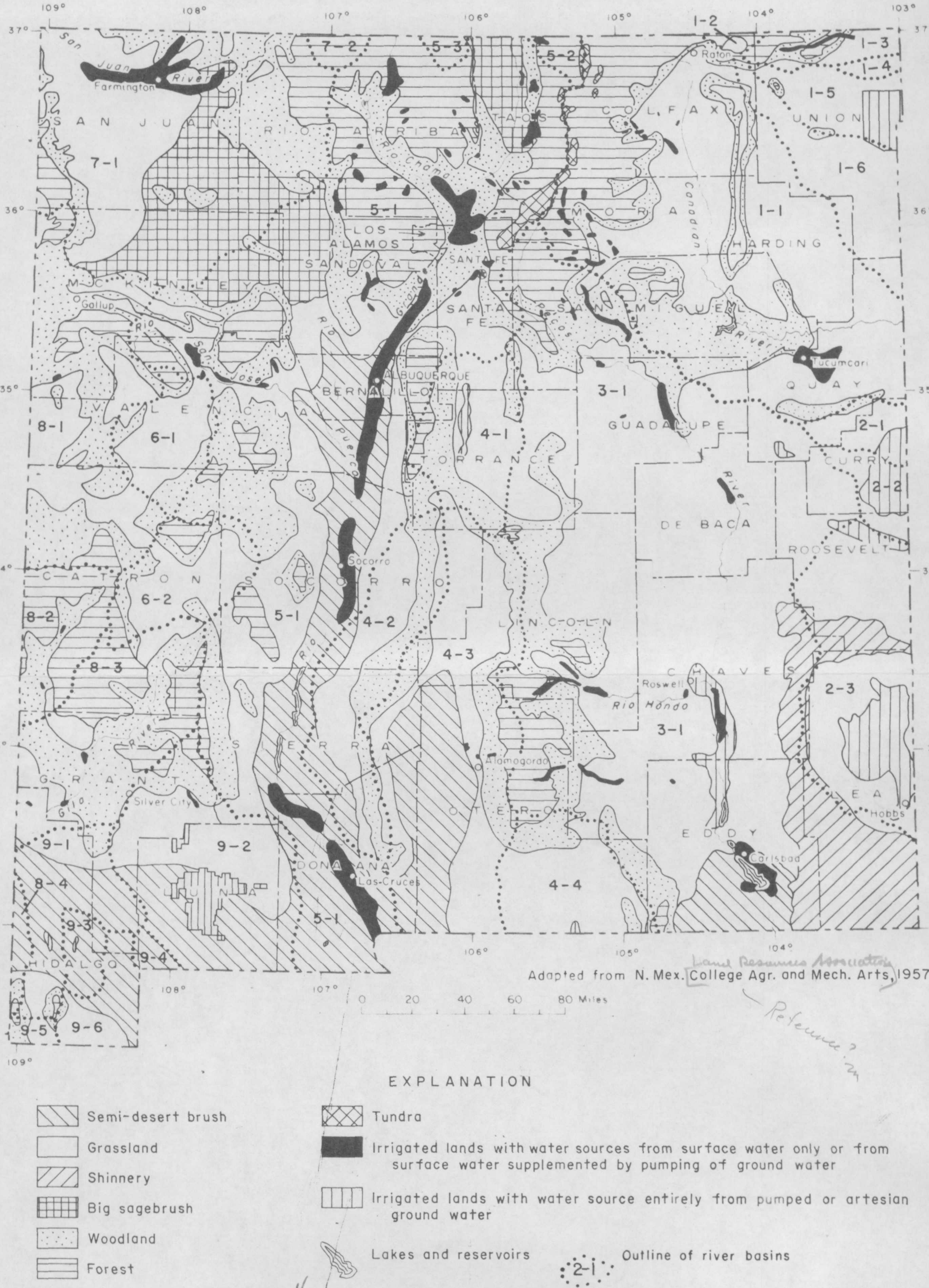
F_7 Largely mountain ranges and foothill slopes. Dominantly medium-textured soils on mountain slopes, and moderately deep to deep soils on foothill slopes.

J_2 Dominantly medium-textured, shallow soils on steep slopes. Medium-textured moderately deep soils on sloping plains, and dissected mesas; and medium to heavy-textured deep soils in valleys.

J_3 Largely medium-textured, moderately deep to shallow soils interspersed with areas of light-textured soils. Generally rolling topography with steep slopes in mountainous areas.

J_4 Generally mountainous shallow soils interspersed with rock outcrops and small areas of moderately deep soils. Generally mountainous topography.

Figure 3/4.--Soils resource map of New Mexico



Adapted from N. Mex. [Land Resources Association College Agr. and Mech. Arts], 1957a

Reference?

Figure ~~3~~ 4.--Vegetative type map of New Mexico

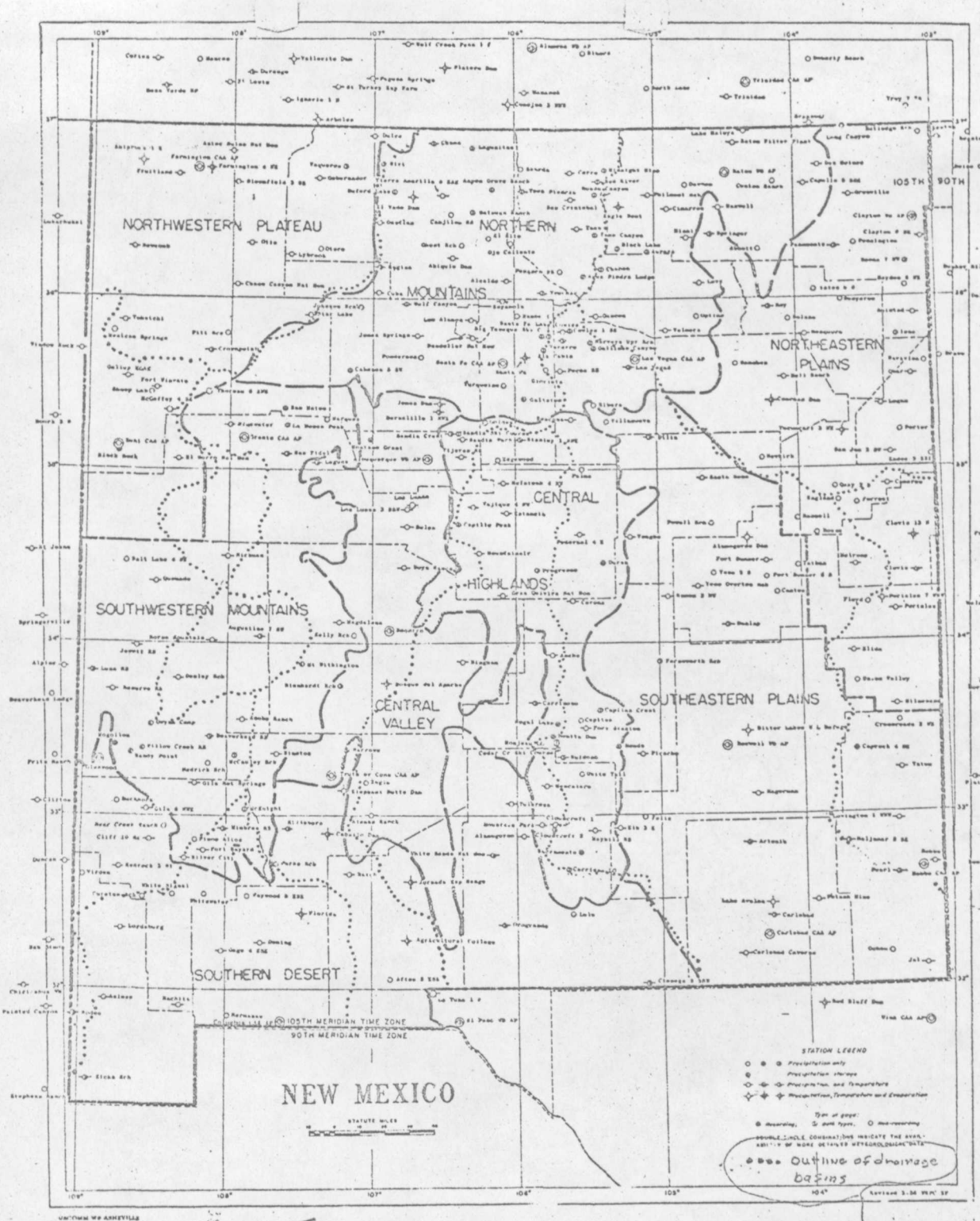


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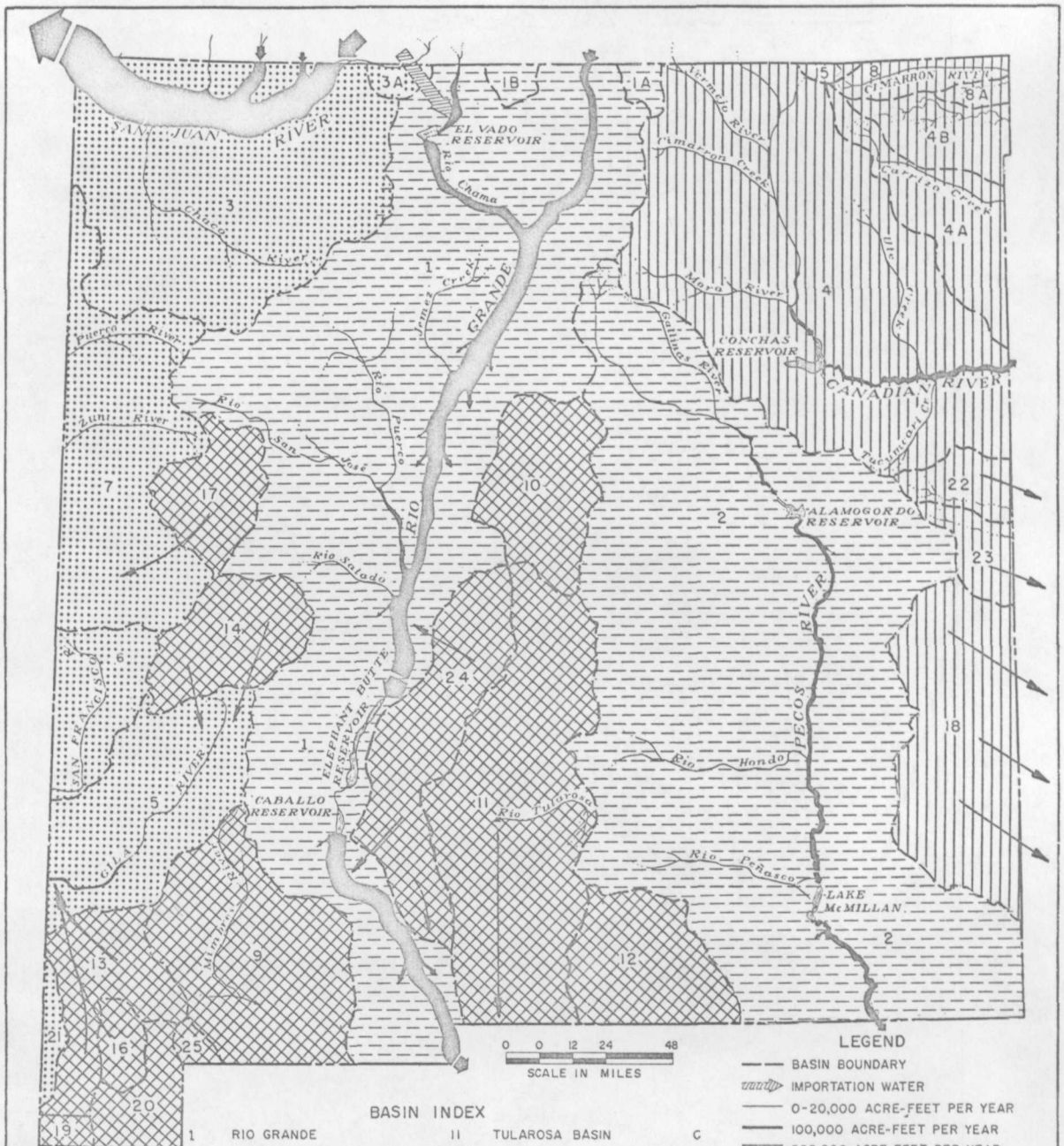
Figure 5.--Weather stations, locations, and climatologic divisions in New Mexico

Note



BASIN INDEX

1	RIO GRANDE		11	TULAROSA BASIN	C
1A	COSTILLA CREEK		12	SACRAMENTO RIVER	C
1B	RIO SAN ANTONIO		13	ANIMAS VALLEY	C
2	PECOS RIVER		14	SAN AGUSTIN BASIN	C
3	SAN JUAN RIVER		15	PURGATOIRE RIVER	
3A	NAVAJO RIVER		16	PLAYAS VALLEY	C
4	CANADIAN RIVER		17	LAVA BED VALLEY	C
4A	CARRIZO CREEK		18	LEA PLATEAU (COLORADO RIVER OF TEXAS)	
4B	NORTH CANADIAN RIVER				
5	GILA RIVER		19	SAN LUIS BASIN	C
6	SAN FRANCISCO RIVER		20	HACHITA	C
7	LITTLE COLORADO RIVER		21	SAN SIMON	
8	CIMARRON RIVER		22	RED RIVER	
8A	CARRIZOZO CREEK		23	BRAZOS	
9	MIMBRES RIVER	C	24	JORNADA DEL MUERTO	C
10	ESTANCIA VALLEY	C	25	WAMEL BASIN	C

SURFACE DRAINGE SYSTEMS

- RIO GRANDE
- COLORADO RIVER TRIBUTARIES
- MISSISSIPPI RIVER AND TEXAS GULF COAST TRIBUTARIES
- CLOSED BASINS

LEGEND

- BASIN BOUNDARY
- IMPORTATION WATER
- 0-20,000 ACRE-FEET PER YEAR
- 100,000 ACRE-FEET PER YEAR
- 500,000 ACRE-FEET PER YEAR
- 1,000,000 ACRE-FEET PER YEAR
- 2,000,000 ACRE-FEET PER YEAR
- C CLOSED DRAINAGE-BASINS
- DIVERSIONS
- DIRECTION OF FLOW OF UNDERGROUND WATER

FIGURE 16
DRAINAGE BASINS
AND
STREAM FLOW MAP
OF
NEW MEXICO
SEPTEMBER, 1960