PLANNING STATUS REPORT

WATER RESOURCES APPRAISALS FOR HYDROELECTRIC LICENSING

This is one of a series of revised Planning Status Reports for major river basins in the United States. The original reports, which were prepared several years ago, are being revised as part of a program of Water Resources Appraisals for Hydroelectric Licensing. The revised reports provide updated information on water resources for use by the Federal Energy Regulatory Commission and its staff when considering hydroelectric licensing and other work. The reports present data on water resource developments, existing and potential, and on water use by existing and projected steam-electric generating facilities. The reports also summarize past and current planning studies. The information presented in these reports was abstracted from available sources and involved no new analyses. Information is current as of December 1980 unless otherwise indicated. The report is a staff effort which was not prepared for adoption or approval by the Commission, and does not commit or prejudice later Commission action.

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ELECTRIC POWER REGULATION

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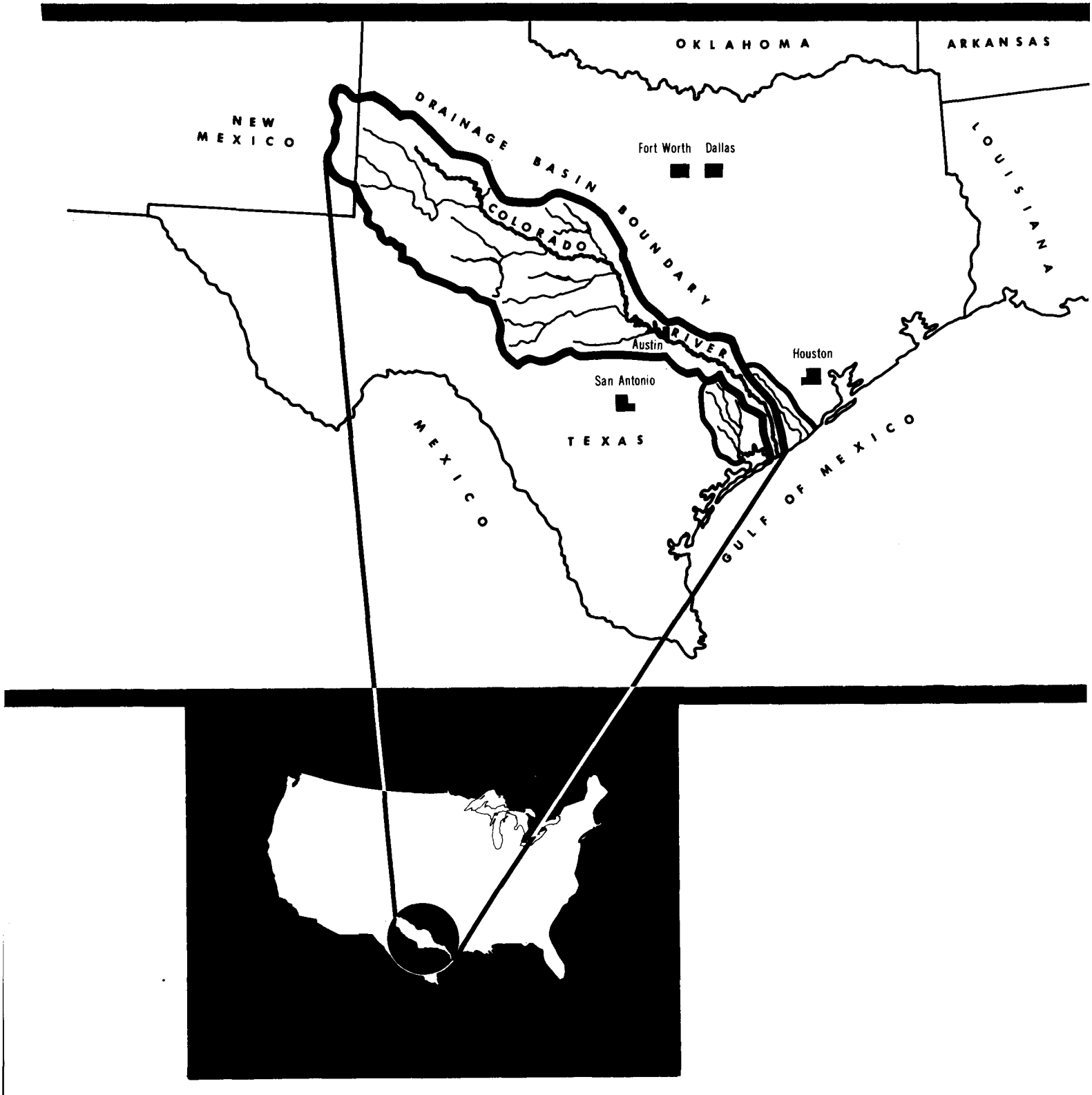
THE COLORADO RIVER BASIN



DESCRIPTION OF THE BASIN

Colorado River Basin

The Colorado River basin extends from southeastern New Mexico southeasterly across the State of Texas to the Gulf of Mexico; and the associated area includes the intervening areas in the coastal drainage between the Colorado River basin and the Guadalupe River basin on the west and the Brazos River basin on the east. The Colorado River basin has an overall length of 580 miles and a maximum width of 170 miles, and covers an area of 41,763 square miles of which 39,893 square miles lie in Texas and 1,870 square miles lie in New Mexico. Elevations within the basin vary from 4,500 feet to sea level. In addition to the area tributary to the Colorado River, 6,096 square miles of associated coastal drainage are covered in this report, bringing the total area to 47,859 square miles. The Colorado River has a total length of approximately 900 miles. A basin profile, figure 1, and a detailed basin map, figure 2, are included at the end of this report.

The Colorado River basin contains portions of three distinct areas separated by the Cap Rock Escarpment, which defines the eastern edge of the High Plains, and the Balcones Escarpment, which marks the inland boundary of the West Gulf Coastal Plain. The High Plains area of about 9,000 square miles has a virtually uniform slope from a maximum elevation of 4,500 feet to about 2,600 feet at the top of the Cap Rock Escarpment. Surface runoff from the area west of the Escarpment, including the High Plains, collects in the numerous depressions of the area and is dissipated through evaporation and percolation. Thus this area of 11,900 square miles contributes virtually no surface runoff to the Colorado River.

The topography of the central basin between the Cap Rock Escarpment and the Balcones Escarpment near Austin varies from smooth, nearly flat areas to rolling plains and areas that have been deeply eroded into rough hills, buttes, mesas, and deep canyons. This section of the basin contains all of the principal tributaries of the Colorado River, including the Concho, San Saba, Llano, and Pedernales Rivers and Pecan Bayou.

Below the Balcones Escarpment, the Colorado River enters an erosional plain characterized by moderately rolling terrain with maximum elevations ranging from about 750 feet at Austin to about 300 feet near Columbus. At Columbus, the river enters the flat and sparsely vegetated coastal prairie which is a depositional plain extending to the Gulf of Mexico.

Associated Drainage Areas

The associated drainage area of 6,096 square miles includes the San Bernard River drainage on the east and the Lavaca River drainage on the west.

Climate

Mean annual precipitation ranges from 14 inches in the western basin to slightly over 44 inches at the mouth of the river. Average runoff from 29,863 square miles of contributing area in the Colorado River basin is 2,424 cubic feet per second based on 30-years of record at the USGS gaging station near Bay City, Texas. Average annual net lake evaporation varies from about 25 inches near the mouth of the Colorado River to about 65 inches in the western portion of the

basin. The mean annual temperature ranges from 62 degrees Fahrenheit in the northwest to 70 degrees Fahrenheit in the southwest. The upper basin occasionally experiences sub-zero temperatures while the coastal area seldom has subfreezing temperatures. Humid conditions prevail along the Gulf Coast but the upper basin is semi-arid.

Population

The 1970 population for the Colorado River basin and associated areas was approximately 1,055,000 of which 1,005,400 were in the Texas portion of the basin and 49,600 in the New Mexico portion. In 1978, the population estimated for the basin was 1,210,000 of which 1,156,200 were in Texas and 53,800 were in New Mexico.

In the Texas portion of the basin, cities having a population of 15,000 or more in 1970 were Austin - 255,900; Odessa - 79,900; Midland - 59,500; San Angelo - 63,900; Big Spring - 28,700; and Brownwood - 17,400. In the New Mexico portion of the basin, the major city is Hobbs with a 1980 population of about 28,700.

Economy

The economy of the Colorado River basin and associated areas is based on petroleum and other minerals, State and Federal government, agribusiness, research and industry, and varied manufacturing activities. Underlying the basin's economic base is oil and agricultural production. The western basin has a heavy concentration of oil production and petrochemical-based industries such as asphalt, carbon black, and natural gas. Additionally, a rather large petrochemical complex has developed in Odessa. Ranching and farming throughout the basin support a wool industry, cottonseed oil plants, cattle marketing operations, textile plants, creameries, and other industries. Principal livestock and livestock products include cattle, sheep, goats, wool, mohair, poultry, and poultry products. Numerous large ranches handling cattle, sheep, and goats are located in the central and upper reaches of the basin. Chief crops grown are cotton, wheat, grain, sorghum, vegetables, and rice. In the lower basin, below the Balcones Escarpment, there is considerable irrigation of rice acreage from surface water sources while in the High Plains of the upper basin cotton and feed crops are irrigated from groundwater. Light manufacturing includes aircraft and boat fabrication. State and Federal offices, the University of Texas, tourism, and recreation on the Highland Lakes contribute substantially to the Austin area's economy. Revenue is also obtained from game hunting leases and from fishing and boating in the central and lower portions of the basin. Principal mineral deposits occurring in the basin include petroleum, natural gas, sulphur, lignite, and clay.

EXISTING WATER RESOURCE DEVELOPMENTS

Existing Developments

There are 32 reservoirs in the basin, with storage capacities of 5,000 acre-feet or more, either constructed or nearing completion. Table 1 summarizes the storage allocations of these reservoirs and their locations are shown on figure 2.

EXISTING WATER RESOURCE DEVELOPMENTS

Table 1

Storage Reservoirs
Existing and Under Construction
Colorado River Basin

Name	Stream	Owner[1]	Purpose[2]	Drainage Area (sq mi)	Storage Capacity (1,000 acre-feet) Flood Control	Inactive	Conservation	Sediment	Total
J.B. Thomas	Colorado R.	CRMWD	WS	3,524	-	-	189	15	204
Colorado City	Morgan Creek	TESC	WS, SC	322	-	-	26	6	32
Champion Creek	Champion Creek	TESC	WS, SC	203	-	-	40	2	42
E.V. Spence (Robert Lee)	N. Colorado R.	CRMWD	WS	2,695	-	-	480	9	489
Oak Creek	Oak Creek	City of Sweetwater	WS, SC	244	-	-	37	2	39
O.C. Fisher (San Angelo)	N. Concho R.	Corps	FC, WS	1,511	277	-	80	39	396
Twin Buttes	Middle, S. Concho R.	WPRS	FC, WS, I	3,724	454	-	183	4	641
Nasworthy	S. Concho R.	City of San Angelo	WS, SC	3,833	-	-	12	-	12
Hords Creek	Hords Creek	Corps	FC, WS	48	17	-	6	3	26
Coleman	Jim Ned Creek	City of Coleman	WS	292	-	-	38	2	40
Clyde	N. Prong Pecan Bayou	SCS	FC, WS	38	-	-	6	-	6
Brownwood	Pecan Bayou	BCWID	WS, I	1,535	-	-	137	6	143
Clear Creek No. 4	W. Clear Creek	SCS	FC	NA	4	-	-	1	5
Clear Creek No. 6	Clear Creak	SCS	FC	NA	4	-	-	1	5
Brady	Brady Creek	City of Brady	WS	513	-	-	30	-	30
Brady Creek No. 17	Brady Creek	SCS	FC	NA	9	-	-	-	9
Brady Creek No. 20	Brady Creek	SCS	FC	NA	7	-	-	-	7
Brady Creek No. 28	Brady Creek	SCS	FC	NA	9	-	-	-	9
Brady Creek No. 31	Brady Creek	SCS	FC	NA	8	-	-	-	8
Buchanan[3]	Colorado R.	LOCR	WS, P	31,250	-	38	744	210	992
Inks[3]	Colorado R.	LOCR	WS, P	31,290	-	17[4]	-	NA	17
Lyndon B. Johnson[3] (Granite Shoals)	Colorado R.	LOCR	WS, P, SC, I	36,290	-	67[4]	-	70	137
Marble Falls[3]	Colorado R.	LOCR	WS, P, I	36,325	-	9[4]	-	NA	9
Mansfield (Travis)[3]	Colorado R.	LOCR, WPRS	WS, P, FC	38,130	783	81[4]	995	95	1,954
Austin[3]	Colorado R.	City of Austin, LOCR	WS, P	38,240	-	20[4]	-	-	20
Town Lake	Colorado R.	City of Austin	SC	NA	-	-	4	-	4
Water E. Long (Decker Lake)	Decker Creek	City of Austin	SC	9	-	-	34	-	34
Bastrop	Spicer Creek	LOCR	SC	9	-	-	17	-	17
Cedar Creek	Cedar Creek	LOCR	SC	6	-	-	71	-	71
Eagle Lake	Off Channel	LIC	I	20	-	-	10	-	10
South Tex s Project[5]	Off Channel	HOLP, CPL, City of Austin, City of San Antonio	SC	11	-	-	187	-	187
Palmetto Bend Stage I (Texana and Ganado)[5]	Navidad R., Sandy Creek	WPRS, LNRA	WS	NA	-	-	170	-	170
Totals					1,572	232	3,496	465	5,765

NA - Not available

1/ CRMWD - Colorado River Municipal Water District;
TESC - Texas Electric Service Company;
Corps - U.S. Army Corps of Engineers;
WPRS - Water and Power Resources Service;
HOLP - Houston Lighting and Power Company;
BCWID - Brownwood Water Improvement District No. 1;
SCS - Soil Conservation Service;
LOCR - Lower Colorado River Authority;
LIC - Lakeside Irrigation Company;
CPL - Central Power and Light Company;
LNRA - Lavaca-Navidad River Authority.

2/ WS - water supply; FC - flood control; P - power; I - irrigation; SC - steam-electric cooling

3/ Lower Colorado River Authority System

4/ For power head

5/ Under Construction

The Lower Colorado River Authority (LOCR), an agency of the State of Texas, operates an integrated system of six reservoirs all of which have hydroelectric powerplants at their dams. The total installed capacity of these plants is 202,250 kilowatts as shown in table 2. Water supply for irrigation and for municipal and industrial use is also provided from this system. The system includes two large storage reservoirs, three small reservoirs operated at constant levels, and one reservoir, Lyndon B. Johnson (Granite Shoals), of intermediate size that is used for minor flow regulation and steam-electric cooling. Lake Travis (Mansfield Dam, originally called Marshall Ford Dam) was a joint development by the U.S. Bureau of Reclamation (now the Water Power and Resources Service) and the Lower Colorado River Authority with the flood control storage being the responsibility of the Corps of Engineers and the physical works being operated by the Lower Colorado River Authority as a part of its integrated system.

Table 2

Existing Hydroelectric Powerplants 1/
Colorado River Basin

Plant Name	Power Pool Elevation (ft)	Gross Head 2/ (ft)	Installed Capacity (kW)	Average Annual Energy (MWh)	Year Installed
Buchanan	1,020	132	33,750 3/	61,000	1938
Inks	888	61	12,500	26,000	1938
L.B. Johnson (Granite Shoals)	825	87	45,000	53,000	1951
Marble Falls	738	57	30,000	30,000	1951
Mansfield (Travis)	681	150	67,500	161,000	1941
Austin	493	62	13,500	51,000	1940
TOTAL			202,250	382,000	

1/ *All plants are on the main stem of the Colorado River and constitute the system of the Lower Colorado River Authority.*
2/ *At top of power pool.*
3/ *The Buchanan plant also includes a 11,250-kW reversible unit for return of Lake Inks to Buchanan for peak period capacity.*

Other Federal storage projects include Hords Creek and O.C. Fisher (San Angelo), which were developed by the Corps of Engineers and Twin Buttes and Palmetto Bend Stage 1 (Texana and Ganado), presently under construction, which are Water and Power Resources Service projects. Six reservoirs are part of the Soil Conservation Service's program of flood water retardation. The remaining reservoirs listed are owned by municipalities, water districts, State, and private interests for various water supply uses.

There are no hydroelectric power generating facilities in the San Bernard River or the Lavaca River associated drainage areas.

The Gulf Intracoastal Waterway traverses the lower extremity of the basin and connecting navigation links to the interior of the basin and associated areas have been developed to some extent. The associated drainage areas of the Colorado River basin include navigation features.

The LOCR and the Federal agencies have been cognizant of the recreation potential attached to reservoir development and have made provisions for recreationists. The harbors and refuges of the Gulf Intracoastal Waterway offer many attractions for boating and deep sea fishing.

Steam-Electric Generation and Cooling Water Requirements

The operating data for the nine fossil-fueled steam-electric plants that use fresh surface-water cooling sources in the Colorado River basin are from the

EXISTING WATER RESOURCE DEVELOPMENTS

Second National Water Assessment, dated December 1978. The total generating capacity shown in table 3 for these plants is 3,157 megawatts and average annual energy generation was 10,620 gigawatt-hours. The estimated cooling water consumption values are average values. The actual daily rates are dependent upon power demand, temperature of cooling water, and several other factors.

Table 3

Cooling Water Requirements
Existing Steam-Electric Powerplants
Colorado River Basin

Plant Name	Owner[1]	Owner Class[2]	Installed Capacity (MW)	Average Annual Energy (GWh)	Type Prime Mover[3]	Type Cooling[4]	Source of Cooling Water	1975 Cooling Water Use: Withdrawal (mgd)	1975 Cooling Water Use: Consumption (mgd)
Oak Creek	WETU	U	82	551	F	CP	Oak Creek Lake	2	1
Concho	WETU	U	53	14	F	WT	Lake Nasworthy	0	0
San Angelo	WETU	U	101	719	F	CP	Lake Nasworthy	2	1
Morgan Creek	TEES	U	846	3,739	F	CP	Lake Colorado City, Champion Creek	6	4
Holly Street	AUST	M	555	1,500	F	OT	Town Lake	388	1
Seaholm	AUST	M	125	277	F	OT	Town Lake	116	0
Decker Creek	AUST	M	325	1,003	F	CP	Walter E. Long (Decker Lake)	2	1[5]
Gideon	LOCR	S	662	2,114	F	CP	Lake Bastrop	3	2[5]
Ferguson (Granite Shoals)	LOCR	S	408	703	F	CP	L.B. Johnson Lake	2	1
Totals			3,157	10,620				521	11

1/ *WETU - West Texas Utilities Company; TEES - Texas Electric Service Company AUST - Austin; LOCR - Lower Colorado River Authority.*
2/ *U - privately-owned utility; M - Municipal; S - State.*
3/ *F - fossil.*
4/ *CP - cooling pond; WT - wet tower; OT - once through.*
5/ *Does not include net natural evaporation from lakes constructed for steam-electric cooling purposes.*

There are no steam-electric plants in the San Bernard River associated drainage area. The South Texas project, which sits on the divide between the Colorado River basin and the Lavaca River associated drainage area, is presently under construction. When completed it will have an installed capacity of 2,500 megawatts.

STATUS OF HYDROELECTRIC LICENSING

There are no licensed projects in the Colorado River basin and associated areas.

Prior Licensing Action

On April 4, 1949, the Lower Colorado River Authority filed, under section 23(b) of the Federal Power Act, a declaration of intention to construct, operate, and maintain the Marble Falls and the Granite Shoals (Lyndon B. Johnson) projects, and to operate and maintain the Lake Austin project. In a finding, in the nature of an opinion, issued April 6, 1949, the Commission concluded that the

interest of interstate or foreign commerce would not be affected by the proposed construction, operation and maintenance of the Austin, Marble Falls, or Granite Shoals (Lyndon B. Johnson) projects, and that no lands or reservations of the United States would be affected thereby.

In the document cited above, the Commission noted that the Buchanan and Inks hydroelectric projects operated by the Authority occupy an area which would have been included in a development proposed by the Syndicate Power Company in 1927 (DI-101) which the Commission then found would not affect the interests of interstate or foreign commerce. These two projects were therefore considered to be exempt from licensing requirements of the Federal Power Act by reason of the earlier finding.

WATER RESOURCES PLANNING

Prior Studies and Reports

The Chief of Engineers transmitted a report to Congress on October 12, 1929, concerning preliminary examination of the Colorado River for navigation below Wharton. It was recommended that no improvement be undertaken at that time and the report has not been published.

The Corps made a preliminary examination of the basin in the interest of flood control and submitted a report to Congress on April 2, 1930. This report, published as House Document No. 361, 71st Congress, 2nd Session, was unfavorable to a survey and received no Congressional action. This report contains a list of 11 reports on the Colorado River published prior to September 27, 1929.

Mansfield Dam (originally called Marshall Ford Dam) (Lake Travis) was constructed by the United States pursuant to section 3 of the River and Harbor Act of August 26, 1937 (50 Stat. 850). This act also validated and ratified an agreement between the Secretary of the Interior and the Lower Colorado River Authority permitting the Authority to construct and operate a powerplant to use water from Mansfield Dam.

Rivers and Harbors Committee Document No. 26, 75th Congress, 1st Session, 1937, is a review of reports on the Colorado River recommending the modification of the existing Intracoastal Waterway Project to provide for maintaining a suitable flood-discharge channel in the Colorado River from Matagorda to the Gulf of Mexico.

House Document No. 642, 75th Congress, 3rd Session, 1938 recommended the modification of the existing project for the Intracoastal Waterway to provide for dredging a channel in the Colorado River, 9 feet deep and 100 feet wide, upstream to mile 17.0. This was adopted by the Rivers and Harbors Act of June 1938.

House Document No. 315, 76th Congress, 1st Session, 1939 contains a survey of the Concho River for flood control and allied purposes. The report recommended construction of the San Angelo Reservoir (O.C. Fisher) on the North Concho River above the City of San Angelo, Texas, and local protection works. The project was authorized by the Flood Control Act of August 1941, and was placed in operation in 1952.

WATER RESOURCES PLANNING

In House Document No. 370, 76th Congress, 1st Session, 1939, recommendations of the Chief of Engineers include (1) construction of Hords Creek Reservoir above the town of Coleman, Texas, and (2) enlargement of Lake Brownwood Reservoir. The project was authorized by the Flood Control Act of August 18, 1941. Hords Creek was completed in 1948, and preconstruction planning is underway for enlargement of the Lake Brownwood Reservoir.

The District and Division Engineers reported to the Chief of Engineers, May 1945, on a survey of the Colorado River and its tributaries for flood control and allied purposes and for navigation. It was recommended that Federal projects for flood control be constructed at the Marble Falls site (mile 384.3, Colorado River), Winchell site (mile 567.6, Colorado River), and Sand Saba site (mile 46.2, San Saba River). In addition, there was a recommendation for reallocation of storage in Mansfield Reservoir (Lake Travis), in the interest of flood control. The proposed additions to the existing developments were shown to be economical but there was insufficient data presented to determine the economics of the added power facilities and the resulting additional generation. It was recommended that no further improvement for navigation should be undertaken by the Federal Government, other than the improvements authorized by the River and Harbor Act of June 1938.

The U.S. Bureau of Reclamation (Water and Power Resources Service) has been active in the basin, particularly during the past 25 years. In 1941, the Bureau made three reports on the Colorado River, based on studies of 1937 and 1938. These referred to storage allocations at Marshall Ford Dam, later renamed Mansfield Dam (Lake Travis), which was constructed by the Bureau, and to irrigation and flood control in the lower reaches of the Colorado basin.

In 1952 the Bureau submitted a report on the Plan of Development for Brownwood Project. This dealt with the downstream irrigation potential in the event the Brownwood Dam enlargement, as proposed by the Corps of Engineers, was provided.

In 1956, the Bureau made a report on its San Angelo Project. The principal feature of this project was the Twin Buttes Dam and Reservoir for irrigation, water supply, and flood control. This project has been completed.

The Bureau prepared a report for the Columbus Bend Project which recommended a dam on the Colorado River just upstream from Columbus, Texas. This report, dated March 1960, was published as House Document 227, 87th Congress, 1st Session, 1961. The project would be a multiple-purpose development operated in conjunction with existing reservoirs of the Lower Colorado River Authority for the primary purpose of increasing the dependable water supply necessary to permit urban and industrial growth in the area. Fish and wildlife conservation and development, as an associated project purpose, would include development of a wildlife refuge. Substantial recreation benefits would be provided incidental to operation of the project.

The State of Texas has completed many reports that cover the Colorado River or portions thereof, of which a notable one is "A Plan for Meeting the 1980 Water Requirements of Texas," dated May 1961.

The U.S. Study Commission-Texas, in a 1962 report, planned development of the land and water resources for the Colorado River basin to meet projected water

requirements during the next 50 years. Several major reservoirs were proposed in the Commission's report. In addition two pumped-storage hydroelectric plants on the Colorado River were identified. The potential Monument Hill plant would be in the vicinity of La Grange, Texas and would utilize the Columbus Bend reservoir as the lower pool. The potential Post Oak plant would be situated a short distance upstream from Lake Buchanan.

Consideration was given, in the above study, to a diversion from the Lavaca River drainage, associated area of the Colorado River basin, to the vicinity of Brownville at the southern tip of Texas. This would require an aqueduct in conjunction with additional storage reservoirs. This scheme is not presently under consideration.

The Federal Energy Regulatory Commission has made studies, with particular reference to power, concurrent with the planning of other agencies. These studies have resulted in commentary letters concluding that development of power would not be feasible, as follows: San Angelo Dam and Reservoir, December 19, 1947, Lake Brownwood modification, March 27, 1950; and Columbus Bend Project, December 15, 1960. In cooperative studies for the U.S. Study Commission-Texas it was determined, on the basis of available data, that the Post Oak project would have a benefit-cost ratio slightly in excess of unity and that the Monument Hill project ratio would be just below unity.

The Texas Water Development Board (TWDB), a leading agency of the State of Texas, is responsible for developing a state wide water plan to serve as a flexible guide for the development of Texas water resources. The Board approved the present Texas Water Plan in April 1969 and it remains in effect until an update and revision of the Plan is formally adopted by the Board.

In May 1977 the TWDB published a two volume report titled "Continuing Water Resources Planning and Development for Texas." The report identifies major water and water related problems, identifies actions currently underway to provide for part of Texas' present and future water needs, and presents a preliminary draft plan of development, including alternatives, for meeting water supply and water-related needs in parts of the state through the year 2000.

In June 1978 the Texas Department of Water Resources published a report "Present and Future Surface-Water Availability in the Colorado River Basin, Texas."

The report describes the results of a joint investigation by the United States Bureau of Reclamation (now the Water and Power Resources Service) and the Texas Department of Water Resources concerning the water resources of the Colorado River basin in Texas. The analysis undertaken by the Department of Water Resources is an independent investigation subject only to the cooperative agreement entered into with the Bureau of Reclamation. The federal study was authorized by P.L. 89-561, 89th Congress, and funds were appropriated to the Bureau of Reclamation by the 93rd Congress, with sponsorship provided by the Lower Colorado River Authority.

The Galveston District of the U.S. Army Corps of Engineers recently completed a report on a feasibility study of the Colorado River Channel to Bay City, a navigation channel 9 feet deep and 100 feet wide. As part of the study two plans for channel enlargement were examined to accommodate existing and prospective waterborn commerce. Economic justification could not be established for

either plan and further studies were determined to be unwarranted.

The Water Resources Planning Act of 1965 (P.L. 89-80) authorizes the Water Resources Council to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. The Council reported its first national assessment in 1968, which put into nation-wide perspective estimates of present and future regional water and related land requirements and supplies. The Second National Water Assessment, dated December 1978, presents nationally consistent current and projected water use and supplies information by regions and subregions for the United States. The second assessment found that significant achievements have been made in the past decade in preserving water and harnessing its power with a growing interest in water conservation and environmental protection; and that greater efforts are needed to insure careful management of our water resources and to solve the complex water and related land problems which still exist. A supplemental report to the second assessment, Water for Energy, provides information on energy and related water requirements at the region and subregion level for the years 1975, 1985, and 2000, including cooling water requirements for steam-electric generation.

Current Studies

The Colorado Coastal Plains Project is a project under study by the Water and Power Resources Service. It is located generally in the Lower Colorado River basin in Travis, Bastrop, Fayette, Colorado, Wharton, and Matagorda Counties, Texas.

The principle objectives of the Colorado Coastal Plains Project investigations are to (1) identify alternative plans for satisfying an imminent need for municipal and industrial water in the area; (2) evaluate potential sources to provide cooling water for steam-electric generating plants; and (3) assess and evaluate the near and midterm needs of the area for enhancing water quality, fish and wildlife, and recreation. The plans, not yet finalized, will evaluate both development and management alternatives in an effort to assure the optimum use of the total resources. A status report on the project is expected to be completed by September 1981.

The Galveston District of the U.S. Army Corps of Engineers has two active studies in the basin. These studies are the Gulf Intracoastal Waterway, Louisiana-Texas Section, and the Mouth of the Colorado River Project. The Gulf Intracoastal Waterway (GIWW) study is a preauthorization study under the direction of the New Orleans District Engineer. The objective of the study is to determine the economic feasibility of enlarging the Gulf Intracoastal Waterway from its current dimensions of 12 feet by 125 feet to 16 feet by 150 feet. The initial efforts will concentrate on the reaches between Houston and New Orleans, but subsequent activities will address the potential of enlarging the reach between Houston and Corpus Christi. That portion of the study will impact on the Colorado River, but it will not be completed until at least 1984.

The Mouth of the Colorado River Project, authorized by the River and Harbor Act of 1968, includes navigation and diversion features. The navigation features consist of a jettied entrance channel, 15 feet deep by 100 feet wide, from the Gulf shore to the GIWW; a harbor and turning basin, 12 feet deep by 350 feet

wide by 1,450 feet long, adjacent to the north side of the GIWW at Matagorda; and recreational facilities. Plans and specifications for this portion of the project have been prepared and, subject to completing certain agreements with the local sponsors, it is ready for construction. The diversion features of the Mouth of the Colorado River Project consist of a diversion channel, 250 feet wide and 20 feet deep, to divert the Colorado River flows into Matagorda Bay; a diversion dam across the existing river channel near the junction of the Colorado River and GIWW; a relocated segment of the navigation channel, 12 feet deep and 100 feet wide; a hydraulically constructed dam in Tiger Island Channel; and new oyster reefs in Matagorda Bay. The necessary reports on the diversion project are essentially complete; but, because of recommended changes to the authorized cost-sharing, this portion of the project must be reapproved by Congress before construction can begin.

The Fort Worth District of the U.S. Army Corps of Engineers has an active ongoing study authorized by the Flood Control Act of 1936. This study, Colorado River and Tributaries, Texas is a continuing investigation of the water resource needs of the basin and is documented by issuance of interim reports.

In addition, the Fort Worth District is currently preparing an Environmental Impact Statement for the construction of the Colorado River Municipal Districts proposed Stacy Dam. The statement will be used in the Corps decision to issue a water quality permit in accordance with section 404 of the Clean Water Act of 1977, as amended.

POTENTIAL WATER RESOURCE DEVELOPMENTS

Listed in table 4 and shown on figure 2 are 15 major potential reservoirs and 1 enlargement of an existing reservoir that have been identified by prior and current studies of the water resource needs of the Colorado River basin. The potential total storage capacity of the reservoirs is about 10,952,000 acre-feet.

Three of the projects in table 4 have been Federally authorized for construction. The Brownwood Dam modification in Brown County on Pecan Bayou, approximately eight miles north of Brownwood, Texas, would provide 85,900 acre-feet of conservation storage and 33,000 acre-feet of storage for sediment reserve, or a total storage capacity of 118,900 acre-feet. Proposed construction would be an "added-on" composite earthfill embankment which would increase the height and strengthen the existing earthen dam at Lake Brownwood. This modification would control the runoff from 1,544 square miles of drainage area.

The Pecan Bayou Dam (Upper Pecan Bayou Reservoir) in Coleman County on Pecan Bayou, approximately 17 miles north of Coleman, Texas, would provide 93,500 acre-feet of conservation storage at elevation 1637.0 top of flood control pool. The lake would provide 102,700 acre-feet of flood control storage capacity and would cover 8,030 surface acres. An additional 10,100 acre-feet of storage space is for sediment reserve. Proposed is the construction of a 14,700-foot dam (including a 5,400-foot dike on the right bank), with a maximum height of 107 feet above streambed, which would control the runoff from 316 square miles of drainage area.

POTENTIAL WATER RESOURCE DEVELOPMENTS

Table 4

Potential Storage Reservoir Developments
Colorado River Basin

Reservoir	Stream	Storage Capacity				Head[3/] (feet)
		Flood Control	Conservation	Sediment	Total	
		(1,000 acre-feet)				
Brownwood Enlargement[1/2/]	Pecan Bayou	0	86	33	119	NA
Upper Pecan Bayou[2/]	Pecan Bayou	103	94	10	206	NA
Camp Colorado	Jim Ned Creek	165	116	12	293	NA
Stacy	Colorado R.	253	554	NA	807	NA
Hanna (Fox Crossing)	Colorado R.	1,326	950	61	2,337	NA
San Saba	San Saba R.	NA	1,740	NA	1,740	77
Mason	Llano R.	NA	651	NA	651	NA
Llano	Llano R.	864	500	9	1,373	63
Pedernales	Pedernales R.	NA	594	NA	594	103
Clearview	Cedar Creek	0	125	NA	125	NA
LaGrange	Colorado R.	890	275	NA	1,165	58
Columbus Bend	Colorado R.	935	235	NA	1,170	42
Baylor	Baylor Creek	0	NA	NA	NA	NA
Cummings Creek	Cummings Creek	0	135	NA	135	NA
Palmetto Bend Stage 2[2/4/]	Lavaca R.	0	170	NA	170	NA
Garcitas	Garcitas Creek	0	62	5	67	NA
Totals		4,536	6,287	130	10,952	

NA - Not available

1/ Enlargement of existing reservoir
2/ Authorized
3/ Average net head for power
4/ Previously identified as Vanderbilt and Edna Reservoirs

Palmetto Bend Stage 2 would provide an additional 170,000 acre-feet of storage in conjunction with Palmetto Bend Stage 1. The dam would be constructed across the Lavaca River about 7 miles south of Edna, Texas, and connected to Palmetto Bend Stage 1 which is under construction. The dam would be 37,000 feet long with a maximum height of 58 feet.

Table 5 lists 10 undeveloped hydroelectric sites in the basin with potential capacity of 269.1 megawatts and potential average annual energy of 366,300 megawatt-hours.

There is one retired hydroelectric plant in the basin. The Llano plant, owned by the City of Llano, is on the Llano River and has an installed capacity of 250 kilowatts, 14 feet of gross head, and was retired in August 1962.

Presently, there are no rivers included in the National Wild and Scenic Rivers System. However, the Heritage Conservation and Recreation Service, in conducting a Nationwide Rivers Inventory, has identified a segment of the Colorado River which appears to have potential for further consideration. This segment is in Burnet and San Saba Counties from upper Lake Buchanan to Bend, Texas, a distance of about 26 miles.

Table 5

Potential Hydroelectric Developments
Colorado River Basin

Project	Stream	Drainage Area (sq mi)	Usable Storage Capacity (1,000 ac-ft)	Power Pool Elevation (ft)	Gross Head (ft)	Potential Installed Capacity (kW)	Potential Average Annual Energy (MWh)
Altair	Colorado R.	41,100	9	167	16	10,000	26,200
Columbus Bend	Colorado R.	40,725	160	225	58	31,000	23,900
Monument Hill	Colorado R.	NA	720	225	237	120,000 1/	43,000
West Point	Colorado R.	39,000	-	335	80	15,000	60,000
Lower Austin	Colorado R.	38,250	-	429	94	15,000	60,000
Mason	Llano R.	3,000	-	1,428	108	18,000	15,800
Hanna (Fox Crossing)	Colorado R.	25,757	300	1,290	105	20,000	49,000
Winchell	Colorado R.	24,813	558	1,420	129	24,000	48,000
Stacy	Colorado R.	11,758	700	1,570	150	15,000	37,000
Upper Pecan Bayou	Pecan Bayou	316	-	1,637	21	1,100	3,400
Totals						269,100	366,300

NA - Not available

1/ Includes 35,000-kW of reversible capacity.

The Texas Parks and Wildlife Department has studied the State System of Waterways and has categorized some river and stream segments in the basin the following way: (1) Wild Waterways - Pendernales River (2) Scenic Waterways - Colorado, Llano, San Bernard, and San Saba Rivers (3) Recreational Waterway - Concho River.

The criteria for a river, stream, or bayou to be considered for inclusion in a Texas Waterway System includes (1) scenic, historic, and recreational qualities; (2) adequate streamflow; (3) relative state of development; (4) water quality; (5) length and access; and (6) dredging activities, channelization, and impoundments.

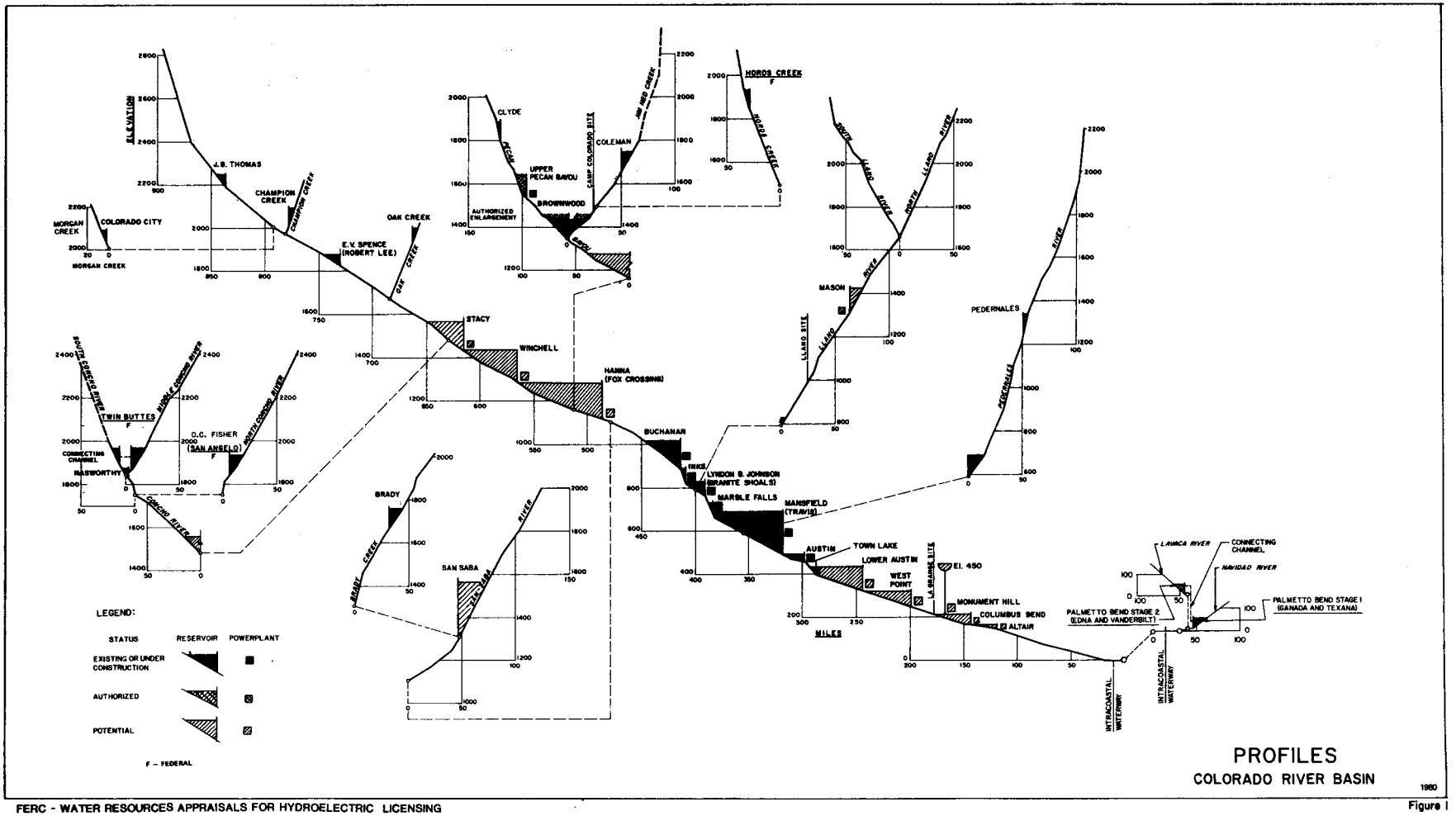
The projected steam-electric generating capacity and cooling water needs in the basin area are listed in table 6. This data is based on projections from the Second National Water Assessment of the Water Resources Council for steam-electric generating plants with installed capacities of 25,000 kilowatts or more.

Table 6

Projected Cooling Water Requirements
Colorado River Basin

Year	Capacity (MW)	Generation (GWh)	Cooling Water Use	
			Withdrawal (mgd)	Consumption (mgd)
1985	8,000[1/]	33,290	553	37
2000	41,780[2/]	213,160	9,000	299

1/ *2,500 MW assumed nuclear.*
2/ *34,750 MW assumed nuclear.*

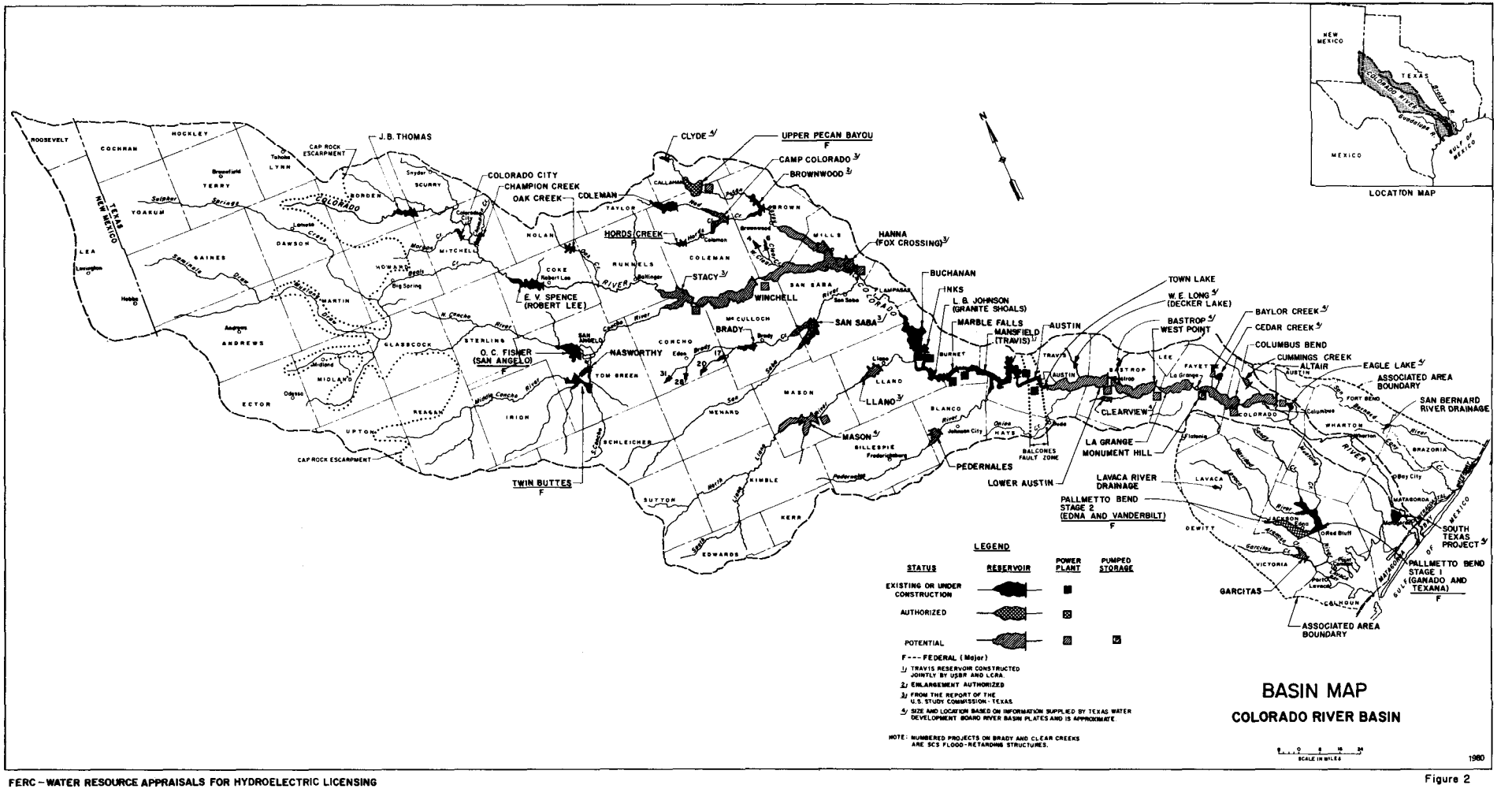


PROFILES
COLORADO RIVER BASIN

1980

FERC - WATER RESOURCES APPRAISALS FOR HYDROELECTRIC LICENSING

Figure 1



FERC – WATER RESOURCE APPRAISALS FOR HYDROELECTRIC LICENSING

Figure 2

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