RECLAMATION

Managing Water in the West

RIO GRANDE PROJECT

El Paso Field Division
10737 Gateway Blvd. West, Suite 350
El Paso, TX 79935

U. S Dept. of the Interior
Bureau of Reclamation

RECLAMATION

Managing Water in the West

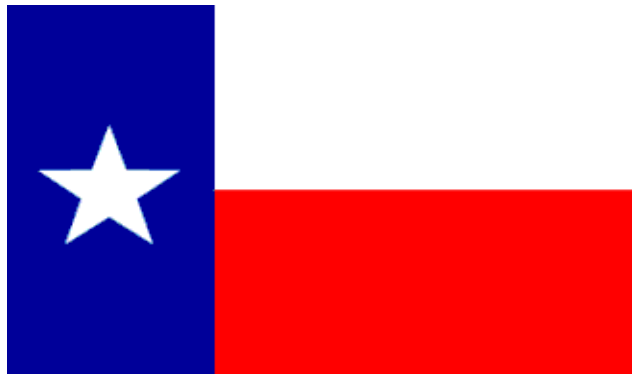
RIO GRANDE PROJECT

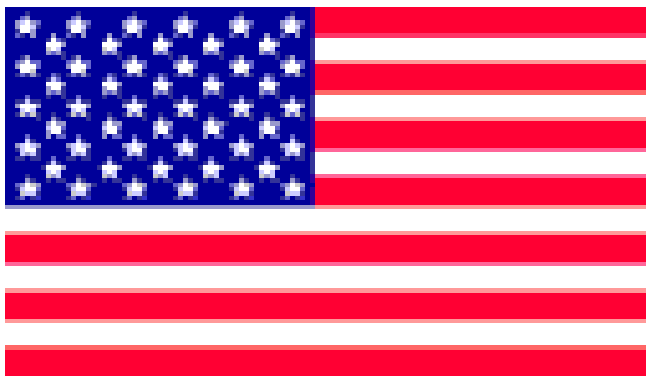
HISTORICAL PERSPECTIVE OF RIO GRANDE PROJECT

U. S Dept. of the Interior
Bureau of Reclamation

U. S. BUREAU OF RECLAMATION

RIO GRANDE PROJECT





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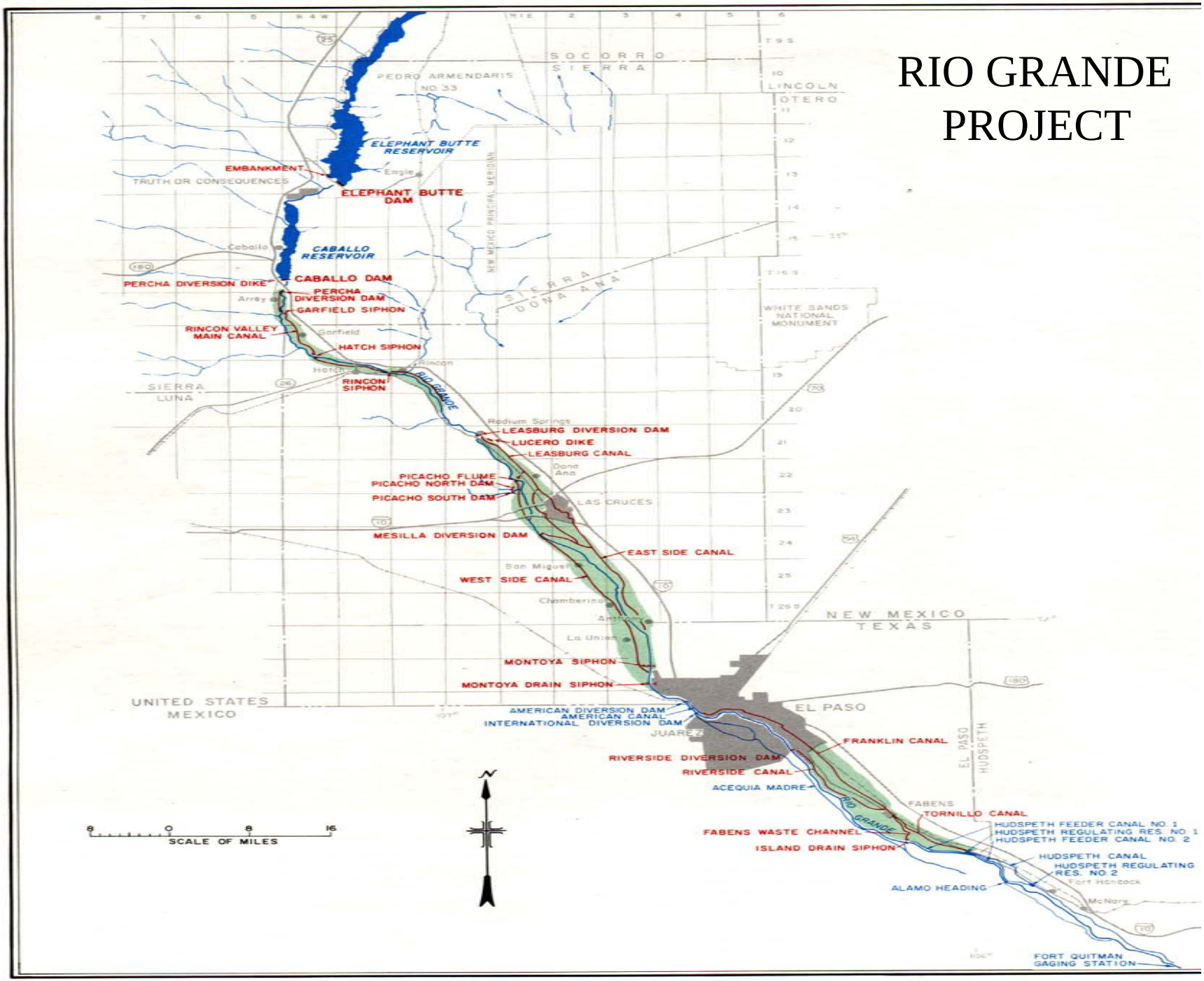
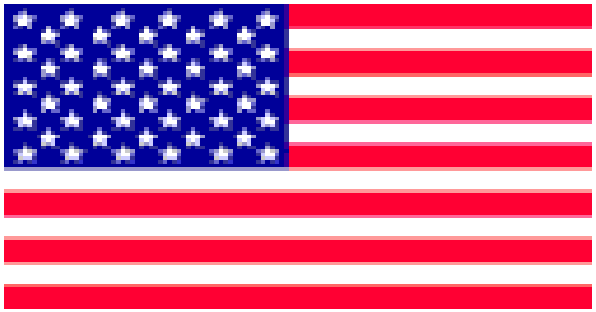
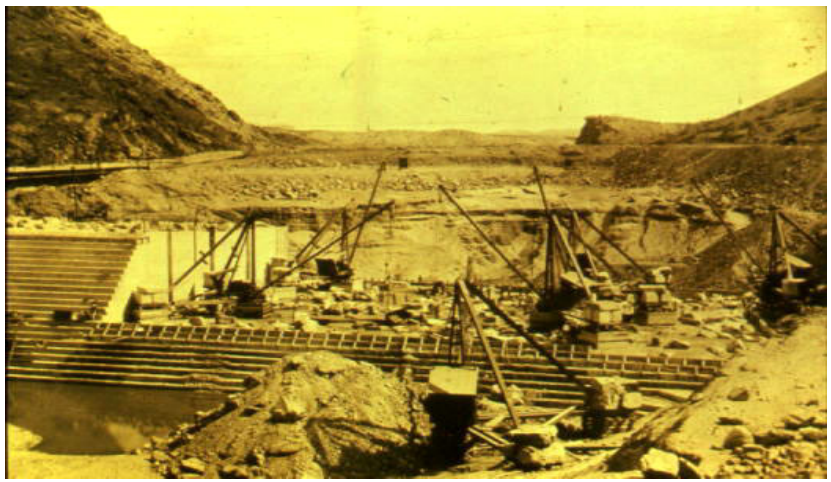


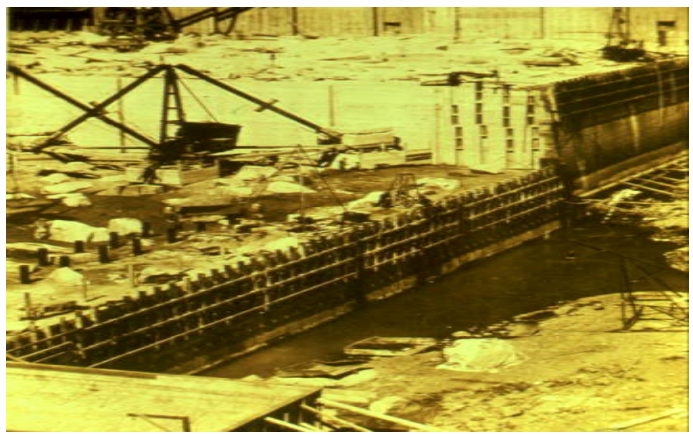




Rio Grande Project
authorized by U. S. Congress
on February 25, 1905

Treaty between U. S. and
Mexico signed on
May 21, 1906

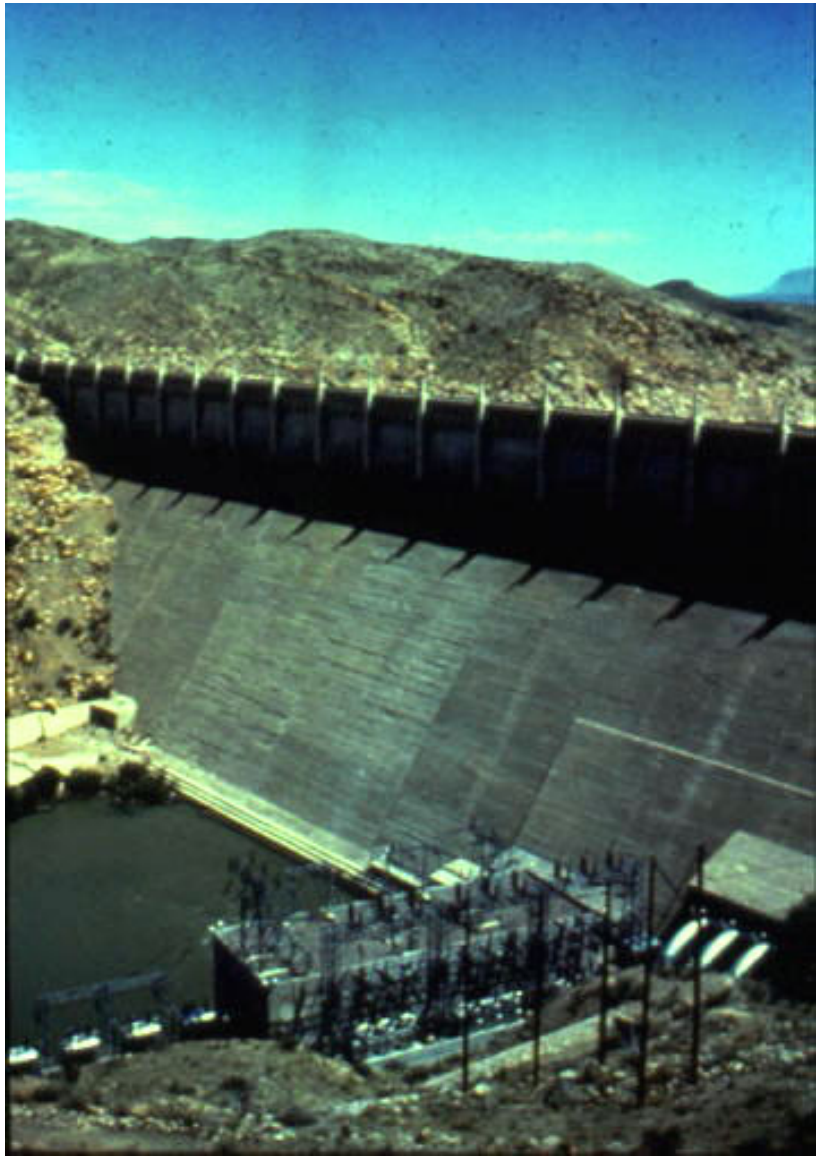
New Mexico Territory becomes
A State of the United States
Of America on January 6, 1912

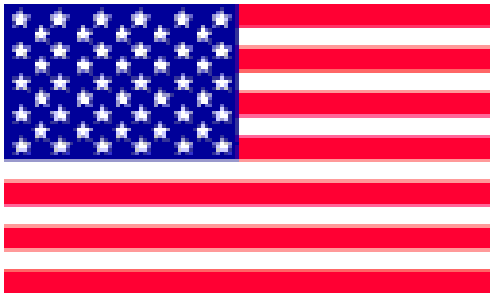


Elephant Butte Dam and Reservoir

Completed in 1916

Total Storage Capacity: 2,023,358 acre-feet
Flood Reservation Pool: 50,000 acre-feet
Minimum Recreation Pool: 50,000 acre-feet





February 1, 1933 Treaty
Between U. S. and Mexico

Alleviate Flooding in
El Paso – Juarez Region,
Build a Flood Control
Facility

CABALLO DAM & RESERVOIR

Completed in 1938

Total Storage Capacity: 326,672 acre-feet
Excl. Flood Control Pool: 100,000 acre-feet
Min. Fish & Wildlife Pool: 25,000 acre-feet

Percha Diversion Dam

Completed in 1918

Arrey Canal delivers irrigation water to Rincon Valley

16,260 acres of irrigation (Elephant Butte Irrig. Dist.)

Leasburg Diversion Dam

Completed in 1907

Leasburg Canal deliveries irrigation water to upper Mesilla Valley

31,600 acres of irrigation (Elephant Butte Irrig. Dist.)

Mesilla Diversion Dam

Completed in 1916

East Side & West Side Canals deliver irrigation water to lower Mesilla Valley

53,650 acres of irrigation (Elephant Butte Irrig. Dist. & El Paso County WI Dist.)

AMERICAN DIVERSION DAM

Completed in 1938

Bypass 1906 Treaty water to Mexico; divert remaining waters to American Canal for U. S. waters

Owned and operated by U. S. International Boundary & Water Commission

INTERNATIONAL DIVERSION DAM

Owned and operated by U. S. International
Boundary & Water Commission;
Water diverted into Acequia Madre to
Satisfy 1906 Treaty requirements for Mexico

Riverside Diversion Dam

Completed in 1928, removed 2003

Riverside Canal delivers
Irrigation water to Lower
El Paso Valley and City
Of El Paso
39,000 acres of irrigation
(El Paso County Water
Improvement Dist. No. 1)

American Canal Extension

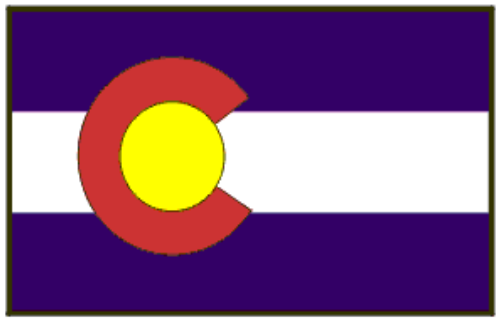
Completed in 1998

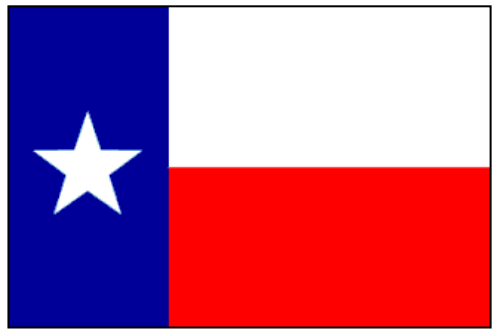
Delivers irrigation water to El Paso Valley and City of El Paso

56,000 acres of irrigation (El Paso County Water Improvement Dist. No. 1)

MAR 3 2006

Rio Grande Compact





- **3 States signed final Compact on Mar. 18, 1938; U. S. Congress ratifies Compact on May 31, 1939**

- **Compact apportions Rio Grande waters among 3 States from headwaters of southern Colorado to Fort Quitman, Texas**

  - **Texas portion of Compact is the Rio Grande Project which irrigates lands in southern New Mexico, far west Texas, and includes water delivery to Mexico under the 1906 Treaty**

- **Compact is administered by the Rio Grande Compact Commission consisting of a commissioner appointed by each State's Governor, and a Federal Representative which serves as Chairperson**

  - **Per Compact accounting regulations, the Rio Grande Project's average normal release is 790,000 acre-feet per year; Elephant Butte & Caballo Reservoirs are key components**

RIO GRANDE PROJECT

Sale of Project Water for Miscellaneous Purposes Act – February 25, 1920

Conversion of agricultural water to other purposes

Recreational Facilities at Elephant Butte & Caballo Reservoirs July 25, 1962

established construction & administration of recreational facilities

Authorization of a 50,000 AF Minimum Pool for Recreation at Elephant Butte Reservoir – October 27, 1974

established minimum recreational pool to be filled with SJ-C water

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Transfer of O&M of Irrigation Distribution System – February 15, 1979 and March 14, 1980

Elephant Butte Irrig. Dist. and El Paso County Water Improvement Dist. No. 1 assume O&M responsibilities of the Project's canals and distribution system

Title Transfer of Canals, Laterals, & Drains to Elephant Butte Irrig. Dist. & El Paso County Water Improvement Dist. # 1 - January 19, 1996

Elephant Butte Irrig. Dist. & El Paso County Water Improvement Dist. # 1 acquire title and ownership to their respective canals, laterals, and drains of their irrigation delivery systems, make allocation to their farmers

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RIO GRANDE PROJECT

Court Order No. CIV-90-95 HB/WWD – October 17, 1996

established maximum storage level of 50,000 AF in Caballo Reservoir during winter months and minimize evaporation differences between Caballo and Elephant Butte Reservoirs

New Rio Grande Project Operating Agreement Signed by Elephant Butte Irrig. Dist. & El Paso County Water Improvement Dist. # 1 - February 14, 2008

established new procedures for allocating Project water supply to Elephant Butte Irrigation District, El Paso County Water Improvement District # 1, and Mexico

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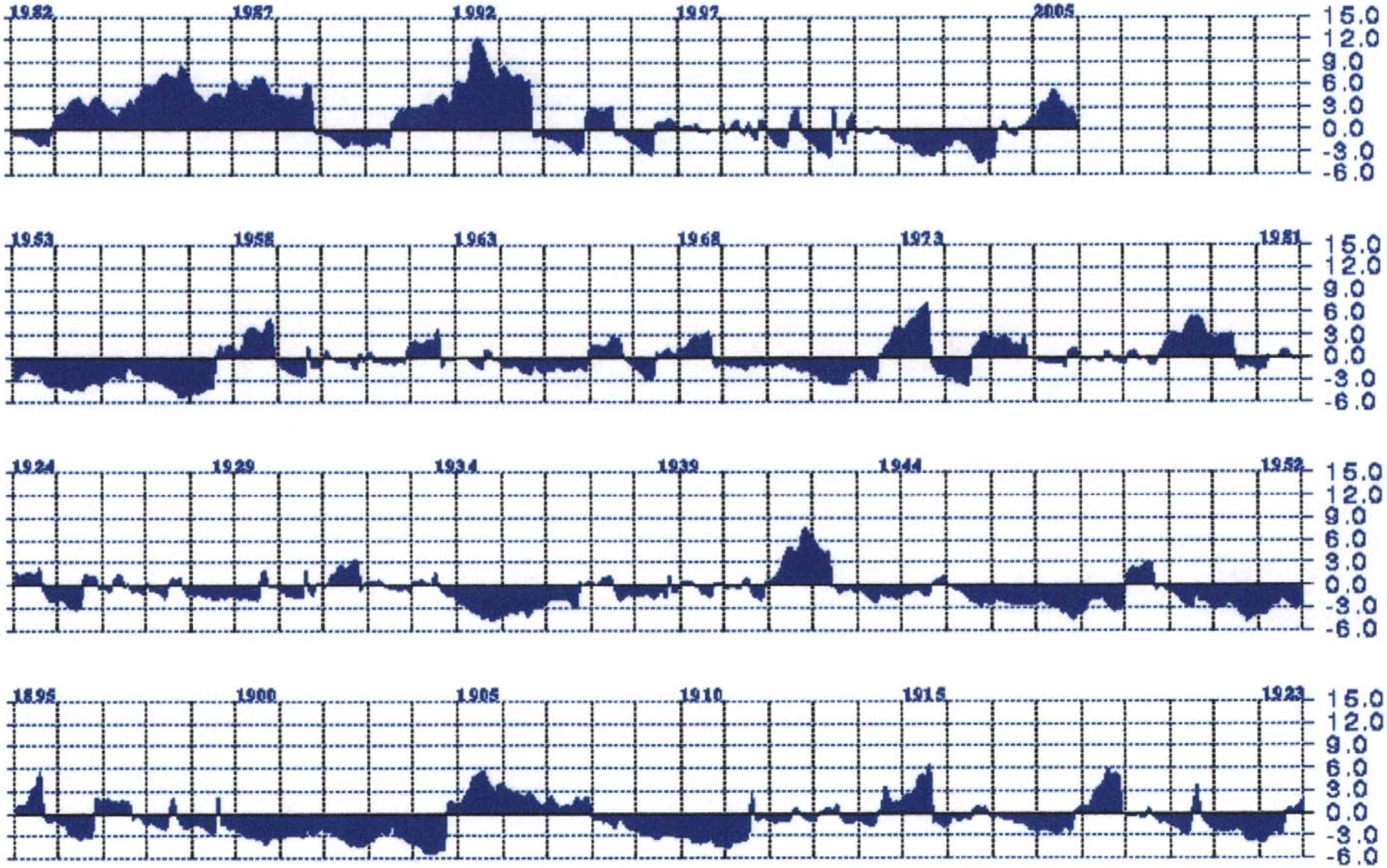
Managing Water in the West

RIO GRANDE PROJECT

HYDROLOGIC HISTORY OF UPPER RIO GRANDE BASIN

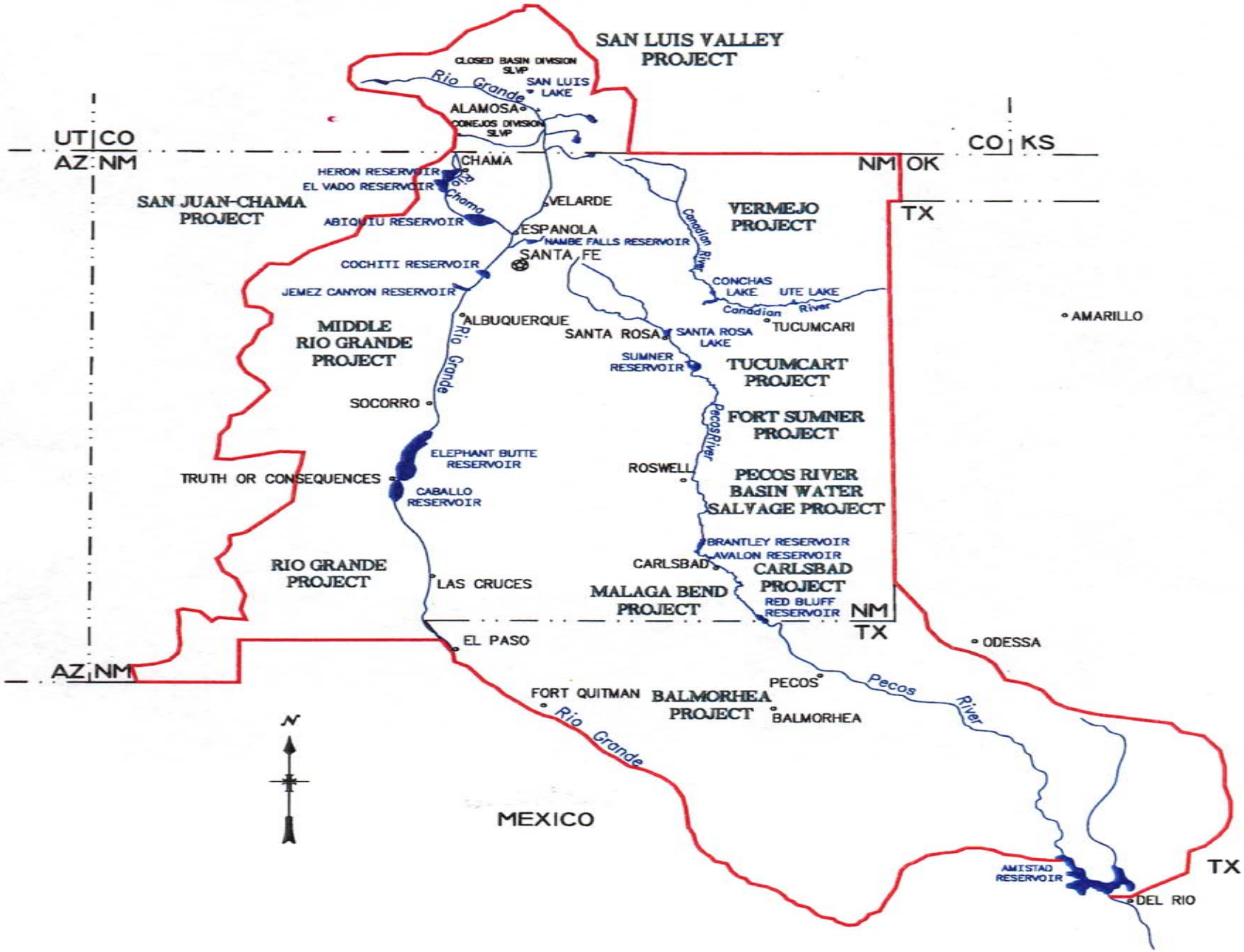
U. S Dept. of the Interior
Bureau of Reclamation

Palmer Drought Severity Index

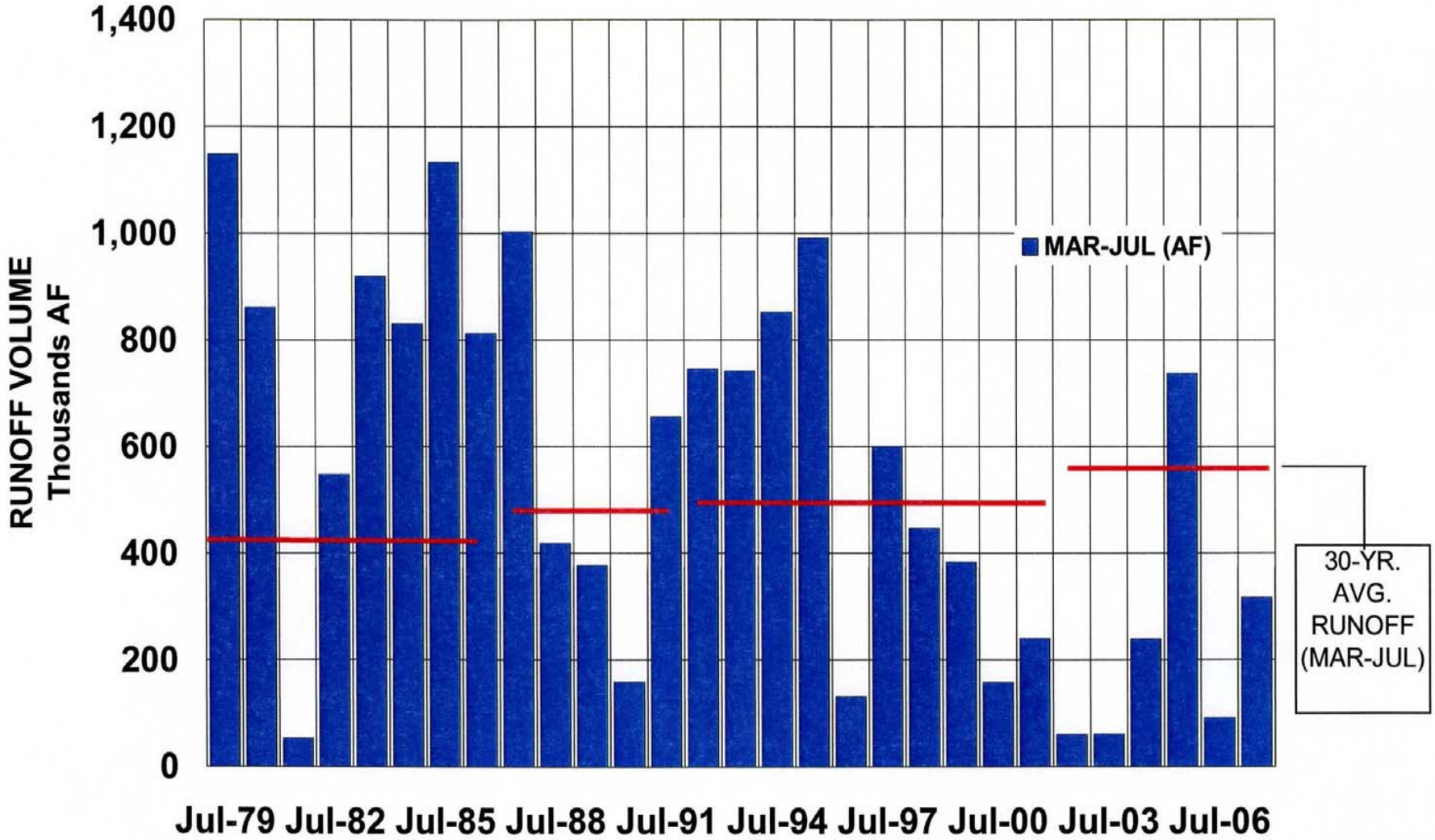


New Mexico - Division 08: 1895-2005 (Monthly Averages)

ALBUQUERQUE AREA OFFICE
BUREAU OF RECLAMATION

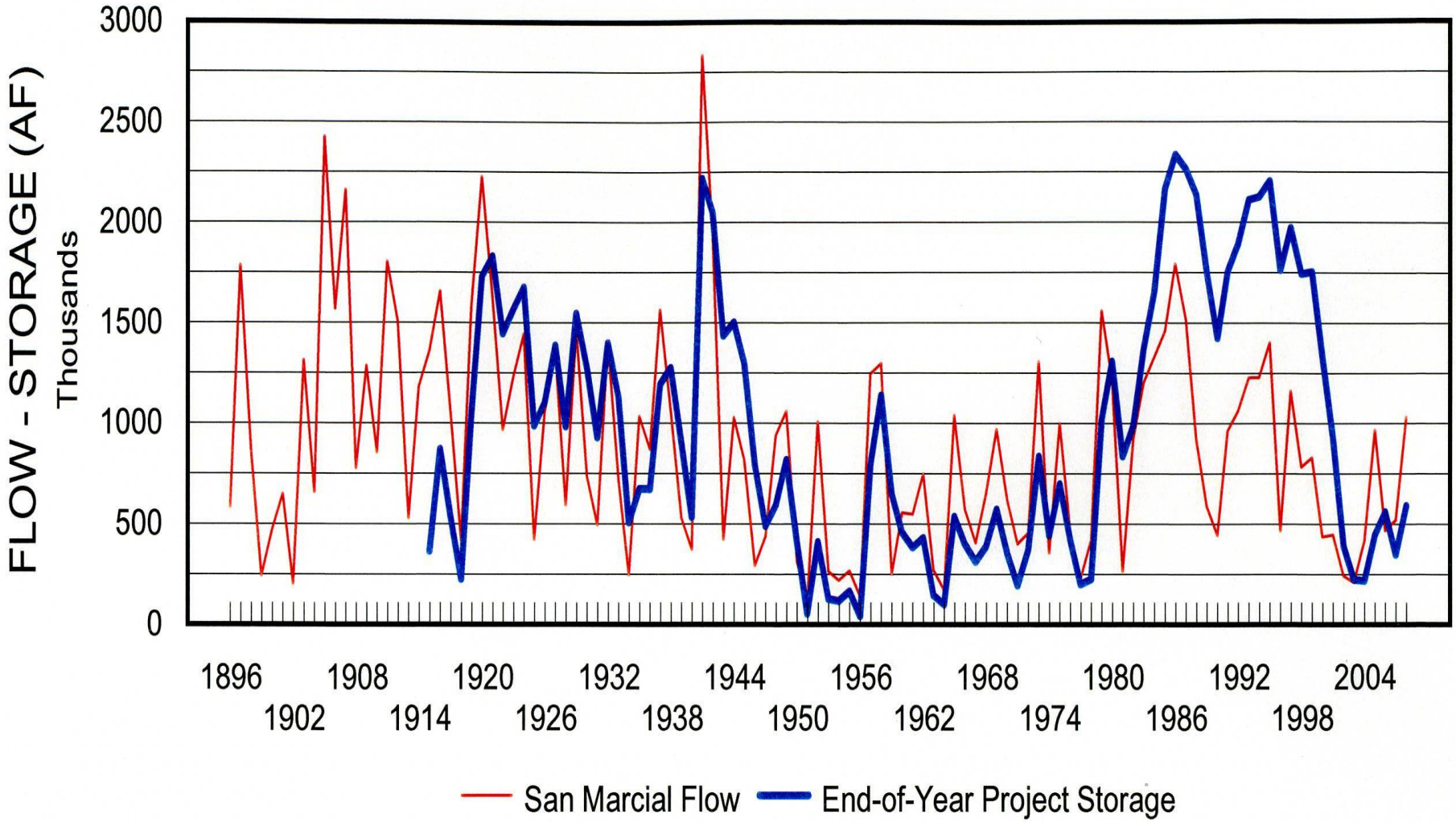


HISTORICAL RUNOFF - SAN MARCIAL
1979 - 2007



SAN MARCIAL FLOW - RIO GRANDE PROJECT STORAGE

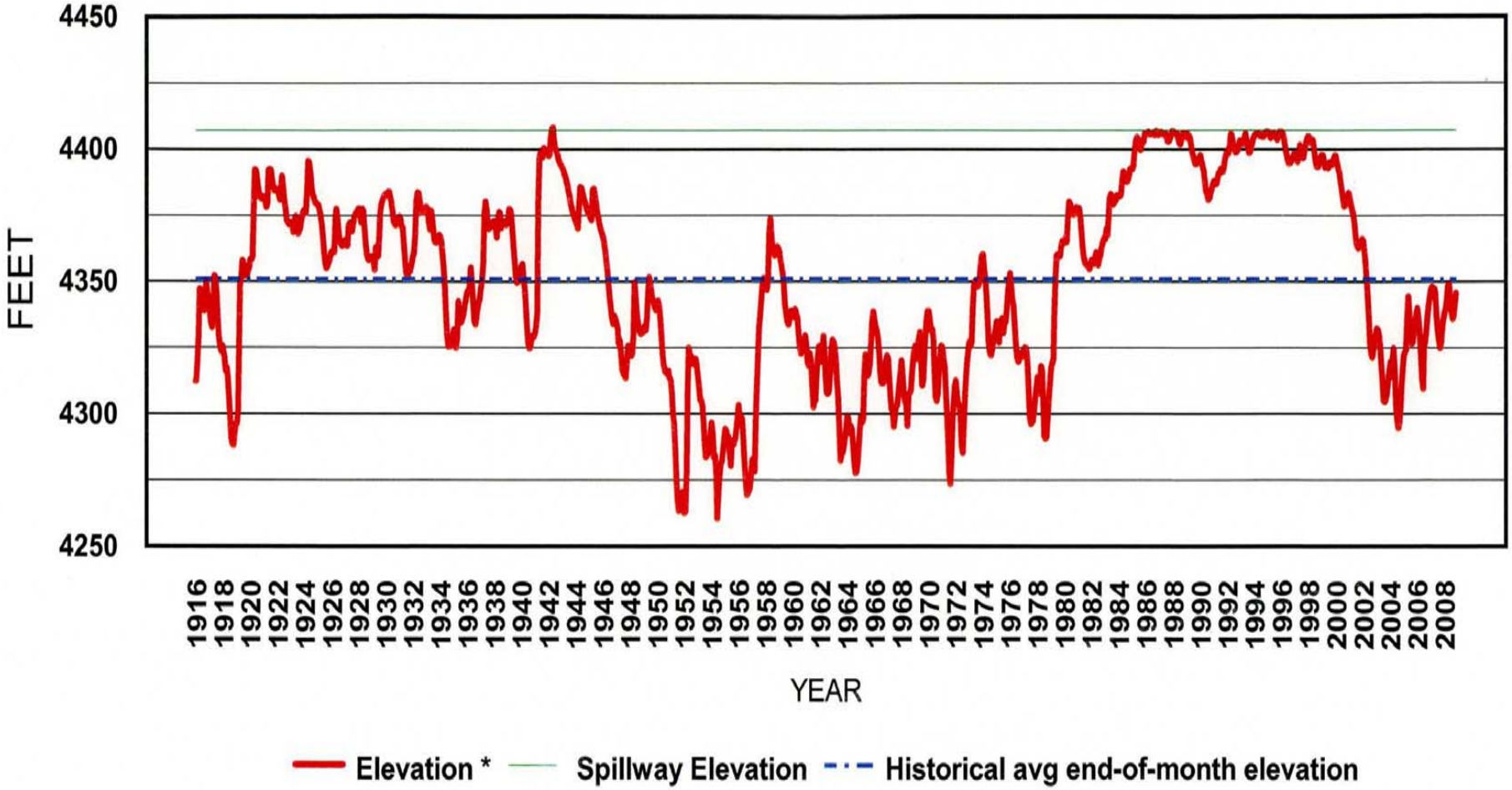
1896 Through 2008*



* End-of-year project storage and San Marcial flow for 2008 is a projection based on Rio Grande Project most probable plan.

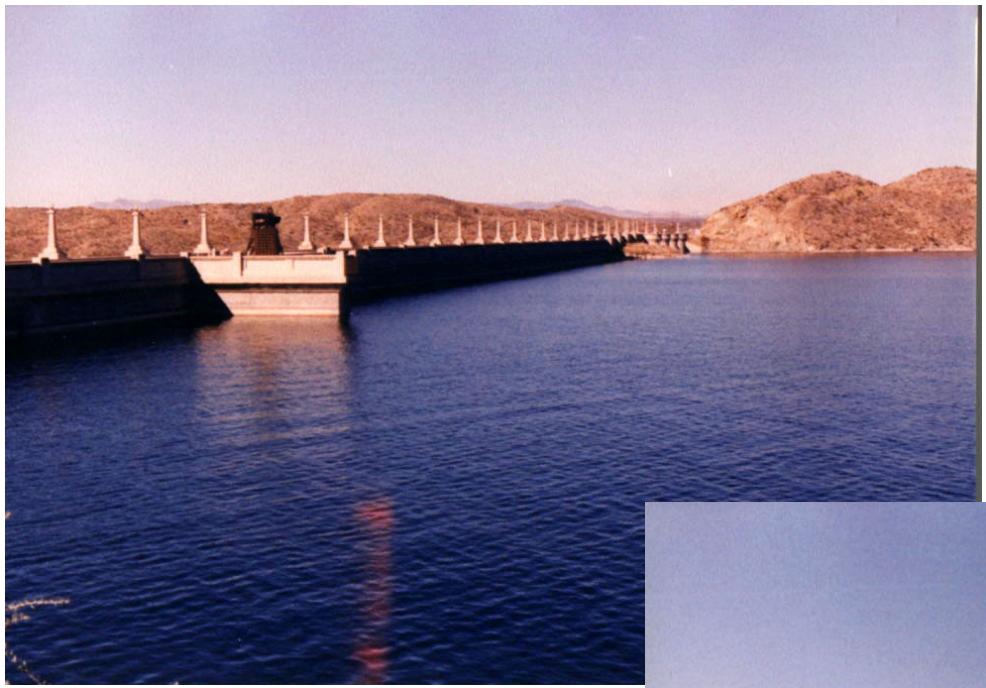
ELEPHANT BUTTE RESERVOIR

HISTORICAL END-OF-MONTH ELEVATION**

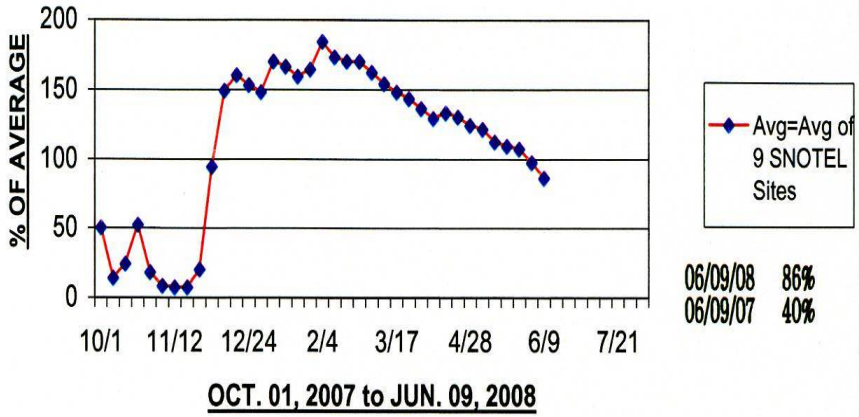


**Data thru May 2008 is actual data; other 2008 data is a projection based on Reclamation's most probable plan.

* BOR project datum. To obtain mean sea level datum, add 43.3 feet



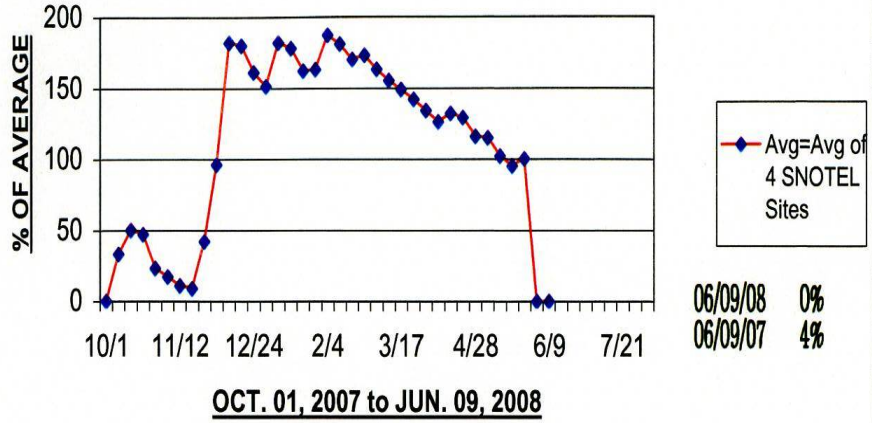
% OF AVG. SNOW WATER EQUIVALENT vs TIME
Upper Rio Grande Basin (Basin Avg.)



06/09/08 86%
06/09/07 40%

OCT. 01, 2007 to JUN. 09, 2008

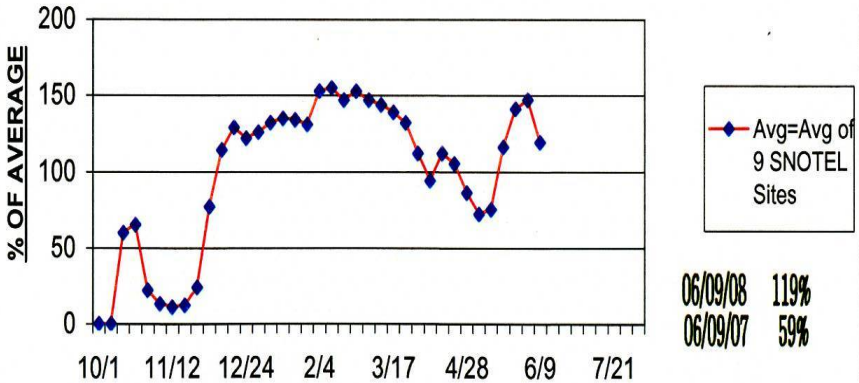
% OF AVG. SNOW WATER EQUIVALENT vs TIME
Rio Chama Basin (Basin Avg.)



06/09/08 0%
06/09/07 4%

OCT. 01, 2007 to JUN. 09, 2008

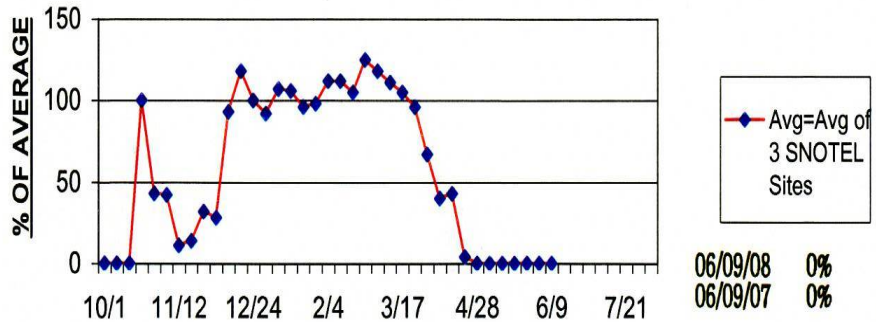
% OF AVG. SNOW WATER EQUIVALENT vs TIME
Sangre de Cristo Mtn Basins (Basin Avg.)



06/09/08 119%
06/09/07 59%

OCT. 01, 2007 to JUN. 09, 2008

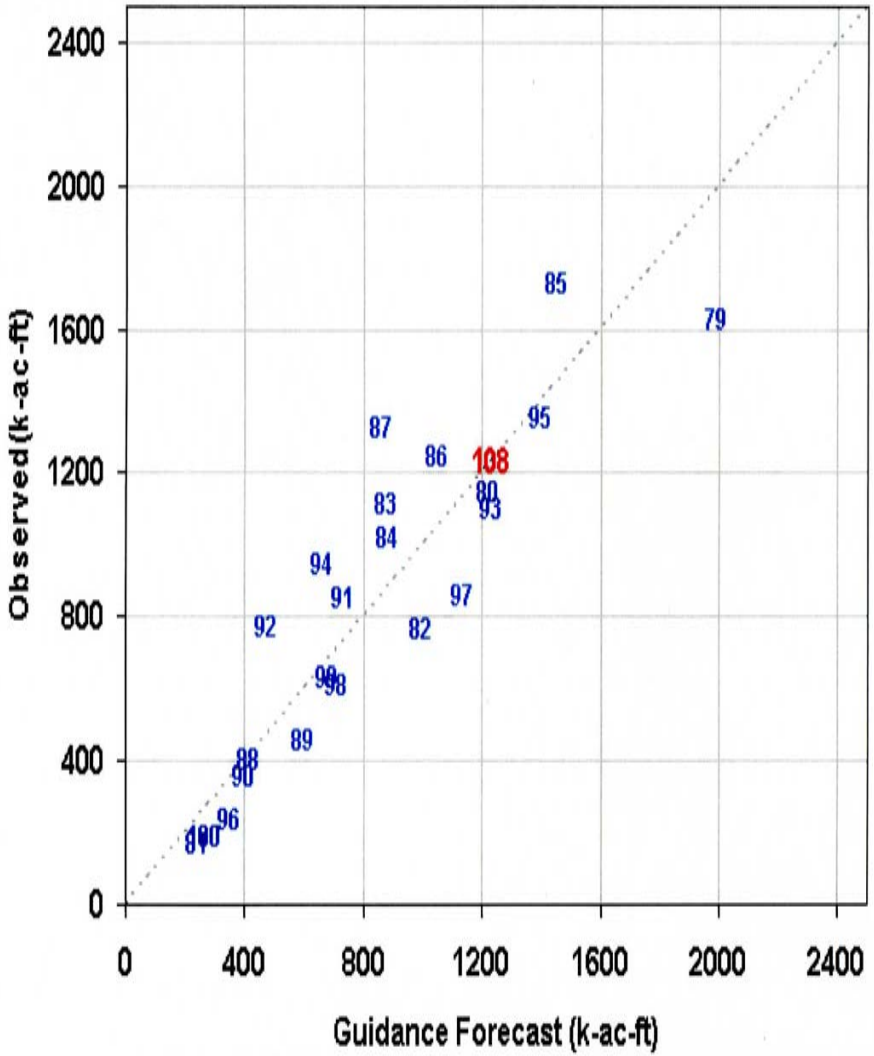
% OF AVG. SNOW WATER EQUIVALENT vs TIME
Jemez River Basin (Basin Avg.)



06/09/08 0%
06/09/07 0%

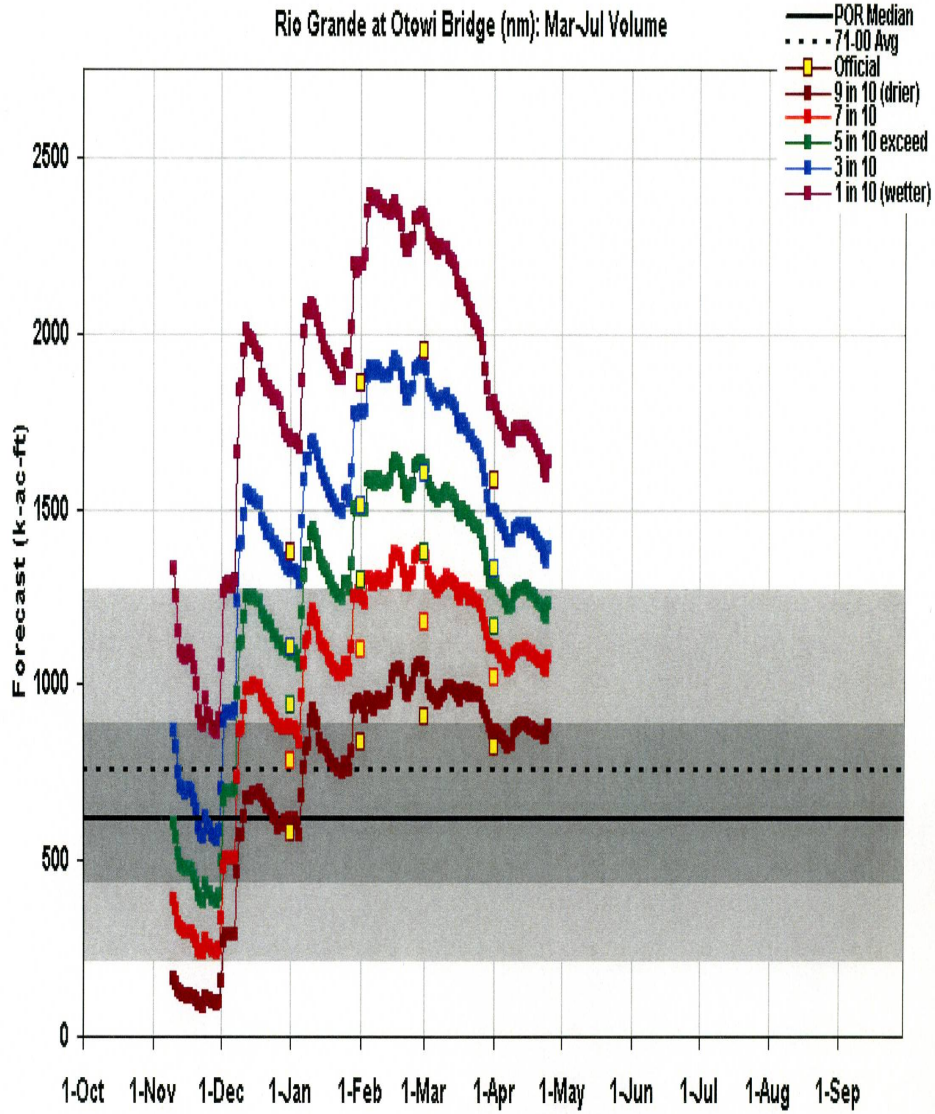
OCT. 01, 2007 to JUN. 09, 2008

Rio Grande at Otowi Bridge (nm): Mar-Jul Volume



This is an automated product based solely on SNOTEL data, provisional data are subject to change.
Each number (e.g. "99", "104") represents an individual year (e.g. "1999","2004") from the calibration set of the guidance forecast equation for today's date. The most recent guidance forecast is shown in red. This product is not meant to replace or supercede the official forecasts produced in coordination with the National Weather Service and should only be used for planning purposes.
Science Contact: Tom.Pagano@por.usda.gov 503 414 3010
http://www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html
Generated 11:59 Apr 25 2008

Rio Grande at Otowi Bridge (nm): Mar-Jul Volume



Created 11:59 Apr 25 2008

This is an automated product based solely on SNOTEL data, provisional data are subject to change.
This product is a statistically based guidance forecast combining indices of snowpack and precipitation.
Yellow squares are the official outlooks. **Gray background** is the historical period of record variability.
This product does not consider climate information such as El Nino or short range weather forecasts, or a variety of other factors considered in the official forecasts. This product is not meant to replace or supercede the official forecasts produced in coordination with the National Weather Service.
Science Contact: Tom.Pagano@por.usda.gov 503 414 3010 www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html

SPRING RUNOFF FORECASTS

2008

RIO GRANDE BASIN

(ACRE-FEET)

FORECAST POINT	Rio Grande nr Del Norte	Rio Chama at El Vado Reservoir	Rio Grande at Otowi Bridge	Jemez River at Jemez Canyon Reservoir	Rio Grande at San Marcial
FORECAST PERIOD	APR-SEP	MAR-JUL	MAR-JUL	MAR-JUL	MAR-JUL
30-YEAR AVERAGE RUNOFF *	531,000	237,000	757,000	45,000	**573,000**
JANUARY 1 FORECAST	**690,000** 130%	**295,000** 124%	**940,000** 124%	**36,000** 80%	**750,000** 131%
FEBRUARY 1 FORECAST	**790,000** 149%	**390,000** 165%	**1,300,000** 172%	**50,000** 111%	**1,050,000** 183%
MARCH 1 FORECAST	**850,000** 160%	**400,000** 169%	**1,380,000** 182%	**52,000** 116%	**1,150,000** 201%
APRIL 1 FORECAST	**745,000** 140%	**375,000** 158%	**1,170,000** 155%	**41,000** 91%	**980,000** 171%
MAY 1 FORECAST **	**680,000** 128%	**330,000** 139%	**1,040,000** 137%	**36,000** 80%	**695,000** 121%
JUNE 1 FORECAST	**655,000** 123%	**305,000** 129%	**965,000** 127%	**33,000** 73%	**665,000** 116%
	70% Exceedance: (drier)		**920,000** 122%		**615,000** 107%
	90% Exceedance: (minimum - driest)		**860,000** 114%		**550,000** 96%
JUNE 1, 2007	**450,000** 85%	**178,000** 75%	**530,000** 70%	**38,000** 84%	**410,000** 72%

* based on 1971-2000 runoff data.

** last official forecast for 2008 spring runoff.

RIO GRANDE PROJECT RESERVOIR OPERATIONS — **PRELIMINARY SUBJECT TO REVIEW** — 09-Jun-08

BASED ON 2008 MARCH THROUGH JULY WATER SUPPLY OUTLOOK REPOF Jun 1

2008 MAR-JUL @ SAN MARCIAL (NRCS forecast)	116%	665 KAF
2008 MAR-JUL @ SAN MARCIAL (regulated forecast)	118%	676 KAF

** Based on 30-yr (1971-2000)avg of 573,000 Acre-feet.

* Actual historical data

	YEAR	COCHITI RELEASE	NET LOSSES	SAN MARCIAL	<==== LOSSES	ELEPHANT BUTTE EVAP	ELEPHANT BUTTE CONTENT	ELEPHANT BUTTE RELEASE	<=== CABALLO EVAP	CABALLO LOSSES	IRRIG. DEMAND	EXCESS RELEASE	TOTAL RELEASE	CABALLO CONTENT	
	2007														**2007**
*	JAN	38	-14	52	5	2	558	1	1	-3	0	0	0	45	JAN
*	FEB	40	-3	44	-1	4	598	0	1	-2	0	0	0	47	FEB
*	MAR	86	28	57	-14	7	609	54	1	4	76	0	76	19	MAR
*	APR	73	8	66	-15	10	556	124	2	6	74	0	74	61	APR
*	MAY	161	29	133	4	10	601	73	3	6	56	0	56	68	MAY
*	JUN	84	38	46	-11	14	571	73	4	-7	104	0	104	40	JUN
*	JUL	50	34	16	-13	11	461	128	3	1	105	0	105	59	JUL
*	AUG	44	29	15	-15	9	397	86	3	4	105	0	105	33	AUG
*	SEP	40	23	17	-12	7	358	61	1	0	77	0	77	16	SEP
*	OCT	32	21	11	-5	6	326	42	1	-2	39	0	39	21	OCT
*	NOV	32	5	27	-4	4	352	0	1	-2	0	0	0	22	NOV
*	DEC	56	23	33	-27	3	409	0	1	-3	0	0	0	24	DEC
	TOTAL	**736**	**221**	**515**	**-109**	**87**		**642**	**22**	**2**	**637**	**0**	**637**		**TOTAL**
	AVG		**Total Mar-Jul**				**483**							**38**	**AVG**
		454	**137**	**317**	**55%**										

	YEAR	COCHITI RELEASE	NET LOSSES	SAN MARCIAL	<==== LOSSES	ELEPHANT BUTTE EVAP	ELEPHANT BUTTE CONTENT	ELEPHANT BUTTE RELEASE	<=== CABALLO EVAP	CABALLO LOSSES	IRRIG. DEMAND	EXCESS RELEASE	TOTAL RELEASE	CABALLO CONTENT	
	2008														**2008**
*	JAN	45	-3	48	-1	3	455	1	1	-2	0	0	0	26	JAN
*	FEB	57	3	54	-4	5	482	25	1	3	7	0	7	41	FEB
*	MAR	140	55	84	-32	8	495	95	2	7	89	0	89	38	MAR
*	APR	215	78	137	-33	12	536	117	3	6	95	0	95	51	APR
*	MAY	260	61	199	-0	16	615	104	3	3	103	0	103	46	MAY
	JUN	255	78	177	7	18	625	141	8	-4	129	0	129	55	JUN
	JUL	72	-7	79	-7	18	561	132	3	1	133	0	133	50	JUL
	AUG	68	16	52	-9	18	480	123	3	3	132	0	132	35	AUG
	SEP	55	17	38	-6	12	449	63	1	0	78	0	78	20	SEP
	OCT	47	7	40	-4	10	467	16	1	-2	25	0	25	11	OCT
	NOV	52	-7	59	1	5	520	0	1	-2	0	0	0	12	NOV
	DEC	53	-7	60	2	3	574	0	1	-3	0	0	0	14	DEC
	TOTAL	**1318**	**292**	**1027**	**-86**	**128**		**819**	**28**	**11**	**790**	**0**	**790**		**TOTAL**
	AVG		**Total Mar-Jul**				**522**							**33**	**AVG**
		941	**265**	**676**	**118%**										

	YEAR	COCHITI RELEASE	NET LOSSES	SAN MARCIAL	<==== LOSSES	ELEPHANT BUTTE EVAP	ELEPHANT BUTTE CONTENT	ELEPHANT BUTTE RELEASE	<=== CABALLO EVAP	CABALLO LOSSES	IRRIG. DEMAND	EXCESS RELEASE	TOTAL RELEASE	CABALLO CONTENT	
	2009														**2009**
	JAN	40	-7	47	0	4	617	0	1	-3	0	0	0	16	JAN
	FEB	44	-4	48	-0	8	635	22	1	-2	0	0	0	40	FEB
	MAR	75	15	60	-1	10	558	128	2	2	119	0	119	45	MAR
	APR	157	37	120	-2	16	581	83	2	2	79	0	79	45	APR
	MAY	250	55	195	-4	18	662	100	3	2	90	0	90	50	MAY
	JUN	197	67	130	-6	24	638	137	4	2	131	0	131	50	JUN
	JUL	119	51	68	-7	18	559	136	4	-1	133	0	133	50	JUL
	AUG	78	34	44	-9	14	484	113	2	-3	124	0	124	40	AUG
	SEP	55	23	32	-6	12	453	58	1	-2	78	0	78	20	SEP
	OCT	47	17	30	-2	10	450	25	1	-2	35	0	35	11	OCT
	NOV	52	-7	59	2	5	502	0	1	-2	0	0	0	12	NOV
	DEC	53	-7	60	2	3	556	0	0	-3	0	0	0	14	DEC
	TOTAL	**1167**	**274**	**894**	**-33**	**142**		**803**	**22**	**-9**	**790**	**0**	**790**		**TOTAL**
	AVG		**Total Mar-Jul**				**558**							**32**	**AVG**
		798	**225**	**573**	**100%**										

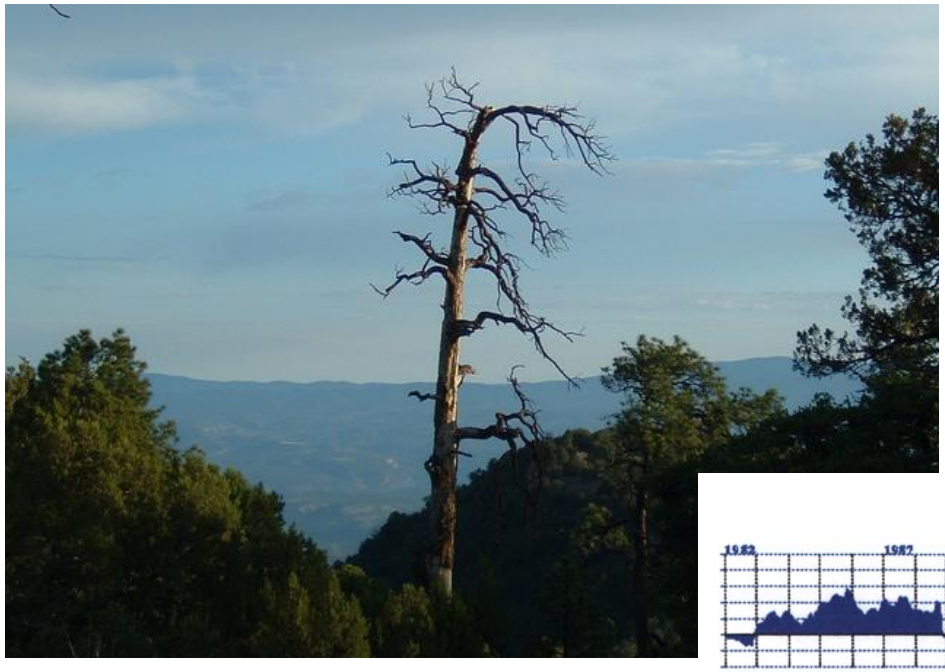
RECLAMATION

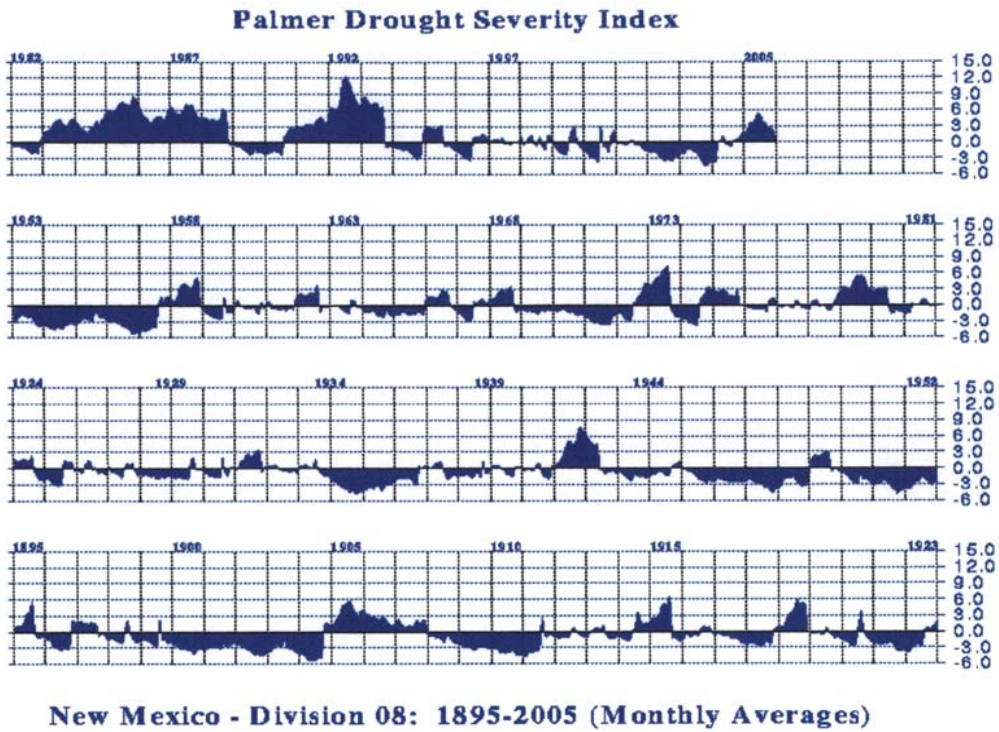
Managing Water in the West

RIO GRANDE PROJECT

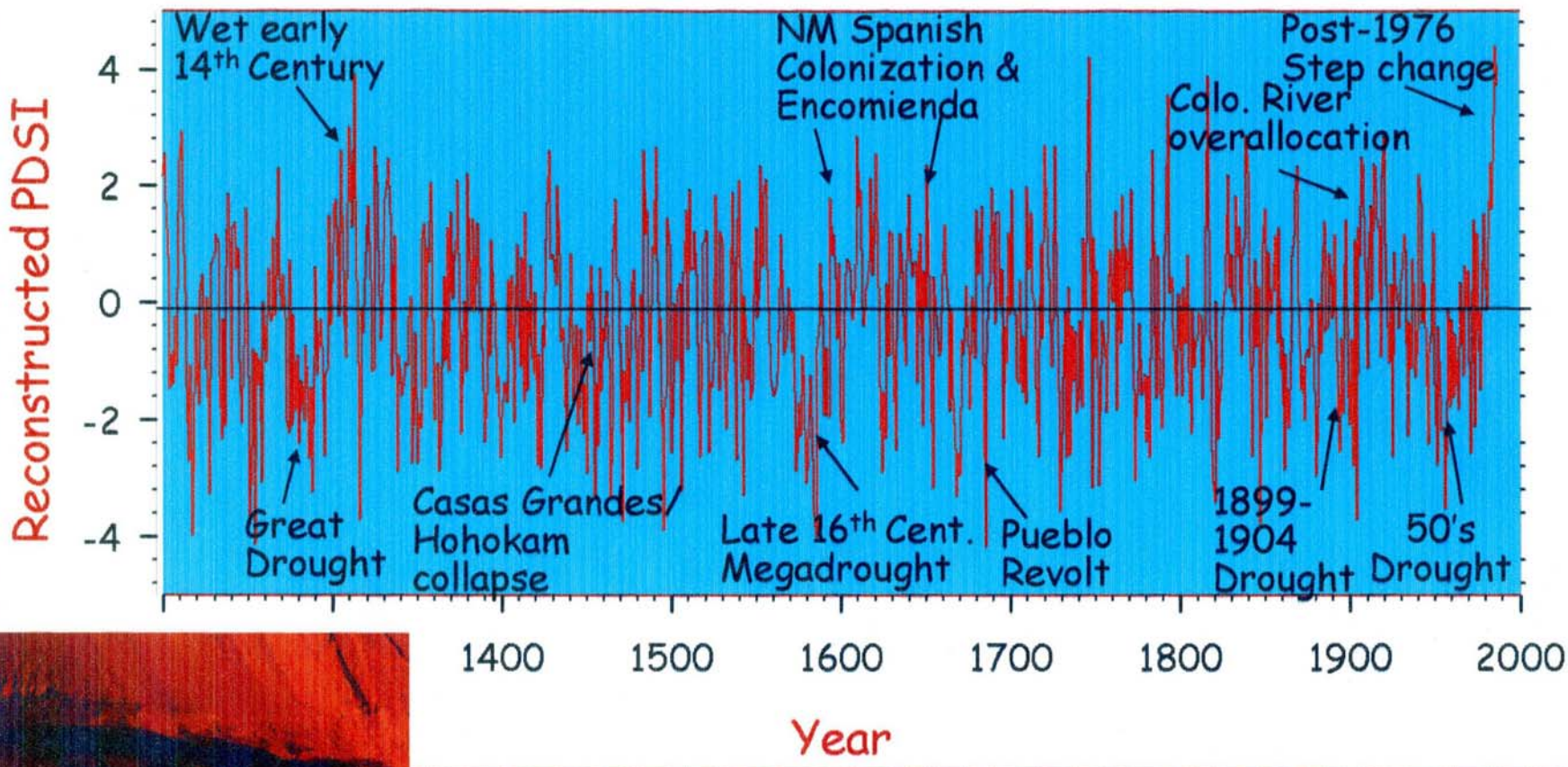
RIO GRANDE PROJECT AND CLIMATE CHANGE

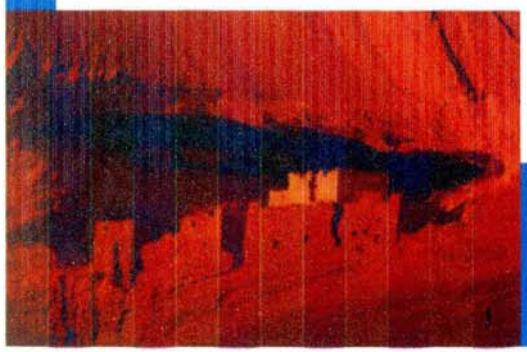
U. S Dept. of the Interior
Bureau of Reclamation




Palmer Drought Severity Index
1982
1987
1992
1997
2005
1953
1958
1963
1968
1973
1981
1924
1929
1934
1939
1944
1952
1895
1900
1905
1910
1915
1923
15.0
12.0
9.0
6.0
3.0
0.0
-3.0
-6.0
New Mexico - Division 08: 1895-2005 (Monthly Averages)

But, such droughts are just part of the naturally recurring range of events in the West...

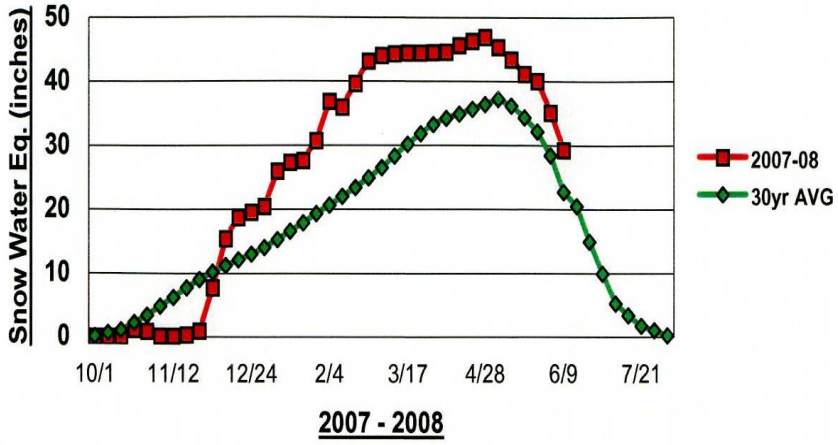




courtesy of Julio Betancourt, USGS, Tucson

WOLF CREEK SUMMIT SNOTEL

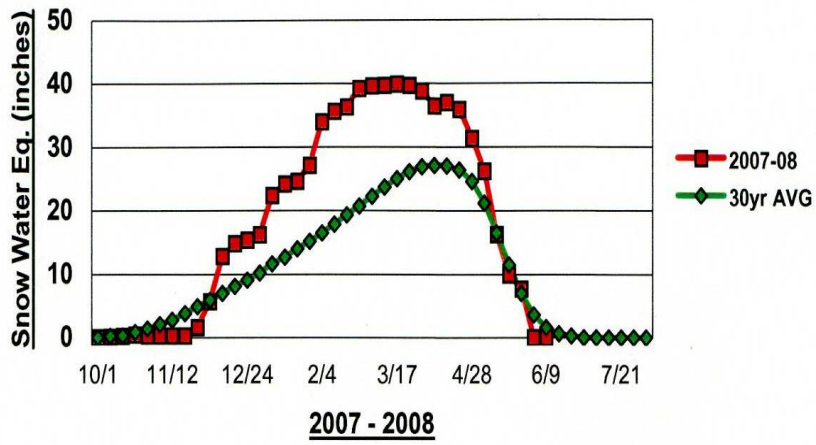
Elevation: 11,000 FT



2007 - 2008

CUMBRES TRESTLE SNOTEL

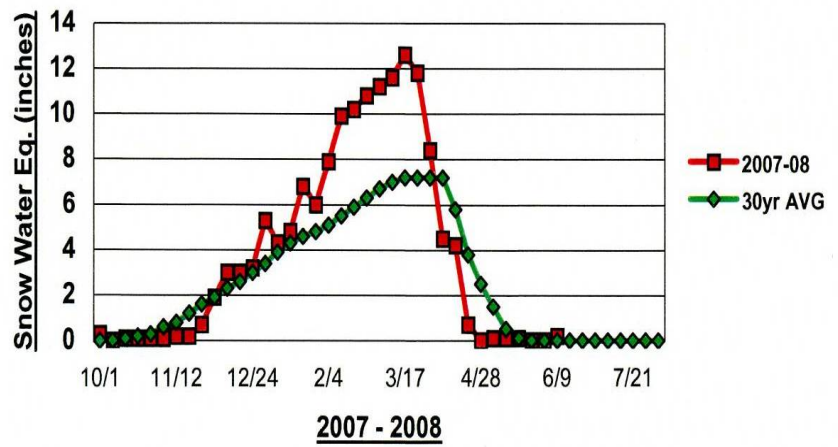
Elevation: 10,040 FT



2007 - 2008

RED RIVER PASS #2 SNOTEL

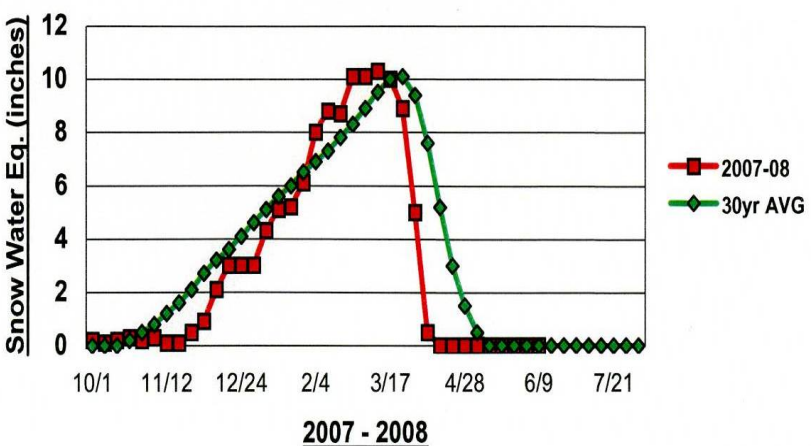
Elevation: 9,850 FT



2007 - 2008

QUEMAZON SNOTEL

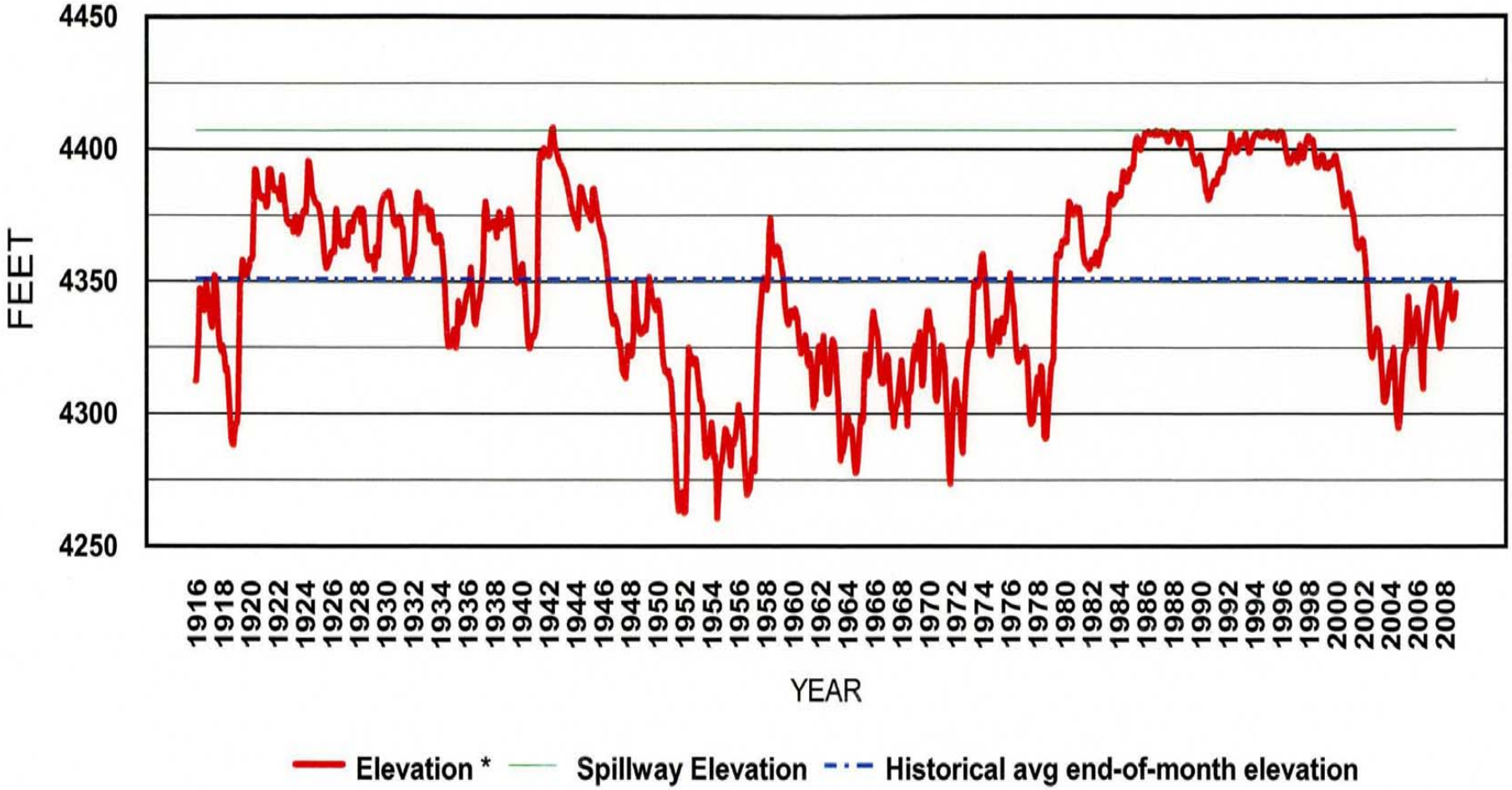
Elevation: 9,500 FT



2007 - 2008

ELEPHANT BUTTE RESERVOIR

HISTORICAL END-OF-MONTH ELEVATION**



**Data thru May 2008 is actual data; other 2008 data is a projection based on Reclamation's most probable plan.

* BOR project datum. To obtain mean sea level datum, add 43.3 feet

RIO GRANDE PROJECT HISTORICAL ALLOCATION OF PROJECT WATER SUPPLY

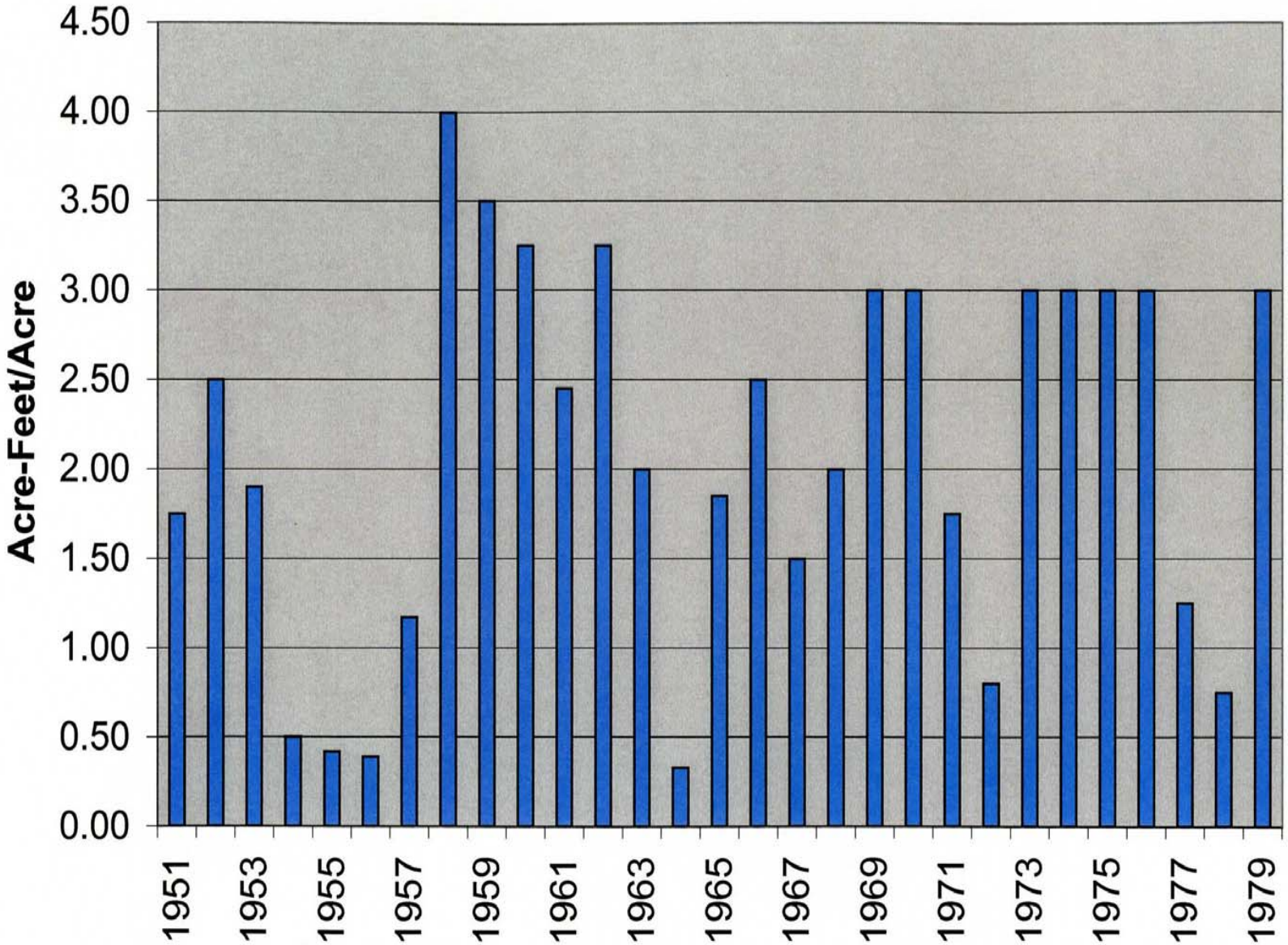
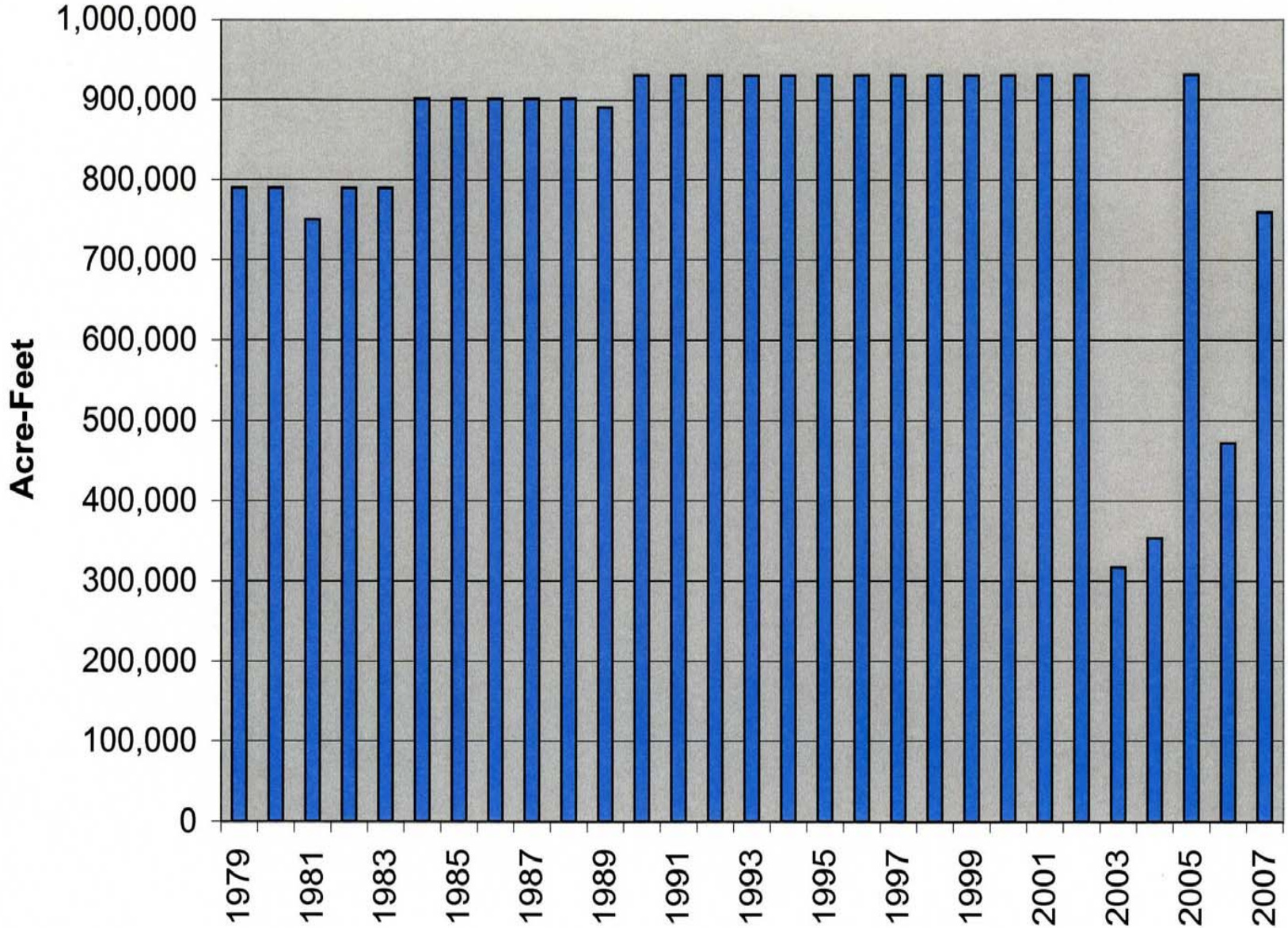
WTreers
03/05/2008

YEAR	EO FEB. TOTAL RIO GRANDE PROJECT STORAGE (acre-feet)	SAN MARCIAL SPRING RUNOFF (Mar-Jul) (acre-feet)	INITIAL ALLOTMENT TO PROJECT LANDS (acre-foot/acre)	FINAL ALLOTMENT TO PROJECT LANDS (acre-foot/acre)	INITIAL ALLOTMENT TO PROJECT CANAL HEADINGS (acre-feet)	FINAL ALLOTMENT TO PROJECT CANAL HEADINGS (acre-feet)	EO OCT. TOTAL RIO GRANDE PROJECT STORAGE (acre-feet)	MEXICO DIVERSION AT ACEQUIA MADRE HEADING (acre-feet) *	INITIAL RELEASE DATE FROM CABALLO DAM	CABALLO DAM TOTAL YEARLY RELEASE (acre-feet)
1951	452,730	17,877	1.00	1.75			32,900	33,059	03/06	469,450
1952	103,920	832,160	0.21	2.50			370,950	49,890	03/20	543,975
1953	468,600	143,170	1.00	1.90			99,990	37,760	03/10	528,628
1954	184,460	76,720	0.42	0.50			91,480	10,147	03/20	244,165
1955	169,850	68,920	0.21	0.42			129,700	8,185	03/20	219,157
1956	212,180	59,885	0.33	0.39			31,040	7,864	03/18	246,140
1957	77,130	600,680	0.10	1.17			645,760	23,290	03/20	397,103
1958	857,510	988,030	1.75	**4.00**			1,007,170	60,050	03/01	737,125
1959	1,185,120	72,590	3.00	**3.50**			575,670	60,110	03/02	687,414
1960	713,550	410,900	2.25	**3.25**			405,820	60,320	03/02	705,162
1961	492,870	269,550	1.25	2.45			223,080	48,610	03/10	561,697
1962	486,570	448,250	1.75	**3.25**			269,580	60,057	03/05	651,941
1963	513,170	116,765	1.85	2.00			109,440	39,693	03/05	517,172
1964	194,790	67,930	0.25	0.33			58,670	6,653	03/15	206,085
1965	172,340	598,290	0.17	1.85			340,940	36,658	03/20	505,598
1966	627,430	328,380	1.75	2.50			312,910	49,618	03/05	610,341
1967	454,710	74,090	1.25	1.50			223,340	29,829	02/27	456,517
1968	386,860	238,560	1.00	2.00			277,530	39,677	02/27	505,691
1969	466,970	358,710	1.25	**3.00**			387,410	59,884	02/27	667,669
1970	614,620	257,960	2.00	**3.00**			223,870	60,065	02/23	661,125
1971	435,640	112,837	1.50	1.75			75,540	34,847	02/26	498,375
1972	283,380	77,630	0.60	0.80			258,910	16,077	03/01	260,911
1973	457,960	914,090	1.00	**3.00**			707,340	60,000	03/09	617,461
1974	915,650	95,430	3.00	**3.00**			376,650	60,050	03/02	640,843
1975	507,700	617,850	1.00	**3.00**			534,490	60,052	01/24	580,617
1976	762,230	204,260	2.50	**3.00**			353,910	60,172	01/16	679,676
1977	482,460	43,374	1.00	1.25			140,460	24,824	03/03	416,496
1978	268,220	248,610	0.25	0.75			112,160	14,903	03/10	356,167
1979	328,690	1,148,880	0.67	**3.00**		**790,000**	855,640	60,055	03/08	568,687
1980	1,080,400	861,894	3.00	**3.00**		**790,000**	1,178,400	60,033	01/17	658,686
1981	1,339,860	54,256	3.00	**3.00**	**750,650**	**750,650**	774,380	60,262	02/04	608,166
1982	878,660	548,573	3.00	**3.00**	**790,000**	**790,000**	866,140	59,257	01/27	635,642
1983	1,070,130	920,545	3.00	**3.00**	**790,000**	**790,000**	1,289,750	60,621	02/03	648,386
1984	1,424,200	831,291	3.00	**3.00**	**902,000**	**902,000**	1,515,500	58,588	02/09	653,150
1985	1,747,700	1,133,599			**902,000**	**902,000**	2,121,600	60,276	02/20	677,398
1986	2,322,200	812,686			**902,000**	**902,000**	2,290,800	66,163	04/01	1,396,165
1987	2,336,900	1,003,319			**902,000**	**902,000**	2,168,400	65,866	02/03	1,376,099
1988	2,383,900	419,098			**902,000**	**902,000**	2,060,100	61,935	01/20	838,008
1989	2,151,900	378,144			**890,900**	**890,900**	1,705,300	58,854	02/13	736,866
1990	1,801,000	159,213			**931,841**	**931,841**	1,319,400	58,353	02/12	680,107
1991	1,509,660	656,638			**931,841**	**931,841**	1,580,080	59,242	02/19	625,956
1992	1,830,380	745,950			**931,841**	**931,841**	1,802,720	58,080	01/09	734,982
1993	1,980,230	742,508			**931,841**	**931,841**	1,978,640	63,763	01/12	823,263
1994	2,155,690	852,845			**931,841**	**931,841**	2,003,860	60,167	01/11	893,384
1995	2,203,730	991,736			**931,841**	**931,841**	2,083,050	63,618	01/17	1,096,146
1996	2,263,420	131,980			**931,841**	**931,841**	1,689,550	60,063	01/12	774,335
1997	1,814,910	600,666			**931,841**	**931,841**	1,814,980	59,442	01/21	798,621
1998	2,036,000	447,172			**931,841**	**931,841**	1,636,860	60,628	01/16	808,661
1999	1,803,410	384,225			**931,841**	**931,841**	1,658,810	58,308	01/27	735,467
2000	1,804,980	159,000			**931,841**	**931,841**	1,243,900	60,611	01/20	751,373
2001	1,359,370	241,000			**931,841**	**931,841**	856,910	61,037	02/02	786,549
2002	974,610	61,095			738,139	**931,841**	323,190	60,324	02/19	801,147
2003	456,140	62,029			74,860	317,495	170,490	26,948	03/17	364,528
2004	288,480	240,387			43,667	353,944	128,010	27,613	03/12	398,612
2005	331,000	738,095			138,549	**931,841**	362,060	58,091	03/09	676,031
2006	517,170	92,521			351,560	472,426	436,950	27,112	03/08	434,228
2007	644,990	316,979			369,466	760,391	346,170	51,245	03/07	636,730

bold number means full irrigation supply for Rio Grande Project water users.

* derived from International Boundary & Water Commission (IBWC) - U. S. Section, Yearly Flow Data Publications.

Rio Grande Project Historical Allocation (1951-1979)



Rio Grande Project Historical Allocation (1979-2007)