

PECOS RIVER COMPACT

Report of the River Master

Water Year 2019

Accounting Year 2020

Final Report

**Neil S. Grigg
River Master of the Pecos River
905 Edwards Street
Fort Collins, Colorado 80524**

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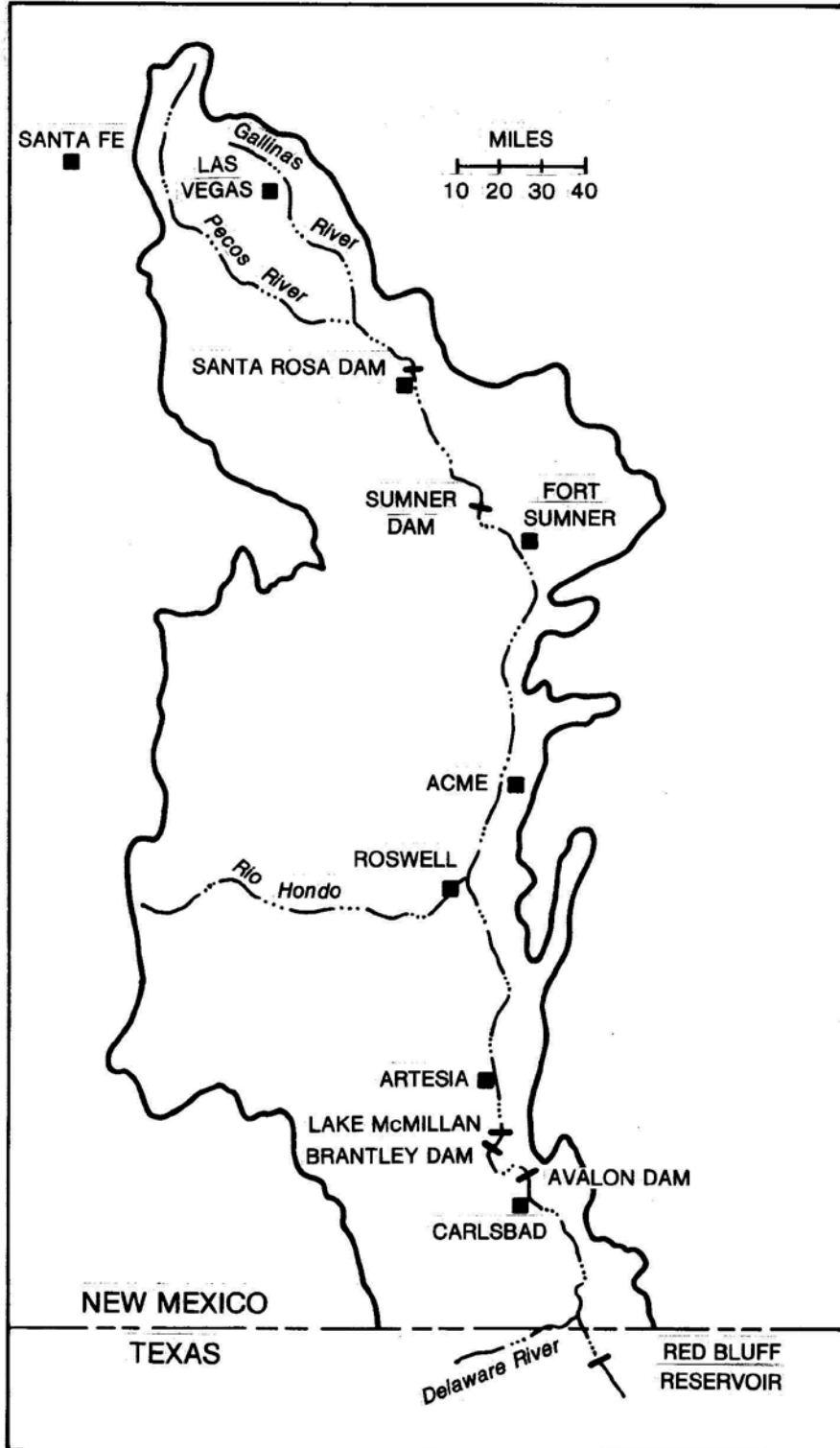
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Map of Pecos River Basin Showing Accounting Reaches

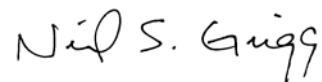
PECOS RIVER COMPACT
Supreme Court of the United States
No. 65, Original
Amended Decree

Final Report of the River Master
Water Year 2019 - Accounting Year 2020
June 24, 2020

Purpose of the Report. In its Amended Decree issued March 28, 1988 the Supreme Court of the United States appointed a River Master of the Pecos River and directed him to "... Deliver to the parties a Preliminary Report setting forth the tentative results of the calculations required by Section III.B.1 of this Decree by May 15 of the accounting year..." and to consider "... any written objections to the Preliminary Report submitted by the parties prior to June 15 of the accounting year..." and to deliver "... to the parties a Final Report setting forth the final results of the calculations required by Section III.B.1 of this Decree by July 1 of the accounting year." This is the required Final Report with the determination of:

- a. The Article III(a) obligation;
- b. Any shortfall or overage, which calculation shall disregard deliveries of water pursuant to an Approved Plan;
- c. The net shortfall, if any, after subtracting any overages accumulated in previous years, beginning with water year 1987.

Result of Calculations and Statement of Shortfall or Overage. The results of the calculations in this Final Report show that New Mexico's delivery in Water Year 2019 was a shortfall of 9,800 acre-feet. The accumulated overage since the beginning of Water Year 1987 is 166,300 acre-feet.



Neil S. Grigg
River Master of the Pecos River

Pecos River Compact		
Accumulated Shortfall or Overage		
	May 7, 2019	
Water Year	Annual Overage or Shortfall, AF	Accumulated Overage or Shortfall, AF
1987	15,400	15,400
1988	23,600	39,000
1989	2,700	41,700
1990	-14,100	27,600
1991	-16,500	11,100
1992	10,900	22,000
1993	6,600	28,600
1994	5,900	34,500
1995	-14,100	20,400
1996	-6,700	13,700
1997	6,100	19,800
1998	1,700	21,500
1999	1,400	22,900
2000	-12,300	10,600
2001	-700	9,900
2002	-3,000	6,900
2003	2,000	8,900
2004	8,300	17,200
2005	24,000	41,200
2006	26,100	67,300
2007	25,200	92,500
2008	6,000	98,500
2009	1,600	100,100
2010	-500	99,600
2011	500	100,100
2012	1,900	102,000
2013	-6,300	95,700
2014	700	96,400
2015	27,300	123,700
2016	27,200	150,900
2017	19,900	170,800
2018	5,300	176,100
2019	-9,800	166,300

Table 1. General Calculation of Annual Departures in TAF (B.1)			
Water Year	2019		
6/24/2020			
	WY 2017	WY 2018	WY 2019
B.1.a. Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	89.7	97.7	125.8
(b) Flood Inflow Alamogordo - Artesia (Table 2)	33.0	5.3	17.4
(c) Flood Inflow Artesia - Carlsbad (Table 3)	13.1	9.8	10.0
(d) Flood Inflow Carlsbad - State Line (Table 4)	6.2	5.6	6.7
Total (annual flood inflow)	142.0	118.4	159.9
(2) Index Inflow (3-year avg)			140.1
B.1.b. 1947 Condition Delivery Obligation (Index Outflow)			
			55.6
B.1.c. Average Historical (Gaged) Outflow			
(1) Annual historical outflow			
(a) Gaged Flow Pecos River at Red Bluff NM	46.9	42.6	45.8
(b) Gaged Flow Delaware River nr Red Bluff NM	3.3	1.8	0.9
(c) Metered diversions Permit 3254 into C-2713	0.4	0.4	0.4
Total Annual Historical Outflow	50.6	44.8	47.1
(2) Average Historical Outflow (3-yr average)			47.5
B.1.d. Annual Departure			
			-8.1
C. Adjustments to Computed Departure			
1. Adjustments for Depletions above Alam Dam			
a. Depletions Due to Irrigation (Table 5)	-1.0	0.6	0.4
b. Depl fr Operation of Santa Rosa Reservoir (Table 6)	9.2	0.6	4.5
c. Transfer of Water Use to Upstream of AD	0	0	0
Recomputed Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	97.9	98.9	130.7
(b) Flood Inflow Alamogordo - Artesia	33.0	5.3	17.4
(c) Flood Inflow Artesia - Carlsbad	13.1	9.8	10.0
(d) Flood Inflow Carlsbad - State Line	6.2	5.6	6.7
Total (annual flood inflow)	150.2	119.6	164.8
Recomputed Index Inflow (3-year avg)			144.9
Recomputed 1947 Condition Del Outflow (Index Outflow)			
			58.3
Recomputed Annual Departures			
			-10.8
Credits to New Mexico			
C.2 Depletions Due to McMillan Dike			1.0
C.3 Salvage Water Analysis			0
C.4 Unappropriated Flood Waters			0
C.5 Texas Water Stored in NM Reservoirs			0
C.6 Beneficial C.U. Delaware River Water			0
Final Calculated Departure, TAF			
			-9.8

Table 3. Determination of Flood Inflows, Artesia to Carlsbad (B.4)													
Water Year													
5/11/2020													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Rio Penasco at Dayton	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0	0.6
Fourmile Draw nr Lakew	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.8	0.0	0.0	1.1
South Seven Rivers	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.1	0.6	0.0	0.0	1.5
Rocky Arroyo at Hwy Br	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.2	1.4	0.0	0.0	2.1
Flood Inflow, Art-DS3	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.4	3.2	0.0	0.0	5.4
Pecos R at Dam Site 3	1.7	1.1	4.4	14.0	10.8	11.5	11.1	14.4	9.5	6.3	0.0	0.1	84.9
CB Sprgs New Water (from Table 7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Inflow, DS3 - CB	1.7	1.1	4.4	14.0	10.8	11.6	11.1	14.4	9.5	6.4	0.0	0.1	85.1
Evap Loss, Lake Avalon (from Table 10)	0.0	0.2	0.3	0.5	0.6	0.5	0.6	0.6	0.5	0.1	0.0	0.0	3.8
Storage Chg, Lake Avalon (from Table 11)	1.1	0.2	0.0	1.0	-0.5	-0.1	0.0	0.1	-0.2	-1.2	-0.4	0.0	0.0
Carls ID diversions	0.0	0.0	3.6	11.4	9.5	9.9	9.5	12.8	8.6	7.2	0.2	0.0	72.6
93% CID diver	0.0	0.0	3.4	10.6	8.8	9.2	8.8	11.9	8.0	6.7	0.2	0.0	67.5
Other depletions	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	1.4
Dark Canyon at Csbad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pecos b Dark Canyon	1.3	1.0	1.1	1.3	1.5	1.5	1.6	1.5	1.8	1.6	1.5	1.4	17.0
Pecos R at Carlsbad	1.3	1.0	1.1	1.3	1.5	1.5	1.6	1.5	1.8	1.6	1.5	1.4	17.0
Total Outflow	2.4	1.6	4.9	13.5	10.5	11.2	11.2	14.2	10.1	7.3	1.4	1.5	89.7
Flood Inflow, DS3-CB	0.7	0.5	0.4	-0.5	-0.4	-0.3	0.1	-0.2	0.6	0.9	1.4	1.4	4.6
Flood Inflow, Art-CB	0.7	0.5	0.4	-0.5	-0.4	1.5	0.1	-0.2	1.0	4.1	1.4	1.4	10.0

Table 4. Summary Table for Computations, Carlsbad to State Line (B.5)						
Water Year		2019				
6/24/2020						
		BCB - RB		Del R	DC	
		RM				
Jan		0.0		0.0	0.0	
Feb		0.0		0.0	0.0	
Mar		0.3		0.1	0.0	
Apr		0.7		0.0	0.0	
May		0.1		0.0	0.0	
Jun		2.8		0.2	0.0	
Jul		1.3		0.1	0.0	
Aug		0.1		0.0	0.0	
Sep		0.4		0.0	0.0	
Oct		0.8		0.0	0.0	
Nov		0.1		0.0	0.0	
Dec		0.0		0.0	0.0	
Total		6.4		0.3	0.0	
Summary of flood inflows, Carlsbad to State Line, TAF						
Red Bluff - Carlsbad + Dark C RM calcs)						6.4
Delaware River						0.3
Total Flood Inflow, Carlsbad to State Line						6.7

Table 5. Depletions Due to Irrigation Above Sumner Dam (C.1.a)								
Water Year	2019							
4/15/2020								
	APR	MAY	JUN	JUL	AUG	SEPT	OCT	TOTAL
Precip Las Vegas FAA AP	1.59	1.04	0.75	4.23	1.59	1.15	0.86	11.21
Eff prec Las Veg FAA AP	1.48	1.01	0.74	3.45	1.48	1.11	0.83	10.1
Precip Pecos Natl Monument	0.99	1.25	0.72	2.40	2.59	0.83	1.43	10.21
Eff Precip Pecos RS	0.96	1.19	0.70	2.14	2.28	0.81	1.35	9.43
Precip Santa Rosa	0.75	1.19	1.78	2.15	1.90	1.10	0.91	9.78
Eff Precip Santa Ro	0.73	1.14	1.64	1.95	1.75	1.06	0.88	9.15
Average eff precip, ft	0.09	0.09	0.09	0.21	0.15	0.08	0.09	0.80
Consumptive use, ft	0.19	0.36	0.36	0.30	0.27	0.18	0.11	1.77
Unit depletion rate (CU less eff precip), ft	0.10	0.27	0.27	0.09	0.12	0.10	0.03	0.97
Acres (most recent inventory)	11529							
Streamflow depletion (actual use), AF	11222							
1947 depletion, AF	10804							
Difference (actual use - 1947 depletion), TAF	0.4							
Adjustment to Gaged Flow, Pecos River below Sumner Dam, TAF =						0.4		

Table 6. Depletions Due to Santa Rosa Reservoir Operations (C.1.b)													
Water Year	2019												
4/15/2020													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
<i>LSR 2013 table (USBR), add 4,200 feet to value shown; LSR 1997 tables used (COE); Add 4,700 feet to value shown</i>													
Lk Sumner ga ht, avg	58.41	59.57	59.81	58.74	56.49	56.25	54.62	52.86	50.18	49.14	50.06	52.79	
LS content, AF, avg	30261	32829	33379	30976	26338	25876	22884	19902	15876	14495	15711	19789	
LS area, acres, avg	2150	2278	2306	2186	1935	1910	1767	1621	1376	1277	1365	1615	
LS evap, inches	3.66	5.49	6.13	10.97	12.72	14.83	15.14	14.07	11.30	7.39	4.03	3.74	109.48
.77 LS Evap	2.82	4.23	4.72	8.45	9.79	11.42	11.66	10.83	8.70	5.69	3.10	2.88	84.30
LS Precip, inches	0.09	0.01	0.85	1.68	0.62	1.14	1.86	1.06	1.20	1.11	0.74	0.28	10.64
Net LS Evap, inches	2.73	4.22	3.87	6.77	9.17	10.28	9.80	9.77	7.50	4.58	2.36	2.60	73.66
LSum Evaploss, TAF	0.49	0.80	0.74	1.23	1.48	1.64	1.44	1.32	0.86	0.49	0.27	0.35	11.11
L S Rosa ga ht, avg	34.76	34.62	35.05	38.70	41.54	39.47	35.34	32.43	26.48	21.59	21.40	21.47	
LSR content, AF, avg	53382	53022	54136	64207	72774	66466	54896	47570	34683	26179	25888	25995	
LSR area, acres, avg	2587	2576	2610	2902	3133	2964	2633	2404	1932	1545	1527	1534	
LSR evap, inches	3.72	4.98	8.58	8.74	9.76	11.42	12.23	11.35	9.38	6.35	4.88	3.76	95.15
.77 LSR Evap	2.86	3.83	6.61	6.73	7.52	8.79	9.42	8.74	7.22	4.89	3.76	2.90	73.27
LSR precip, inches	0.45	0.11	1.42	0.75	1.19	1.78	2.15	1.90	1.10	0.91	1.47	0.09	13.32
Net LSR Evap, inches	2.41	3.72	5.19	5.98	6.33	7.01	7.27	6.84	6.12	3.98	2.29	2.81	59.95
LSR Evaploss, TAF	0.52	0.80	1.13	1.45	1.65	1.73	1.59	1.37	0.99	0.51	0.29	0.36	12.39
Total evaploss, TAF	1.01	1.60	1.87	2.68	3.13	3.37	3.04	2.69	1.85	1.00	0.56	0.71	23.50
Sum contents, AF	83643	85851	87515	95183	99112	92342	77780	67472	50559	40674	41599	45784	
1947 area, acres	3339	3400	3453	3669	3774	3593	3130	2916	2268	1949	1972	2079	
1947 evaploss, TAF	0.76	1.20	1.11	2.07	2.89	3.08	2.56	2.38	1.42	0.74	0.39	0.45	19.03
current-1947evaploss	0.25	0.40	0.76	0.61	0.25	0.29	0.48	0.32	0.43	0.26	0.17	0.26	4.47
Annual adjustment for excess evaporation =													4.5
ADJUSTMENT FOR EXCESSIVE STORAGE IN SANTA ROSA RESERVOIR													
			2018	2018	2019	2019							
			Gage	Storage	Gage	Storage							
EndYear Sumner Sto			4257.59	28535	4253.79	21446							
EndYear S R Sto			4734.76	53382	4721.49	26026							
Sum				81917		47472							
Sto Adjustment, TAF						0.0							
Adjustm Ex Evap, TAF						4.5							
Total Adjustment, TAF						4.5							
			Storage adjustment										
			Both equal or less than 129.3 TAF, adjustment is zero										
			Both greater than 129.3 TAF, subtract previous from current year										
			Current year less than 129.3 TAF, previous greater than 129.3 TAF, subtract previous year from 129.3 TAF										
			Current year greater than 129.3 TAF, previous year less than 129.3 TAF, subtract 129.3 TAF from current year										

Table 7. Carlsbad Springs New Water [B.4.c.(2)]					
Water Year	2019				
4/13/2020					
		TAF	AF/day	cfs	Totals
Pecos R bel DC		17.0	46.6	23.5	23.5
Dark Canyon		0.0	0.0	0.0	0.0
Pecos R bel Lake Avalon		0.0	0.0	0.0	0.0
Depletion, cfs					2.0
CID lag seep, cfs (from Table 8)					6.9
Return flow, cfs					1.0
Lake Av lagged seep, cfs (from Table 9)					14.4
PR seepage, cfs					3.0
Carls new water, cfs					0.26
Carls new wat, TAF					0.2
Carls new wat monthly, TAF					0.0

Table 8. Carlsbad Main Canal Seepage Lagged [B.4.c.(2)(e)]													
Water Year	2019												
4/13/2020													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
WY 2019													
CID, TAF	0	0	3.6	11.4	9.5	9.9	9.5	12.8	8.6	7.2	0.2	0.0	72.6
days/mo	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs	0	0	58.8	191.7	154.1	166.2	154.5	207.6	145.0	116.9	2.8	0.0	99.8
cfs, qtr avg			20.2			170.5			169.3			40.3	
WY 2018		1Q	2Q	3Q	4Q								
FLOWS, cfs				150.6	27.6								
SEVEN %				10.5	1.9								
WY 2019 lagged		1Q	2Q	3Q	4Q								
FLOWS, cfs		20.2	170.5	169.3	40.3								
SEVEN %		1.4	11.9	11.9	2.8								
LAG		3.1	6.8	10.1	7.3	Avg =	6.9	cfs					

Table 9. Lake Avalon Leakage Lagged [B.4.c.(2)(g)]													
Water Year	2019												
	4/13/2020												
WY 2019	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Elev NM rept	64.1	73.2	73.5	74.2	74.0	74.3	74.2	73.8	74.1	74.3	60.9	60.0	
ga ht, avg*	7.1	16.2	16.5	17.2	17.0	17.3	17.2	16.8	17.1	17.3	3.9	3.0	
cfs	0.0	15.5	17.0	20.3	19.4	20.6	20.2	18.1	19.6	20.8	0.0	0.0	
days	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs avg	10.7			20.1			19.3			7.0			14.3
WY 2018		1Q	2Q	3Q	4Q								
cfs				22.7	6.6								
WY 2019 lagged		1Q	2Q	3Q	4Q								
cfs		10.7	20.1	19.3	7.0								
lag cfs		11.3	14.7	18.1	13.3	Avg =	14.4	cfs					

* Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum)

Table 10. Evaporation Loss at Lake Avalon [B.4.d.(1)]													
Water Year	2019												
4/13/2020													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
Av WS NM Rept	64.14	73.21	73.54	74.21	74.02	74.28	74.19	73.75	74.07	74.32	60.92	60.00	
Avalon ga ht, avg, ft*	7.14	16.21	16.54	17.21	17.02	17.28	17.19	16.75	17.07	17.32	3.92	3.00	
Avg area Avalon, ac**	0.00	596.00	634.00	711.00	690.00	719.00	709.00	659.00	696.00	723.00	0.00	0.00	
Panevap Brantley, in.	4.65	5.60	7.15	11.06	13.75	14.63	14.29	14.47	11.56	6.94	4.80	4.34	113.24
Lakeevap Brantley, in.	3.58	4.31	5.51	8.52	10.59	11.27	11.00	11.14	8.90	5.34	3.70	3.34	87.19
Precip Brantley, in.	0.06	0.00	0.60	0.33	0.00	2.63	1.02	0.57	1.14	3.69	1.22	0.10	11.36
Netevap, inches	3.52	4.31	4.91	8.19	10.59	8.64	9.98	10.57	7.76	1.65	2.48	3.24	75.83
Evaploss Av, TAF	0.00	0.21	0.26	0.49	0.61	0.52	0.59	0.58	0.45	0.10	0.00	0.00	3.80
* Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum)													
** Based on 2006 USBR Area and Capacity Table													

Table 11. Change in Storage, Lake Avalon [B.4.d.(2)]														
(Gage heights are end of month)														
Water Year	2020													
5/11/2020														
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
	2018	2019												
WS NM Rept	60.0	73.0	73.4	73.4	74.8	74.1	74.0	74.0	74.1	73.8	71.6	60.0	60.0	
Gage EOM, ft*	3.0	16.0	16.4	16.4	17.8	17.1	17.0	17.0	17.1	16.8	14.6	3.0	3.0	
Storage, AF**	0	1085.0	1323.0	1323.0	2300.0	1784.0	1715.0	1715.0	1784.0	1580.0	382.0	0.0	0.0	
Change sto, TAF		1.1	0.2	0.0	1.0	-0.5	-0.1	0.0	0.1	-0.2	-1.2	-0.4	0.0	0.0
* Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum)														
** Based on 2006 USBR Area and Capacity Table														

APPENDIX

RESPONSE TO STATES'
OBJECTIONS

RESPONSE TO STATES' OBJECTIONS

Final Report, Accounting Year 2020

NEW MEXICO OBJECTIONS

I. Table 4. Summary Table for Computations, Carlsbad to State Line (B.5)

NM noted that the Preliminary Report failed to subtract base flow from the Red Bluff scalped flow for November and December. Texas noted the same error. The states' recalculations were close, and Table 4 of the Final Report has been corrected with a value of 0.1 TAF for November and 0 TAF for December.

II. Accumulated Shortfall or Overage Table

NM noted that the Table of Annual and Accumulated Overage or Shortfall contains a one-time credit of 16,600 AF for Water Year 2017 that is the subject of a motion by Texas before the U.S. Supreme Court. This same observation was addressed in the AY2019 report, and no changes in this Final Report are required to respond to this issue at this time.

TEXAS OBJECTIONS

I. Table 4. Summary Table for Computations, Carlsbad to State Line (B.5)

Scalped Flood Flows for Carlsbad to Red Bluff

This objection has been accepted, see NM Objection I above.

Delaware River

Texas objected to the River Master's total inflow of 0.3 TAF and proposed 0.4 TAF based on its computation. The River Master checked USGS's original computation and noted that it was 346 AF, so this objection is rejected.

2. Table 1. General Calculation of Annual Departures in TAF for WY 2019

The final departure has been modified as a result of changes noted above in Tables 1 and 4.

(Texas's opening statement about reserving its rights in the open dispute before the Supreme Court is acknowledged.)

FINAL CALCULATED DEPARTURE

The Preliminary Report had a Final Calculated Departure as a shortfall of 10.0 TAF. After considering the states' objections, the Final Determination is a shortfall of 9.8 TAF.