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## TWENTY-NINTH ANNUAL REPORT

OF THE

# Upper Colorado River Commission



SALT LAKE CITY, UTAH  
SEPTEMBER 30, 1977

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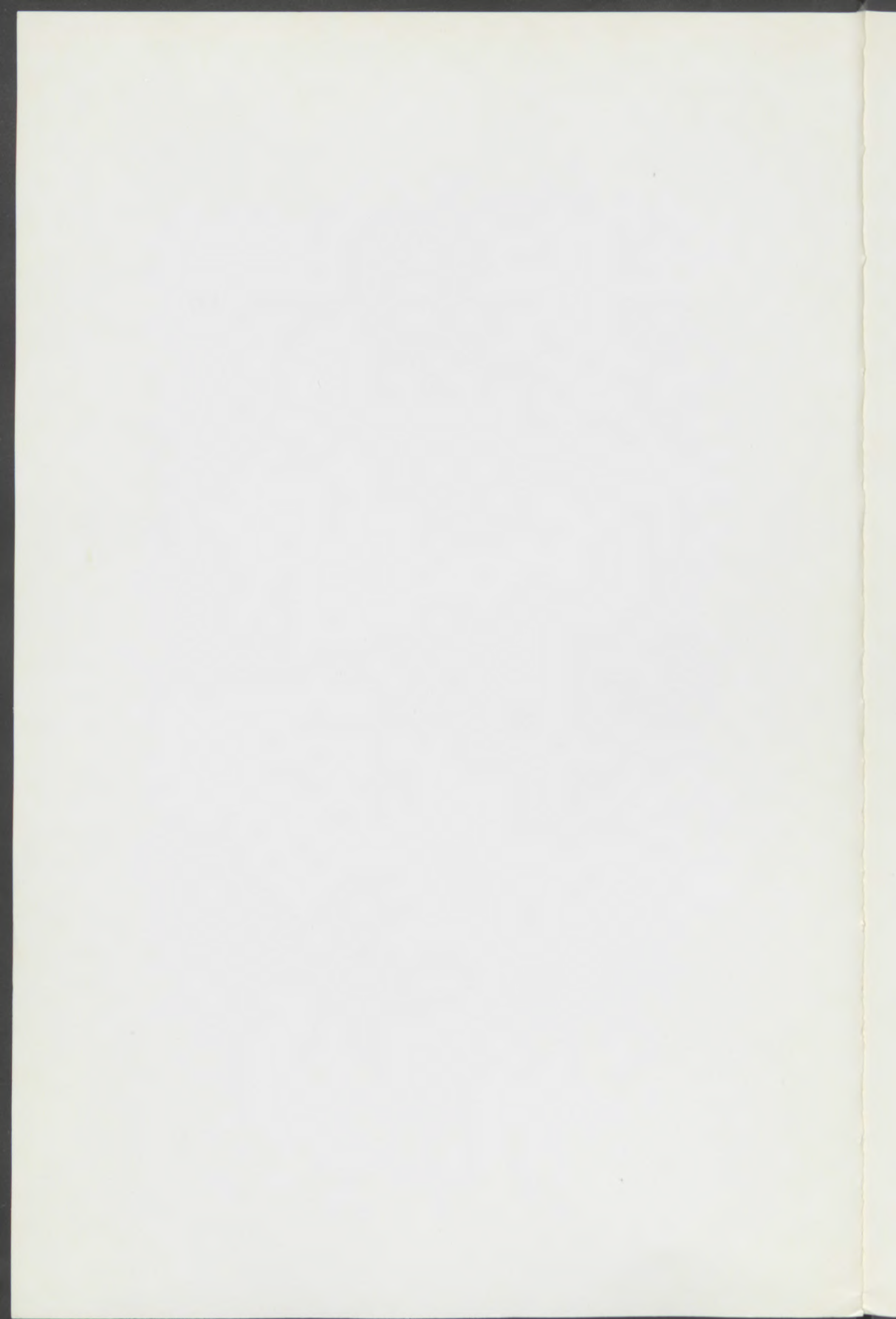
IVAL V. GOSLIN  
Executive Director





# UPPER COLORADO RIVER BASIN

UPPER COLORADO RIVER  
COMMISSION







## UPPER COLORADO RIVER COMMISSION

355 South Fourth East Street

Salt Lake City, Utah 84111

October 31, 1977

Mr. President:

The Twenty-Ninth Annual Report of the Upper Colorado River Commission, as required by Article VIII (d) (13) of the Upper Colorado River Basin Compact, is enclosed.

The budget of the Commission is included in this report as Appendix B.

This report has also been transmitted to the Governor of each State signatory to the Upper Colorado River Basin Compact.

Respectfully yours,

Ival V. Goslin  
Executive Director

The President  
The White House  
Washington, D. C. 20500

Enclosure

hiw

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## I. Preface

Article VIII (d) (13) of the Upper Colorado River Basin Compact requires the Upper Colorado River Commission to "make and transmit annually to the Governors of the signatory States and the President of the United States of America, with the estimated budget, a report covering the activities of the Commission for the preceding water year."

Article VIII (1) of the By-Laws of the Commission specifies that "the Commission shall make and transmit annually on or before April 1 to the Governors of the States signatory to the Upper Colorado River Basin Compact and to the President of the United States a report covering the activities of the Commission for the water year ending the preceding September 30."

This Twenty-ninth Annual Report of the Upper Colorado River Commission has been compiled pursuant to the above directives.

This Annual Report includes, among other things, the following:

Membership of the Commission, its Committees, Advisers, and Staff;

Roster of meetings of the Commission;

Brief discussion of the activities of the Commission;

Engineering and hydrologic data;

Pertinent legal information;

Information pertaining to Congressional legislation;

Maps of Upper Colorado River Basin;

Status of the Storage Units and participating projects of the Colorado River Storage Project;

Appendices containing:

Fiscal data, such as: budget, balance sheet, statements of revenue and expense, Transmountain Diversions, etc.





## II. Commission



**H. G. Berthelson**  
Commissioner for  
Colorado



**John H. Bliss**  
Commissioner for  
New Mexico



**H. P. Dugan**  
Chairman  
Commissioner for  
United States



**Floyd A. Bishop**  
Commissioner for  
Wyoming



**Calvin  
L. Rampton**  
Commissioner for  
Utah

### **III. Officers of the Commission**

Chairman, H. P. Dugan

Vice Chairman, John H. Bliss

Secretary, Ival V. Goslin

Treasurer, William F. Homer

Assistant Treasurer, Romney Stewart, Jr.

### **IV. Staff**

Ival V. Goslin, Executive Director

Paul L. Billhymer, General Counsel

Robert F. Wilson, Chief Engineer

Mrs. Hanna I. Wetmore, Administrative Secretary

Miss Mary Lou Emerson, Clerk-Typist

Mrs. Janet Owens, Clerk-Typist

## V. Committees

The Committees of the Commission convened when required during the year.

Committees and their membership, at the date of this report, are as follows (the Chairman and the Secretary of the Commission are exofficio members of all committees, Article V (4) of By-Laws):

### STANDING COMMITTEES

#### Engineering Committee

Ival V. Goslin, Chairman	George L. Christopulos
Clarence J. Kuiper	C. R. Lord
Laren D. Morrill	Daniel F. Lawrence
Stephen E. Reynolds	Lynn S. Ludlow
David P. Hale	Barry C. Saunders, Alternate

#### Legal Committee

Felix L. Sparks, Chairman	Jack D. Palma II
David W. Robbins	Christian Mai
Richard T. Simms	Dallin W. Jensen
Charles M. Tansey	Reid W. Nielson

#### Budget Committee

John H. Bliss, Chairman	Floyd A. Bishop
H. G. Berthelson	Daniel F. Lawrence



## SPECIAL COMMITTEES

### Finance Committee

Bert A. Page  
H. G. Berthelson

### Education and Information Committee

John H. Bliss	Lynn S. Ludlow
Floyd A. Bishop	H. G. Berthelson

### Committee on Consumptive Use

Stephen E. Reynolds	Jack D. Palma II
Felix L. Sparks	C. R. Lord
Clarence Kuiper	Barry Saunders

## VI. Advisers to Commission

The following individuals serve as advisers to their respective Commissioners:

### COLORADO

#### Legal

Felix L. Sparks, Director  
Colorado Water Conservation Board  
Denver, Colorado

David W. Robbins  
Deputy Attorney General  
Denver, Colorado

#### Engineering

Clarence J. Kuiper  
State Engineer  
Denver, Colorado

Laren D. Morrill, Deputy Director  
Colorado Water Conservation Board  
Denver, Colorado

#### Alternate Commissioner

Felix L. Sparks, Director  
Colorado Water Conservation Board  
Denver, Colorado

## NEW MEXICO

### Legal

Richard T. Simms  
General Counsel  
New Mexico Interstate Stream Commission  
and State Engineer's Office  
Santa Fe, New Mexico

Charles M. Tansey  
Legal Adviser  
New Mexico Interstate Stream Commission  
Farmington, New Mexico

### Engineering

Stephen E. Reynolds, State Engineer  
Santa Fe, New Mexico

David P. Hale, Engineer  
New Mexico Interstate Stream Commission  
Santa Fe, New Mexico



## UTAH

### Legal

Dallin W. Jensen, Assistant Attorney General  
Salt Lake City, Utah

### Engineering

Daniel F. Lawrence, Director  
Division of Water Resources  
Salt Lake City, Utah

Lynn S. Ludlow, Manager  
Central Utah Water Conservancy District  
Orem, Utah

Barry C. Saunders, Alternate  
Division of Water Resources  
Salt Lake City, Utah

### Colorado River Advisory Committee to Utah Commissioner

Laurence Y. Siddoway, Manager  
Uintah Water Conservancy District  
Vernal, Utah

Clyde E. Conover, Member  
Emery County Water Conservancy District  
Ferron, Utah

Robert B. Hilbert  
Central Utah Water Conservancy District  
Salt Lake City, Utah

### Alternate Commissioner

Daniel F. Lawrence, Director  
Division of Water Resources  
Salt Lake City, Utah

## WYOMING

### Legal

Christian Mai  
Jack D. Palma II  
Cheyenne, Wyoming

### Engineering

George L. Christopulos, State Engineer  
Cheyenne, Wyoming  
  
C. R. Lord  
Cheyenne, Wyoming

### Alternate Commissioners

Dan S. Budd  
Big Piney, Wyoming  
  
Aaron H. McGinnis  
Kemmerer, Wyoming

## UNITED STATES OF AMERICA

### Legal

Reid W. Nielson, Regional Solicitor  
U.S. Department of the Interior  
Salt Lake City, Utah

### Engineering

J. R. Riter  
Denver, Colorado

## VII. Meetings of the Commission

During the Water Year ending September 30, 1977, the Commission met six times as follows:

Meeting No. 140	November 15, 1976	Special Meeting Denver, Colorado
Meeting No. 141	January 27, 1977	Special Meeting Denver, Colorado
Meeting No. 142	February 11, 1977	Special Meeting Denver, Colorado
Meeting No. 143	March 21, 1977	Regular Meeting Salt Lake City, Utah
Meeting No. 144	May 6, 1977	Adjourned Regular Meeting Denver, Colorado
Meeting No. 145	September 19, 1977	Annual Meeting Salt Lake City, Utah



## VIII. Activities of the Commission

Within the scope and limitations of Article I (a) of the Upper Colorado River Basin Compact, “. . . to secure the expeditious agricultural and industrial development of the Upper Basin, the storage of water. . .” and under the powers conferred upon the Commission by Article VIII (d) pertaining to making studies of water supplies of the Colorado River and its tributaries and the power to “. . . do all things necessary, proper or convenient in the performance of its duties. . . , either independently or in cooperation with any state or federal agency,” the principal activities of the Commission during the 1977 water year have consisted of: (A) research and studies of an engineering and hydrologic nature of various facets of the water resources of the Colorado River Basin especially as related to energy industries and salinity control; (B) collection and compilation of documents for a legal library relating to the utilization of waters of the Colorado River System for domestic, industrial, and agricultural purposes, and the generation of hydro-electric power; (C) legal analyses of associated laws, court decisions, reports, and problems; (D) analysis of environmental statements on water development projects of the Colorado River Storage Project and participating projects; (E) continuation of a general public relations program related to water resources of the Upper Colorado River Basin; (F) cooperation with water quality and water resources agencies of the Colorado River Basin States on water and water-related problems; (G) participation in the activities of the Colorado River Basin Salinity Control Forum; (H) an education and information program designed to aid in securing appropriations of funds by the United States Congress for the construction, planning, and investigation of storage dams, reservoirs, and water resource development projects of the Colorado River Storage Project that have been authorized for construction, and to secure authorization by the Congress for the construction of additional participating projects as the essential investigations and planning are completed; (I) a legislative program consisting of the analysis and study of water resource Bills introduced in the U.S. Congress for enactment, the preparation of evidence and argument, and the presentation of testimony before Committees of the Congress; and (J) preparation of 1975 Water Assessment.

## A. ENGINEERING — HYDROLOGY

### 1. Colorado River Salinity Problem

The Upper Colorado River Commission has continued its interest and involvement in the Colorado River Basin salinity problem. The Commission staff has worked closely with representatives of the Commission's member States in coordinating and correlating activities with other States and Federal Agencies. The Commission's Director has acted as Secretary for the Colorado River Basin Salinity Control Forum which is composed of representatives from the seven Colorado River Basin States. The "Forum" has developed water quality standards and a plan of implementation as required by the Environmental Protection Agency Regulation (40 CFR Part 120) Colorado River System Salinity Control Policy and Standards Procedure.

The Regulation required that the seven Basin States adopt water quality standards for salinity, consisting of numeric criteria and a plan of implementation for salinity control and submit them for approval to the Environmental Protection Agency by October 18, 1975. The "Forum's" report has been adopted by each of the seven States, and, therefore, complies with this directive.

The plan of implementation for salinity control requires that progress in the program be monitored and evaluated on a continuing basis.

The Colorado River Basin States, through the Colorado River Basin Salinity Control Forum, are to submit a report annually to the Environmental Protection Agency summarizing the results achieved by the salinity control program and the effects of other actions in the Basin having an influence on salinity. The first progress report of the "Forum" was prepared and forwarded to the Environmental Protection Agency in January 1977. The report shows the salinity at Hoover, Parker, and Imperial Dams to be below the 1972 numeric criteria established for those stations by the "Forum." The decreases in salinity are considered to be primarily due to the greater than average water supply conditions and the increases in reservoir storage that have occurred since 1972.



The report states that:

(1) Plans for use of water by energy industries in the Colorado River Basin have not developed as fast as was projected in the 1975 "Forum" Report.

(2) The federal salinity control program is slightly behind schedule.

(3) All seven States have adopted the salinity standards and plan of implementation and are exercising those actions within their authority to achieve salinity control.

(4) Considering the vagaries of nature, and man's activities in both water development and salinity control, the "Forum" found that the conclusions stated in its June 1975 report are still valid.

#### **a. Environmental Defense Fund Lawsuit**

The Environmental Defense Fund, Inc. (EDF), filed suit August 22, 1977 in the United States District Court for the District of Columbia against the Environmental Protection Agency (EPA), the Department of the Interior, and the Bureau of Reclamation to set aside EPA's approval of the water quality standards for the Colorado River Basin.

Members of EDF were present at the "Forum" meeting in San Francisco on July 14, 1977. Discussion between members of the "Forum" and members of the Environmental Defense Fund who were present revealed that EDF wanted state-line numerical salinity standards established and, also, that EDF was not satisfied that the plan of implementation adopted by the "Forum" and the Environmental Protection Agency would be able to maintain salinity at the numerical values set for the three points in the lower basin of the Colorado River.

The discussion among members of the "Forum" and EDF also revealed little, if any, agreement between the "Forum" and EDF concerning the effects, practicability, advisability, or significance of state-line salinity standards.



There will likely be considerable effort expended during the coming year by the Department of the Interior, the Department of Justice, the EPA, the States that have intervened, and possibly others involved in the lawsuit.

## **2. 1975 National Water Assessment**

The 1975 Assessment of the Nation's Water and Related Land Resources is one of the functions assigned to the Water Resources Council by the Congress in the Water Resources Planning Act of 1965 (Public Law 89-80). The Assessment is for the purpose of identifying, describing, and placing in priority the Nation's severe water and water-related problems from both the State/Regional and National Viewpoint. The major components of the study are:

Step I — National Analysis

Step II — Specific-Problem Analysis

Step III — National Priorities Analysis

The Water Resources Council has the primary responsibility for conducting both the National Analysis and the National Priorities Analysis. The Specific-Problem Analysis is being done at the State/Regional level with the Bureau of Reclamation, Department of the Interior, acting as Regional Sponsor and the Upper Colorado River Commission acting as Study Director.

The Specific-Problem Analysis consists of three phases: Phase I involves the development of procedures and guidelines for conducting the Analysis and the execution of a Work Agreement between the Regional Sponsor and the Water Resources Council. Phase II involves the selection of problems to be studied, the development of information in sufficient detail to describe the problems in economic, environmental, and social terms, and conclusions and recommendations concerning needed problem resolution activities from a State/Regional viewpoint. Phase III provides for a regional review and formal State/Regional comment on the national assessment report.

Work accomplished by the staff and the Work Group during the year included the completion of Technical Memorandums No. 3 and No. 4.

Technical Memorandum No. 3 provided a list and description of Problem Areas within the Upper Colorado Region. It identified problem issues in each Problem Area and described the specific effects and implications of not solving severe problems. It also described the interrelationship of problems including complexity and urgency of resolution.

Technical Memorandum No. 4 summarized the severe, critical, existing and emerging water and related land problems. It also compared the State/Regional Future and the nationally-generated Modified Central Case. Conclusions were drawn and recommendations were made concerning resolution of severe water and related land problems.

During the coming year the Work Group will have an opportunity to review and make comments on a draft of the National Assessment Report. It will then be prepared in final form by the Water Resources Council and become the 1975 National Water Assessment.

### **3. Conversion to Metric System**

The various federal agencies with which the Upper Colorado River Commission cooperates, particularly the Bureau of Reclamation and the Geological Survey, are gradually shifting to use of the metric system in reports and correspondence. While they frequently use both systems in one document, some reports are appearing in metric units only.

Customary English units are used throughout this 29th Annual Report of the Commission. The Commission staff will observe the trend toward use of the metric system during the coming year. If the situation warrants, the next report could show English units with metric equivalents and in later reports convert to all metric units.



#### 4. Forecasts of Stream Flow

##### *APRIL 1, 1977 FORECASTS OF INFLOW TO LAKE POWELL<sup>1</sup>*

<i>Agency</i>	<i>Acre-Feet</i>
Soil Conservation Service	
Department of Agriculture (April-July) . . . . .	2,150,000
National Weather Service	
Department of Commerce (April-July) . . . . .	2,300,000
Bureau of Reclamation	
Department of the Interior (April-July) . . . . .	2,200,000

The reconstructed inflow to Lake Powell for the period April-July 1977 amounted to 1,130,000 acre-feet<sup>2</sup> which was about 14 per cent of the normal inflow.

During the April-July 1977 period, changes in storage in Colorado River Storage Project reservoirs above Lake Powell resulted in an overall reduction of 549,000 acre-feet with 57,000 acre-feet of evaporation being nearly offset by 54,000 acre-feet returned from bank storage.<sup>3</sup> Excluding bank storage and evaporation, Fontenelle Reservoir stored 94,000 acre-feet; Blue Mesa storage was reduced by 101,000 acre-feet; Flaming Gorge storage was reduced by 494,000 acre-feet; and Navajo Reservoir storage was reduced by 48,000 acre-feet.

The above actions resulted from extreme drought conditions prevailing in the Basin.

Actual regulated inflow to Lake Powell for the period April-July 1977 was 1,673,000 acre-feet.

The virgin flow of the Colorado River at Lee Ferry for the 1977 water year amounted to 5.6 million acre-feet.<sup>4</sup>

<sup>1</sup>Including water to be stored upstream in other Colorado River Storage Project Reservoirs.

<sup>2</sup>Exclusive of evaporation and seepage losses.

<sup>3</sup>Including Fontenelle Reservoir on Green River in Wyoming.

<sup>4</sup>Provisional records subject to revision.



## 5. Summary of Reservoir Levels and Contents

Runoff during the year ending September 30, 1977 ranged from a low of 18 percent of the 64-year (1914-1977) mean at the San Juan River station near Bluff, Utah, to a high of 30 percent of the 64-year mean at the Green River station at Green River, Utah. Runoff of the Colorado River near Cisco, Utah was 27 percent of the 64-year mean.

Lake Powell's lowest elevation of the 1977 water year occurred on September 30, 1977, reflecting the extremely low runoff conditions during the year. On September 30th the lake was at elevation 3,637 feet (live content 16,143,000 acre-feet). The lake was at its highest point on October 1, 1976 at elevation 3,663.88 feet with a content of 19,624,000 acre-feet. A total of 8,225,000 acre-feet was released to the river below Glen Canyon Dam during the 1977 water year. The 1968-1977 (10-year) delivery to the Lower Basin (measured at Lee Ferry) was 88,231,000 acre-feet.

Lake Mead on September 30, 1977 contained 20,204,000 acre-feet\* of available storage water at elevation 1,180.48 feet. Lake Mead held 6.6 million acre-feet in the 57.45 feet above its rated head. On September 30, 1977 the live storage of Lake Mead was 4,061,000 acre-feet more than the storage in Lake Powell.

The results of the long-range reservoir operation procedures adopted by the Secretary of the Interior for Lake Powell, Flaming Gorge, Navajo, Blue Mesa, and Morrow Point reservoirs in the Upper Colorado River Basin and for Lake Mead in the Lower Basin are illustrated on the following pages for the 1977 water year. There was no equalization of storage in Lake Powell and Lake Mead during the year.

\*Based on April 1, 1967 Capacity Table revised according to Sedimentation Survey 1963-1964.

# STATISTICAL DATA FOR PRINCIPAL RESERVOIRS IN COLORADO RIVER BASIN

(Units: Elevation — feet; capacity — 1,000 acre-feet)

## UPPER BASIN

### Colorado River Storage Project (Total Surface Capacity)

	Flaming Gorge		Navajo		Lake Powell		Blue Mesa		Morrow Point		Fontenelle	
	Elev.	Cap.	Elev.	Cap.	Elev.	Cap.	Elev.	Cap.	Elev.	Cap.	Elev.	Cap.
River elevation at dam (average tailwater) . . . . .	5,603	0	5,720	0	3,138	0	7,160	0	6,775	0	—	—
Dead Storage . . . . .	5,740	40	5,775	13	3,370	1,998	7,358	111	6,808	0	6,408	0.56
Inactive Storage (minimum power pool) . . . . .	5,871	273	5,990 <sup>1</sup>	673	3,490	6,124	7,393	192	7,100	75	—	—
Rated Head . . . . .	5,946	1,102	—	—	3,570	11,426	7,438	361	7,108	80	6,491	234
Maximum Storage (without surcharge) . . . . .	6,040	3,789	6,085	1,709	3,700	27,000	7,519	941	7,160	117	6,506	345

<sup>1</sup>Required for Navajo Indian Irrigation Project

# STATISTICAL DATA FOR PRINCIPAL RESERVOIRS IN COLORADO RIVER BASIN

(Units: Elevation — feet; capacity — 1,000 acre-feet)

## LOWER BASIN

(Usable Surface Capacity)

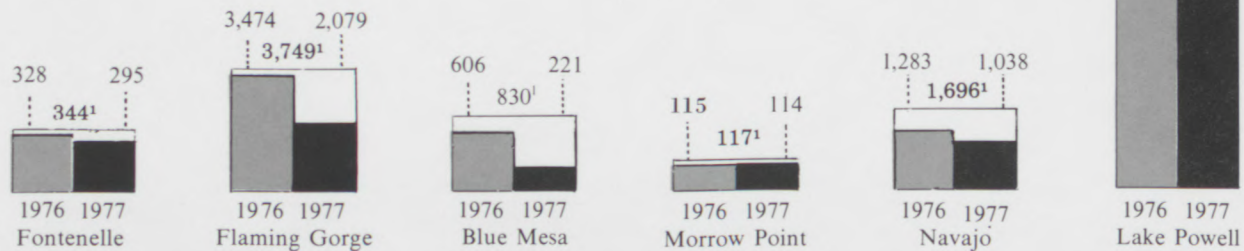
	Lake Mead		Lake Mohave		Lake Havasu	
	Elev.	Capacity	Elev.	Capacity	Elev.	Capacity
River elevation at dam (average tailwater) . . . . .	646	(-2,378)	506	(-8.5)	370	(-28.6)
Dead Storage . . . . .	895	0	533.39	0	400	0
Inactive Storage (minimum power pool) . . . . .	1,050	7,471	570	217.5	440 <sup>1</sup>	439.4
Rated Head . . . . .	1,122.8	13,633	—	—	—	—
Maximum Storage (without surcharge) . . . . .	1,221.4	26,159	647	1,809.8	450	619.4

<sup>1</sup>Contractual minimum for delivery to Metropolitan Water District's Colorado River Aqueduct.



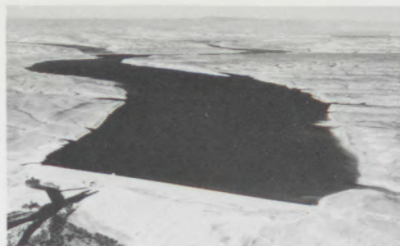
STORAGE IN PRINCIPAL RESERVOIRS AT END  
OF WATER YEAR  
UPPER BASIN  
LIVE STORAGE CONTENTS\*  
(1,000 Acre-Feet)

RESERVOIR	Sept. 30 1976	Percent of Live Capacity	Sept. 30 1977	Percent of Live Capacity	Change in Contents
Fontenelle	328	95	295	86	— 33
Flaming Gorge	3,474	93	2,079	55	—1,395
Blue Mesa	606	73	221	27	— 385
Morrow Point	115	98	114	99	— 1
Navajo	1,283	76	1,038	61	— 245
Lake Powell	19,640	79	16,143	65	—3,497
Total	25,446	80	19,890	63	—5,556



<sup>1</sup>Maximum live storage (exclusive of surcharge)

\*As of September 30 (excludes bank storage).

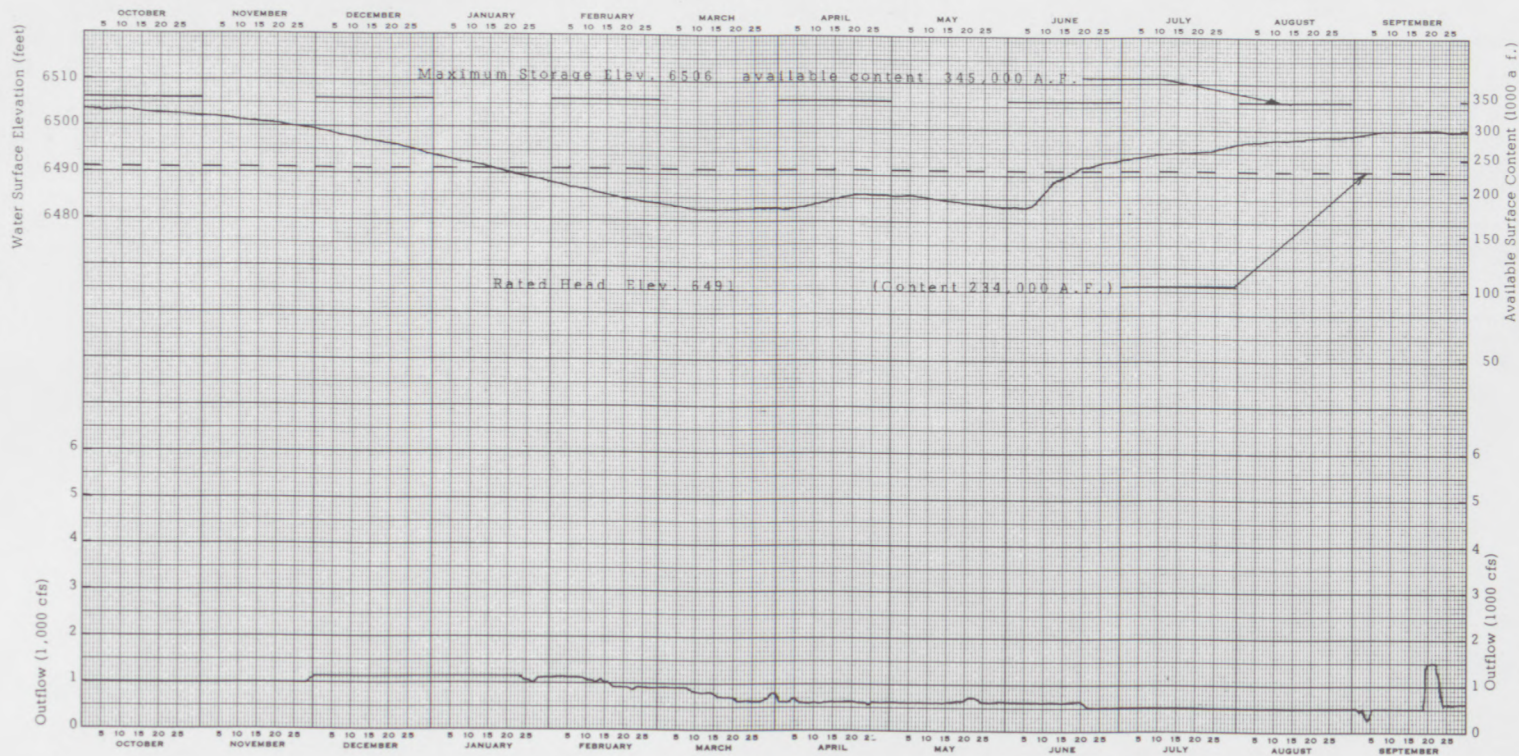


# **FONTENELLE**

Live Storage Capacity — 344,400 acre-feet

Power Generating Capacity — 10,000 KW

Live Storage 9/30/77 — 295,000 acre-feet



FONTENELLE RESERVOIR  
Water Year 1976-1977



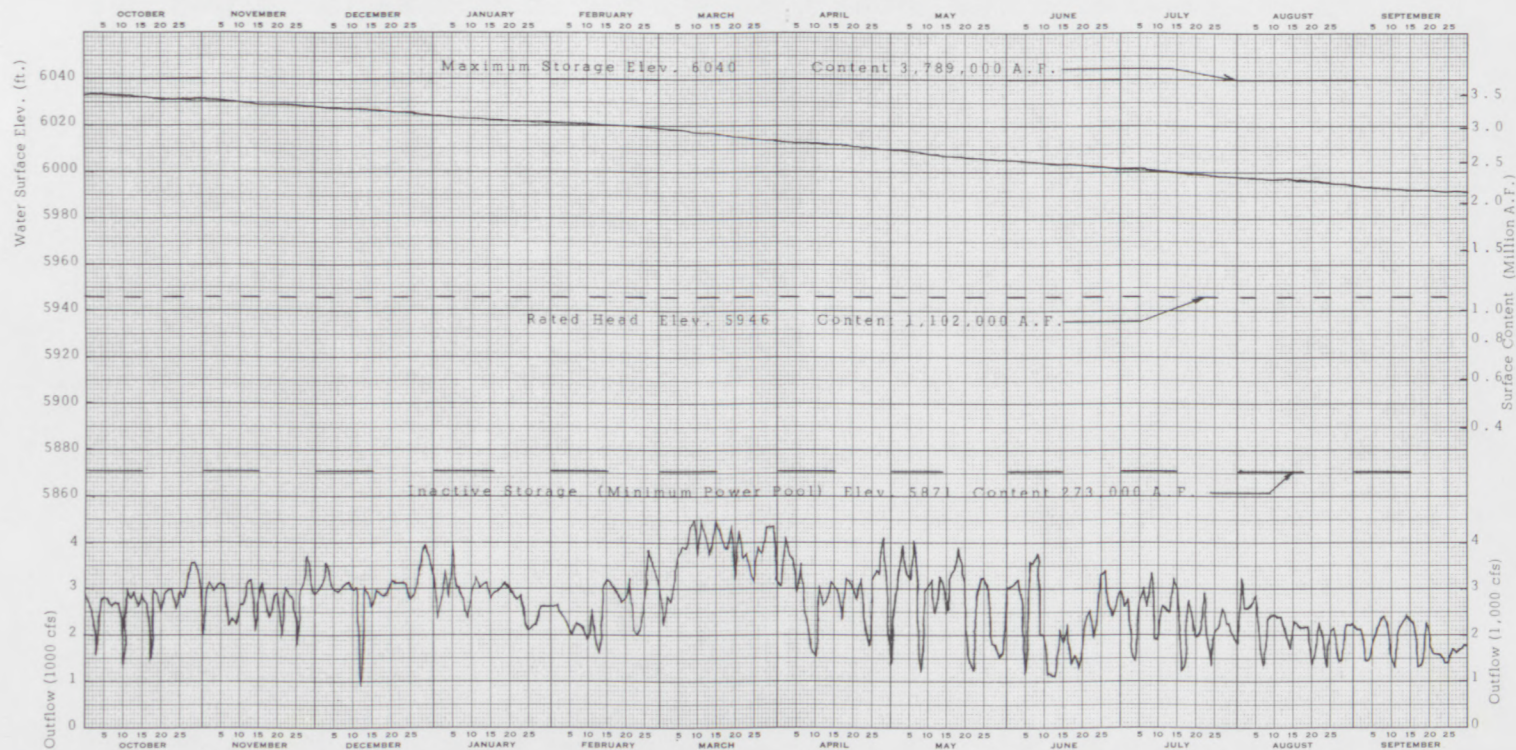


# FLAMING GORGE

Live Storage Capacity — 3,749,000 acre-feet

Power Generating Capacity — 108,000 KW

Live Storage 9/30/77 — 2,079,000 acre-feet



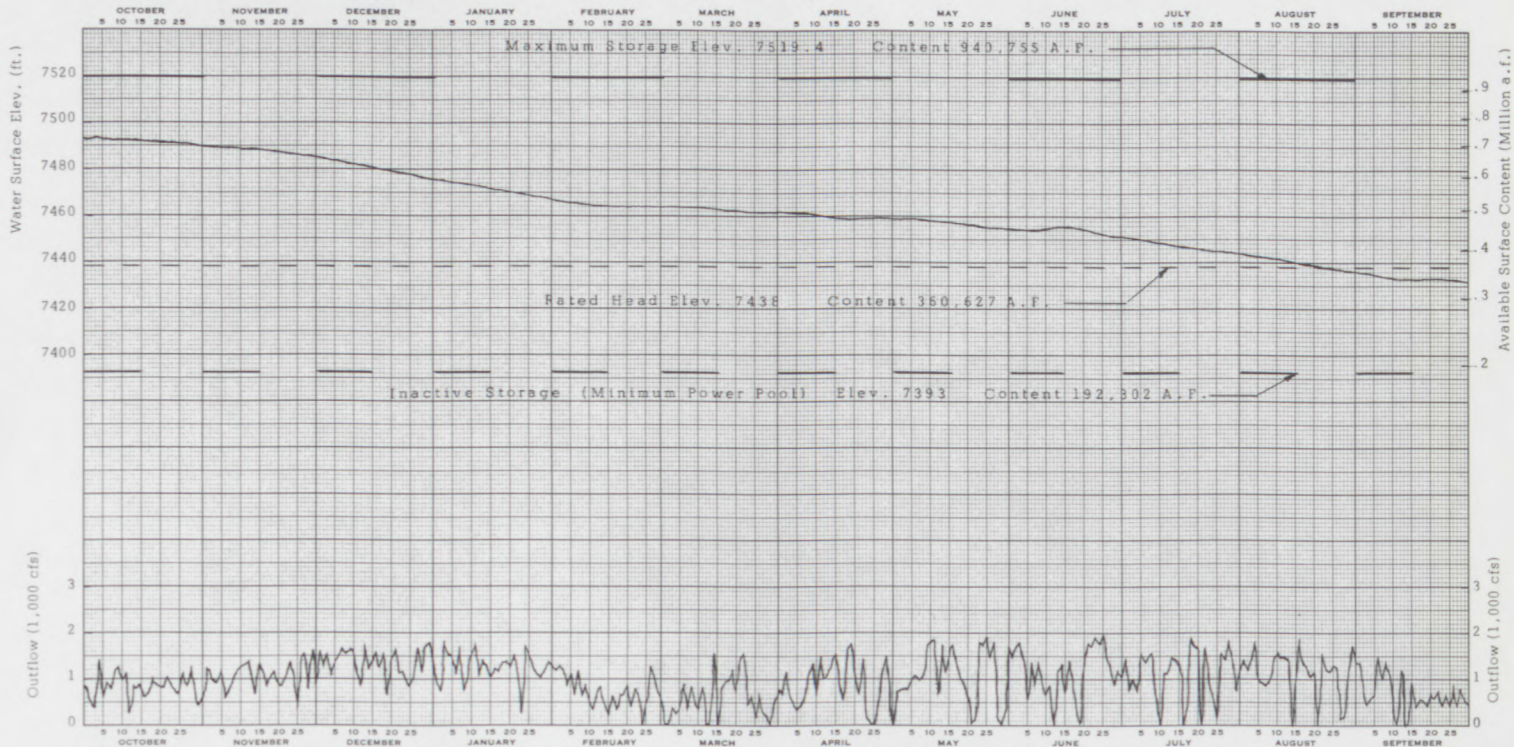
FLAMING GORGE RESERVOIR  
Water Year 1976 - 1977





# **BLUE MESA**

Live Storage Capacity — 830,000 acre-feet  
 Power Generating Capacity — 60,000 KW  
 Live Storage 9/30/77 — 221,00 acre-feet



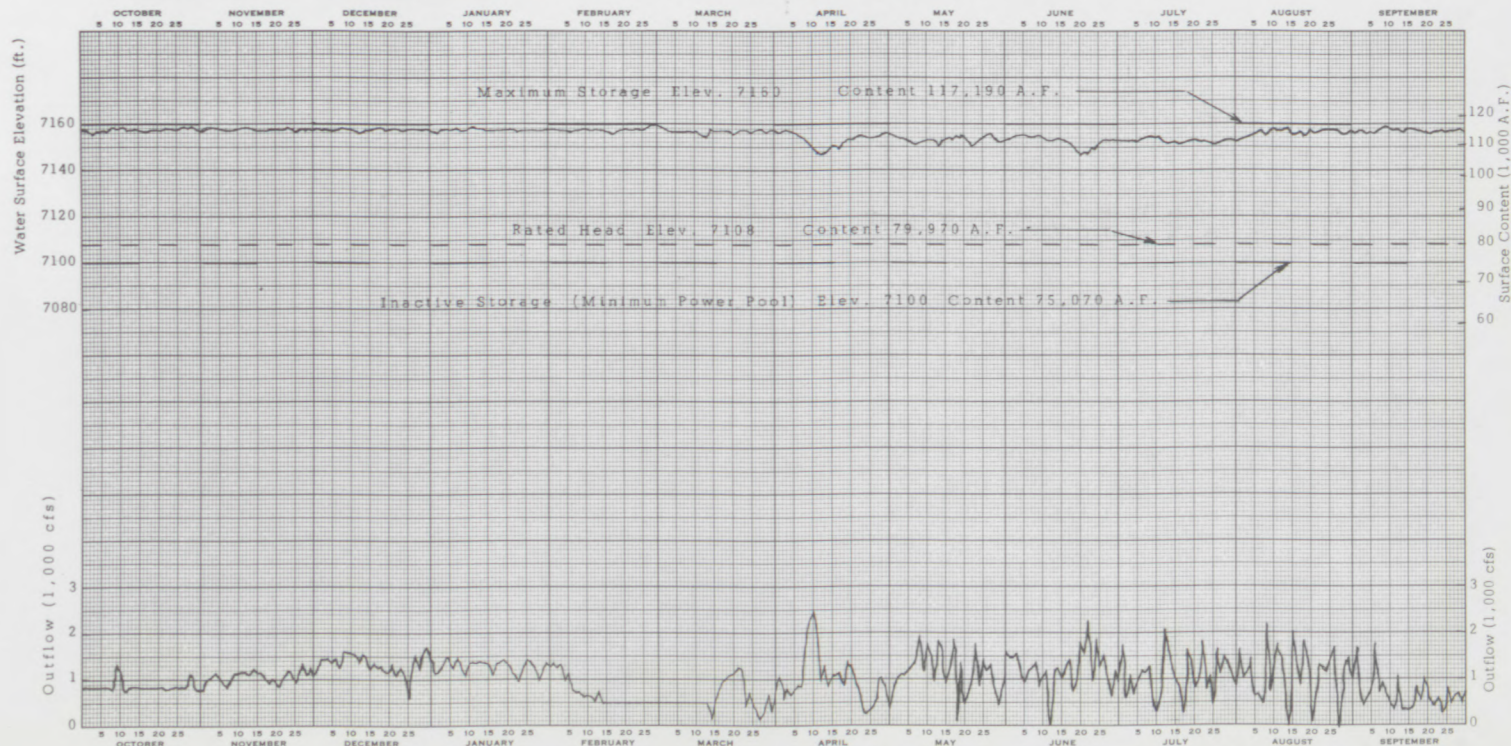




# MORROW POINT

Live Storage Capacity — 117,000 acre-feet  
 Power Generating Capacity — 120,000 KW  
 Live Storage 9/30/77 — 114,000 acre-feet

33



MORROW POINT RESERVOIR  
 Water Year 1976 - 1977



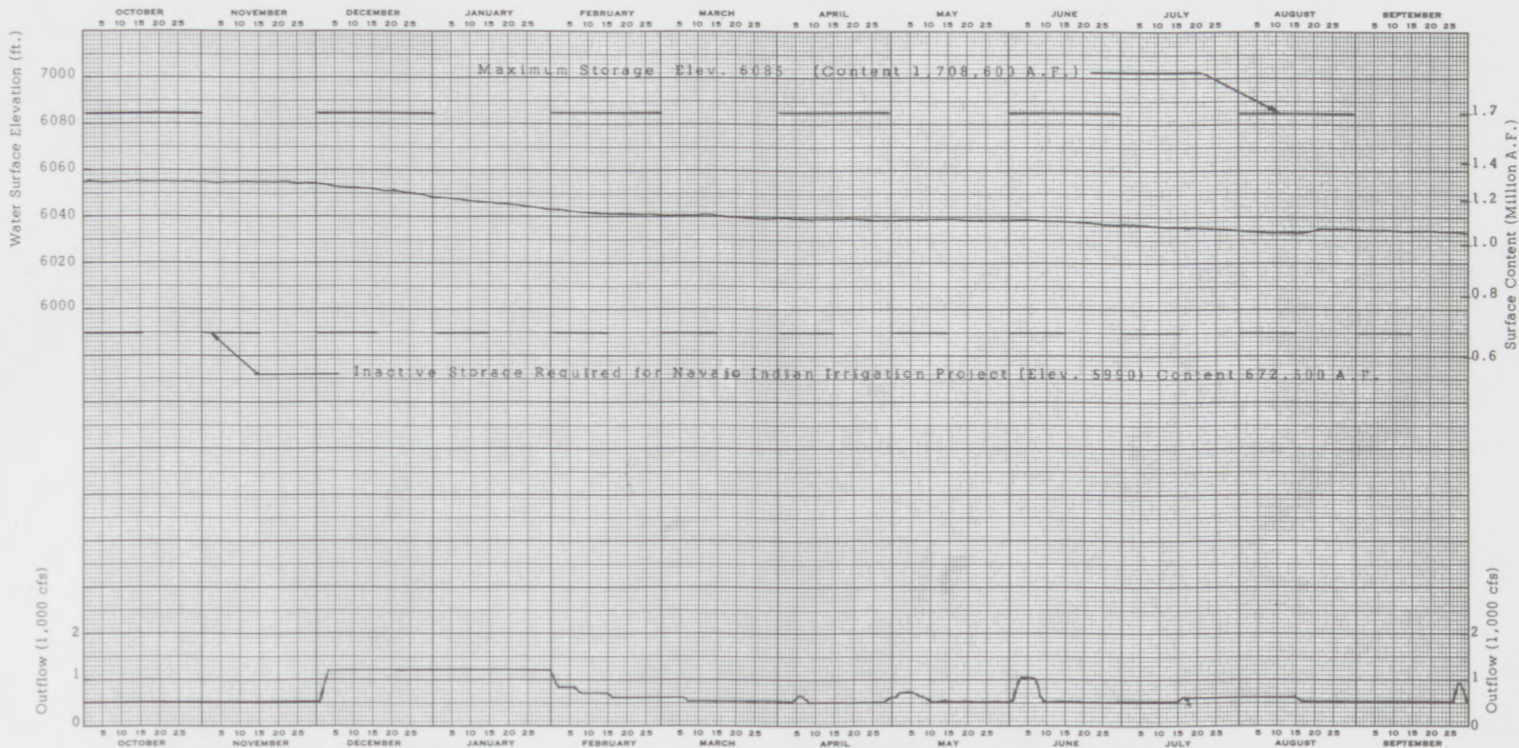


# NAVAJO

Live Storage Capacity — 1,696,000 acre-feet

Power Generating Capacity — 0

Live Storage 9/30/77 — 1,038,000 acre-feet

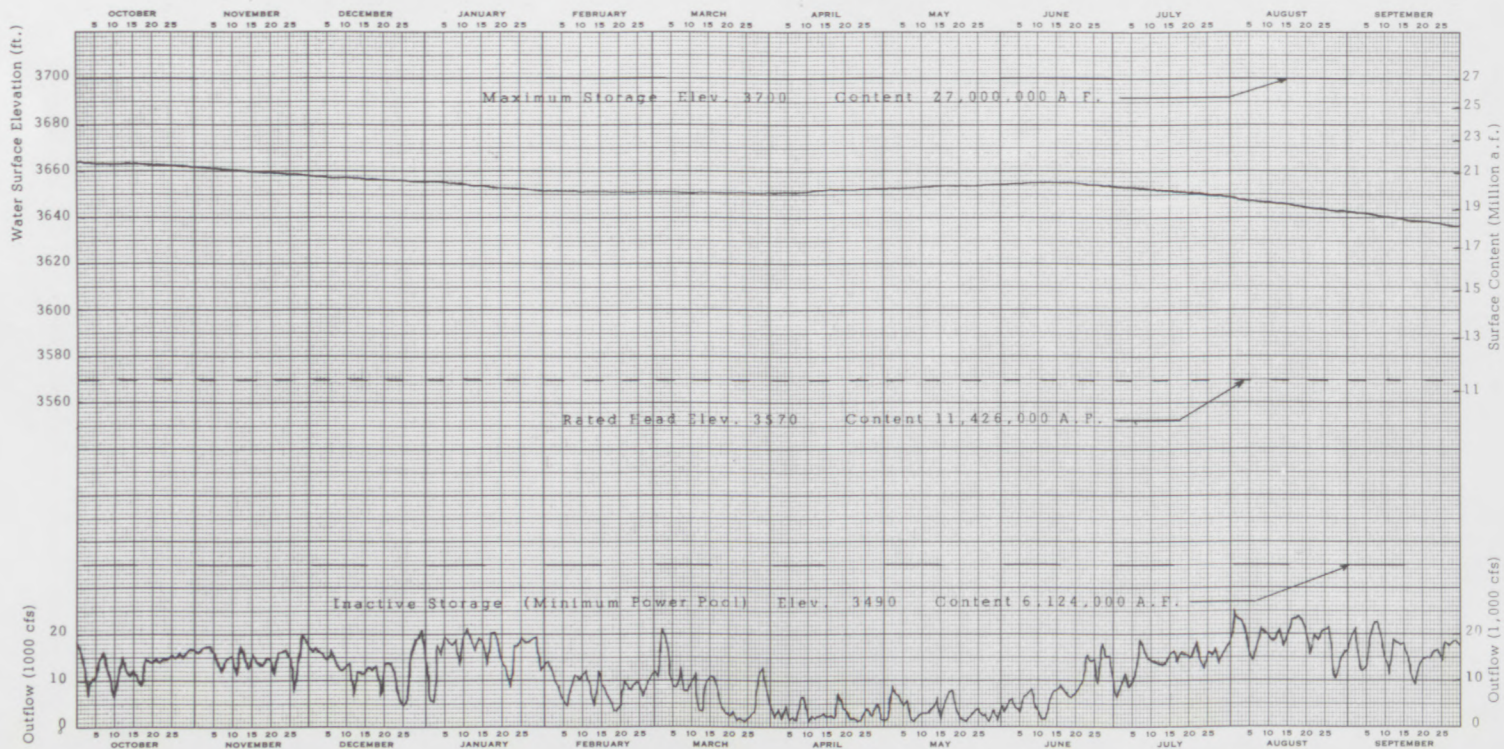


NAVAJO RESERVOIR  
Water Year 1976 - 1977





**LAKE POWELL GLEN CANYON DAM**  
Live Storage Capacity — 25,000,000 acre-feet  
Power Generating Capacity — 950,000 KW  
Live Storage 9/30/77 — 16,143,000 acre-feet

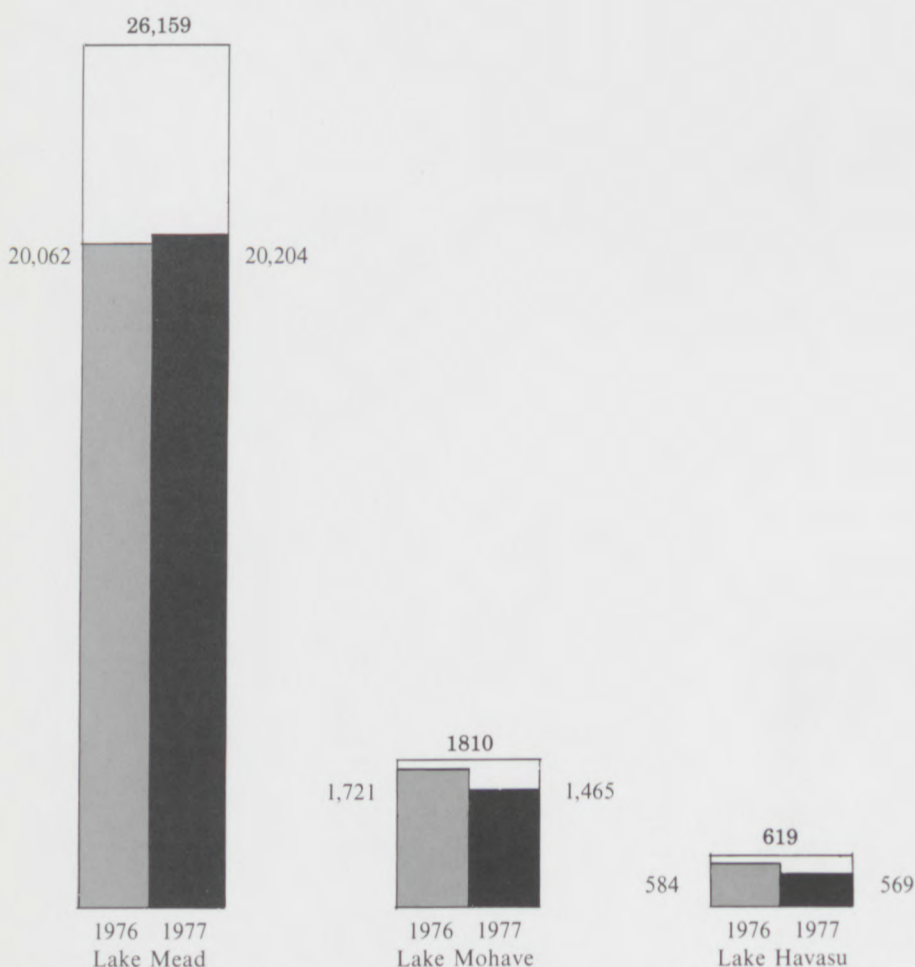


LAKE POWELL  
Water Year 1976 - 1977



STORAGE IN PRINCIPAL RESERVOIRS AT END  
OF WATER YEAR  
LOWER BASIN  
LIVE STORAGE CONTENTS<sup>1</sup>  
(1,000 Acre-Feet)

RESERVOIR	Sept. 30 1976	Percent of live Capacity	Sept. 30 1977	Percent of Live Capacity	Change in Contents
Lake Mead*	20,062	77	20,204	77	+ 142
Lake Mohave	1,721	95	1,465	81	-256
Lake Havasu	584	94	569	92	-15
Total	22,367	78	22,238	78	-129



\*Contents based on April 1967 revised capacity tables according to 1963-64 sedimentation survey at Lake Mead.

<sup>1</sup>As of September 30.

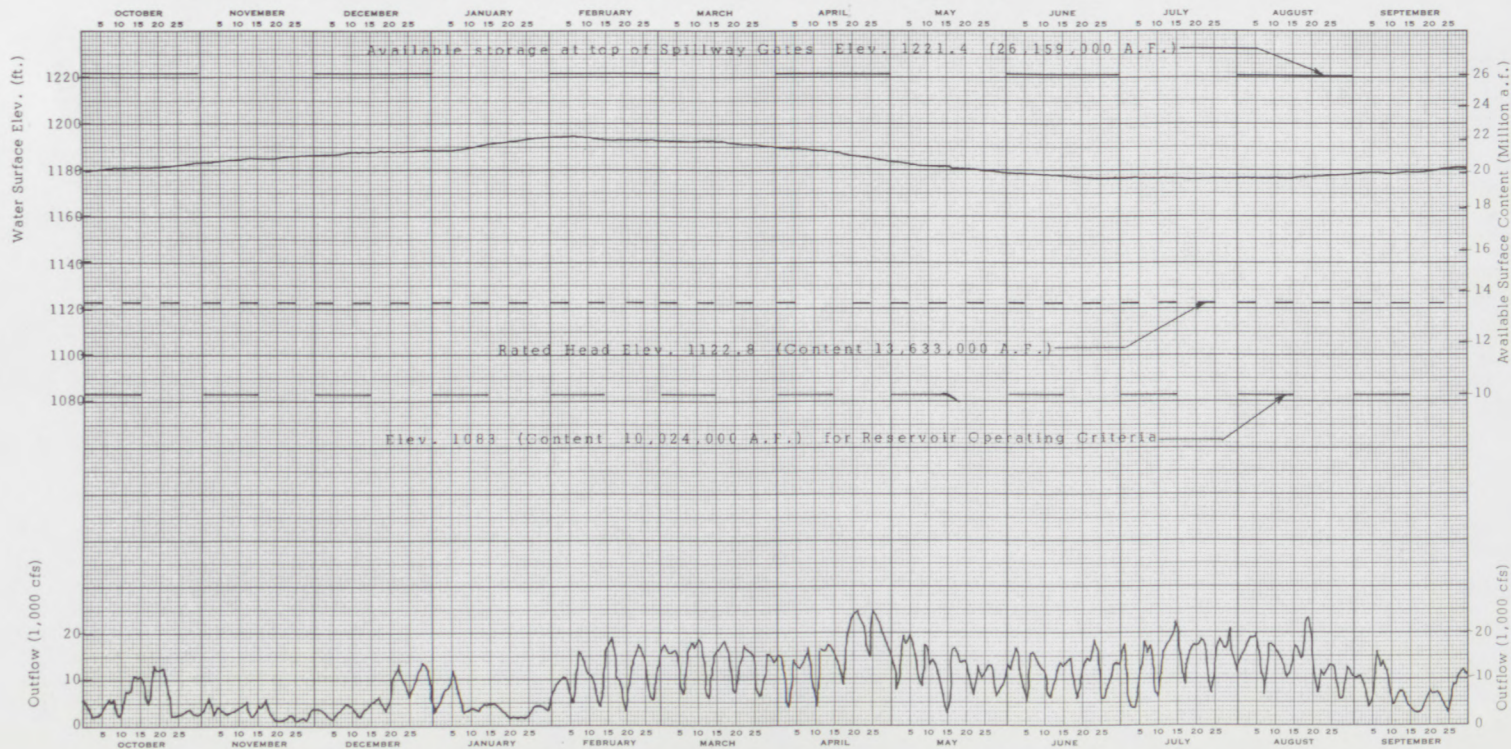


## LAKE MEAD — HOOVER DAM

Live Storage Capacity — 26,159,000 acre-feet

Power Generating Capacity — 1,344,800 KW

Live Storage 9/30/77 — 20,204,000 acre-feet



Lake Mead  
Water Year 1976 - 1977



## 6. Flows of Colorado River

Table VIII (a) on pages 39 and 40 shows the estimated virgin flow\* of the Colorado River at Lee Ferry, Arizona\*\* for each water year from 1896 to 1977. Column (4) of the table shows the average virgin flow from any given year within the period computed through water year 1977. Column (5) shows the average virgin flow for each progressive ten-year period beginning with the ten-year period ending on September 30, 1905.

Article III (d) of the Colorado River Compact stipulates that "the states of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in a continuous progressive series beginning with the first day of October next succeeding the ratification of this Compact."

Prior to the storage of water in the Colorado River Storage Project reservoirs, which began in 1962, the flow of the river at Lee Ferry in any ten consecutive years was greatly in excess of the 75,000,000 acre-feet required by the Compact. Beginning in 1962, Colorado River Storage Project reservoirs have fully regulated the river above Glen Canyon Dam. Table VIII (b) on page 41 shows the historic flow at Lee Ferry for the period 1953-1977. The progressive ten-year period ending September 30, 1962, the commencement of storage in Colorado River Storage Project reservoirs, is shown in Column (3).

In each consecutive ten-year period, the total flow equaled or exceeded the 75,000,000 acre-feet required by the Compact. The flow at Lee Ferry during the ten-year period ending September 30, 1977 was 88,251,000 acre-feet.

\*Virgin flow = estimated flow of the stream if it were in its natural state and unaffected by the activities of man.

\*\*Lee Ferry, Arizona is the division point between the upper and lower basins of the Colorado River as defined in the Colorado River Compact. It is located about one mile downstream from the mouth of the Paria River and about 16 miles downstream from Glen Canyon Dam.



Table VIII (a)  
ESTIMATED VIRGIN FLOW AT LEE FERRY  
(million acre-feet)

(1)	(2)	(3)	(4)	(5)
<i>Years to 1977</i>	<i>Year Ending Sept. 30</i>	<i>Estimated Virgin Flow</i>	<i>Average to 1977</i>	<i>Progressive 10-Year Running Average</i>
82	1896	10.1	14.7	
81	97	18.0	14.7	
80	98	13.8	14.7	
79	99	15.9	14.7	
78	1900	13.2	14.7	
77	01	13.6	14.7	
76	02	9.4	14.7	
75	03	14.8	14.8	
74	04	15.6	14.8	
73	05	16.0	14.8	14.0
72	06	19.1	14.8	14.9
71	07	23.4	14.7	15.5
70	08	12.9	14.6	15.4
69	09	23.3	14.6	16.1
68	1910	14.2	14.5	16.2
67	11	16.0	14.5	16.5
66	12	20.5	14.5	17.6
65	13	14.5	14.4	17.6
64	14	21.2	14.4	18.1
63	15	14.0	14.3	17.9
62	16	19.2	14.3	17.9
61	17	24.0	14.2	18.0
60	18	15.3	14.0	18.2
59	19	12.5	14.0	17.1
58	1920	22.0	14.0	17.9
57	21	23.0	13.9	18.6
56	22	18.3	13.7	18.4
55	23	18.3	13.7	18.8
54	24	14.2	13.6	18.1
53	25	13.0	13.6	18.0
52	26	15.9	13.6	17.6
51	27	18.6	13.5	17.1
50	28	17.3	13.4	17.3
49	29	21.4	13.3	18.2
48	1930	14.9	13.2	17.5
47	31	7.8	13.1	16.0
46	32	17.2	13.2	15.9
45	33	11.4	13.2	15.2
44	34	5.6	13.2	14.3
43	35	11.5	13.4	14.2
42	36	13.8	13.4	14.0

Table VIII (a)  
ESTIMATED VIRGIN FLOW AT LEE FERRY  
(million acre-feet)

(1)	(2)	(3)	(4)	(5)
<i>Years to 1977</i>	<i>Year Ending Sept. 30</i>	<i>Estimated Virgin Flow</i>	<i>Average to 1977</i>	<i>Progressive 10- Year Running Average</i>
41	1937	13.7	13.4	13.5
40	38	17.5	13.4	13.5
39	39	11.1	13.3	12.5
38	1940	8.6	13.4	11.8
37	41	18.1	13.5	12.8
36	42	19.1	13.4	13.0
35	43	13.1	13.2	13.2
34	44	15.2	13.2	14.2
33	45	13.4	13.1	14.4
32	46	10.4	13.1	14.0
31	47	15.5	13.2	14.2
30	48	15.6	13.1	14.0
29	49	16.4	13.1	14.5
28	1950	12.9	12.9	15.0
27	51	11.6	12.9	14.3
26	52	20.7	13.0	14.5
25	53	10.6	12.7	14.2
24	54	7.7	12.8	13.5
23	55	9.2	13.0	13.1
22	56	10.7	13.2	13.1
21	57	20.1	13.3	13.6
20	58	16.5	12.9	13.6
19	59	8.6	12.8	12.9
18	1960	11.3	13.0	12.7
17	61	8.5	13.1	12.4
16	62	17.3	13.4	12.1
15	63	8.5	13.1	11.8
14	64	10.2	13.4	12.1
13	65	18.9	13.7	13.1
12	66	11.2	13.3	13.1
11	67	11.9	13.4	12.3
10	68	13.6	13.6	12.0
9	69	14.4	13.6	12.6
8	1970	15.4	13.5	13.0
7	71	14.8	13.2	13.6
6	72	11.9	13.0	13.1
5	73	19.3	13.2	14.2
4	74	12.8	11.7	14.4
3	75	16.8	11.3	14.2
2	76	11.5	8.5	14.2
1	77	5.6*	5.6	13.6

\*Based upon provisional streamflow records subject to revision

TABLE VIII (b)  
HISTORIC FLOW AT LEE FERRY  
1953-1977

*unit: 1000 a.f.*

1	2	3
<i>Water year Ending Sept. 30</i>	<i>Historic Flow</i>	<i>Progressive 10-year Total</i>
1953	8,805	
1954	6,117	
1955	7,308	
1956	8,750	
1957	17,337	
1958	14,259	
1959	6,756	
1960	9,193	
1961	6,674	
1962 <sup>1</sup>	14,785	99,984
1963 <sup>2</sup>	2,520	93,699
1964 <sup>3</sup>	2,427	90,009
1965	10,835	93,536
1966	7,870	92,656
1967	7,823	83,142
1968	8,358	77,241
1969	8,850	79,335
1970	8,688	78,830
1971	8,607	80,763
1972	9,331	75,309
1973	10,141	82,930
1974	8,274	88,777
1975	9,275	87,217
1976	8,494	87,841
1977	8,233	88,251

<sup>1</sup>Storage in Flaming Gorge and Navajo Reservoirs began in 1962

<sup>2</sup>Storage in Glen Canyon Reservoir began in 1963

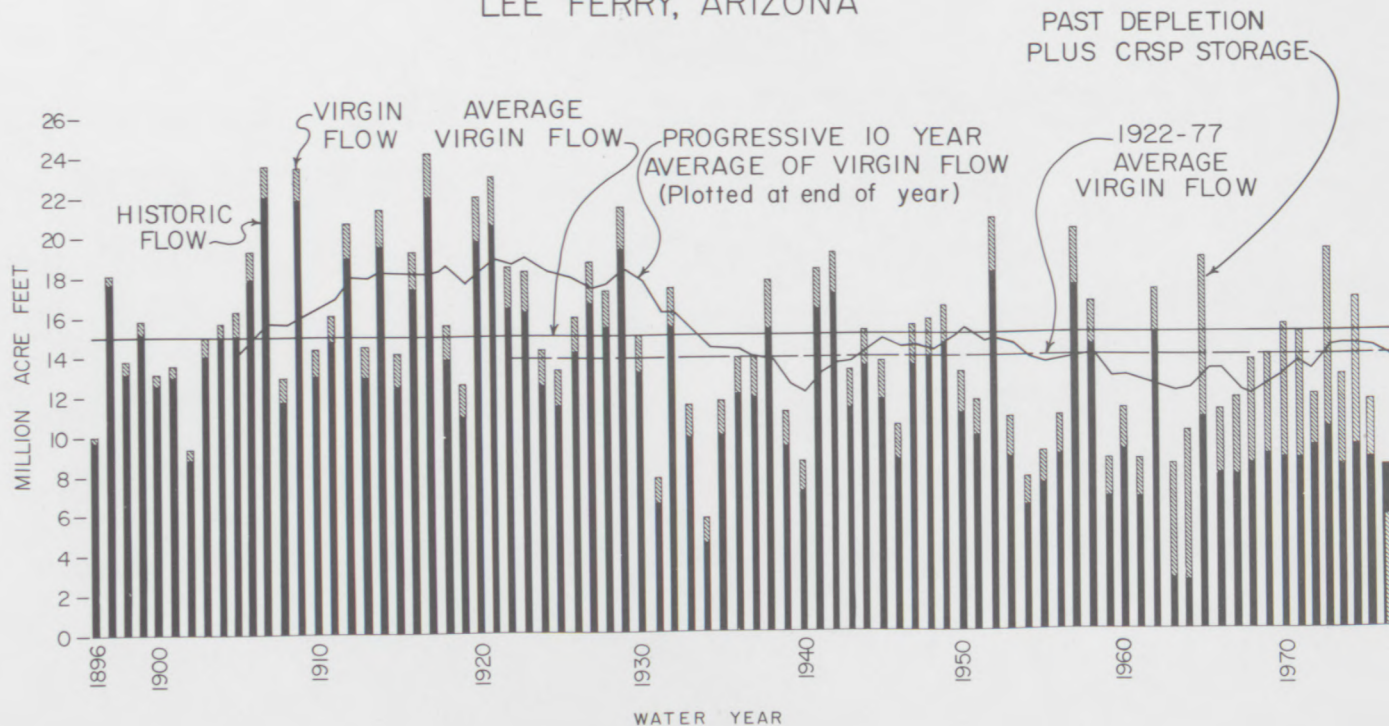
<sup>3</sup>Storage in Fontenelle Reservoir began in 1964



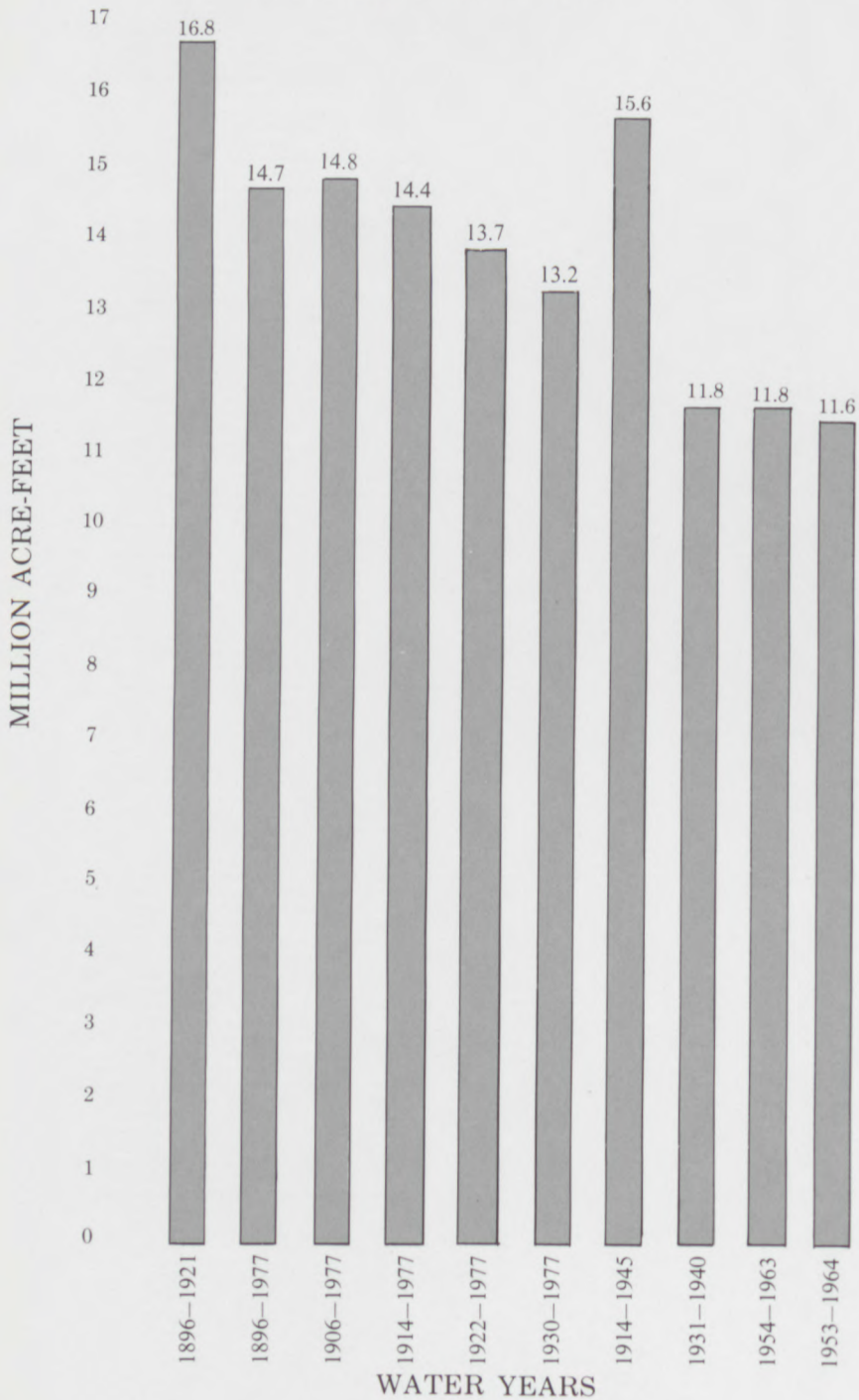
The next two charts illustrate some of the pertinent historical facts related to the amounts of water produced by the Colorado River system above Lee Ferry, Arizona, the compact division point between the Upper and Lower Colorado River Basins. See maps on page 3 and page 55. The first chart is entitled COLORADO RIVER FLOW AT LEE FERRY, ARIZONA. The top of each vertical bar represents the estimated virgin flow of the river, i.e., what the flow of the river in millions of acre-feet past Lee Ferry would have been for a given year had it been undepleted by activities of man. Each vertical bar has two components. The lower black part represents the estimated or measured historic flow at Lee Ferry. The upper, lighter vertical-hatched portion represents the stream depletion, or the amount of water estimated to have been removed by man from the virgin supply upstream from Lee Ferry. Beginning in 1962, part of this depletion at Lee Ferry was caused by the retention and storage of water in storage units of the Colorado River Storage Project. The horizontal line (at approximately 15 million acre-feet) shows the long-term average virgin flow. Because the Colorado River Compact is administered on the basis of running averages covering periods of ten years, the irregular horizontal line is plotted to show the progressive ten-year average virgin flows. In only one decade (1941-1950) following 1933 has the progressive ten-year average virgin flow exceeded the long-term average virgin flow.

The second chart entitled LEE FERRY AVERAGE ANNUAL VIRGIN FLOW FOR SELECTED PERIODS is a graphical representation of averages for several periods of records. The periods of water years selected were those to which reference is usually made for various purposes in documents pertaining to the Colorado River System.

# COLORADO RIVER FLOW AT LEE FERRY, ARIZONA



# LEE FERRY AVERAGE ANNUAL VIRGIN FLOW FOR SELECTED PERIODS





Several important hydrologic facts are apparent from these two charts:

- (1) A great majority of the high flows occurred prior to 1929.
- (2) In only one decade, 1941-1950, following the 1924-1933 decade has the progressive ten-year average flow exceeded the average virgin flow.
- (3) For the period 1896-1921, prior to the Colorado River Compact of 1922, the average was estimated to be 16.8 million acre-feet per year, which is considerably greater than for any other period selected, including the long-term average. A stream-gaging station at Lees Ferry, Arizona was not installed until 1921. The annual flows at Lee Ferry prior to the 1922 Compact are estimates based upon records obtained at other stations.
- (4) For the longest period shown, 1896-1977 the estimated annual average flow was 14.7 million acre-feet.
- (5) For the next longest period, 1906-1977, the estimated annual average virgin flow was 14.8 million acre-feet. Many of the early records for this series of years, as well as for the 1896-1977 period, were based upon the estimates of flows made at other gaging stations, as mentioned in (3) above. This average is slightly less than that used for the 1906-1967 period as the basis for justification of a water supply for the Central Arizona Project which was authorized in 1968.
- (6) The estimated annual average virgin flow during the 1914-1977 period was 14.4 million acre-feet. This period is an extension of the 1914-1965 period used in the Upper Colorado Region Comprehensive Framework Studies of 1971.
- (7) The average annual virgin flow for 1914-1945 was 15.6 million acre-feet. This is the period of record used by the negotiators of the Upper Colorado River Basin Compact of 1948.
- (8) For 1922-1977, the period since the signing of the Colorado River Compact, the annual average was 13.7 million acre-feet. Records for this series of years are based upon actual measurements of flows at Lees Ferry. The ten-year moving average flow since 1922 has been considerably less than the ten-year moving average prior to 1922.

(9) For the 48-year period, 1930-1977, the annual average virgin flow dropped to 13.2 million acre-feet.

(10) Two completely unrelated ten-year periods of minimum flows have occurred since 1930. These are series of years 1931-1940 and 1954-1963, for which the average annual virgin flow for *each* ten-year period amounted to only 11.8 million acre-feet.

(11) The annual average virgin flow for a 12-year period, 1953-1964, amounted to only 11.6 million acre-feet.

## **7. Hoover Powerplant Study**

The Secretary of the Interior has been authorized to make a feasibility study for increasing the peaking capability at the Hoover Powerplant. The feasibility study, started in October 1976, will extend for four years through fiscal year 1980. The extent of development will be limited by availability of water, agreement among affected parties, and the need to preserve established scenic and recreational qualities.

A variety of possible modifications to Hoover Powerplant will be considered: the addition of conventional hydroelectric generating units; the addition of reversible pumped-storage hydroelectric units; uprating the existing generating units; and combinations of these three. The object of the study will be to determine the optimum amount of peaking capacity which can be added at Hoover Dam within the constraints imposed by water operations and environmental and recreational conditions.

The Commission will be kept advised of the progress of this study and the effects, if any, on Upper Basin development.



## B. CONSUMPTIVE USE STUDY

The Colorado River Basin Project Act, P.L. 90-537, requires the Secretary of the Interior to "make reports as to the annual consumptive uses and losses of water from the Colorado River system after each successive five-year period, beginning with the five-year period starting on October 1, 1970. Such reports shall include a detailed breakdown of the beneficial consumptive use of water on a State-by-State basis. Specific figures on quantities consumptively used from the major tributary streams flowing into the Colorado River shall also be included on a State-by-State basis. Such reports shall be prepared in consultation with the States of the lower basin individually and with the Upper Colorado River Commission, and shall be transmitted to the President, the Congress, and to the Governors of each State signatory to the Colorado River Compact."

The Upper Colorado River Commission's Special Committee on Consumptive Use met in Denver, Colorado on November 5, 1976 to review the Bureau of Reclamation's first report "Colorado River System Consumptive Uses and Losses, 1971-1975." Draft comments were prepared and furnished to each of the Upper Basin States.

The Special Committee on Consumptive Use met again in Denver on January 27, 1977 to review and revise the draft comments and then recommended that a letter be sent from the Commission to the Bureau of Reclamation including the comments. This was accomplished by letter dated January 28, 1977 to the Commissioner of Reclamation.



## C. LEGAL

The legal staff continues to inform the Commissioners and their advisers on various legal matters by the *Aqualante Newsletter*. Current information can be made readily available by the newsletter. In matters needing more than detailed treatment, legal memoranda have been furnished.

The fourth volume of *Selected Legal References*, together with an index, was published and distributed to the Commissioners and legal advisers during the year. This volume will make *Selected Legal References* current through the 94th Congress.

*Environmental Defense Fund v. Costle, et al.*, U.S. District Court, District of Columbia, Civil Action No. 77-1436, was filed August 22, 1977 wherein the Plaintiff is seeking to have nullified the Salinity Standards adopted by the seven Basin States and approved by the Environmental Protection Agency. At the end of the 1977 water year this suit was pending.

## IX. Legislation

### A. LAWS ENACTED

Significant resource laws enacted by the 95th Congress, 1st Session, prior to the end of the water year are:

<u>Public Law</u>		<u>Approved</u>
95-87	<i>Providing for a surface mining control and reclamation act.</i>	August 3, 1977
95-91	<i>Providing for a Department of Energy Organization Act.</i>	August 4, 1977
95-95	<i>Providing for the Clean Air Act Amendments of 1977</i>	August 7, 1977
95-96	<i>Public Works for Water and Power Development and Energy Research Appropriation Act, 1978.</i>	August 8, 1977

## B. LAWS PROPOSED

During the first session of the 95th Congress an amendment to Section 404 of Public Law 92-500, the Federal Water Pollution Control Act Amendments of 1972, was proposed.

The House of Representatives in the second session of the 94th Congress approved a similar amendment to Section 404 of Public Law 92-500 which would have defined the terms "navigable waters" and "adjacent wetlands." The amendment failed in the U. S. Senate by one vote.

The intent of the following resolution is to again urge the United States' Congress to approve the same amendment at the earliest practicable date to avoid costly problems associated with Section 404.

### **RESOLUTION of UPPER COLORADO RIVER COMMISSION**

**re:**

#### **Amendment to Section 404 of P.L. 92-500, The Federal Water Pollution Control Act Amendments of 1972**

*WHEREAS, the House of Representatives of the United States Congress on June 3, 1976, by an overwhelming vote of 339 to 5, did pass H.R. 9560 cited as "The Federal Water Pollution Control Act Amendments of 1976"; and*

*WHEREAS, the House of Representatives, by a vote of 234 to 121, almost a two-to-one majority, did incorporate into said H.R. 9560 an amendment to section 404 of P.L. 92-500 by Congressman James Wright of Texas, which, had it been enacted into law, would have defined the terms "navigable waters" and "adjacent wetlands"; limited application of the Federal permit program to navigable waters and contiguous or adjacent wetlands; added, in the interest of environmental quality, adjacent wetlands to be under the permit process of section 404 of P.L. 92-500; allowed States that desire to do so to extend the Federal permit process to waters other than navigable waters or adjacent wetlands; and provided for administration of the permit process of section 404 of P.L. 92-500 by States possessing specified qualifications; and*

*WHEREAS, on September 1, 1976 said amendment failed of passage in the U.S. Senate by only one vote; and*

*WHEREAS, the intent of the language of the said amendment would have confirmed what appears to be the original intent of section 404 of P.L. 92-500; and*



*WHEREAS, said language provides a practicable solution to the seriously, complex and unreasonably expensive problems created by the U.S. District Court for the District of Columbia in **Natural Resources Defense Council v. Callaway** in its interpretation of section 404 of P.L. 92-500; and*

*WHEREAS, the third phase of said regulatory program which will further expand jurisdiction of the Corps of Engineers to regulate discharges of dredged or fill materials into other waters, generally upstream to the headwaters, is scheduled to be initiated on July 1, 1977; and*

*WHEREAS, the said amendment to section 404 of P.L. 92-500 has nation-wide support of many diverse organizations interested in the proper conservation and utilization of the natural resources of the United States in promotion of the social, economic, environmental, and general welfare of its citizens; and*

*WHEREAS, enactment of the said amendment as soon as possible will aid in preventing the waste of money, manpower, and time by Federal, State, and local governments required to implement the second and third phases of the permit process under section 404 of P.L. 92-500; and*

*WHEREAS, said amendment to section 404 of P.L. 92-500, or another with identical or similar objectives, will be an item of business before the first session of the 95th Congress:*

*NOW, THEREFORE, BE IT RESOLVED by the Upper Colorado River Commission at a special meeting convened at Denver, Colorado on January 27, 1977 that said Commission strongly supports said amendment to section 404 of P.L. 92-500 and hereby urges the United States Congress to approve it at the earliest practicable date in the first session of the 95th Congress;*

*BE IT FURTHER RESOLVED that copies of this resolution be transmitted to the Congressional delegations of the four member States of the Upper Colorado River Commission who are hereby requested to do everything within the powers of their respective offices to carry out the spirit and objectives of this resolution, to the Chairmen of the appropriate Congressional committees, and to other interested entities.*

#### **CERTIFICATE**

*I, IVAL V. GOSLIN, Executive Director of the Upper Colorado River Commission, do hereby certify that the above Resolution was adopted by the Upper Colorado River Commission at the Special Meeting held in Denver, Colorado on January 27, 1977.*

*WITNESS my hand this 1st day of February, 1977.*

*Ival V. Goslin  
Executive Director*

## **X. Education — Information**

### **General Cooperation**

The Upper Colorado River Commission has directed its Education and Information program toward promoting interstate cooperation, harmony and united efforts; developing an understanding in other sections of the United States of the problems of the Upper Colorado River Basin; and the creation of a favorable attitude on the part of the Congress with respect to the development of the industrial and agricultural resources of the Upper Colorado River Basin.

The Commission has continued to cooperate with members of the Congressional Delegations from the Upper Colorado River Basin States and with officials of the Department of the Interior and the Bureau of Reclamation in seeking appropriations of funds by the Congress for the construction of the Storage Units and participating projects authorized for construction, as well as funds for the investigations of additional participating projects that are given priority in planning in the Colorado River Storage Project Act. As part of this cooperation the Commission's Executive Director has been in Washington, D.C. at intermittent periods acting as liaison between the Congress and States and various departments of government, supplying information, arranging and taking part in Congressional hearings, and providing other assistance requested.

### **Relief Model**

The Relief Model of the Upper Colorado River Basin and adjacent areas is available for display at conventions and other public events and has proved to be extremely interesting and instructive in promoting an understanding of the physical and hydrologic problems of the Upper Colorado River Basin and the development of its water and other natural resources. (See last page of this report.)

### **Library**

Efforts are being continued to accumulate all types of engineering, legal, economics, and semi-technical documents



related to the Colorado River Basin to comprise a well-equipped and efficiently operating permanent library. Many thousands of pages of documents have been placed on microfilm. Information in the Commission's library will be available to any of its member States on short notice should a need arise. Studies are being made and supplemented of many problems associated with the development, utilization, and conservation of water and hydro-electric resources of the Colorado River Basin.

The continuing program of library expansion has been maintained. Emphasis is placed on the acquisition of information which illumines that growing body of law known as the "law of the river." Since the Environmental Protection Agency has assumed a growing importance in the water development field, it is important that documents from the agency be monitored and acquired as a part of the Commission's library.





# **XI. Colorado River Storage Project and Participating Projects**

## **A. AUTHORIZED STORAGE UNITS**

*(Information relative to Storage Units and participating projects has been obtained from reports on investigations and activities of the United States Department of the Interior, Bureau of Reclamation.)*

The Colorado River Storage Project was authorized for construction by the U.S. Congress in the Act of April 11, 1956 (70 Stat. 105). The four storage units are comprised of Glen Canyon Dam and Lake Powell on the Colorado River in Arizona and Utah, Navajo Dam and Reservoir on the San Juan River in New Mexico and Colorado, Flaming Gorge Dam and Reservoir on the Green River in Utah and Wyoming, and the Curecanti Storage Unit on the Gunnison River in Colorado. The Curecanti Unit consists of three dams and reservoirs — Blue Mesa, Morrow Point, and Crystal. Combined, the four storage units will provide about 33,583,000 acre-feet of water storage capacity.

The authorizing Act also authorized the construction of eleven participating irrigation projects. Ten additional participating projects have been authorized by subsequent Congressional legislation.

The Storage Units and participating projects are described in the twenty-seventh and earlier annual reports of the Upper Colorado River Commission. Progress in construction, planning, and investigations of the Storage Units and participating projects accomplished during the 1976 water year are briefly outlined below.

### **1. Glen Canyon Storage Unit**

Glen Canyon Dam and Reservoir comprises the key storage unit and is the largest of the initial four, providing about 80 percent of both the storage and generating capacity. Glen Canyon Dam was completed in 1964.



## **Construction**

Minor construction work on curbs, gutters, sidewalks, and street surfacing in Page, Arizona was completed in May 1977. Work on the Carl Hayden Visitor Center office additions was substantially completed in May also.

## **Recreation**

During 1976, approximately 1,367,000 people visited the Glen Canyon National Recreation Area.

The National Park Service has concession-operated facilities at Wahweap, Rainbow Bridge, Halls Crossing, Hite, Lees Ferry, and Bullfrog Basin.

From 1909 through 1961 a total of 20,972 vacationers visited Rainbow Bridge. When access to the Bridge was made available by water through closure of the dam in 1963, visitation rapidly increased. In 1966 there were 20,468 visitors, or almost as many as the total of 20,972 who enjoyed Rainbow Bridge during the 53 years prior to the construction of the dam. During 1974 there were 55,104 visitors, or more than two and one-half times the number of people who viewed the Bridge from 1909 through 1961. There were 621,000 fish taken from the reservoir in 1976.

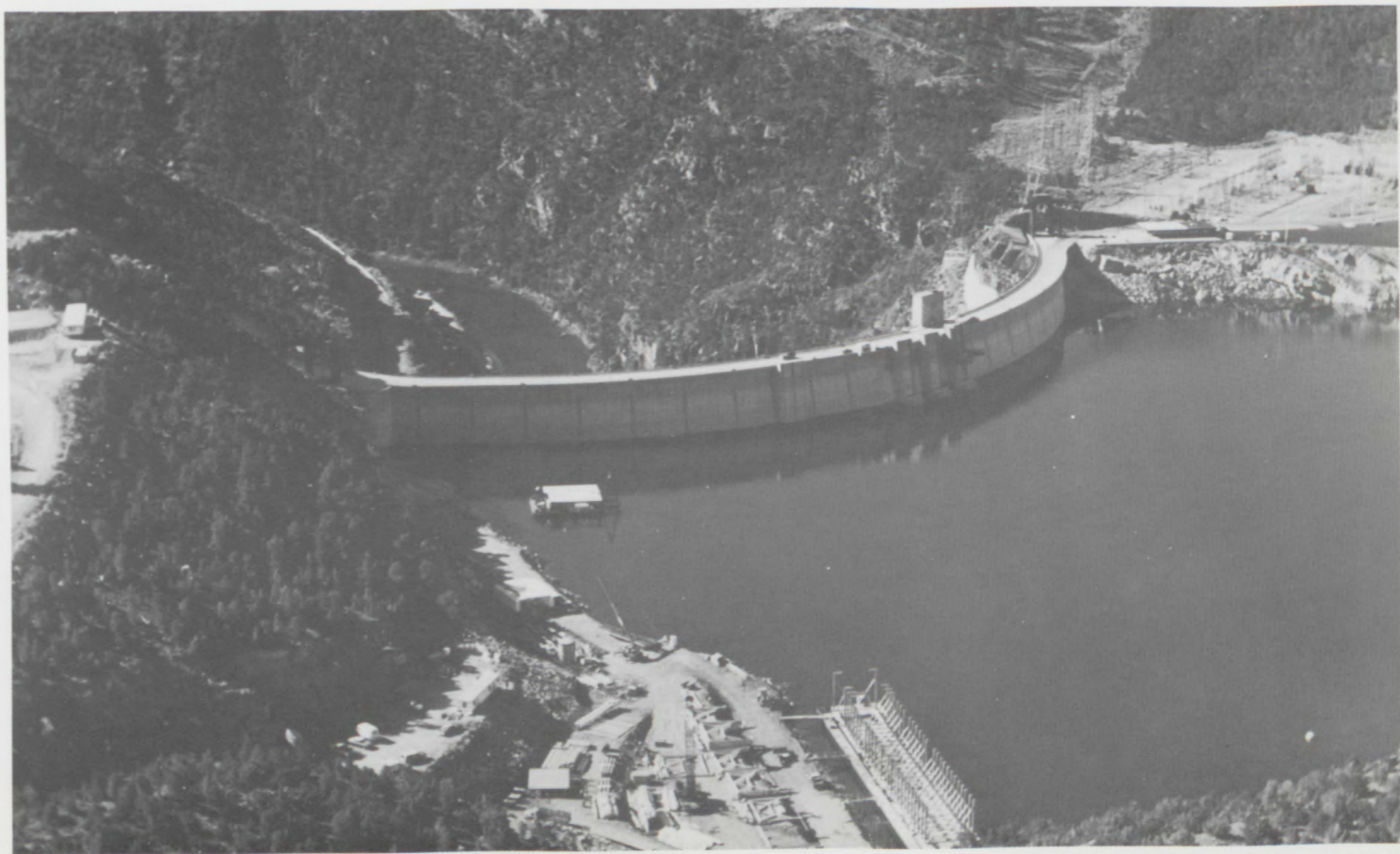
## **2. Flaming Gorge Storage Unit**

The Flaming Gorge Dam and powerplant were completed in 1963. A contract for modification of the powerplant intake structures was awarded March 22nd to Osberg Construction Company for \$4,198,000. The purpose of the modification is to permit better control of water temperature below the dam to enhance trout fishing. The contract was about 67 percent complete at the end of September 1977. Another contract was awarded in September to provide an addition to the visitor center.

## **Recreation**

Flaming Gorge National Recreation Area recorded about 642,000 visitations in 1976.





Selective withdrawal structure being assembled for modification of Powerplant Intake, Flaming Gorge Unit.

*Photo by U.S. Bureau of Reclamation*

Fishing is an important recreation activity at Flaming Gorge Reservoir and in the Green River below the dam. During 1976, there were 498,000 trout taken from the reservoir.

The U. S. Forest Service administers recreation facilities at Lucerne Valley, Antelope Flat, Buckboard Crossing, Squaw Hollow, Firehole Canyon, Dutch John Draw, Cedar Springs, and Sheep Creek. Each site has boat ramps, picnic, and campground areas. Concession facilities are available at Lucerne Valley, Buckboard, and at Cedar Springs. In addition, several campground and overlook areas have been developed near the reservoir in the Ashley Forest.

### **3. Navajo Storage Unit**

The major purpose of the Navajo Dam and Reservoir is to regulate the flows of the San Juan River for the authorized Navajo Indian Irrigation Project near Farmington, the San Juan-Chama participating project in the Rio Grande Basin, and the Hammond participating project in New Mexico. Part of the water is also used for industrial and municipal purposes in northwestern New Mexico.

The Navajo Dam was completed in 1963. There were no construction activities during 1977.

#### **Recreation**

Navajo Reservoir draws visitors from many points. Nearly 335,000 people visited the reservoir during 1976. Recreational areas have been developed in New Mexico on the Pine River just above Navajo Dam and on Sims Mesa on the opposite shore, and near Arboles, Colorado on the upper portion of the lake. Plans have been prepared by an Inter-agency Task Force for development of recreation sites along the San Juan River below Navajo Dam. These sites include picnicking, camping, sanitary, and related facilities for fishermen and hunters.

Navajo Reservoir is a popular fishing lake. During the 1976 season, 275,000 fish were taken from the reservoir.



#### **4. Curecanti Storage Unit**

Curecanti Storage Unit includes three major dams and powerplants in the canyon of the Gunnison River downstream from Gunnison, Colorado, and upstream from the Black Canyon of the Gunnison National Monument. The three dams are the Blue Mesa, Morrow Point, and Crystal Dams.

##### **Construction**

Blue Mesa and Morrow Point Dams, Reservoirs, and Powerplants are in operation and produce electrical energy for the Colorado River Storage Project power system.

Crystal Dam is nearing completion. At the end of September 1977, the contractor was continuing the general cleanup, wiring, and painting. The powerplant electrical completion has been delayed because of difficulties with equipment purchases and, therefore, will not begin generating electricity until about June 1978. Some water has been stored in the reservoir during the year and a contractor started work in August to clear trees and brush from the Black Canyon walls between high and low water lines of the reservoir.

##### **Recreation**

The National Park Service has recreational facilities on Blue Mesa Reservoir at Elk Creek adjacent to highway U. S. 50, at the Iola site across the lake, and at Lake Fork near the dam. A total of 138,000 fish were taken from the reservoirs during the year and there were 736,000 visitors to the area.



## B. TRANSMISSION DIVISION

The power system includes high voltage transmission lines that interconnect the Colorado River Storage Project hydroplants and delivers power to major load centers or to other delivery points. The system is interconnected with adjacent Federal, public, and private utility transmission systems. The transmission division will be transferred to the Department of Energy in fiscal year 1978.

### **Power Marketing**

Generation at Colorado River Storage Project powerplants and Fontenelle powerplant amounted to 4.9 billion kilowatt hours during the 1977 water year (October 1976-September 1977). The major portion, 3.7 billion kilowatt hours, was produced at Glen Canyon with the balance being produced at Flaming Gorge, Blue Mesa, Morrow Point, and Fontenelle powerplants. Due to the extremely low runoff, the total production was .3 billion kilowatt hours less than the amount produced in the previous year. The reservoirs were drawn down severely to deliver 8.25 million acre-feet at Lee Ferry.

Since the average price of purchased energy has increased from about 5 mills per kilowatt hour to almost 25 mills per kilowatt hour the last two years, purchases during 1977 were the largest dollar amounts the project has ever made. It is hoped with a more normal water year these purchases of high priced energy can be decreased. If this is not possible it may be necessary for the Bureau of Reclamation to seek a power rate increase in the near future.

Sales of power by the Colorado River Storage Project in calendar year 1976 amounted to over 6.6 billion kilowatt hours for total revenue of over \$50,000,000.

Section 302 of Public Law 95-91, signed by the President on August 4, 1977, will require transfer of the power marketing functions and transmission facilities of the Bureau of Reclamation to the Department of Energy. This transfer will be made in October of 1977.

Over 120 Bureau employees are scheduled to be transferred from the Upper Colorado Region to the Department of Energy. The Bureau will retain, operate and maintain all powerplants. The Department of Energy will take over the power operations center at Montrose, Colorado and operate the transmission and communication systems built for the Colorado River Storage Project.

## C. AUTHORIZED PARTICIPATING PROJECTS

Twenty-one participating projects have been authorized by Congress. Eleven were authorized by the initial authorizing Act of April 11, 1956 (70 Stat. 105); two were authorized by the Act of June 13, 1962 (76 Stat. 96); three were authorized by the Act of September 2, 1964 (78 Stat. 852); and five by the Act of September 30, 1968 (82 Stat. 886). Eleven are in Colorado, three in New Mexico, two in Utah, three in Wyoming, one in both Colorado and Wyoming, and one in both Colorado and New Mexico. Participating projects consume water of the Upper Colorado River System for irrigation, municipal and industrial purposes and participate in the use of revenues in the Basin Fund to help repay the costs of irrigation features beyond the ability of the water users to repay. The participating projects are described in the Twenty-Eighth Annual Report and in earlier Annual Reports.

The present status of construction or investigations for each of the participating projects follows:

### 1. Colorado

#### a. Paonia Project

Paonia Dam was completed in January 1962—the first participating project of the Colorado River Storage Project to be completed. During the 1977 drought, the project received about a 50 percent water supply. Without the project the supply would have been about 25 percent.

#### b. Smith Fork

Smith Fork Project, completed in the fall of 1962, provides a full water supply for irrigating 1,423 acres of new land and a supplemental supply for 8,056 acres of irrigated land located near Crawford, Colorado.

Recreation facilities for boating, picnicking, and camping have been developed at Crawford Reservoir, and local use of the reservoir is significant. About 99,000 visits were recorded during the 1976 season.

The project received about a 40 percent water supply in 1977. Without storage the supply would have been only 10 percent.





Carter Tunnel Outlet Portal, West Slope Collection System, Fryingpan-Arkansas Project, Colorado.

*Photo by U.S. Bureau of Reclamation*



### **c. Florida Project**

Lemon Dam, key feature of the project, was completed in November, 1963.

Recreational use at Lemon Reservoir far exceeds estimate made before the construction of the dam and reservoir. The reservoir area sustained 73,000 visits during the 1976 season. Recreation facilities include a boat ramp, picnic areas, campgrounds, parking, water, and sanitation facilities.

### **d. Silt Project**

Rifle Gap Dam was completed in June, 1967.

Recreation facilities include a boat ramp, picnic areas, campground, parking, water, and sanitary facilities. The area sustained 76,000 visits during the 1976 season.

### **e. Fryingpan-Arkansas Project**

The Fryingpan-Arkansas Project does not participate in the use of Upper Colorado River Basin Fund revenues. It does, however, use water apportioned to the Upper Basin by the Colorado River Compact and to the State of Colorado by the Upper Colorado River Basin Compact. The project was authorized by Public Law 87-590, August 16, 1962.

## **Construction**

Construction of Hunter Tunnel of the South Side Collection System continued and was 74 percent complete at the end of September 1977. Construction of Cunningham Tunnel of the North Side Collection System was completed, and construction of Mormon and Carter Tunnels is 36 percent complete. The contract for the Mt. Elbert Conduit and Halfmoon Diversion Dam was awarded and is 63 percent complete. The first unit of the Mt. Elbert Pumped-Storage Powerplant is 84 percent complete, and the contract for the Mt. Elbert Forebay, Dam, Reservoir, and Penstock was completed. The second unit of the Mt. Elbert Pumped-Storage Powerplant is 34 percent complete, and the Mt. Elbert-Malta Transmission Line and Switchyard are nearing completion. Contracts for the water and sewer utilities for the Northern Plains area at Pueblo Reservoir were awarded and work is 94 percent complete.



Ninety-inch Mount Elbert Conduit, East Slope Power System, Fryingpan-Arkansas Project, Colorado.

*Photo by U.S. Bureau of Reclamation*



## Water Supply

Exports of project water from the Colorado River Basin in water year 1977 amounted to 11,418 acre-feet. This was a decrease from water year 1976 exports of 26,326 acre-feet, and was caused by below average precipitation. Reservoir contents as of September 30, 1977, were 85,509 acre-feet at Ruedi Reservoir, 61,721 acre-feet at Turquoise Lake, and 34,609 acre-feet at Pueblo Reservoir.

### f. Fruitland Mesa Project

The environmental impact statement was filed on March 25, 1977. All requirements had been met for beginning construction in 1977 on Fruitland Mesa when funds were rescinded and work halted. This and a number of other projects were deleted from the Federal budget. In the coming year, the definite plan report will be reviewed and an attempt will be made to add municipal and/or industrial water to the project plan to improve the benefit-cost ratio.

### g. Bostwick Park Project

Regulation of flows of Cimarron Creek is provided by the Silver Jack Dam, principal feature of the project, which was completed in 1971. There was no construction in 1977. The project provided about a 60 percent water supply during the 1977 drought. Without Silver Jack Dam the water supply would have been about 15 percent.

### h. Dallas Creek Project

The Tri-County Water Conservancy District signed a repayment contract on January 14, 1977 and all subcontracts for municipal and industrial water use have been signed. Initiation of construction has been approved. A construction agreement has been approved by the Colorado Highway Department for relocation of U. S. Highway 550 around Ridgway Reservoir. Land acquisition is progressing and the issuance of specifications for Ridgway Dam is scheduled for late 1978. Funds totaling \$11,775,000 are available for fiscal year 1978.

### i. Dolores Project

The environmental impact statement was approved April 4, 1977 and the definite plan report was approved May 5, 1977. Small contracts are to be awarded late in 1977 for road relocation, gas line relocation, and for an access road. With the repayment contract signed on September 23, 1977, groundbreaking ceremonies were held the next day in Cortez, Colorado. Award of the prime contract on McPhee Dam is scheduled for the fall of 1978.





Artist's Concept of Ridgway Dam, Dallas Creek Project, Colorado.

Photo by U.S. Bureau of Reclamation



Dolores Project Groundbreaking Ceremony, September 24, 1977 near McPhee Damsite, Southwestern Colorado.



**j. San Miguel Project**

The plan selected for the San Miguel Project is contingent upon results of the final land classification and also upon participation by the Colorado-Ute Electric Association. Feasibility designs and cost estimates for the various project features are progressing. The definite plan report is scheduled for completion in the summer of 1979 along with the environmental impact statement. Contracts have been awarded for aerial mapping and for exploratory drilling at the Salto Damsite.

**k. West Divide Project**

The plan now selected has no Crystal River involvement. Contracts have been awarded for exploratory drilling, topographic mapping, fish and wildlife resource inventory, for chemical and biological analysis of Colorado River water samples, and for a cultural resources inventory. The definite plan report and environmental impact statement are scheduled for 1979. Advance planning is to be completed in 1979.

**2. Colorado and New Mexico**

**a. Animas-La Plata Project**

A final plan has been selected and feasibility designs and estimates are progressing. The definite plan report and the final environmental impact statement are scheduled for the fall of 1978 and early 1979 respectively. The project will serve 42,300 acres in Colorado and 5,630 acres in New Mexico and will provide 26,500 acre-feet of water for the Southern Ute Tribe.

The La Plata Water Conservancy District in Colorado and the La Plata Conservancy District in New Mexico have been organized to serve as the contractual and operating agencies for the portion of the project in each State.

**3. Colorado and Wyoming**

**a. Savery-Pot Hook Project**

Funding for the project was rescinded, along with the Fruitland Mesa Project, for both 1977 and 1978. The environmental impact statement had been completed and the definite plan review was under review. Contract repayment elections were held and passed in both Colorado and Wyoming. The project plan will now be reviewed to see if the benefit-cost ratio can be improved and possibly resubmitted at a more appropriate time.



Signing of Dolores Project Contract, September 23, 1977, Cortez, Colorado.

*Photo by U.S. Bureau of Reclamation*



#### **4. New Mexico**

##### **a. Hammond Project**

The Hammond Project is located in northwestern New Mexico and was completed in 1962.

The project provides irrigation water for 3,933 acres of which approximately 2,095 acres are now irrigated. Project lands are divided into 23 full-time and 39 part-time farms.

##### **b. Navajo Indian Irrigation Project**

During the past year a contract was awarded for construction of Navajo Dam powerplant and switchyard. On June 21, 1977, a District Court decision in Civil Action No. 76-22-66, *National Wildlife Federation, et. al. v. Cecil Andrus, et al.*, enjoined the Department of the Interior from taking any action to construct the Navajo Dam powerplant. Subsequently, supply contracts and the construction contract for the Navajo Dam powerplant and switchyard were terminated.

An agreement was signed on September 26, 1977 between the Upper Colorado Region and the Navajo Tribe for sale of Colorado River Storage Power to Navajo Agricultural Products Industry for operation of project pumping facilities.

In April 1977, work on the Main Canal, the Gallegos East and West Fork Siphons contract was completed, thus completing all parts of the Main Canal.

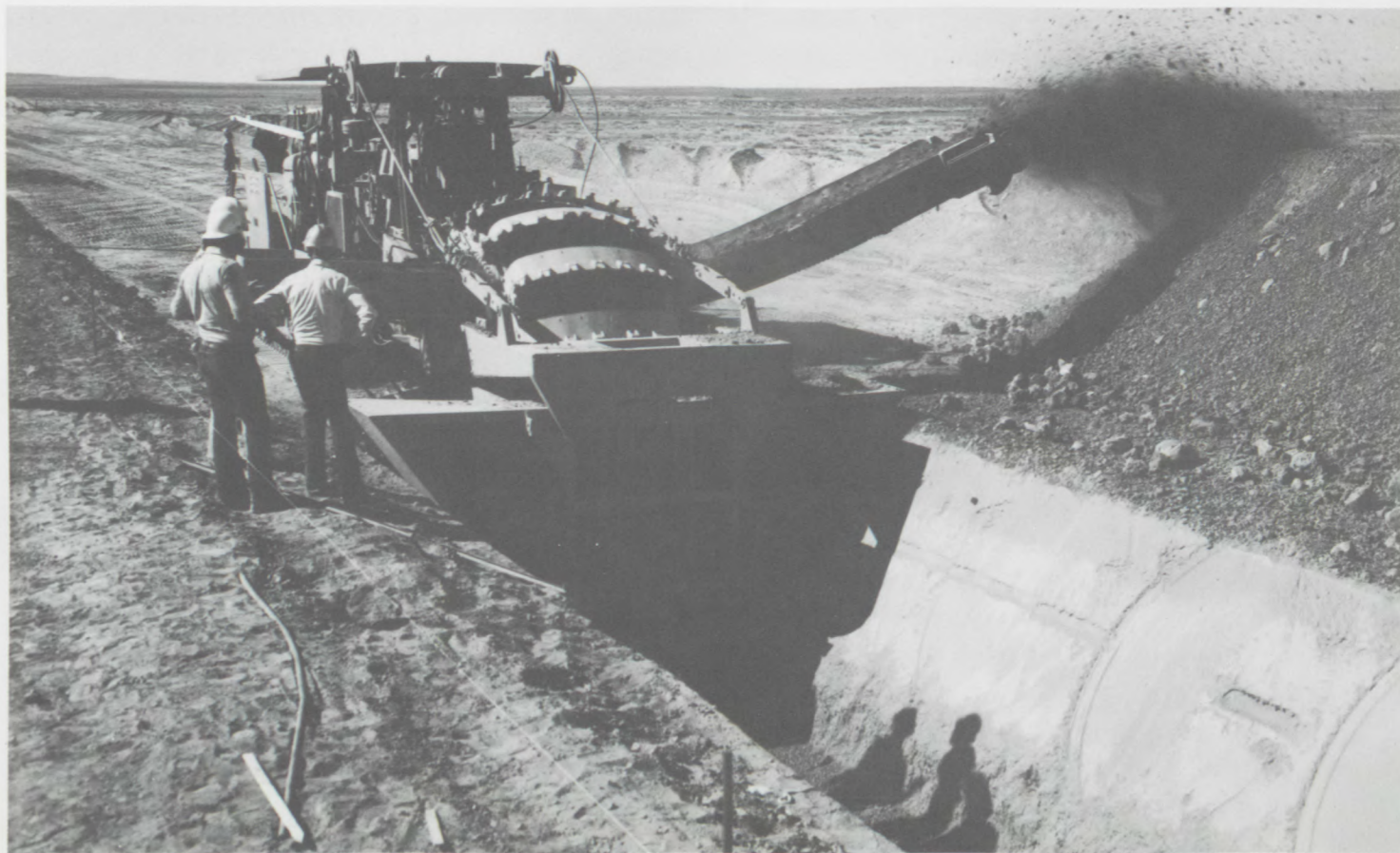
Irrigation was initiated in Block 2 in 1977.

##### **c. San Juan-Chama Project**

Construction of the San Juan-Chama Project is almost completed. Only minor contracts remain.

Negotiations were held with the Small Business Administration for an 8(a) minority contract for construction of access roads and recreational facilities at Nambe Falls Reservoir. A contract was awarded and construction of these facilities is now in progress.

A consultant performed a structural stability study on Nambe Falls Dam and prepared a report. The report made various recommendations concerning the stability and operation of the Dam. As a result of the report's recommendations a small contract was awarded in May 1977 for installation of piezometer wells for monitoring the performance of Nambe Falls Dam.



Lateral Construction, Navajo Indian Irrigation Project, New Mexico.

*Photo by U.S. Bureau of Reclamation*



## 5. Utah

### a. Central Utah Project (Initial Phase)

The Central Utah Project will provide water for irrigation, municipal and industrial use, and power generation. Benefits also will be realized in the fields of outdoor recreation, fish and wildlife conservation, flood control, water quality control, and area redevelopment. The Initial Phase consists of five units. Largest of these is the Bonneville Unit which involves diversion of water from the Uinta Basin to the Bonneville Basin and associated developments in both Basins. The other four units—the Vernal, Uintah, Upalco, and Jensen—provide for local development in the Uinta Basin.

#### i. Vernal Unit

The Vernal Unit, near Vernal, Utah, was completed in 1962. The Vernal Unit, through storage of waters diverted from Ashley Creek, provides supplemental water to 14,700 acres of irrigated land, assures farmers an adequate, year-round supply of water, and augments municipal water supply for three communities in Ashley Valley, Vernal, Maeser, and Naples, by providing 1,600 acre-feet of municipal and industrial water.

The Unit provides recreation and fishing at Steinaker Reservoir. About 61,000 people visited the reservoir in 1976.

Since completion of the project in 1962 it has been necessary to install drains in certain areas. During fiscal year 1978 drains will be installed for lands in Block No. 3 at a cost of \$279,000.

#### ii. Bonneville Unit

The Bonneville Unit will provide irrigation water to 44,600 acres of full-service lands, and 213,170 acres of supplemental service lands; develop 133,500 kw of power; and supply 99,000 acre-feet of municipal and industrial water.

The development of lands on Leland Bench, a new segment of the Bonneville Unit, is under investigation. A definite plan report is scheduled to be completed in fiscal year 1978.

Soldier Creek Dam and the enlarged Strawberry Reservoir were completed in 1972.

The Starvation Dam was completed in 1970. Starvation Reservoir filled and spilled for the first time on June 14, 1971. More than 41,000 people visited the reservoir during 1976.

Construction work now in progress includes Vat Tunnel, Rock Creek road, and Stillwater Tunnel.

On September 30, 1977, Currant Creek Dam was almost completed, and Vat Tunnel was about 45 percent complete. Work on the Rock Creek road was nearly complete, and on Stillwater Tunnel completion was only 20 percent on September 30th.

### iii. Upalco Unit

This unit will provide a supplemental water supply for 42,610 acres of land, 27,540 acres of this being non-Indian and 15,070 acres with Indian water rights.

Local requirements for additional municipal and industrial water have developed since completion of the 1969 definite plan report and will be considered in the reevaluation of the plan. Fish and wildlife and recreation uses will be enhanced at 14 upstream mountain reservoirs through reservoir stabilization. This will be accomplished by replacing irrigation storage water presently provided by the upstream reservoirs with project storage water from Taskeech Reservoir.

Advance Planning will be completed during the year.

### iv. Uintah Unit

Water developed by this unit will aid agricultural development and alleviate the poor economic and social conditions of the Indians. It would virtually eliminate flooding of agricultural lands, allowing earlier planting on lands which were previously inundated by spring floods and subjected to loss by frequent changes in stream channels.

The program in fiscal year 1978 provides for collection of design data, preparation of specification designs and estimates, repayment contract negotiations, and right-of-way appraisals. This will complete the advance planning work.

### v. Jensen Unit

The definite plan report and the final environmental impact statement were completed in December 1975. The name of Tysack Dam has been changed to Red Fleet Dam. The county road around





Construction Work Getting Underway at Red Fleet Damsite, Jensen Unit, Central Utah Project, Utah.

*Photo by U.S. Bureau of Reclamation*

Red Fleet Dam is essentially complete and the field station is complete. Red Fleet Dam on September 30th was about 16 percent complete, with the outlet works tunnel excavated from the inlet portal to downstream of the gate chamber.

vi. Resolution re: Construction of Central Utah Project

The construction of various units of the Central Utah Project has been delayed by a number of adverse circumstances to the extent that repayment obligations by the water users have been increased excessively. Water shortages are now imminent and the intent of the following resolution is to urge Congress to continue funding of this project, and, if possible, to provide additional funding to expedite the construction of critically needed units.

**RESOLUTION**  
**of**  
**UPPER COLORADO RIVER COMMISSION**  
**re:**  
**Construction of Central Utah Project**

*WHEREAS, the United States Congress authorized the Secretary of the Interior to construct the Bonneville, Jensen, and Upalco Units of the initial phase of the Central Utah Project in the Colorado River Storage Project Act of 1956 (70 Stat. 105); and*

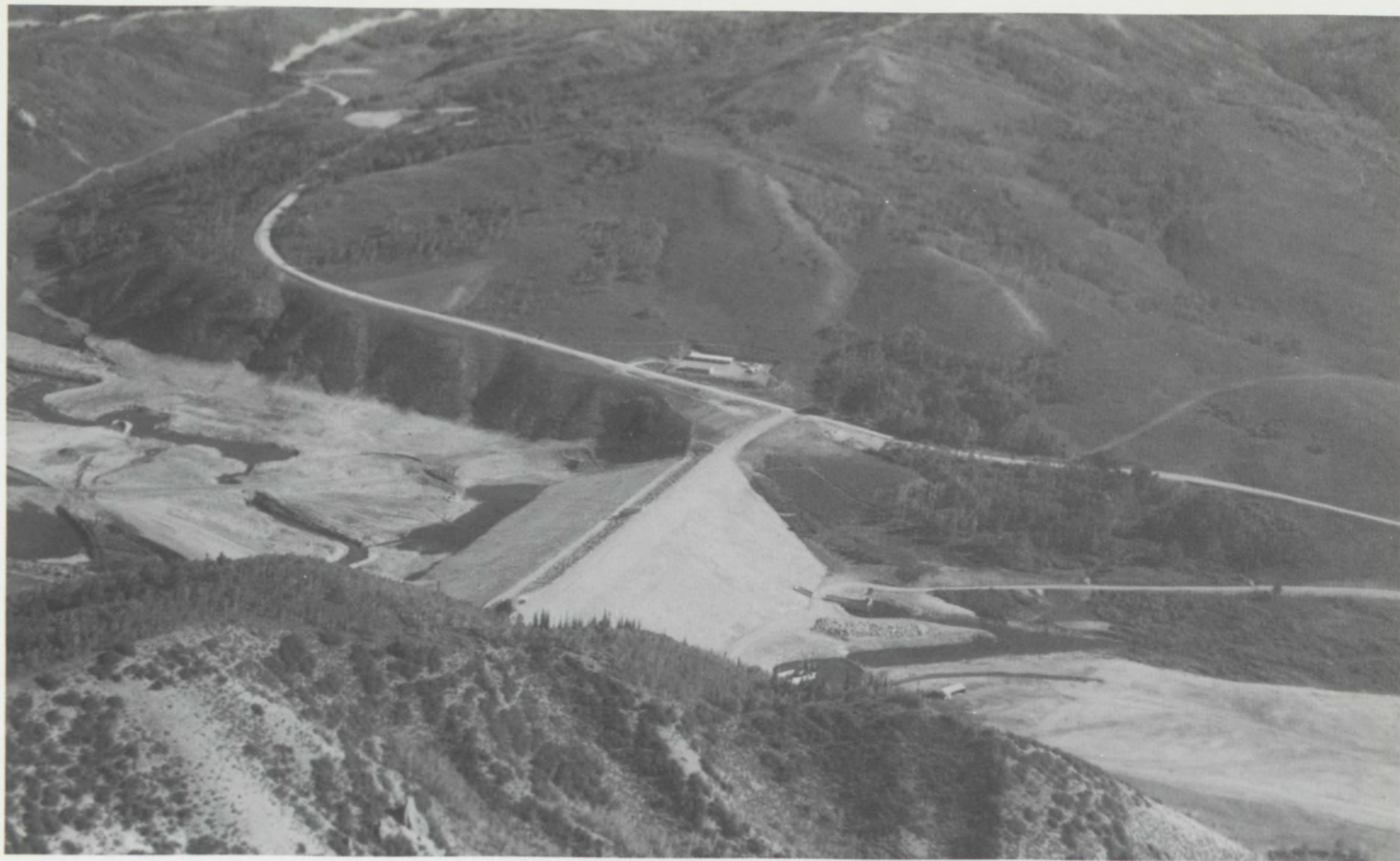
*WHEREAS, the U. S. Congress authorized the Secretary of the Interior to construct the Uintah Unit of the ultimate phase of the Central Utah Project in the Colorado River Basin Project Act of 1968 (82 Stat. 885); and*

*WHEREAS, the construction of these urgently needed water development units and facilities has been delayed by a variety of adverse circumstances to the point that repayment obligations of the water users have been increased by tens of millions of dollars; and*

*WHEREAS, shortages of municipal, industrial, and agricultural water are now imminent due to lack of facilities for the collection, storage, and distribution of Central Utah Project water supplies; and*

*WHEREAS, the President in his budget delivered to the United States Congress on January 17, 1977 requested \$43,084,000 for continuing construction of the Bonneville and Jensen units, advance planning of the Uintah and Upalco units, general investigations of the Ute Indian unit, drainage and minor construction of the Vernal unit, and construction of facilities for recreation, fish and wildlife on various units of the Central Utah Project; and*





Currant Creek Dam nearing completion, Bonneville Unit, Central Utah Project, Utah.

*Photo by U.S. Bureau of Reclamation*

*WHEREAS, additional funding would expedite the construction of several critically needed units and facilities of the Central Utah Project:*

*NOW, THEREFORE, BE IT RESOLVED BY THE UPPER COLORADO RIVER COMMISSION in special meeting convened this 27th day of January, 1977, at Denver, Colorado, that the Congress of the United States is hereby urged to appropriate sufficient funds for fiscal year 1978 for continuing the construction, planning, and investigations of the various units and recreational and fish and wildlife features of the Central Utah Project to fully utilize the capabilities of the Bureau of Reclamation assigned to said project including the initiation of construction of the Uintah and Upalco units in fiscal year 1978, as requested in resolutions of August 1975 and December 1976 of the Tribal Business Committee of the Ute Indian Tribe on the Uintah and Ouray Indian Reservation;*

*BE IT FURTHER RESOLVED that this resolution be transmitted to the Congressional delegations of the Upper Division States of the Colorado River Basin, members of the Committee on Appropriations of the U. S. House of Representatives and U. S. Senate, President of the United States, Secretary of the Interior, Commissioner of the Bureau of Reclamation, and other interested entities.*

#### CERTIFICATE

*I, IVAL V. GOSLIN, Executive Director of the Upper Colorado River Commission, do hereby certify that the above Resolution was adopted by the Upper Colorado River Commission at the Special Meeting held in Denver, Colorado on January 27, 1977.*

*WITNESS my hand this 1st day of February, 1977.*

*IVAL V. GOSLIN  
Executive Director*

#### **b. Emery County**

The Emery County Project was completed in 1966. This project provides supplemental water for 18,000 acres of land and a full supply for 771 acres in Emery County, Utah. Drainage work is continuing with \$348,000 allotted for this work in fiscal year 1978.

### **6. Wyoming**

#### **a. Lyman Project**

The Lyman Project is located in Uinta County in southwestern Wyoming. The project will deliver supplemental water to 42,674 acres



of presently irrigated lands. Two dams—Meeks Cabin and Stateline—comprise the principal features of this project. Meeks Cabin Dam and Reservoir were completed in 1971. Construction on Stateline Dam had been underway during the past year and was about 59 percent complete by September 30, 1977.

#### **b. Seedskadee Project**

Construction of Fontenelle Dam and Reservoir was completed in 1964 and the 10,000 kilowatt powerplant at the toe of the dam began operation in May 1968. Development of the wildlife refuge downstream from the dam is proceeding under Section 8 of the Colorado River Storage Project Act.

The State of Wyoming has contracted for additional water from Fontenelle Reservoir for municipal and industrial uses. Involved are 60,000 acre-feet of reservoir capacity and certain direct streamflows appropriated for municipal and industrial use and irrigation, limited to a total of 125,000 acre-feet. The United States will retain the remaining 65,000 acre-feet of storage capacity in Fontenelle Reservoir, and the proportional part of the direct flow rights to the Green River for other uses. Water deliveries and points of diversion that would be compatible with maintaining the substantial stream fishery in the Green River downstream from Fontenelle Dam are to be encouraged by the parties to the contract. Execution of the municipal and industrial water contract will preclude any substantial irrigation developments under the Seedskadee Project.

Recreation facilities which have been provided at Fontenelle Reservoir include a boat ramp, parking areas, camp ground, picnic sites, water, and comfort stations. The reservoir area accommodated 54,000 visits during 1976.

#### **c. Eden Project**

The Eden Project is located in Sweetwater County, southwestern Wyoming, about 45 miles north of Rock Springs. Major physical features consist of the Big Sandy Reservoir (39,700 acre-feet) and the Eden Reservoir (8,000 acre-feet). There are 113 miles of canals and laterals to serve the project. The present project area under water right is 17,088 acres.

Construction started in 1950 and was completed in 1960.

## **D. POTENTIAL PARTICIPATING PROJECTS**

In carrying out further investigations of projects under Federal Reclamation Laws in the Upper Colorado River Basin, the Secretary of the Interior is directed to give priority to completion of planning reports on a number of potential projects. The Bureau of Reclamation, so far as limited funds and personnel will permit, is continuing its studies on these project.

### **1. Colorado**

#### **a. Grand Mesa Project**

Investigations are continuing on this project. A multi-objective planning (MOP) team has been selected and development of alternative plans has started. A contract has been awarded to Colorado Division of Wildlife Resources for a fish and wildlife inventory. The project area presently attracts large numbers of tourists. Project facilities are expected to enhance the area and attract even more tourists by providing more water-oriented recreational opportunities.

#### **b. Dominguez Reservoir Project**

A planned reservoir on the Gunnison River would impound about 300,000 acre-feet of water. As now conceived, a 500-megawatt pumping-generation station would be included. Rim Basin reservoir, about 800 feet above the river would provide 5,800 acre-feet of pumped storage for eight hours of generation during peak demand periods. The proposed feasibility report is scheduled for completion in late 1978.

The project would provide at least 76,000 acre-feet of municipal and industrial water for population expansion in the Grand Junction-Fruita area and for energy development in the Delta area. Problems and needs of the area have been identified and power market studies, preliminary cost estimates, hydrology studies, and environmental studies are continuing.

### **2. Utah**

#### **a. Central Utah Project, Ute Indian Unit**

The Ute Indian Unit feasibility report will cover an evaluation of the most promising alternatives for the potential development. A



multi-objective planning team has been organized to do the planning. Contracts have been awarded for chemical and biological analysis of water samples, for historical and projected municipal and industrial water usage in the area, and for a mineral survey of the Uinta Basin.

This Unit will provide water for irrigation and municipal and industrial use and for generation of hydroelectric power and for use in coal-fired steam powerplants. Other purposes will include recreation development, fish and wildlife conservation, and flood control.

### **3. Wyoming**

#### **a. Sublette Project**

The State of Wyoming has recommended that completion of the feasibility of investigations be delayed until the future long-term water needs of the Green River Basin are better known. The State has indicated that the Bureau of Reclamation should analyze the various project alternatives under the new principles and standards on an appraisal level so that they may be cataloged in a status report for utilization in future decisions.

### **4. Colorado and Utah**

#### **a. Upper Colorado Resource Study**

Appraisal level studies are underway for the Yampa, White, and a portion of the Green River Basins in northwest Colorado and eastern Utah. The plan for the Yellow Jacket Project has been selected and draft feasibility level studies will be completed on this unit near the end of calendar year 1978.

Contracts have been awarded for exploratory drilling, topographic mapping, a cultural resources inventory, and a fish and wildlife inventory for various locations in this study area. A proposed feasibility report is scheduled for completion in fiscal year 1979.

Colorado and Utah have a joint effort underway to reach agreement on a satisfactory division of flows of the White River and push forward with development. Three conservancy districts, Yellow Jacket Water Conservancy District, Juniper Water Conservancy District, and Great Northern Water Conservancy District, have been organized, which indicates great interest in development of the resources in the White River Basin.

## 5. Other Projects

### a. Power Peaking Capacity

The overall power load in the southwestern area of the United States is increasing at a rapid rate. To meet the growing power needs, non-Federal entities are rapidly developing plans for construction of large steam powerplants at or near large coal reserves in the Upper Colorado River Basin and for construction of high voltage transmission facilities to transmit bulk power to load centers in the West. It is expected that the combined hydroelectric and thermal generation will be operated on an integrated basis to secure maximum overall economy for both Federal and non-Federal entities. It is visualized that a combined system in this area may have some 30,000 megawatts of base load thermal generation by 1990, with which possibly as much as 2,000 megawatts of hydroelectric peaking capability could be economically coordinated to meet the foreseeable power requirements of the West.

This investigation program has established that there is interest in providing Federally sponsored hydroelectric power peaking capacity in the Upper Colorado River Basin and eastern part of the Bonneville Basin in Utah. Feasibility investigations were initiated in fiscal year 1975 with the organization of a multi-objective planning team. The MOP team is headed by the Bureau of Reclamation, and is composed of members selected from among representatives of utility companies, environmental interests, and local, State, and Federal agencies that have an interest in the investigation. Collection of data and the identification of problems, needs, and resources have been completed.

Reconnaissance appraisals of possible conventional hydroelectric and pumped storage power peaking at proposed plants of the Bonneville Unit of the Central Utah Project have been included in these studies. Previous investigations by the Bureau of Reclamation and an inventory by the Federal Power Commission have been included for consideration. Investigators are evaluating the possibility of increasing the conventional hydroelectric generating capacity at existing Colorado River Storage Project powerplants and of providing conventional and pumped storage hydroelectric peaking capacity at one or more potential hydro-peaking power sites in the Region. Studies of transmission facilities are included in the evaluation of any site considered for the development of hydroelectric power peaking capacity. The development of alternative plans is well underway. A



program is being established to involve the public in providing input to the studies at all phases.

In fiscal year 1978 the investigators will continue to monitor the interest, needs, and resources for power peaking capacity in the Upper Colorado Region. Recommendations for feasibility studies will be made as the need for hydroelectric peaking capability is demonstrated.

## E. RESERVOIR OPERATIONS

The 1977 snowmelt runoff in the Upper Colorado Basin during the April through July period totaled 1,130,000 acre-feet, or only 14 percent of the long-term average. The computed unregulated runoff at Lee Ferry for the water year ending September 30, 1977 was 3,194,000 acre-feet:

	<b>Acre-feet</b>
Net Storage .....	-5,556,000
Bank Storage .....	- 86,000
Evaporation .....	603,000
Releases to Lower Basin (including Paria River) .....	<u>8,233,000</u>
	3,194,000

The Upper Basin reservoirs had a net decrease of 5,556,000 acre-feet of water in storage during water year 1977 because of the drought and the necessity to release over 8,000,000 acre-feet to the Lower Basin. During the same twelve-month period, storage in Lake Mead increased 142,000 acre-feet.

### 1. Lake Powell

The highest water surface in Lake Powell during the year was 3,664 feet elevation on October 1, 1976, the first day of the water year, with an active surface storage of 19,624,000 acre-feet. On Sept. 30, 1977 the lake was down to elevation 3,637 feet, with a storage content of 16,143,000 acre-feet. A total of 8.225 million acre-feet of water was released from Lake Powell to the Lower Basin during water year 1977. All of the water released was used to generate power for both Upper and Lower Basin consumers. The annual discharge of the Paria River was 8,166 acre-feet making a total of 8.233 million acre-feet at Lee Ferry.

### 2. Flaming Gorge Reservoir

The water surface of Flaming Gorge Reservoir on the Green River was at its highest elevation of the year also on October 1, 1976, with 3,470,000 acre-feet of active storage at elevation 6,033 feet. The April through July runoff of the Green River above the reservoir was about 233,000 acre-feet, or only 21 percent of normal.



### **3. Fontenelle Reservoir**

On October 1, 1976, Fontenelle Reservoir on the Upper Green River in Wyoming held 327,400 acre-feet of water at elevation 6,504 feet. During the 1976-1977 winter, the reservoir was drawn down to elevation 6,483 feet. The reservoir was at the maximum level for the year on October 1, 1976. During the coming year the water level will again be drawn down to about elevation 6,480 feet.

### **4. Navajo Reservoir**

On October 1, 1976, Navajo Reservoir was at elevation 6,055 feet and held 1,284,000 acre-feet. The reservoir was drawn down to a low of 6,033 feet in August, with contents of 1,041,000 acre-feet. Twenty thousand acre-feet of water were furnished to the Navajo Indian Irrigation Project. The year-end storage was 1,038,000 acre-feet on September 30, 1977. It is estimated that the Navajo Indian Irrigation Project will use 70,000 acre-feet of water in 1978.

### **5. Blue Mesa Reservoir**

Blue Mesa Reservoir was drawn down severely during the year, and on September 30, 1977 contained only 220,800 acre-feet of water.

### **6. Morrow Point Reservoir**

Morrow Point Reservoir was operated at or near full stage throughout the 1977 water year.

### **7. Crystal Reservoir**

Crystal Dam was almost complete at the end of September 1977. Some water has been stored in the reservoir since early in 1977, but the powerplant electrical work has been delayed because of equipment purchase problems. Therefore, the plant will not begin electric generation until about June 1978.

## F. WATER QUALITY PROGRAM IN THE UPPER COLORADO RIVER BASIN

### 1. Colorado River Water Quality Improvement Program

The Colorado River Basin Salinity Control Act, Public Law 93-320, June 24, 1974, authorized and directed the Secretary of the Interior to expedite completion of the planning reports on the following units:

- Irrigation Source Control
  - Lower Gunnison Basin
  - Uinta Basin
  - Colorado River Indian Reservation
  - Palo Verde Irrigation District

- Point Source Control
  - La Verkin Springs
  - Littlefield Springs
  - Glenwood-Dotsero Springs

- Diffuse Source Control
  - Price River
  - San Rafael River
  - Dirty Devil River
  - McElmo Creek
  - Big Sandy River

The principal purposes of the investigations are to study sources and causes of salinity in the Upper Colorado River Basin, and develop plans for maintaining salinity in the lower reaches of the Colorado River at or below present levels while States of the Basin continue to develop and use their compact apportionments of water.

Feasibility investigations are in progress and continuing on the Lower Gunnison Systems Improvement Unit and Uinta Basin Systems Unit. Irrigation scheduling is in progress on the Grand Valley Unit, Lower Gunnison Unit, and in the Uinta Basin. Several contracts are in force for Irrigation Management Service, Irrigation Scheduling, collection of environmental data, and aerial topography. Collection and analysis of water quality samples are continuing on the Price, San Rafael, Dirty Devil, and Big Sandy Rivers, and McElmo Creek. An appraisal report for the Glenwood-Dotsero Springs Unit has been completed. Under a cooperative agreement



with the Agricultural Research Service of the Department of Agriculture, an irrigation efficiency research study was initiated in the Grand Valley, Colorado area and is scheduled for completion in fiscal year 1977.

Investigations to test the theory that the seepage of saline ground water can be controlled by lowering the pressure in artesian aquifers have been completed and the results are being analyzed. These studies were conducted on the Big Sandy River, about 15 miles west of Farson, Wyoming. Further investigations are in progress to determine the source and characteristics of the saline water.

A study to utilize the return flows to the San Juan River and to the Colorado River in the Grand Valley area is in progress.

In fiscal year 1978 feasibility investigations are scheduled to be completed on the Lower Gunnison and Uinta Basin Water Systems Improvement Units. Irrigation Scheduling will continue on the Lower Gunnison and Uinta Basin Units. Data gathering will continue on the Price, San Rafael, Dirty Devil, and Big Sandy Rivers, and McElmo Creek. Feasibility investigations on the Glenwood-Dotsero Springs Unit will be initiated in 1978.

#### **a. Uinta Basin Unit**

Canal seepage studies have been made under contract. Another contract was awarded for aerial photography, topography, and cross sections of several miles of canals. Infrared photography of the Uinta Basin has been completed and will be used as an aid in identifying areas of canal seepage.

#### **b. Big Sandy Unit**

Several wells have been drilled in an attempt to trace the saline aquifers from the seeps near the river back toward the irrigated area. Bids were opened in August 1977 for drilling observation holes and test wells. The objective is to determine if the seeps can be intercepted by groundwater pumping.

#### **c. Lower Gunnison Unit**

Investigation work is continuing on water systems improvement with a proposed feasibility report scheduled for completion in late 1979. Concurrently, an attempt is being made to institute Irrigation Management Service.

## **2. Colorado River Basin Salinity Control Project**

Title II of the "Colorado River Basin Salinity Control Act" of June 24, 1974 (P.L. 93-320) authorized the Secretary of the Interior to construct, operate, and maintain four salinity control units as the initial stage of the Colorado River Basin Salinity Control Program. The four units are: Paradox Valley Unit, Grand Valley Unit, Crystal Geyser Unit, and Las Vegas Wash Unit.

### **a. Paradox Valley Unit**

The plan for removing salt from the Dolores River consists of installing and pumping brine wells to eliminate the natural brine inflow to the river. Wells have been installed and will undergo pumping tests for a period of time. If the pumping tests are satisfactory, the remaining facilities will be installed. These include a reservoir for storage and evaporation of the brine, a hydrogen sulfide stripping plant, pumping plants and high pressure pump line. The definite plan report and the environmental impact statement are scheduled for completion early in 1978.

### **b. Crystal Geyser Unit**

Construction of the Crystal Geyser Unit has been authorized. Because of the low cost effectiveness and the minor salinity improvement derived, a decision has been made to defer plans for construction.

### **c. Grand Valley Unit**

The Bureau of Reclamation's plans for locating the initial stage of the Grand Valley Unit in the Salt Wash area and for beginning construction in 1977 were revised. It is now contemplated that the Reed Wash drainage, just upstream from Salt Wash, would be the site for initial construction beginning in 1978. This area covers about 6,000 acres and would involve lining 6.7 miles of Government High-line Canal and associated laterals. The second stage would include the balance of the project. The available funding for construction work in fiscal year 1978 is \$1,500,000.

The Agricultural Research Service will study the feasibility and benefits of level basin irrigation in the Grand Valley during 1978. Benefits are expected to include increased water application effi-



ciencies, elimination of surface runoff, more uniform infiltration and leaching, and a reduction in irrigation labor requirement.

The Soil Conservation Service is required under Public Law 92-500 to cooperate in implementing salinity control. It is necessary that on-farm improvements be accomplished concurrently with canal and lateral lining being done by the Bureau of Reclamation. The following resolution by the Upper Colorado River Commission urges Congress to appropriate \$1,500,000 for fiscal year 1978 so that the Soil Conservation Service can proceed with on-farm improvements on the Grand Valley Salinity Control Unit.

**RESOLUTION**  
**of**  
**UPPER COLORADO RIVER COMMISSION**  
**re:**

**Appropriations of Funds by the U.S. Congress  
to the Soil Conservation Service of the Department  
of Agriculture for the Grand Valley Salinity Control Unit**

*WHEREAS, following the passage of Public Law 92-500, the Federal Water Pollution Control Act Amendments of 1972, the Environmental Protection Agency issued a regulation requiring the States of the Colorado River Basin to adopt water quality standards and a plan of implementation for salinity control; and*

*WHEREAS, the seven Colorado River Basin States did adopt such water quality standards and plan of implementation which includes the construction and operation of four salinity control units authorized by the Colorado River Basin Salinity Control Act, Public Law 93-320; and*

*WHEREAS, the Grand Valley Salinity Control Unit is an integral part of the implementation plan; and*

*WHEREAS, the Soil Conservation Service of the U. S. Department of Agriculture under the law is required to cooperate in implementing the salinity control plan; and*

*WHEREAS, the President's budget for fiscal year 1978 did not contain a recommendation for funding of on-farm improvements for salinity control under the jurisdiction of the Soil Conservation Service; and*

*WHEREAS, in order to make the Grand Valley Salinity Control Unit practicable, it is necessary that the on-farm improvements be accomplished simultaneously with the canal and lateral lining being done by the U.S. Bureau of Reclamation; and*

*WHEREAS, a level of Federal funding that provides incentive for voluntary and accelerated participation by farm owners is necessary; and*

*WHEREAS, a larger staff is needed in the Soil Conservation Service Field Office in Grand Junction, Colorado to assist with the work load:*

*NOW, THEREFORE, BE IT RESOLVED by the Upper Colorado River Commission convened in Special Meeting at Denver, Colorado on February 11, 1977, that the Congress of the United States is hereby urged to appropriate \$1,500,000 to the Soil Conservation Service for on-farm improvements on the Grand Valley Salinity Control Unit and for transfer to other entities for related activities;*

*BE IT FURTHER RESOLVED that copies of this resolution be transmitted to members of the Congressional delegations of the four member States of the Upper Colorado River Commission, with the request that they lend their support to the attaining of the objectives of this resolution, to the Secretary of Agriculture, members of the Subcommittees on Agriculture and Related Agencies of the Committees on Appropriations of the U. S. House of Representatives and the U. S. Senate, and to other interested parties.*

#### **CERTIFICATE**

*I, IVAL V. GOSLIN, Executive Director of the Upper Colorado River Commission, do hereby certify that the above Resolution was adopted by the Upper Colorado River Commission at the Special Meeting held in Denver, Colorado on February 11, 1977.*

*WITNESS my hand this 24th day of February, 1977.*

*IVAL V. GOSLIN  
Executive Director*



## G. WEATHER MODIFICATION

Research experiments and operational cloud seeding projects indicate weather modification has a potential for increasing mountain snowfall and thus augmenting water supplies in the Colorado River Basin. Cloud seeding is currently being applied for water production in portions of the Colorado River region through both continuing and emergency drought programs. Although the current drought has stimulated much of this interest, particularly in some of the hardest hit water districts and ski areas, long-term interest in cloud seeding is developing throughout the region. Over \$2,000,000, including emergency drought funds, will be expended during the 1977-78 winter season on cloud seeding activities in the region.

Seeding winter orographic clouds to increase snowfall may be a major alternative in helping meet long-range water problems in the Colorado River area. Before this can happen, the remaining scientific uncertainties need to be resolved to develop an improved technology and a practical demonstration and evaluation of water production. A comprehensive augmentation demonstration program, including research experiments, coordinated operational seeding and associated impact studies could be conducted within the next 15 years. The Bureau of Reclamation has an appropriation of \$600,000 for fiscal year 1978 to design a long-range demonstration program for the above purposes.

The cooperation of local and state groups and the Upper Colorado River Commission will be needed in order for the program to be a success.

## H. APPROPRIATION OF FUNDS BY THE UNITED STATES CONGRESS

The funds appropriated for fiscal year 1978 for construction of the Colorado River Storage Project and participating projects total \$67,051,000, including \$4,229,000 designated as "undistributed reduction based on anticipated delays."

The largest item is for construction of participating projects amounting to \$63,863,000. Crystal Dam of the Curecanti Unit has been moved to drainage and minor construction since it is nearing completion. Drainage work is continuing on Emery County Project and the Vernal Unit of the Central Utah Project with \$548,000 and \$279,000 respectively. Advance planning is continuing on the Animas-La Plata Project, the Uintah and Upalco Units of the Central Utah Project, the San Miguel Project, and the West Divide Project for a total of \$1,519,000.

Recreation and fish and wildlife facilities receive a total of \$4,015,000, with the major portion designated for Flaming Gorge and the Bonneville Unit of the Central Utah Project. In addition, Congress appropriated \$25,000,000 to continue work on the Navajo Indian Irrigation Project. This money is appropriated to the Bureau of Indian Affairs and transferred to the Bureau of Reclamation for construction.

Funds for the Transmission Division have been transferred to the Department of Energy for the 1978 fiscal year.

Both the House and Senate approved the conference report on July 25, 1977.

President Carter signed the "Public Works for Water and Power Development and Energy Research Appropriation Bill, Fiscal Year 1978" on August 7, 1977, after which date it became Public Law 95-96 of the First Session of the 95th Congress.

Public Law 95-96 again contains the following language with reference to Rainbow Bridge: *"Provided, That no part of the funds herein approved shall be available for construction or operation of facilities to prevent waters of Lake Powell from entering any national monument."*

### 1. Presidential "Hit List"

The Colorado River Storage Project participating projects suffered through a difficult time in 1977 under the new administration



which took office on January 20th. As early as December 30, 1976, Interior Secretary designate Cecil D. Andrus leaked a transition team plan calling for "reevaluation" of 61 water projects nation-wide. On February 21, 1977 President Carter made the "hit-list" public, which included the Dallas Creek, Dolores, and Fruitland Mesa Projects in Colorado; the Bonneville Unit of the Central Utah Project in Utah; the Lyman Project in Wyoming; and the Savery-Pot Hook Project in Colorado and Wyoming.

Review hearings for the projects were announced for March 15th in Washington, D.C. These hearings were later changed to field locations and six of the thirty-two reviews were held in the Upper Division States. On April 18, 1977 the President sent his statement on 32 water projects to the Congress. There were 18 projects recommended for deletion, five for modification, and nine to be continued. Lyman, Dallas Creek, and Dolores Projects were three of the nine to be continued. The Bonneville Unit of the Central Utah Project was slated for severe modification, and Fruitland Mesa and Savery-Pot Hook Projects were to be deleted.

The House of Representatives subsequently voted to fund all of the 18 projects remaining on the "hit list," even in the face of a threatened presidential veto. The vote in the House gave a clear indication, though, that it would not be possible to override a veto. The Senate, after conferring with the White House staff, cut nine projects from its version of the Public Works Bill to make it more appealing to the President. Attempts to restore Fruitland Mesa and Savery-Pot Hook Projects by amendment were unsuccessful, and on July 20th, the House-Senate Conference Committee cut money for new starts and only 9 of the 18 projects survived.

On July 25th, both the House and Senate approved the Public Works Bill and sent it to the President for his signature. He later signed the Bill, but there are still some misgivings as to what the administration will do on water projects in succeeding years.

## **2. Fiscal Year 1978 Appropriations**

Table XI(a) illustrates a general recapitulation of action by the First Session of the 95th Congress pertaining to appropriations of funds for the construction program of the Colorado River Storage Project and participating projects.

Table XI(b) shows the total funds appropriated by the U. S. Congress for the Colorado River Storage Project and participating

projects and chargeable against the limitations of various authorizing Acts (P.L. 485, 84th Congress, Colorado River Storage Project Act, as amended in 1972 by P.L. 92-370; P.L. 87-483, San Juan-Chama and Navajo Indian Irrigation Projects Act; P.L. 88-568, Savery-Pot Hook, Bostwick Park, Fruitland Mesa Projects Act; P.L. 90-537, Colorado River Basin Project Act).



**Table XI (a)**  
**COLORADO RIVER STORAGE PROJECT**  
**Fiscal Year 1978 Appropriations**

Project and State	Budget Request	House Approved June 2, 1977	Senate Approved June 25, 1977	Conference Report Approved July 20, 1977
<b>Construction:</b>				
Colorado River Storage Project: Transmission Division, Various States	\$ 4,771,000	\$ 4,771,000	\$ 4,771,000	\$ 4,771,000
<b>Participating Projects:</b>				
Animas-LaPlata, Colorado and New Mexico	---	1,000,000	---	---
Central Utah, Utah	---	---	---	---
Bonneville Unit	15,000,000	32,965,000	31,965,000	32,965,000
Jensen Unit	8,204,000	8,204,000	8,204,000	8,204,000
Uintah Unit	---	1,500,000	---	---
Upalco Unit	---	700,000	---	---
Dallas Creek, Colorado	12,175,000	12,175,000	12,175,000	12,175,000
Dolores Project, Colorado	5,700,000	5,700,000	5,700,000	5,700,000
Fruitland Mesa, Colorado	---	7,702,000	---	---
Lyman, Utah and Wyoming	4,219,000	4,219,000	4,219,000	4,219,000
San Juan-Chama, Colorado and New Mexico	600,000	600,000	600,000	600,000
Savery-Pot Hook, Colorado and Wyoming	---	5,992,000	---	---
	<u>\$50,669,000</u>	<u>\$85,528,000</u>	<u>\$67,634,000</u>	<u>\$68,634,000</u>
<b>Drainage and Minor Construction:</b>				
Curecanti Unit, Colorado	\$ 300,000	\$ 300,000	\$ 300,000	\$ 300,000
Central Utah, Utah	---	---	---	---
Vernal Unit	279,000	279,000	279,000	279,000
Emery County, Utah	548,000	548,000	548,000	548,000
	<u>\$ 1,127,000</u>	<u>\$ 1,127,000</u>	<u>\$ 1,127,000</u>	<u>\$ 1,127,000</u>
<b>Advance Planning:</b>				
Animas-LaPlata, Colorado and New Mexico	\$ 350,000	\$ ---	\$ 350,000	\$ 350,000
Central Utah, Utah	---	---	---	---
Uintah Unit	500,000	---	500,000	500,000
Upalco Unit	200,000	---	200,000	200,000
San Miguel, Colorado	317,000	317,000	317,000	317,000
West Divide, Colorado	152,000	152,000	152,000	152,000
	<u>\$ 1,519,000</u>	<u>\$ 469,000</u>	<u>\$ 1,519,000</u>	<u>\$ 1,519,000</u>
Undistributed reduction based on anticipated delays	<u>\$-3,129,000</u>	<u>\$-4,229,000</u>	<u>\$-4,229,000</u>	<u>\$-4,229,000</u>
<b>Total -</b>				
Upper Colorado River Basin Fund	<u>\$50,186,000</u>	<u>\$82,895,000</u>	<u>\$66,051,000</u>	<u>\$67,051,000</u>
<b>Recreational &amp; Fish and Wildlife Facilities:</b>				
Recreational Facilities	\$ 2,070,000	\$ 2,070,000	\$ 2,070,000	\$ 2,070,000
Fish & Wildlife Facilities	1,945,000	1,945,000	1,945,000	1,945,000
	<u>\$ 4,015,000</u>	<u>\$ 4,015,000</u>	<u>\$ 4,015,000</u>	<u>\$ 4,015,000</u>
General Reduction of 3 percent	---	\$-2,607,000	---	---
<b>Total -</b>				
Colorado River Storage Project	<u>\$54,201,000</u>	<u>\$84,303,000</u>	<u>\$70,066,000</u>	<u>\$71,066,000</u>

**Table XI (b)**  
**APPROPRIATIONS BY THE CONGRESS**  
**FOR**  
**COLORADO RIVER STORAGE PROJECT AND**  
**PARTICIPATING PROJECTS\***

Fiscal Year	Amount
1957 . . . . .	\$ 13,000,000
1958 . . . . .	35,142,000
1959 . . . . .	68,033,335
1960 . . . . .	74,459,775
1961 . . . . .	58,700,000
1962 . . . . .	52,534,500
1963 . . . . .	108,576,000
1964 . . . . .	94,036,700
1965 . . . . .	55,800,000
1966 . . . . .	45,328,000
1967 . . . . .	46,648,000
1968 . . . . .	39,600,000
1969 . . . . .	27,700,000
1970 . . . . .	25,740,000
1971 . . . . .	24,230,000
1972 . . . . .	27,284,000
1973 . . . . .	45,770,000
1974 . . . . .	24,426,000
1975 . . . . .	22,967,000
1976 . . . . .	38,160,000
Transition Quarter (July, August, September 1976) . . . . .	15,562,000
1977 . . . . .	55,200,000
1978 . . . . .	67,051,000
Total . . . . .	\$1,065,948,310
Plus:	
Navajo Indian Irrigation . . . . .	
Project Appropriations . . . . .	166,232,385
Total Appropriations . . . . .	\$1,232,180,695

\*Exclusive of non-reimbursable funds for fish and wildlife, recreation, etc. under Section 8 of P.L. 485, 84th Congress.



## **XII. Findings of Fact**

No findings of fact pursuant to Article VIII of the Upper Colorado River Basin Compact have been made by the Upper Colorado River Commission. No part of this Annual Report is to be construed as a finding of fact by the Commission.

### XIII. Acknowledgements

The Upper Colorado River Commission wishes to acknowledge the united actions of the Governors of Colorado, New Mexico, Utah and Wyoming on the fundamental issues involved in the development of the water and land resources of the Upper Colorado River Basin and for their interest in and support of the Upper Colorado River Commission.

The Commission especially wishes to give recognition to the difficult and able work of the members of the United States Congress from the Upper Division States of the Colorado River Basin and to acknowledge with appreciation the assistance it has received from agencies of the Executive Branch of the Federal Government: the Department of the Interior, Bureau of Reclamation, Geological Survey, Environmental Protection Agency, Bureau of Indian Affairs, and the Department of Agriculture.

The diligent devotion to duty by departments of health and environment, water pollution control commissions, and counterpart organizations of the Upper Division States in aiding in the resolution of pollution and salinity problems of the Upper Colorado River System deserves special commendation.

Special recognition and appreciation is due to the Colorado River Basin Salinity Control Forum, several of whose members are advisers closely associated with the Commission, for the excellent work accomplished on the difficult salinity problem of the Colorado River.

Officers and personnel of many State agencies having their primary interests in various phases of water resources have also aided materially with cooperative efforts and information.



## Appendices

APPENDIX A

Upper Colorado River Commission

Financial Statements  
and  
Supplementary Information  
with  
Report of Certified Public Accountants  
Year Ended June 30, 1977



ELMER FOX, WESTHEIMER & CO.

CERTIFIED PUBLIC ACCOUNTANTS

REPORT OF CERTIFIED PUBLIC ACCOUNTANTS

The Commissioners  
Upper Colorado River Commission  
Salt Lake City, Utah

We have examined the balance sheets of the General Fund and the Property and Equipment Fund of the Upper Colorado River Commission as of June 30, 1977 and the related statement of revenues and expenditures and fund balance of the General Fund for the year then ended. Our examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the financial statements designated above present fairly the financial position of the General Fund and the Property and Equipment Fund of the Upper Colorado River Commission at June 30, 1977 and the results of their operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

The accompanying supplementary information, while not necessary for a fair presentation of financial position or results of operations, has been examined and, in our opinion, is fairly stated in all material respects in relation to the financial statements taken as a whole.

*Elmer Fox, Westheimer & Co.*

Grand Junction, Colorado  
September 19, 1977

# **UPPER COLORADO RIVER COMMISSION GENERAL FUND BALANCE SHEET**

**June 30, 1977**

## **ASSETS**

Cash:		
Office cash fund . . . . .	\$	25
Cash on deposit with First Security Bank of Utah, N.A.:		
Demand deposit . . . . .		15,478
Time certificates . . . . .		70,000
		<u>85,503</u>
Receivables:		
Due on assessment . . . . .	\$	100
Pension trust insurance premiums from employees . . . . .		242
		<u>342</u>
Prepaid expenses:		
Unexpired insurance premiums . . . . .		333
Pension trust insurance premiums . . . . .		289
Office expenses . . . . .		2,108
		<u>2,730</u>
Deposit—United Air Lines . . . . .		425
		<u><u>\$89,000</u></u>

## **LIABILITIES AND FUND BALANCE**

Liabilities:	
Accounts payable . . . . .	\$ 492
Contingency . . . . .	—
Fund balance . . . . .	<u>88,508</u>
	<u><u>\$89,000</u></u>

The accompanying notes are an integral  
part of the financial statements.



**UPPER COLORADO RIVER COMMISSION**  
**GENERAL FUND**  
**STATEMENT OF REVENUES AND EXPENDITURES**  
**AND FUND BALANCE WITH BUDGET COMPARISONS**

**Year ended June 30, 1977**

	<u>Budget</u>	<u>Actual</u>	<u>Actual over (under) budget</u>
Revenues:			
Assessments . . . . .	\$150,000	\$150,000	\$ —
Interest on time deposits . . . . .	<u>—</u>	<u>6,267</u>	<u>6,267</u>
	<u>150,000</u>	<u>156,267</u>	<u>6,267</u>
Expenditures:			
Personal services . . . . .	105,200	102,982	(2,218)
Travel . . . . .	18,000	13,840	(4,160)
General expenses . . . . .	31,300	25,821	(5,479)
Capital outlay . . . . .	4,500	806	(3,694)
Education and information . . . . .	<u>1,000</u>	<u>464</u>	<u>(536)</u>
	<u>160,000</u>	<u>143,913</u>	<u>(16,087)</u>
Excess (deficit) of revenues over expenditures . . . . .	<u>\$ (10,000)</u>	\$ 12,354	<u>\$ (22,354)</u>
Fund balance at July 1, 1976 . . . . .		<u>76,154</u>	
Fund balance at June 30, 1977 . . . . .		<u>\$ 88,508</u>	

The accompanying notes are an integral  
part of the financial statements.

**UPPER COLORADO RIVER COMMISSION  
PROPERTY AND EQUIPMENT FUND  
BALANCE SHEET**

**June 30, 1977**

**ASSETS**

Property and equipment, at cost:

Land and land improvements . . . . .	\$ 26,551
Building . . . . .	47,627
Furniture and fixtures . . . . .	23,380
Library . . . . .	6,551
Automobile . . . . .	6,432
Engineering equipment . . . . .	2,781
Upper Colorado River Basin relief model . . . . .	5,938

\$119,260

**FUND BALANCE**

Investment in property and equipment . . . . . \$119,260

The accompanying notes are an integral  
part of the financial statements.



# **UPPER COLORADO RIVER COMMISSION**

## **NOTES TO FINANCIAL STATEMENTS**

**June 30, 1977**

### **1. Summary of significant accounting policies**

#### **History and activities**

The Upper Colorado River Commission was formed pursuant to the terms of the Upper Colorado River Basin Compact on October 11, 1948, and consented to by the Congress of the United States of America by Act on April 6, 1949. As an administrative agency representing the Upper Division States of the Colorado River Basin, namely Colorado, New Mexico, Utah and Wyoming, the Commission consists of one commissioner representing each of the four Upper Division States and one representing the United States. The activities of the Commission are conducted for the purpose of promoting and securing agricultural and industrial development of the Upper Basin's water facilities.

The Commission is exempt from Federal income taxes under provisions of Section 501(c)(1) of the Internal Revenue Code.

#### **Basis of accounting**

The Commission utilizes the accrual basis of accounting. Under this basis of accounting, expenditures are recorded when incurred and revenues are recorded when earned.

#### **Assessments**

The Commission's major source of revenue is assessments levied against the four states and apportioned among them on the basis of the formula contained in the Upper Colorado River Basin Compact. The Commission determined the amount of the assessment for the year ended June 30, 1977 on the assumption that expenditures would exceed revenues by the amount of \$10,000.

#### **Property and equipment**

Property and equipment purchased is recorded as capital outlay in the general fund at time of purchase and capitalized at cost in the property and equipment fund. Cost of maintenance, repairs and minor renewals are expensed as incurred. When assets are retired or otherwise disposed of, the related cost is removed from the accounts. No provision for depreciation is provided on assets of the property and equipment fund.

## **2. Pension plan**

The Commission initiated a pension plan in 1965 for the benefit of its employees. Each covered employee contributes 3% of his base monthly salary as his cost of the plan with the Commission paying the balance. Contributions to the plan are utilized to purchase insurance which provides retirement income and life insurance benefits for the participating employees.

## **3. Contingency**

In accordance with Commission policy effective in 1960, each employee is entitled to fifteen days of annual leave per calendar year for which the employee receives normal salary. Employees may accumulate a maximum of thirty days annual leave. Upon ceasing employment, an employee is entitled to payment for accrued annual leave not taken. At June 30, 1977, the Commission is contingently liable for approximately \$9,000 under this policy.



## SUPPLEMENTARY INFORMATION

## Schedule of cash receipts and disbursements — General Fund

Cash at July 1, 1976 .....		\$ 85,859
Cash receipts:		
Assessments .....	\$133,025	
Interest on time deposits .....	7,285	
Refunds .....	<u>3,238</u>	<u>143,548</u>
		\$229,407
Cash disbursements:		
Personal services .....	103,706	
Travel .....	13,851	
General expenses .....	25,049	
Capital outlay .....	834	
Education and information .....	<u>464</u>	<u>143,904</u>
Cash at June 30, 1977 .....		<u>\$ 85,503</u>

	Budget	Actual	Actual over (under) budget
Summary of personal services with budget comparisons:			
Administrative salaries .....	\$ 43,300	\$ 43,272	\$ (28)
Legal salary .....	24,300	24,300	—
Engineering salary .....	21,000	21,000	—
Clerical salaries .....	6,000	4,409	(1,591)
Janitorial .....	3,000	2,207	(793)
Social security .....	4,000	3,879	(121)
Pension fund contributions .....	<u>3,600</u>	<u>3,915</u>	<u>315</u>
	<u>\$105,200</u>	<u>\$102,982</u>	<u>\$(2,218)</u>

Summary of general expenses with budget comparisons:			
Reporting and accounting .....	\$ 4,000	\$ 3,891	\$ (109)
Telephone and telegrams .....	3,600	2,928	(672)
Office supplies and postage .....	5,100	4,184	(916)
Insurance and bonds .....	1,200	1,069	(131)
Secretarial services .....	500	138	(362)
Engineering supplies and services .....	500	347	(153)
Printing .....	4,650	4,578	(72)
Library supplies and expenses ..	2,550	1,833	(717)
Meeting expenses .....	900	653	(247)
Utilities .....	1,650	1,619	(31)
Repairs and maintenance .....	1,000	1,025	25
Miscellaneous .....	1,750	1,467	(283)
Washington liaison expense not included in travel .....	<u>3,900</u>	<u>2,089</u>	<u>(1,811)</u>
	<u>\$31,300</u>	<u>\$25,821</u>	<u>\$(5,479)</u>



## Summary of insurance coverage

	Type	Coverage Co-insurance clause	Amount
Treasurer . . . . .	Fidelity bond	—	\$ 40,000
Assistant treasurer . . . . .	Fidelity bond	—	40,000
Automobile . . . . .	Comprehensive	—	Actual cash value
	Liability:		
	Each person	—	30,000
	Each accident	—	500,000
	Property damage	—	50,000
	Medical	—	5,000
	Collision	—	\$100 deductible
	Uninsured motorists	—	15/30,000
Employees . . . . .	Workmen's compensation	—	100,000
Office contents . . . . .	Fire and comprehensive	90%	50,000
Office premises . . . . .	Liability	—	300,000
Building . . . . .	Special multi-peril	90%	106,000

## APPENDIX B

### Budget

Fiscal Year Ending June 30, 1979



# UPPER COLORADO RIVER COMMISSION BUDGET

Fiscal Year Ending June 30, 1979

## PERSONAL SERVICES

Administrative Salaries (including Administrative Secretary) . . . . .	\$44,850	
Legal Salary . . . . .	25,520	
Engineering Salary . . . . .	22,050	
Clerical-Secretary . . . . .	7,580	
Janitor . . . . .	3,000	
Pension Trust . . . . .	8,000	
Social Security . . . . .	<u>4,000</u>	
		\$115,000

<u>TRAVEL</u> . . . . .	\$19,000
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## CURRENT EXPENSE

Reporting and Accounting . . . . .	\$ 3,000	
Telephone and Telegraph . . . . .	3,600	
Insurance and Bond Premiums . . . . .	1,200	
Printing . . . . .	4,500	
Secretarial Services . . . . .	500	
Engineering Supplies and Services . . . . .	500	
Office Supplies and Services . . . . .	4,500	
Library . . . . .	2,200	
Meeting Expense . . . . .	900	
Utilities . . . . .	2,000	
Building Repair and Maintenance . . . . .	800	
Miscellaneous . . . . .	1,000	
Washington liaison expense not included in Travel Account . . . . .	<u>4,800</u>	
		\$ 29,500

<u>CAPITAL OUTLAY</u> . . . . .	\$ 4,500
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<u>EDUCATION AND INFORMATION</u> . . . . .	\$ 2,000
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## TOTAL ESTIMATED EXPENSE

Fiscal Year July 1, 1978 through June 30, 1979 . . . . .	<u>\$170,000</u>
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Total Assessments for Fiscal Year 1979 . . . . .	\$170,000	<u>\$170,000</u>
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## APPENDIX C

### Transmountain Diversions Upper Colorado River Basin

1967 - 1976



**TRANSMOUNTAIN DIVERSIONS FROM  
COLORADO RIVER BASIN IN  
COLORADO 1967 - 1976**

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
<b>TO PLATTE RIVER BASIN</b>										
Grand River Ditch . . . . .	8,950	16,260	18,350	12,830	14,950	18,520	14,760	15,640	21,830	18,350
Eureka Ditch . . . . .	188	63	116	32	12	53	0	15	0	6
Alva B. Adams Tunnel . . . . .	267,500	198,600	170,500	204,600	190,800	235,000	230,700	231,100	239,300	256,100
Berthoud Pass Ditch . . . . .	793	708	586	291	806	466	754	809	402	359
Moffat Water Tunnel . . . . .	52,210	67,340	38,730	44,680	38,850	60,360	33,170	68,130	58,580	62,950
Boreas Pass Ditch . . . . .	0	42	0	0	111	0	0	6	39	68
Vidler Tunnel . . . . .					64	47	57	58	12	31
Harold D. Roberts Tunnel . . . . .	52,950	45,660	48,610	10,620	18,990	34,280	2,245	34,730	47,260	63,050
<b>TO ARKANSAS RIVER BASIN</b>										
Hoosier Pass Tunnel . . . . .	9,930	10,080	7,750	6,100	12,940	10,420	5,834	10,780	8,460	10,750
Columbine Ditch . . . . .	1,570	1,750	1,910	2,160	886	1,970	2,466	1,690	2,000	1,660
Ewing Ditch . . . . .	757	1,020	1,250	1,340	1,350	716	1,114	934	1,140	904
Wurtz Ditch . . . . .	1,560	2,270	2,390	3,870	3,610	3,270	3,240	2,910	3,430	2,590
Homestake Tunnel . . . . .	4,420	20,370	30,770	23,010	45,230	17,280	23,400	25,030	59,870	0
Twin Lakes Tunnel . . . . .	47,550	49,860	50,570	62,020	51,660	43,710	55,900	43,490	49,540	48,850
Twin Lakes Tunnel . . . . .	47,550	49,860	50,570	62,020	51,660	43,710	55,900	43,490	49,540	41,850
Charles H. Boustead Tunnel . . . . .						32,070	36,580	33,830	36,870	26,940
Busk - Ivanhoe Tunnel . . . . .	4,830	7,130	6,750	7,910	7,460	6,720	6,330	5,680	7,100	4,800
Larkspur Ditch . . . . .	0	157	535	488	327	269	722	237	328	199
<b>TO RIO GRANDE BASIN</b>										
Tarbell Ditch . . . . .	337	252	410	386	453	524	74	133	692	662
Tabor Ditch . . . . .	397	921	670	1,050	514	465	1,330	209	955	540
Treasure Pass Ditch . . . . .	255	194	303	328	303	273	720	154	465	278
Don La Font Ditches No. 1 and 2 . . . . .	54	0	0	55	0	254	388	109	428	239
Williams Creek - Squaw Pass Ditch . . . . .	42	137	144	108	181	0	211	62	223	86
Pine River - Weminuche Pass Ditch . . . . .	303	425	980	423	289	255	628	134	123	227
Weminuche Pass Ditch . . . . .	795	1,390	2,590	1,060	1,450	929	1,984	713	1,550	2,210
<b>TOTAL</b>	<b>455,400</b>	<b>424,600</b>	<b>383,900</b>	<b>383,400</b>	<b>391,200</b>	<b>467,900</b>	<b>422,600</b>	<b>476,600</b>	<b>540,600</b>	<b>494,800</b>

# **TRANSMOUNTAIN DIVERSION FROM<sup>1</sup> COLORADO RIVER BASIN IN UTAH 1967 — 1976**

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TO GREAT BASIN										
Fairview Tunnel . . . . .	—	2,040	2,410	2,130	1,740	1,748	2,310	2,500	2,400	2,110
Ephraim Tunnel . . . . .	4,170	5,050	5,670	6,120	4,717	2,290	5,466	4,690	4,480	2,488
Spring City Tunnel . . . . .	1,250	1,620	3,490	864	2,607	2,310	2,145	2,090	1,190	2,304
Strawberry Tunnel . . . . .	60,310	56,230	62,397	62,528	63,436	73,386	55,273	69,278	62,784	80,012
Duchesne Tunnel . . . . .	28,670	15,560	9,391	33,175	20,565	33,185	21,853	18,048	18,359	15,380
TOTAL . . . . .	94,400	80,500	83,358	104,817	93,065	112,919	87,047	96,606	89,213	102,294

<sup>1</sup>Streamgaging of the following small transmountain diversion in Utah was discontinued in 1959: Candland Ditch, Horseshoe Tunnel, Larsen Tunnel, Coal Fork Ditch, Twin Creek Tunnel, Cedar Creek Tunnel, Black Canyon Ditch, Reeder Ditch, Madsen Ditch, and John August Ditch. These diversions are from the San Rafael River in the Colorado River Basin to the Great Basin in Utah and total about 4000 acre-feet annually.

## **Transmountain Diversions from the Great Basin in Utah to Colorado River Basin in Utah**

Water is diverted from the Great Basin to the Colorado River Basin in Utah through the Tropic and East Fork Canal averaging about 2,500 acre-feet annually.

## **Transmountain Diversions from Colorado River Basin in Colorado to Rio Grande Basin in New Mexico**

### San Juan — Chama Diversions

1971	1972	1973	1974	1975	1976
54,290	41,080	174,900	47,730	145,480	84,400

## **Transmountain Diversions from the Colorado River Basin to North Platte Basin in Wyoming**

1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
9,152	7,848	8,207	7,955	4,496	7,193	8,124	6,965	5,086	4,327





The Relief model of the Upper Colorado River Basin, pictured above, was constructed by the Upper Colorado River Commission in cooperation with the Babson Institute of Business Administration. This model shows the topographic features of the area and indicates location of major units of the Colorado River Storage Project and Participating Projects. It is used by the Commission in work connected with administration of Upper Basin activities and is available for display at conventions and other public events.

#### UPPER COLORADO RIVER COMMISSION

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