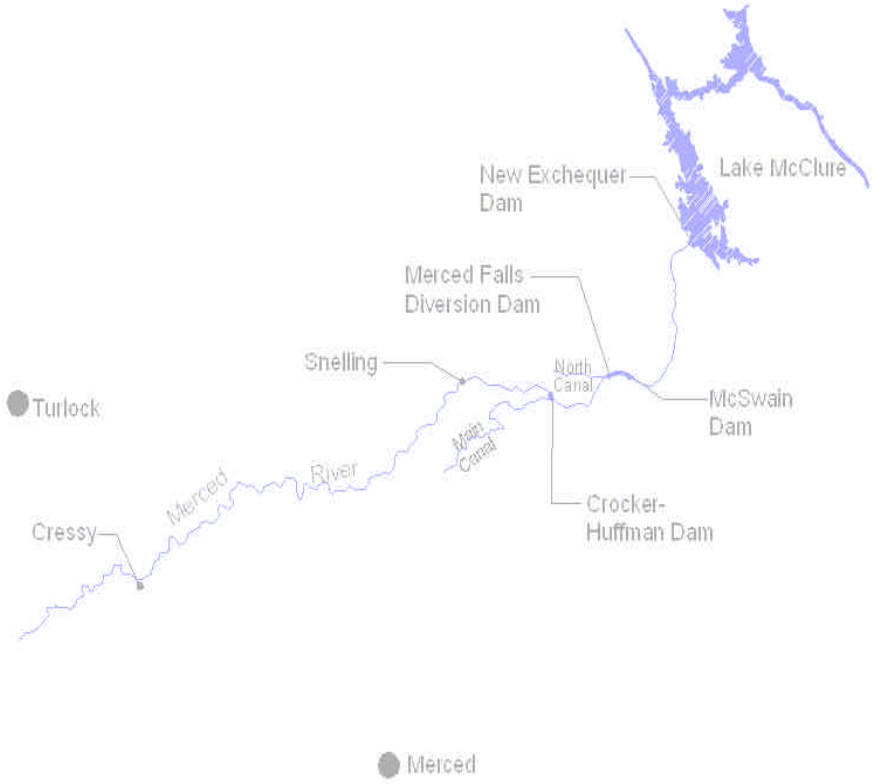
Merced River Simulation Model (MRSIM)



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Introduction

The Merced River Simulation Model (MRSIM) is a computer simulation model of the Merced River encompassing Lake McClure downstream to Cressey. MRSIM does not address reregulation of the Merced River above Lake McClure or operations downstream from Cressey. Figure 1 shows the area represented by the model. There are nine nodes in the model that are used to represent the Merced River:

MRSIM Node	Node Description
1	Lake McClure / Exchequer Dam
95	Accretions/Depletion from Exchequer Dam to Merced Falls Dam
100	Merced Falls Dam, Merced ID North Side Canal diversion
195	Accretions/Depletion from Merced Falls Dam to Crocker-Huffman Dam
200	Crocker-Huffman Dam, Merced ID Main Canal diversion
295	Accretions/Depletion from Crocker-Huffman Dam to Snelling
300	Merced River at Snelling
395	Accretions/Depletion from Snelling to Cressey
400	Merced River at Cressey

Although there are three regulatory reservoirs downstream from Lake McClure they are not operated by MRSIM, their storage is assumed to remain constant through out the simulation.

Model Description and Operation

MRSIM is a mass balance sequential simulation model that operates Lake McClure on a monthly time step to satisfy irrigation demands and instream flow requirements on the Merced River from Exchequer Dam to Cressey. MRSIM is written in FORTRAN and is specifically designed to simulate Lake McClure and the Merced River down to Cressey. Operational rules that are specific to this river system are incorporated into the FORTRAN code to reflect actual operational constraints.

MRSIM begins each month by operating Lake McClure for flood control and required releases from Exchequer Dam. After necessary releases have been made from Lake McClure MRSIM sequentially steps through each downstream node satisfying demands and instream flow requirements and accounting for river accretions and depletions.

When storage in Lake McClure falls below 115,00 AF storage releases can only be used for instream flows and Merced I.D. is not allowed to make diversions from the Merced River. During periods of low storage, MRSIM determines how much water Merced ID can divert each month while storage remains above 115,00 AF. In addition to simply curtailing diversions by Merced ID when storage in Lake McClure falls below 115,00 AF MRSIM makes a water supply forecast at the beginning of March each year to determine if the water supply available for that year is greater than or less than the diversion demands. If the available water supply is less than the diversion demand, the MRSIM shortens the irrigation season by setting the March and October diversion demands to zero. If the available water supply is insufficient, the remaining deficit is distributed proportional over the April through September period.

Model Operation Criteria

Lake McClure/New Exchequer Dam Flood Control Storage Limits:

Rain Flood Space

Jun. 16 to Aug. 31:	1024.6 TAF
Sep. 1 to Oct. 31:	Linear reduction from 1024.6 TAF to 674.6 TAF
Nov. 1 to Mar. 15:	674.6 TAF
Mar. 16 to Jun. 15:	Linear increase from 674.6 TAF to 1024.6 TAF

Conditional Space (snow melt flood space)

During the months of March through July, depending on the forecasted runoff and demands, the allowable storage may fall anywhere between the above defined Rain Flood Space and the following Maximum Conditional Space. Although this is an important in actual operations it is not addressed in MRSIM.

Mar. 1 to Mar. 31:	Linear reduction from 674.6 TAF to 624.6 TAF
Apr. 1 to May 15:	624.6 TAF
May 16 to Jul. 31:	Linear increase from 624.6 TAF to 1024.6 TAF

The following table summarizes the flood control storage limits in terms of end-of -month storages in 1000 AF:

Maximum End of Month Storage for Flood Control

Month	Rain Flood Storage Limit	Maximum Conditional Space Storage Limit
Oct	674.6	674.6
Nov	674.6	674.6
Dec	674.6	674.6
Jan	674.6	674.6
Feb	674.6	674.6
Mar	736.0	624.6
Apr	850.0	624.6
May	968.0	708.0
Jun	1024.6	864.0
Jul	1024.6	1024.6
Aug	1024.6	1024.6
Sep	858.0	858.0

Merced River Flow Requirements

MRSIM operates to satisfy minimum flow requirements but ignores maximum allowable flow requirements, therefore the maximum allowable flow in the Merced River at Cressey of 6,000 cfs is ignored in MRSIM. In actual operations it is better to encroach in the flood control space in Lake McClure than it is to exceed 6,000 cfs in the Merced River below Crocker-Huffman. This operation criterion is important in daily operations for flood protection, but has a minimal impact on monthly planning model operations.

Due to water rights adjudication (Cowell Agreement), Merced must make available, below Crocker-Huffman diversion Dam an amount of water that could then be diverted from the river at a number of private ditches between Crocker-Huffman Diversion Dam and Shaffer Bridge. The Merced River also has flow requirements as set forth by the Federal Energy Commission (FERC) and the Davis-Grunsky contract between the State of California and Merced ID. In order to satisfy the flow requirements and the Cowell Agreement, Merced I.D. operates to a target flow below Crocker-Huffman diversion dam equal to the Cowell Agreement adjudicated entitlement plus the FERC/Davis-Grunsky flow requirement. The flow below Crocker - Huffman Diversion Dam must be equal the greater of the Davis-Grunsky and FERC flows plus the Cowell Agreement Entitlement. The flow requirement and Cowell Agreement entitlements are listed in the following table.

Minimum Flow Requirements (cfs)

Month	Davis-Grunsky	FERC		Cowell Agreement Entitlement
	Crocker-Huffman Dam to Shaffer Bridge	At Shaffer Bridge		
		Normal Year [1]	Dry Year [2]	
Oct 1-15	0	25	15	50 [3]
Oct 16-31	0	75	60	50 [3]
Nov	180-220	100	75	50 [3]
Dec	180-220	100	75	50 [3]
Jan	180-220	75	60	50 [3]
Feb	180-220	75	60	50 [3]
Mar	180-220	75	60	100
Apr	0	75	60	175
May	0	75	60	225
Jun	0	25	15	250 [4]
Jul	0	25	15	225 [4]
Aug	0	25	15	175 [4]
Sep	0	25	15	150 [4]

1. Normal year as defined by FERC license: Forecasted April through July inflow to Lake McClure is equal to or greater than 450 TAF, as published in DWR May 1 Bulletin 120.
2. Dry year as defined by FERC license: Forecasted April through July inflow to Lake McClure is less than 450 TAF, as published in DWR May 1 Bulletin 120.
3. Entitlement is equal to 50 cfs or the natural flow of the Merced River (inflow to Lake McClure), whichever is less.
4. If the natural flow of the Merced River falls below 1,200 cfs in the month of June, the entitlement flows are reduced accordingly from that day: 225 cfs flow for next 31 days; 175 cfs flow for next 31 days; 150 cfs for next 30 days; 50 cfs for the remainder of September

Using the Model

MRSIM is written in Lahey FORTRAN 95 as a DOS application. Input to MRSIM is constructed using an Excel spreadsheet. The Excel spreadsheet builds input files containing demands, reservoir data,

minimum flows, and accretions / depletions, which are read in to MRSIM as ASCII text files. An Excel spreadsheet has been designed to analyze MRSIM output and compare alternative simulations of MRSIM.

Data Files, Requirements, and Data Development

Gage data, historical information, and calculated time series data are included in Appendix A of this document. There are five input files to MRSIM: control file input, reservoir input, demand input, accretion / depletion input, and minimum flow input. Most input data to MRSIM are in units of 1000 AF per month. The contents of each file and a brief description are provided below.

Control File Input

The Control file contains information that controls the simulation. Title of the simulation, names of input and output files, beginning year, number of years in simulation, and nodal information are contained in the control file. Included in the nodal information is the number of the node directly upstream of each node, an indicator for delivery allocation, and an indicator to consider this node in the water supply forecast. The first node must be the reservoir (Lake McClure) and the node at the upper most part of the system, all other nodes must follow in sequential order moving downstream. The model will skip most lines that begin with the letter c.

```
c
c
MRSIM Existing conditions              ! Simulation title
1970  30                               ! Begining year, number of years
demand.prn                             ! Demand input file name
accdep.prn                             ! Accretions / depletions input file name
minflow.prn                            ! Minimum flow input file name
res.prn                                ! Reservoir data input file name
output                                 ! Output file name
c
c  forecasting routine data
0.9999          !fraction of total demand satisfied below which irrigation season is        c
shortend, march and october set to zero
c
9                  number of nodes
c node number, upstream node, delivery allocation indicator, use node in supply forecast
1      0     0    1             Lake McClure / Exchequer Dam
95     1     0    1     Accretions/Depletion from Exchequer Dam to Merced Falls Dam
100   95     1    1     Merced Falls Dam, Merced ID North Side Canal diversion
195  100     0    1     Accretions/Depletion Merced Falls Dam to Crocker-Huffman Dam
200  195     1    1     Crocker-Huffman Dam, Merced ID Main Canal diversion
295  200     0    0     Accretions/Depletion from Crocker-Huffman Dam to Snelling
300  295     0    0             Merced River at Snelling
395  300     0    0     Accretions/Depletion from Snelling to Cressey
400  395     0    0     Merced River at Cressey
```

Reservoir Input

The reservoir data file contains data that describes the physical characteristics of the reservoir, operational criteria, and a time series of hydrologic data.

```
c       Reservoir operations data for Exchequer
c
c
       1        reservoir node number
  1024.6     3.0   115.0   749.6            max_stor, dead_stor, min_stor, ini_stor
c
c                                    equation to calcualte area based on storage
4.205  62.651  89.497  94.002   area = 4.205*Stor + 62.651*Stor^0.5 + 89.497*Stor^(1/3) - 94.002
c
c       flood rule, maximum allowable storage
```

```
c       Oct     Nov     Dec     Jan     Feb     Mar     Apr     May     Jun     Jul     Aug     Sep
       674.6   674.6   674.6   674.6   674.6   735.0   845.0   970.0  1024.6  1024.6  1024.6   850.0
c
c       power rule, water will be released from storage to this rule to ramp down for fall flood
c    control, but releases will remain below power plant capacity
       674.6   674.6   674.6   674.6   674.6   735.0   845.0   970.0  1024.6  1024.6  1024.6   850.0
c
c       max power plant release capacity – not currently used
      9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0  9999.0
c
c       Reservoir time series data
c       inflow  evap rate (inches/month)
c
 1970.01    18.7     4.1             ! Water year.month, inflow, evaporation rate
 1970.02    17.9    -1.2                      !   Month 1=October
 1970.03    31.3    -2.4                      !   Month 2=November
 1970.04   151.5    -4.5
   .   .     .       .
 1999.10    35.9    12.5
 1999.11    13.1    12.1
 1999.12    10.1     8.3
```

River Demand Input

This file contains direct diversion demand data. Demands can be placed at any node in the model, including Lake McClure. The demands in this file will be fully satisfied unless they are subject to reduction as specified in the *Control File* by a "1" in the *delivery allocation indicator.*

```
c       Demand data for Merced ID in 1000 AF
c                   100  MID northside Canal
c                   200  MID Main Canal
       2
                    100            200
c
 1970.01         1.9420        35.8359       ! year.month, demand at node 100, demand at node 200
 1970.02         0.0000         0.0000  !   Month 1=October
 1970.03         0.0000         0.0000  !   Month 2=November
 1970.04         0.0000         0.0000
   .               .              .
 1999.10         4.1420       115.8580
 1999.11         3.5310       106.2933
 1999.12         2.2430        63.3114
```

River Accretions / Depletions Input

This input file contains all the gains and losses (accretions and depletions) occurring between flow gages along the Merced River. Accretion / depletion data represent gains and loss occurring along specific river reaches, which are bounded by flow gages. Historical flow data used in the computation of accretions / depletions are included in Appendix A. Accretions / depletions along the Merced River are calculated using the following equations:

Exchequer Dam to Merced Falls Dam Accretions and Depletions

+ Merced River below Merced Falls
+ Merced ID Northside Canal at head
- Exchequer Release

Merced Falls Dam to Crocker-Huffman Dam Accretions and Depletions

+ Merced River below Crocker Huffman Dam
+ Merced ID Main Canal
- Merced River below Merced Falls

Crocker-Huffman Dam to Snelling Gage Accretions and Depletions

+ Merced River at Snelling
- Merced River below Crocker Huffman Dam

Snelling Gage to Cressey Gage Accretions and Depletions

+ Merced River at Cressey
- Merced River at Snelling

```
Accretion / Depletion data for Merced River 1000 AF
c             95   Exchequer Dam to Merced Falls Dam Accretions and Depletions
c            195   Merced Falls Dam to Crocker-Huffman Dam Accretions and Depletions
c            295   Crocker-Huffman Dam to Snelling Gage Accretions and Depletions
c            395   Snelling Gage to Cressey Gage Accretions and Depletions
       4
               95     195     295     395
c
 1970.01     0.3     7.6   -14.0    -6.9
 1970.02    -1.1     6.4    -9.2     0.0
 1970.03     1.4     4.2    -8.5     2.1
 1970.04     3.8     1.5    -1.0    11.7
   .          .       .       .       .
 1999.10    -0.5    -1.2    -5.0    -2.5
 1999.11    -0.6    -1.1    -4.3    -2.5
 1999.12    -1.2    -0.6    -4.2    -2.3
```

Minimum Flow Input

Calculation of minimum flow requirements

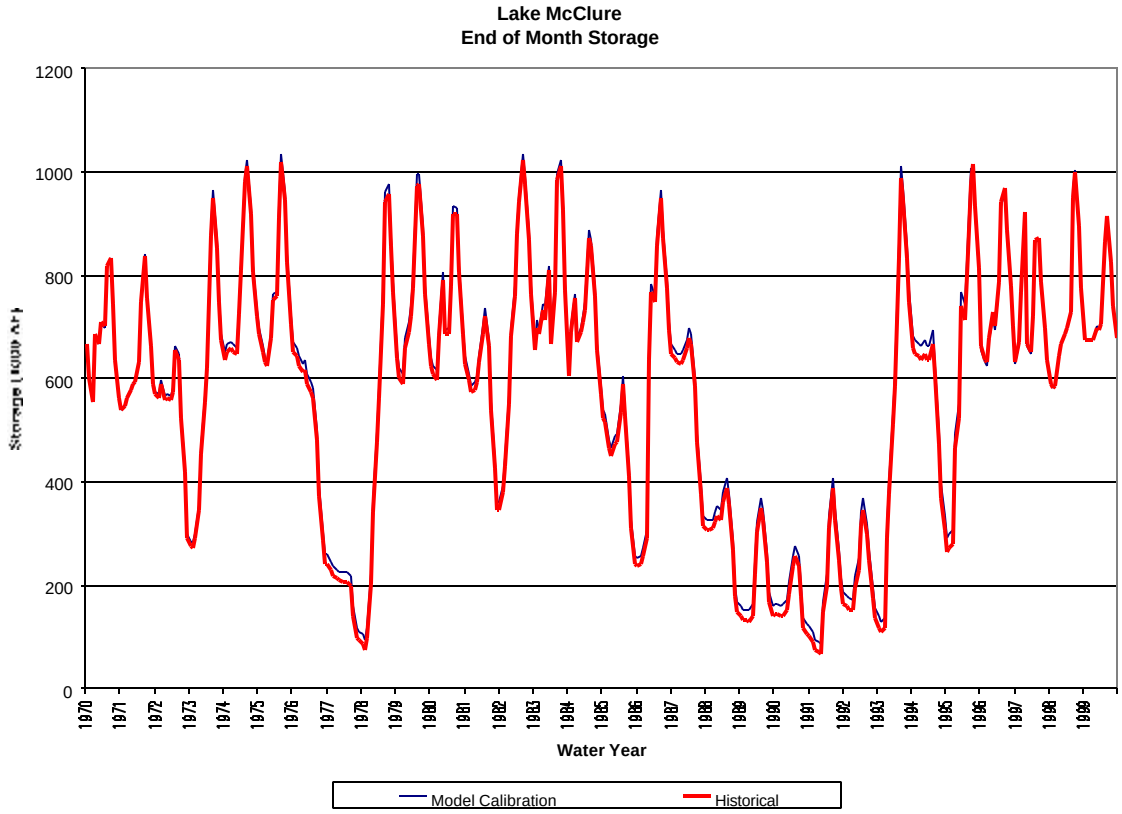
```
c       Minimum flow data for Merced River 1000 AF
c
c              1  Merced River below Exchequer
c            200  Merced River below Crocker Huffman
c
       2
                1     200
c
 1970.01     0.0     6.2
 1970.02     0.0    16.1
 1970.03     0.0    16.6
 1970.04     0.0    16.6
   .          .       .
 1999.10     0.0    15.4
 1999.11     0.0    12.3
 1999.12     0.0    10.4
```

Model Verification

Calibration is a process of ensuring MRSIM maintains the historical water budget and can replicate the operations of Lake McClure that have occurred historically. MRSIM is calibrated by using historical river demands for Merced ID, historical stream accretions / depletions, historical reservoir inflow, and historical evaporation.

Throughout the historical period of this study (water year 1970 – 1999) many factors have influenced the operation of the Merced River system. Many of these factors change each year and are difficult to address in a monthly planning model. Due to the many factors that have influenced operations, actual flows at Cressey on the Merced River are used to drive the Lake McClure operation for the calibration scenario. This forces the reservoir to make releases for flood control, demands, and instream flow needs as was done during the historical period accounting for any nuances during the historical period.

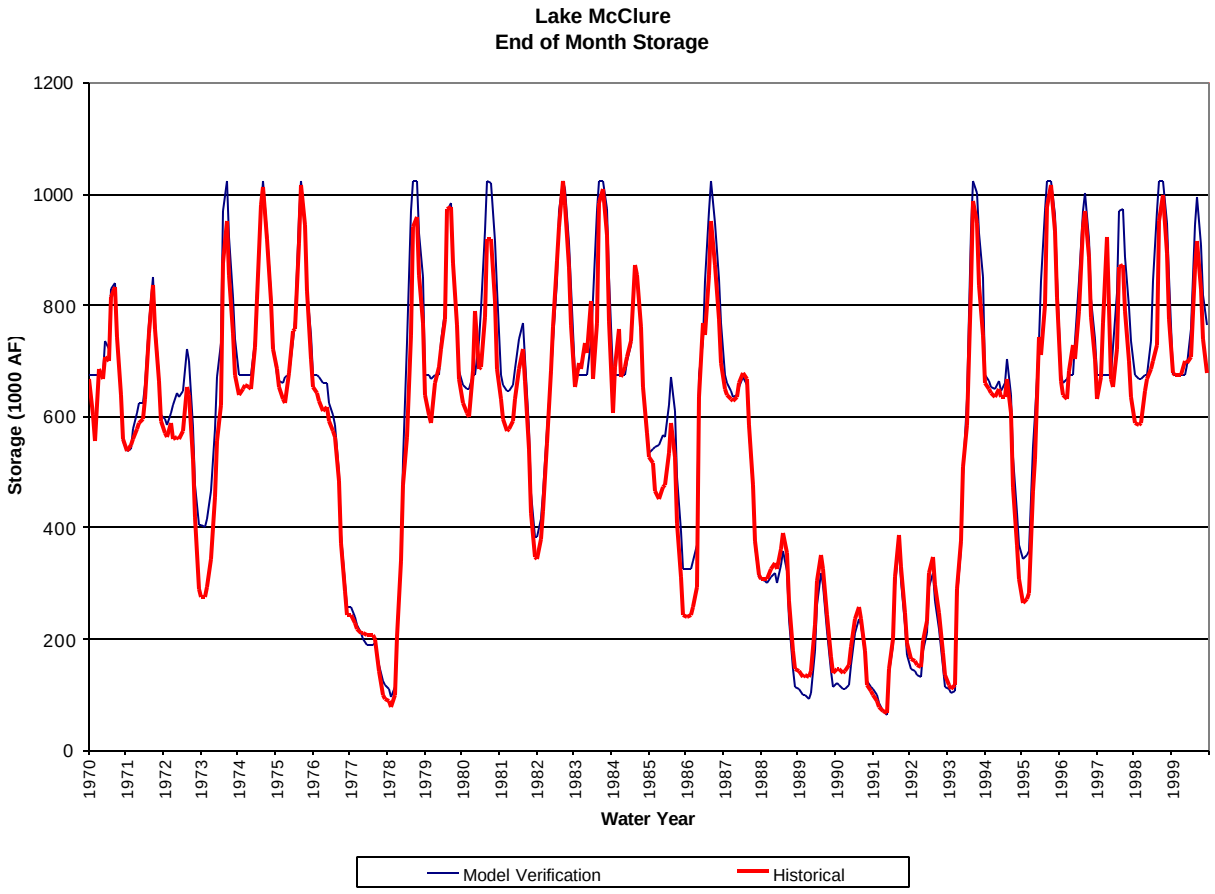
Using historical flows at Cressey to drive the operation of Lake McClure forces all errors in the calibration to be realized as variations in Lake storage. The figure below demonstrates the accuracy of the calibration by comparing simulated end of month storage to actual historical storage. The simulation compares very well to historical. A majority of the difference between the verification model simulation and historical are due to assumptions in MRSIM regarding evaporation.



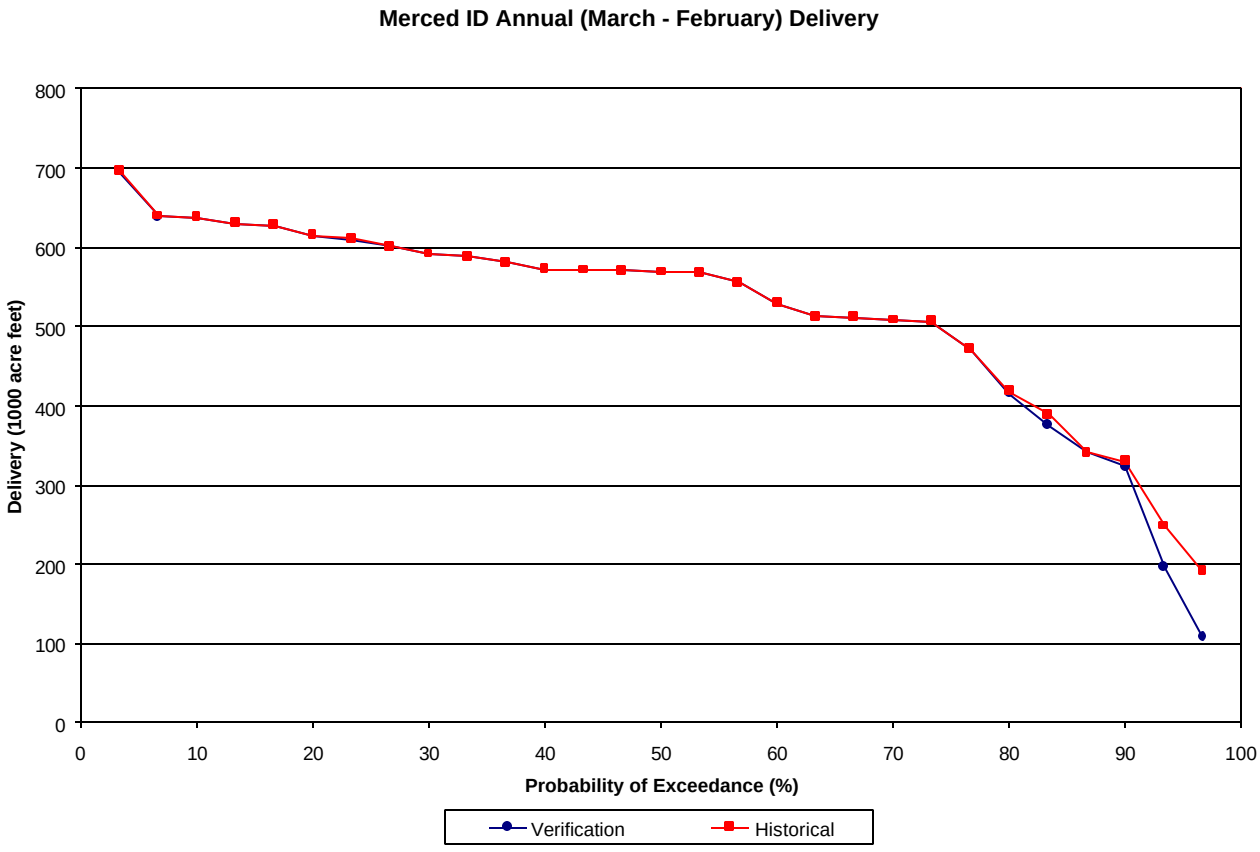
Model Operational Rule Verification

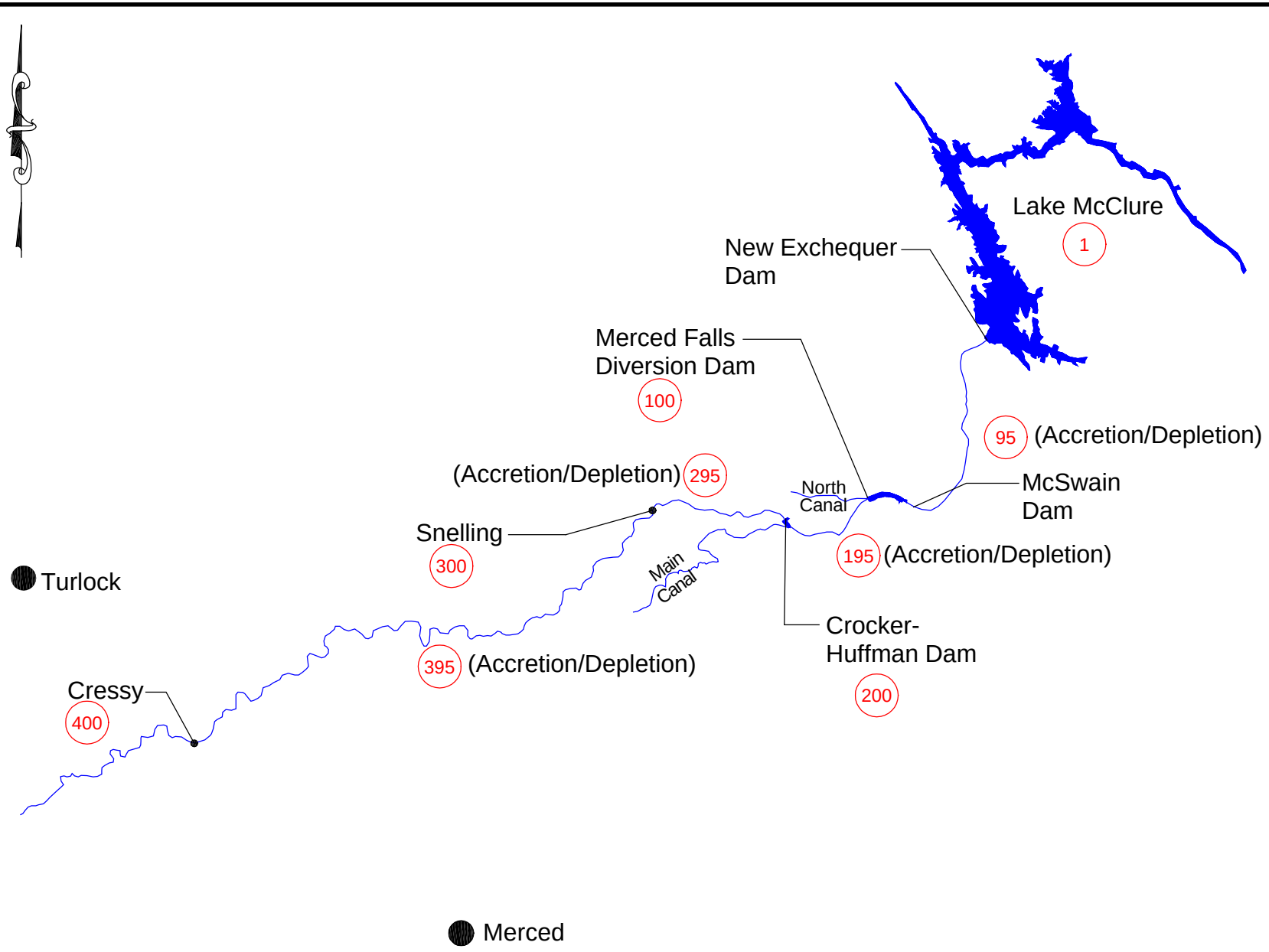
Verification is a means of demonstrating how the operation of MRSIM, using historical data and current operating criteria, compares to historical operations. This process differs from the calibration process in that it uses rules to operate the Merced River system rather than historical flows. The verification scenario uses minimum flow criteria described above, reservoir operational constraints (i.e. 115,000 AF minimum storage rule), and reservoir flood rules. The operational rules built into the verification scenario are used for future scenarios analyzed with MRSIM.

By using the operational criteria describe in this document for minimum flows established below Crocker – Huffman Diversion Dam, historical Merced ID river demands, and reservoir flood control criteria a comparison of how MRSIM operates under these constraints can be compared to historical. The difference between the model verification and the historical end of month storage are presented in the figure below.



Differences in delivers are presented in the following figure. The variation from historical are caused by the use of operational rules rather than forcing the system to behave as it did historically. The model verification demonstrates that MRSIM is operating the system according to the defined operating rules.





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Merced River Simulation Model
Model Schematic

Figure 1

Appendix A

Support Data
For
Merced River Simulation Model
MRSIM

MRSIM Control Point 1
Historical Flow below Exchequer

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	97.8	84.3	79.0	25.0	83.3	68.5	95.3	99.0	105.8	119.1	111.9	78.8	1047.8
1971	23.0	10.0	40.6	29.9	27.3	51.8	60.0	60.9	86.0	118.5	96.3	72.0	676.4
1972	22.5	17.4	12.2	53.3	28.1	83.1	63.5	86.5	112.7	126.7	108.1	137.7	851.8
1973	19.6	16.0	11.5	11.6	12.2	12.3	68.0	125.9	126.0	130.1	118.2	79.9	731.3
1974	42.1	44.1	51.7	92.9	44.8	55.7	78.1	158.9	172.4	134.9	126.2	93.0	1094.7
1975	42.0	41.5	36.8	30.0	52.9	51.3	92.2	151.8	223.5	135.8	129.7	129.7	1117.3
1976	75.7	28.7	30.4	23.6	10.6	58.7	63.4	101.4	96.4	112.9	88.9	49.5	739.9
1977	4.1	15.3	12.1	8.8	6.6	9.0	30.7	33.3	50.6	60.7	43.6	6.2	280.9
1978	5.1	13.6	12.3	9.8	7.0	50.3	145.7	195.4	206.5	138.9	138.3	133.4	1056.4
1979	139.2	49.3	27.5	25.3	74.7	102.8	77.4	144.7	145.8	135.3	124.2	103.7	1149.9
1980	51.6	31.1	27.5	178.8	146.9	261.5	167.2	191.6	140.3	134.5	138.3	133.7	1602.7
1981	60.2	40.6	30.8	16.3	11.7	11.3	61.1	125.7	124.4	133.9	117.7	80.7	814.2
1982	5.8	14.8	13.1	11.0	72.6	104.0	323.0	358.5	192.2	171.6	146.6	141.2	1554.4
1983	169.5	50.2	162.5	138.8	240.6	293.9	324.0	322.5	429.6	326.5	180.4	191.5	2830.0
1984	198.5	27.8	144.7	182.4	60.1	76.8	99.4	124.9	126.7	133.8	115.8	87.3	1378.4
1985	51.7	36.4	72.0	33.4	11.0	53.1	89.2	114.1	115.7	126.7	99.3	75.6	878.2
1986	10.9	11.6	15.6	9.5	14.7	158.0	215.5	199.7	138.9	128.2	110.6	85.2	1098.4
1987	50.3	12.9	10.1	11.0	11.0	13.4	75.7	109.2	108.2	111.7	100.4	63.2	677.1
1988	9.1	12.7	12.4	12.1	12.4	59.1	50.2	74.0	79.1	98.0	91.3	32.6	543.1
1989	7.0	12.1	9.2	15.6	11.3	13.1	78.3	89.6	90.1	93.5	81.0	31.8	532.4
1990	6.5	11.8	13.0	12.0	11.3	20.6	57.3	61.7	62.4	74.5	60.8	11.4	403.2
1991	7.4	13.9	14.3	9.5	6.4	11.2	24.4	55.1	63.8	85.5	85.5	54.5	431.6
1992	32.9	14.6	13.7	14.3	13.4	14.5	42.1	74.9	75.2	75.7	76.7	39.8	487.8
1993	18.0	15.7	14.1	11.2	11.9	22.9	107.3	132.8	120.8	132.2	129.9	92.9	809.8
1994	93.8	13.4	14.4	14.2	12.9	50.1	78.0	81.8	106.1	133.2	103.3	61.8	762.9
1995	51.7	15.0	15.4	14.6	11.3	141.3	237.3	297.5	294.1	274.6	142.7	136.1	1631.5
1996	157.1	29.8	31.7	15.1	137.8	179.0	105.2	157.8	121.7	125.0	115.0	79.2	1254.3
1997	70.6	16.8	132.9	458.6	367.8	131.4	100.2	121.6	108.4	114.5	96.5	64.5	1783.8
1998	48.2	12.0	12.3	39.1	229.8	147.8	181.3	218.5	233.3	240.5	157.1	144.6	1664.5
1999	110.7	17.3	27.4	47.6	84.8	69.1	113.9	121.5	103.0	116.6	95.6	64.2	971.7
Avg.	56.1	24.4	36.7	51.8	60.9	79.2	110.2	139.7	138.7	134.8	111.0	85.2	1028.6
Max	198.5	84.3	162.5	458.6	367.8	293.9	324.0	358.5	429.6	326.5	180.4	191.5	2830.0
Min	4.1	10.0	9.2	8.8	6.4	9.0	24.4	33.3	50.6	60.7	43.6	6.2	280.9

Source: Merced ID

MRSIM Control Point 1
Inflow to Exchequer

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	18.7	17.9	31.3	151.5	65.9	107.0	89.0	218.8	129.0	34.3	11.6	5.4	880.5
1971	3.0	18.2	52.7	45.5	37.4	56.7	98.0	182.6	181.7	44.3	7.5	4.3	731.8
1972	3.0	10.5	38.0	21.0	31.8	78.5	80.9	169.4	99.9	18.4	6.3	12.6	570.2
1973	6.1	13.1	29.4	63.2	123.3	112.1	133.0	391.4	203.2	39.3	19.1	7.0	1140.3
1974	9.3	57.8	57.2	85.5	36.1	133.0	162.9	335.5	207.5	48.8	20.8	12.2	1166.7
1975	7.6	5.4	14.7	21.6	104.9	127.4	98.4	319.9	331.1	68.0	18.4	12.4	1129.9
1976	25.5	19.1	12.6	6.8	16.8	30.5	48.5	92.5	18.9	7.6	6.3	7.5	292.5
1977	3.8	1.7	0.9	2.5	3.5	6.3	30.4	37.3	42.8	5.9	2.2	0.9	138.2
1978	0.5	2.0	34.6	112.3	145.9	186.1	232.7	382.6	405.3	162.6	41.0	49.2	1754.9
1979	12.6	12.2	14.9	94.2	103.8	129.7	136.3	347.8	154.1	41.4	11.2	12.0	1070.1
1980	10.0	13.1	18.8	258.7	251.1	153.5	172.3	282.8	290.0	138.8	31.9	15.6	1636.7
1981	8.4	7.5	9.0	18.4	26.1	49.3	118.6	164.8	69.4	16.4	7.7	4.7	500.4
1982	5.6	48.1	66.0	128.3	200.3	186.8	437.4	426.4	277.4	134.3	45.1	39.2	1995.0
1983	59.2	94.0	143.8	184.8	234.4	368.8	186.2	430.6	646.1	358.4	101.7	41.0	2849.1
1984	34.9	108.9	206.4	97.1	79.2	98.6	128.4	269.6	114.5	45.4	14.9	8.1	1206.0
1985	9.0	25.3	20.6	18.5	33.6	57.1	149.2	171.0	57.0	14.5	6.2	5.4	567.5
1986	8.7	14.2	32.4	43.8	357.8	286.6	196.3	317.2	235.2	58.3	18.3	8.4	1576.9
1987	8.3	3.6	3.6	6.3	18.5	35.9	99.3	100.6	31.3	7.3	5.3	3.3	323.1
1988	5.1	14.0	12.2	26.8	24.3	50.6	87.3	104.0	48.9	13.6	5.0	2.6	394.5
1989	1.3	4.5	9.5	12.2	23.2	94.8	158.5	137.9	68.4	15.2	5.9	5.8	537.2
1990	13.3	10.1	8.8	14.4	20.1	54.4	110.6	82.8	44.1	18.3	3.3	1.4	381.6
1991	1.0	2.9	1.8	2.7	2.9	93.2	78.8	167.8	141.6	30.0	7.2	2.9	532.9
1992	4.7	10.0	7.0	11.4	59.2	48.8	130.7	105.3	29.1	27.8	5.2	2.1	441.4
1993	1.8	5.4	21.7	182.3	99.9	156.2	183.0	386.2	277.0	96.8	23.9	10.0	1444.3
1994	8.2	5.1	7.2	10.0	24.6	37.4	79.5	115.4	43.9	9.4	4.2	3.0	347.7
1995	10.0	21.1	24.7	196.6	69.9	355.2	214.3	382.8	473.7	281.3	67.6	20.1	2117.3
1996	10.0	5.8	24.1	61.6	180.7	152.7	195.2	311.5	154.1	49.1	14.5	6.2	1165.5
1997	3.9	54.5	224.8	610.3	112.2	118.2	171.9	272.8	119.6	35.3	13.0	6.2	1742.6
1998	3.9	5.1	14.9	93.2	246.3	166.4	195.2	245.5	475.9	284.2	51.6	29.1	1811.3
1999	14.5	16.4	26.0	46.9	108.7	64.0	124.8	281.9	159.5	35.9	13.1	10.1	901.8
Avg.	10.4	20.9	39.0	87.6	94.7	119.9	144.3	241.2	184.3	71.4	19.7	11.6	1044.9
Max	59.2	108.9	224.8	610.3	357.8	368.8	437.4	430.6	646.1	358.4	101.7	49.2	2849.1
Min	0.5	1.7	0.9	2.5	2.9	6.3	30.4	37.3	18.9	5.9	2.2	0.9	138.2

Historical Release from Exchequer adjusted for historical change in storage and evaporation

MRSIM Control Point 1
Exchequer Evaporation Rate

Inches / month

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1971	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1972	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1973	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1974	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1975	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1976	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1977	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1978	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	46.8
1979	4.1	-1.2	-2.4	-4.5	-5.9	-2.7	4.3	7.7	11.8	12.1	11.0	9.0	43.3
1980	-0.1	-1.2	-2.0	-6.9	-4.2	1.3	3.8	6.4	10.6	13.2	11.2	8.9	41.0
1981	5.9	2.9	-0.4	-6.7	0.8	-3.2	4.1	9.0	13.6	14.3	12.7	9.8	63.0
1982	1.9	-3.9	-2.4	-5.0	-1.9	-5.4	2.4	10.8	11.0	12.8	12.3	5.0	37.6
1983	0.3	-5.1	-2.3	-6.9	-5.7	-8.5	1.8	7.9	11.3	12.7	11.3	6.3	23.0
1984	4.7	-8.5	-5.0	0.9	-0.6	2.9	5.0	11.3	11.7	14.6	12.8	10.5	60.2
1985	2.8	-4.9	-1.0	-0.2	0.3	-1.7	6.8	9.2	12.2	13.2	12.1	5.8	54.7
1986	4.4	-3.6	-0.9	-2.2	-8.4	-2.5	4.6	9.3	12.3	13.4	12.3	6.7	45.3
1987	5.7	3.0	-0.2	-1.5	-1.6	-1.3	7.1	9.8	12.5	13.1	12.8	9.5	69.0
1988	6.1	0.2	-1.2	-1.5	2.2	5.0	2.3	7.8	11.3	15.0	13.4	10.3	70.9
1989	7.1	-0.6	-2.7	-0.5	0.0	-1.9	5.6	9.3	12.0	14.7	12.3	5.9	61.3
1990	1.2	0.5	0.9	-1.0	-1.7	2.1	4.7	5.8	11.8	14.6	13.2	9.8	61.9
1991	6.9	2.1	0.1	1.2	0.9	-8.8	5.7	7.2	10.9	14.1	12.0	10.0	62.4
1992	4.1	1.8	-1.7	-1.1	-2.6	-1.0	5.0	9.9	9.7	10.6	12.3	8.6	55.6
1993	3.2	1.8	-6.0	-12.1	-4.4	-2.0	3.4	5.7	8.6	12.2	11.7	9.7	32.0
1994	4.9	1.6	-1.5	-0.8	-3.0	3.3	2.3	5.6	11.9	13.4	12.9	8.4	58.8
1995	3.6	-3.7	-2.3	-14.2	0.8	-9.2	0.2	3.1	7.1	11.5	11.9	8.4	17.2
1996	6.1	2.4	-5.1	-6.1	-6.5	0.2	2.5	3.5	9.4	13.3	12.3	8.7	40.6
1997	4.2	-4.1	-11.1	-9.8	1.6	4.1	6.4	9.8	10.2	12.4	11.1	8.4	43.3
1998	4.3	-3.3	-1.1	-11.0	-12.2	-2.1	-0.6	-2.3	6.3	11.2	10.9	6.8	6.9
1999	4.5	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.5	12.1	8.3	47.2
Avg.	4.1	-1.2	-2.4	-4.5	-2.6	-1.6	3.9	7.3	10.8	12.9	12.1	8.3	47.2
Max	7.1	3.0	0.9	1.2	2.2	5.0	7.1	11.3	13.6	15.0	13.4	10.5	70.9
Min	-0.1	-8.5	-11.1	-14.2	-12.2	-9.2	-0.6	-2.3	6.3	10.6	10.9	5.0	6.9

Source: 1979-1989 New Melones Evaporation
1970-1979 Average

MRSIM Control Point 100
Historical Flow below Merced Falls Dam

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	96.2	83.1	80.4	28.8	81.7	69.5	93.1	95.7	102.3	114.8	106.9	76.0	1028.4
1971	24.1	10.2	36.7	30.4	27.1	51.2	55.4	62.2	86.8	114.3	95.2	69.3	662.9
1972	26.5	13.7	12.3	52.3	30.3	79.9	62.3	82.9	106.5	118.4	103.5	135.4	824.0
1973	23.3	11.8	12.4	12.8	12.9	13.7	64.7	117.5	117.8	123.6	113.9	79.0	703.4
1974	39.8	42.8	51.2	92.6	40.1	53.8	75.6	151.1	166.9	133.0	123.3	86.7	1056.9
1975	39.5	40.4	35.7	30.6	54.3	51.9	91.6	155.9	219.1	133.2	126.2	124.9	1103.4
1976	76.2	30.2	30.4	21.9	11.5	54.9	63.0	96.0	92.0	107.0	86.1	46.7	716.0
1977	6.9	11.1	11.3	8.2	6.3	8.6	28.9	32.5	48.4	56.7	39.1	4.9	262.8
1978	4.7	11.4	11.7	9.7	8.2	50.9	145.1	190.6	205.2	135.2	134.8	132.5	1039.9
1979	137.2	54.1	23.5	26.1	74.2	105.3	75.8	139.0	143.5	131.0	119.2	98.9	1127.9
1980	49.4	27.1	26.0	180.3	148.5	261.0	163.4	191.8	137.6	130.5	134.8	129.2	1579.5
1981	61.4	38.2	30.9	16.7	11.7	11.9	58.9	120.4	120.9	128.9	114.0	78.9	792.7
1982	8.3	11.3	12.1	12.8	67.8	103.7	311.2	350.6	179.2	161.9	136.6	132.4	1488.0
1983	162.1	52.0	150.7	139.6	235.9	287.8	314.1	309.2	415.1	318.3	169.8	181.4	2735.9
1984	193.3	28.7	137.1	180.6	60.0	74.8	97.3	120.3	121.5	127.2	109.1	82.9	1332.9
1985	52.0	33.9	72.3	33.2	11.0	51.6	84.5	109.2	110.6	121.0	94.1	72.9	846.3
1986	12.1	11.7	15.4	10.3	15.8	154.8	211.1	196.7	135.5	123.7	107.9	82.1	1076.9
1987	49.7	11.6	10.6	10.6	9.6	12.0	73.6	104.8	103.7	107.0	94.4	59.5	647.0
1988	8.2	11.9	12.2	12.8	12.0	55.1	49.5	68.7	74.7	92.7	84.6	31.2	513.5
1989	6.1	11.1	11.4	11.5	10.1	12.9	71.3	82.2	83.7	86.4	74.5	30.8	492.0
1990	6.5	11.6	11.8	11.8	11.0	19.3	53.6	59.2	58.1	69.4	56.2	10.1	378.6
1991	6.9	11.8	11.7	8.7	6.9	13.0	23.4	52.1	61.0	80.7	79.5	52.0	407.7
1992	30.6	13.6	14.5	14.7	13.8	14.7	41.1	74.2	73.6	74.8	75.4	38.2	479.2
1993	17.0	15.3	13.3	15.2	12.5	22.6	104.1	131.0	118.9	128.9	127.6	91.2	797.7
1994	93.2	12.5	13.8	14.0	12.9	48.4	74.0	76.2	99.7	125.4	96.5	55.8	722.5
1995	56.9	14.8	14.8	15.3	11.9	143.9	232.3	294.0	288.4	295.4	134.1	125.7	1627.4
1996	159.9	32.8	33.9	17.6	140.9	187.1	106.7	159.9	122.7	126.5	114.9	79.3	1282.2
1997	73.7	17.9	134.1	453.0	371.3	139.6	99.2	122.0	105.6	111.7	94.7	63.7	1786.3
1998	49.3	14.0	12.9	41.7	229.9	152.5	182.8	220.4	234.4	240.1	152.7	144.3	1675.0
1999	110.2	18.2	26.7	48.2	86.1	68.2	111.9	119.8	98.2	111.9	91.5	60.8	951.7
Avg.	56.0	23.6	35.7	52.1	60.9	79.2	107.3	136.2	134.4	131.0	106.4	81.9	1004.6
Max	193.3	83.1	150.7	453.0	371.3	287.8	314.1	350.6	415.1	318.3	169.8	181.4	2735.9
Min	4.7	10.2	10.6	8.2	6.3	8.6	23.4	32.5	48.4	56.7	39.1	4.9	262.8

Source: USGS gage data

MRSIM Control Point 200
Historical Flow below Crocker-Huffman Dam

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	75.3	82.1	81.0	29.2	86.3	52.6	10.0	8.9	9.0	9.6	9.0	8.3	461.4
1971	9.7	10.2	35.9	27.6	22.7	11.4	9.3	9.5	9.8	10.2	10.2	9.9	176.3
1972	19.0	11.7	12.4	57.3	32.2	16.0	9.6	10.7	10.7	10.9	10.9	73.3	274.5
1973	24.1	11.3	11.7	12.1	14.3	12.2	13.0	12.2	11.7	10.5	10.5	11.1	154.9
1974	21.7	46.9	51.5	101.8	38.0	29.1	24.3	41.6	58.7	12.6	12.3	11.0	449.3
1975	21.6	38.7	33.7	31.7	63.1	53.4	45.9	43.0	108.4	11.1	14.2	51.6	516.5
1976	52.7	28.4	29.7	18.1	7.5	9.7	9.1	9.2	9.3	9.5	10.1	6.0	199.2
1977	4.9	9.8	10.6	6.6	4.3	5.9	6.3	5.6	7.0	7.8	7.5	2.9	78.9
1978	2.3	9.5	10.0	8.4	7.6	57.3	141.9	116.0	93.7	14.0	22.1	73.5	556.3
1979	107.2	54.5	21.3	22.5	66.5	92.8	13.1	28.5	27.4	14.4	14.1	21.3	483.6
1980	25.6	23.5	23.3	173.5	135.7	228.9	68.7	70.1	25.3	13.7	21.3	45.1	854.6
1981	28.8	30.1	25.9	13.6	8.8	9.5	9.8	11.2	11.1	11.1	10.0	7.5	177.5
1982	6.4	10.2	10.1	10.7	65.1	93.0	267.4	221.9	67.5	44.9	22.5	35.6	855.5
1983	84.7	36.3	113.8	104.9	182.1	227.5	228.4	175.2	241.4	161.2	47.7	68.1	1671.2
1984	109.0	22.5	99.8	176.5	56.5	22.5	17.4	19.2	18.8	15.9	11.5	9.6	579.2
1985	13.6	32.1	71.9	33.6	10.4	9.7	12.5	16.2	14.5	11.6	10.2	10.0	246.2
1986	10.0	10.3	14.1	8.7	17.0	167.9	166.4	106.1	34.8	14.8	11.7	9.8	571.6
1987	20.4	9.9	8.9	9.9	9.3	10.3	10.2	15.3	15.0	13.0	11.2	7.6	140.8
1988	5.0	11.5	10.8	11.3	10.5	11.2	9.5	13.4	12.4	11.8	10.4	3.8	121.6
1989	5.6	11.7	12.7	12.8	11.5	13.6	14.3	25.9	14.4	12.3	10.7	4.8	150.4
1990	5.9	12.3	12.2	12.1	11.2	12.1	14.1	14.7	13.8	11.5	9.9	5.2	135.2
1991	6.3	12.5	12.9	8.8	7.0	14.3	10.2	12.3	10.8	11.3	12.7	10.6	129.8
1992	8.5	14.9	15.8	15.2	14.6	14.3	10.7	13.0	11.0	10.7	11.7	7.8	148.3
1993	19.5	16.0	11.4	12.5	13.1	15.6	84.8	70.7	46.6	35.9	53.3	46.6	425.9
1994	85.8	12.4	13.8	14.5	13.8	16.7	25.3	32.1	13.8	31.7	11.1	7.6	278.7
1995	24.7	13.8	14.1	16.8	12.2	140.7	190.1	220.5	184.9	155.6	33.1	45.0	1051.6
1996	97.0	26.9	28.7	17.1	128.3	155.6	47.5	68.6	19.8	14.8	13.9	13.1	631.4
1997	28.8	16.5	129.1	459.2	362.6	85.1	42.9	36.2	14.0	13.5	12.8	11.2	1211.8
1998	11.4	13.8	12.7	41.4	227.5	142.9	160.4	157.3	142.2	126.5	47.9	70.2	1154.2
1999	66.3	18.3	27.8	49.3	86.2	41.7	68.7	47.4	17.2	16.5	11.7	11.8	463.0
Avg.	33.4	22.0	32.3	50.6	57.5	59.1	58.1	54.4	42.5	28.3	16.9	23.3	478.3
Max	109.0	82.1	129.1	459.2	362.6	228.9	267.4	221.9	241.4	161.2	53.3	73.5	1671.2
Min	2.3	9.5	8.9	6.6	4.3	5.9	6.3	5.6	7.0	7.8	7.5	2.9	78.9

Source: Merced ID

MRSIM Control Point 400
Historical Flow at Cressey

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	54.4	72.8	74.6	39.9	88.0	59.1	10.5	6.8	5.4	4.5	4.4	6.5	426.9
1971	10.6	11.3	34.7	29.4	23.6	11.3	9.9	8.3	5.2	4.3	4.2	8.9	161.6
1972	19.3	12.5	14.5	47.0	31.0	13.5	8.4	6.6	5.0	4.9	4.5	55.2	222.5
1973	23.1	13.0	14.3	19.3	32.4	26.0	14.8	10.8	8.7	4.9	5.2	9.9	182.4
1974	22.9	40.8	47.0	93.7	39.2	32.3	26.7	38.8	48.5	10.9	10.5	11.7	423.0
1975	22.5	38.6	35.8	30.0	64.9	54.3	45.5	36.3	99.0	10.6	12.0	40.5	490.0
1976	49.0	25.6	27.5	20.5	10.1	10.6	8.8	7.8	5.6	4.1	5.7	5.3	180.5
1977	4.9	9.1	10.6	9.2	5.0	5.5	3.7	3.5	1.3	0.7	0.9	0.0	54.4
1978	0.3	6.1	10.7	17.6	23.9	49.2	137.6	96.8	81.1	10.4	15.7	60.1	509.5
1979	87.8	54.2	23.1	38.6	76.1	111.1	17.1	25.5	26.5	10.1	9.7	18.0	497.7
1980	31.8	25.5	26.4	181.2	152.4	246.0	77.3	77.5	25.7	10.7	17.3	46.0	917.8
1981	37.4	34.0	31.0	20.5	14.2	20.3	11.8	8.8	6.8	5.9	5.7	5.6	202.1
1982	7.8	13.4	11.8	18.8	75.2	117.1	282.7	236.0	71.7	52.3	22.2	38.6	947.3
1983	101.7	54.9	153.4	156.9	243.7	306.7	284.1	221.8	283.2	196.2	57.6	91.5	2151.6
1984	157.9	33.9	145.5	187.7	62.1	26.8	18.0	17.5	16.6	10.6	9.0	8.9	694.5
1985	17.3	32.4	72.2	38.9	15.1	14.6	12.7	11.6	10.0	8.4	8.9	9.3	251.6
1986	15.1	12.9	17.9	11.9	28.4	160.3	157.2	97.6	31.3	10.4	8.9	9.0	560.9
1987	23.2	12.1	11.1	11.0	11.3	17.1	9.2	10.5	8.1	6.6	7.3	9.0	136.3
1988	5.4	12.1	12.9	13.4	11.1	11.1	9.5	9.8	8.9	5.0	4.9	1.6	105.6
1989	2.7	10.0	10.4	11.0	10.2	14.1	10.5	10.8	8.9	3.8	3.3	1.8	97.6
1990	4.1	9.9	10.3	9.0	11.1	11.0	10.7	9.3	7.2	2.8	1.7	1.5	88.6
1991	2.6	8.7	10.1	6.9	4.2	18.8	7.9	5.8	2.1	2.2	2.3	3.5	75.0
1992	4.7	11.7	13.5	14.8	16.9	15.4	7.8	5.4	3.9	2.8	3.0	2.8	102.8
1993	12.7	13.6	12.2	36.2	19.1	19.4	61.7	54.0	31.9	23.2	37.6	35.1	356.7
1994	58.5	10.6	11.8	13.5	18.2	14.8	22.6	23.4	6.8	20.7	3.7	3.3	207.8
1995	20.9	13.2	12.8	36.6	14.6	155.1	195.4	226.6	188.8	151.9	30.2	37.2	1083.2
1996	109.1	24.6	24.8	21.3	144.4	175.8	52.2	74.7	15.1	5.4	3.9	5.7	657.0
1997	25.5	15.5	127.2	430.5	371.8	96.7	38.5	35.9	5.6	5.2	3.9	5.5	1161.7
1998	7.4	10.1	12.1	43.0	250.5	161.0	172.6	157.8	139.4	119.5	36.1	59.2	1168.6
1999	66.2	15.5	23.2	47.1	91.0	43.2	72.3	45.6	11.9	9.0	4.9	5.3	435.1
Avg.	33.6	22.0	34.8	55.2	65.3	67.3	59.9	52.7	39.0	23.9	11.5	19.9	485.0
Max	157.9	72.8	153.4	430.5	371.8	306.7	284.1	236.0	283.2	196.2	57.6	91.5	2151.6
Min	0.3	6.1	10.1	6.9	4.2	5.5	3.7	3.5	1.3	0.7	0.9	0.0	54.4

Source: DWR

MRSIM Control Point 100
Historical Merced ID North Canal Diversion

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	1.9	0.1	0.0	0.0	0.0	0.4	2.8	3.7	3.8	4.5	3.9	3.3	24.5
1971	1.3	0.1	0.1	0.1	0.0	1.2	2.4	2.9	3.8	4.5	4.2	2.9	23.5
1972	0.9	0.1	0.0	0.0	0.0	2.4	3.0	3.4	4.1	4.7	3.8	3.8	26.2
1973	0.6	0.4	0.1	0.1	0.0	0.0	2.1	4.7	4.7	4.8	4.1	2.9	24.7
1974	1.0	0.0	0.2	0.1	0.1	0.6	2.1	4.5	4.4	4.7	4.1	3.1	24.8
1975	0.9	0.1	0.1	0.2	0.1	0.0	1.2	3.3	4.2	4.5	4.4	3.8	22.7
1976	1.6	0.1	0.2	0.2	0.4	2.1	2.6	3.9	4.3	4.9	3.9	3.0	27.0
1977	0.5	0.3	0.3	0.0	0.2	0.4	1.6	2.1	2.8	3.4	3.0	0.3	14.9
1978	0.2	0.1	0.2	0.1	0.0	0.0	0.2	2.7	4.7	4.8	4.5	2.3	19.8
1979	2.3	0.2	0.0	0.0	0.0	0.0	1.9	3.5	4.2	4.6	4.4	3.1	24.4
1980	1.3	0.2	0.2	0.1	0.0	0.1	3.2	4.1	4.2	4.4	4.8	3.1	25.8
1981	1.1	0.3	0.0	0.0	0.0	0.0	1.8	4.6	4.5	4.8	4.4	2.9	24.4
1982	0.5	0.2	0.0	0.0	0.0	0.0	0.6	4.2	4.1	4.4	4.5	3.1	21.6
1983	2.0	0.0	0.0	0.0	0.0	0.0	1.1	3.3	4.6	4.8	4.5	3.5	23.7
1984	1.9	0.3	0.1	0.1	0.1	1.9	3.5	4.2	4.3	4.9	3.9	2.9	28.2
1985	1.5	0.0	0.1	0.1	0.1	1.5	3.6	4.1	4.2	4.7	3.4	2.4	25.8
1986	0.1	0.1	0.0	0.0	0.1	0.1	2.4	4.1	4.3	4.2	3.1	2.6	21.2
1987	0.8	0.3	0.3	0.2	0.2	0.3	2.9	4.1	4.0	4.3	3.9	2.9	24.2
1988	0.5	0.1	0.2	0.0	0.2	1.9	2.8	3.6	3.9	4.2	3.8	1.6	22.7
1989	0.4	0.5	0.1	0.1	0.1	0.1	2.8	3.6	3.4	3.9	3.5	1.3	19.9
1990	0.3	0.2	0.3	0.3	0.3	0.7	2.4	2.9	2.8	3.8	2.7	0.7	17.3
1991	0.8	0.4	0.2	0.3	0.1	0.1	0.7	2.8	3.0	3.4	3.3	2.3	17.4
1992	1.5	0.1	0.3	0.1	0.0	0.1	1.3	3.1	3.3	3.3	2.1	1.7	17.0
1993	0.6	0.3	0.4	0.0	0.0	0.1	1.2	2.9	2.8	3.7	3.1	2.2	17.4
1994	1.6	0.2	0.3	0.1	0.1	0.9	2.4	2.5	3.4	3.9	3.4	2.4	21.2
1995	1.0	0.2	0.1	0.1	0.0	0.0	1.1	2.3	3.4	3.5	3.0	2.4	17.3
1996	1.9	0.2	0.2	0.1	0.1	0.3	1.6	2.7	3.6	3.8	3.3	2.3	20.0
1997	1.6	0.0	0.1	0.1	0.0	1.9	2.8	3.4	3.6	3.8	2.8	2.1	22.3
1998	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.6	3.0	3.6	3.8	2.4	16.3
1999	1.4	0.2	0.4	0.3	0.1	0.5	1.6	3.0	3.6	4.1	3.5	2.2	20.9
Avg.	1.1	0.2	0.2	0.1	0.1	0.6	2.0	3.4	3.8	4.2	3.7	2.5	21.9
Max	2.3	0.5	0.4	0.3	0.4	2.4	3.6	4.7	4.7	4.9	4.8	3.8	28.2
Min	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.8	3.3	2.1	0.3	14.9

Source: Merced ID

MRSIM Control Point 200
Historical Merced ID Main Canal Diversion

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	28.5	7.4	3.5	1.2	0.8	16.8	84.1	86.2	92.6	105.5	97.3	67.5	591.3
1971	15.2	0.7	2.5	3.7	4.7	39.0	46.4	53.7	79.3	108.6	88.2	60.4	502.4
1972	6.3	2.6	1.1	2.0	2.0	65.6	55.1	74.2	97.2	108.5	93.4	73.1	581.2
1973	3.3	3.2	3.5	3.6	3.4	3.9	53.2	107.5	106.7	113.6	102.4	66.0	570.3
1974	19.4	2.4	6.6	4.9	3.9	25.7	51.0	105.4	107.2	115.5	106.6	73.4	621.8
1975	17.5	3.6	3.8	1.9	1.7	4.7	49.5	110.4	110.7	115.5	106.1	73.7	599.2
1976	26.8	2.7	2.3	2.2	2.1	44.3	52.1	83.1	80.4	95.3	76.3	42.7	510.3
1977	0.8	1.0	1.1	2.1	1.7	2.5	21.1	24.2	39.0	49.4	34.5	0.7	178.0
1978	1.2	1.1	1.2	1.0	0.9	2.8	14.4	81.8	116.7	119.8	110.3	62.3	513.3
1979	37.7	1.2	1.0	0.9	0.9	1.2	57.9	98.3	105.4	109.3	98.0	72.3	583.9
1980	22.0	0.6	0.8	1.2	1.2	12.2	76.6	99.3	102.7	110.5	107.2	75.2	609.5
1981	26.1	1.6	1.3	0.7	0.6	0.7	46.6	103.4	105.6	116.0	102.1	70.9	575.8
1982	0.2	0.0	0.1	0.0	1.5	2.2	25.5	102.8	101.8	111.8	111.8	90.4	548.2
1983	55.4	0.7	0.3	0.7	0.9	1.3	24.4	80.1	107.0	113.9	108.1	82.8	575.7
1984	34.1	0.4	0.7	2.1	1.2	49.6	77.3	101.2	104.5	116.2	102.4	76.6	666.4
1985	39.1	0.4	0.4	0.7	0.5	38.0	68.8	90.7	94.6	109.2	83.0	62.8	588.0
1986	0.4	0.3	0.2	0.2	0.2	0.6	58.9	96.8	101.3	109.8	96.8	72.5	538.0
1987	28.6	0.2	0.2	0.2	0.3	1.5	62.3	90.0	90.5	96.9	87.4	55.3	513.5
1988	0.3	0.2	0.2	0.1	0.2	43.2	38.8	55.5	64.5	83.5	78.4	29.6	394.6
1989	0.3	0.3	0.3	0.3	0.2	0.7	53.0	60.3	66.9	79.3	75.4	32.5	369.6
1990	0.3	0.3	0.2	0.2	0.2	7.3	37.9	42.4	36.9	51.9	48.3	5.1	231.1
1991	0.3	0.3	0.2	0.2	0.2	0.2	13.2	41.0	45.4	74.6	78.9	46.7	301.2
1992	22.2	0.3	0.2	0.2	0.2	0.2	27.3	51.8	55.4	66.1	70.6	41.9	336.3
1993	0.2	0.3	0.3	0.0	0.0	6.1	37.8	74.0	80.1	100.4	83.7	57.8	440.7
1994	53.4	0.0	0.0	0.0	0.0	34.7	57.2	45.6	94.5	101.4	94.2	50.2	531.3
1995	30.9	0.0	0.0	0.0	0.0	0.1	34.0	63.9	89.2	108.3	103.4	80.8	510.7
1996	50.9	3.0	3.1	0.5	0.3	12.2	49.7	78.6	96.6	107.5	99.0	64.8	566.1
1997	40.9	0.0	0.0	0.0	0.0	52.6	59.6	77.5	91.8	97.5	81.1	51.2	552.4
1998	34.8	0.0	0.0	0.0	0.0	3.1	13.4	49.5	74.6	102.8	101.4	67.7	447.2
1999	41.4	0.3	0.7	0.0	0.0	25.4	38.4	68.9	79.3	94.2	78.7	48.4	475.5
Avg.	21.3	1.2	1.2	1.0	1.0	16.6	46.2	76.6	87.3	99.8	90.2	58.5	500.8
Max	55.4	7.4	6.6	4.9	4.7	65.6	84.1	110.4	116.7	119.8	111.8	90.4	666.4
Min	0.2	0.0	0.0	0.0	0.0	0.1	13.2	24.2	36.9	49.4	34.5	0.7	178.0

Source: Merced ID

MRSIM Control Point 95
Exchequer Dam to Merced Falls Dam Accretions and Depletions

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	0.3	-1.1	1.4	3.8	-1.6	1.5	0.6	0.4	0.3	0.2	-1.2	0.5	5.1
1971	2.3	0.3	-3.7	0.6	-0.2	0.5	-2.1	4.2	4.5	0.3	3.2	0.2	10.0
1972	4.9	-3.6	0.1	-0.9	2.2	-0.8	1.8	-0.1	-2.1	-3.5	-0.9	1.5	-1.6
1973	4.3	-3.7	1.0	1.3	0.7	1.3	-1.2	-3.6	-3.5	-1.7	-0.2	2.1	-3.3
1974	-1.3	-1.3	-0.3	-0.1	-4.6	-1.3	-0.4	-3.3	-1.1	2.8	1.3	-3.2	-12.9
1975	-1.6	-1.1	-1.0	0.8	1.5	0.6	0.5	7.4	-0.2	1.9	0.9	-1.1	8.7
1976	2.1	1.6	0.2	-1.4	1.4	-1.6	2.2	-1.5	-0.1	-1.0	1.1	0.2	3.0
1977	3.3	-3.8	-0.5	-0.6	-0.1	0.0	-0.3	1.3	0.6	-0.7	-1.4	-0.9	-3.2
1978	-0.2	-2.1	-0.4	0.0	1.2	0.6	-0.4	-2.0	3.4	1.0	1.0	1.3	3.3
1979	0.4	5.0	-4.0	0.8	-0.5	2.5	0.4	-2.1	1.9	0.3	-0.6	-1.6	2.4
1980	-0.9	-3.8	-1.2	1.7	1.6	-0.4	-0.6	4.3	1.5	0.4	1.2	-1.3	2.6
1981	2.3	-2.1	0.1	0.4	0.0	0.6	-0.4	-0.8	1.0	-0.1	0.7	1.1	2.9
1982	3.0	-3.2	-0.9	1.7	-4.8	-0.3	-11.3	-3.7	-8.9	-5.3	-5.5	-5.7	-44.8
1983	-5.4	1.8	-11.8	0.8	-4.8	-6.1	-8.9	-10.0	-10.0	-3.4	-6.2	-6.6	-70.4
1984	-3.4	1.3	-7.5	-1.8	0.0	-0.1	1.4	-0.4	-0.9	-1.7	-2.8	-1.5	-17.4
1985	1.9	-2.5	0.4	-0.1	0.2	0.0	-1.0	-0.8	-0.9	-1.0	-1.8	-0.3	-6.0
1986	1.4	0.2	-0.2	0.8	1.2	-3.1	-2.1	1.1	0.9	-0.3	0.5	-0.6	-0.3
1987	0.1	-1.0	0.7	-0.2	-1.2	-1.1	0.7	-0.2	-0.5	-0.4	-2.1	-0.7	-5.9
1988	-0.5	-0.7	-0.1	0.7	-0.2	-2.2	2.0	-1.7	-0.4	-1.1	-2.8	0.1	-6.9
1989	-0.4	-0.6	2.3	-4.0	-1.0	0.0	-4.2	-3.8	-2.9	-3.2	-3.0	0.3	-20.5
1990	0.3	0.0	-0.8	0.0	-0.1	-0.6	-1.3	0.4	-1.5	-1.3	-1.9	-0.6	-7.3
1991	0.3	-1.7	-2.5	-0.6	0.5	1.9	-0.3	-0.1	0.3	-1.4	-2.7	-0.2	-6.6
1992	-0.8	-0.9	1.2	0.5	0.4	0.3	0.3	2.4	1.7	2.4	0.9	0.0	8.4
1993	-0.4	-0.1	-0.5	4.0	0.5	-0.2	-2.0	1.1	0.9	0.5	0.8	0.5	5.2
1994	1.0	-0.7	-0.3	-0.1	0.1	-0.8	-1.6	-3.2	-3.0	-3.9	-3.4	-3.5	-19.2
1995	6.3	0.0	-0.5	0.8	0.6	2.6	-3.9	-1.2	-2.3	24.3	-5.6	-8.1	13.2
1996	4.8	3.2	2.4	2.6	3.2	8.5	3.1	4.8	4.5	5.4	3.2	2.3	48.0
1997	4.7	1.1	1.3	-5.5	3.5	10.1	1.7	3.8	0.8	1.0	1.0	1.2	24.8
1998	2.9	2.1	0.6	2.6	0.2	4.7	1.6	3.5	4.1	3.2	-0.6	2.1	26.8
1999	0.9	1.0	-0.4	0.9	1.4	-0.3	-0.3	1.3	-1.2	-0.5	-0.6	-1.2	0.9
Avg.	1.1	-0.6	-0.8	0.3	0.0	0.6	-0.9	-0.1	-0.4	0.4	-0.9	-0.8	-2.0
Max	6.3	5.0	2.4	4.0	3.5	10.1	3.1	7.4	4.5	24.3	3.2	2.3	48.0
Min	-5.4	-3.8	-11.8	-5.5	-4.8	-6.1	-11.3	-10.0	-10.0	-5.3	-6.2	-8.1	-70.4

MRSIM Control Point 195
Merced Falls Dam to Crocker-Huffman Dam Accretions and Depletions

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	7.6	6.4	4.2	1.5	5.5	-0.1	0.9	-0.6	-0.7	0.3	-0.6	-0.2	24.2
1971	0.8	0.6	1.7	0.9	0.3	-0.7	0.3	1.0	2.3	4.5	3.1	1.0	15.9
1972	-1.3	0.6	1.3	7.0	3.8	1.8	2.5	2.0	1.4	1.0	0.8	10.9	31.8
1973	4.1	2.8	2.8	2.9	4.9	2.4	1.5	2.2	0.6	0.5	-1.0	-1.9	21.8
1974	1.3	6.5	6.9	14.0	1.8	0.9	-0.4	-4.2	-1.0	-4.9	-4.4	-2.3	14.2
1975	-0.4	2.0	1.7	3.1	10.5	6.2	3.9	-2.5	0.0	-6.6	-5.9	0.4	12.4
1976	3.3	1.0	1.6	-1.6	-1.9	-0.9	-1.9	-3.7	-2.3	-2.3	0.3	2.0	-6.5
1977	-1.3	-0.3	0.4	0.4	-0.3	-0.2	-1.5	-2.6	-2.4	0.5	2.8	-1.4	-5.9
1978	-1.2	-0.8	-0.5	-0.3	0.4	9.2	11.3	7.3	5.1	-1.4	-2.5	3.3	29.7
1979	7.7	1.6	-1.2	-2.7	-6.8	-11.4	-4.9	-12.2	-10.7	-7.4	-7.2	-5.4	-60.4
1980	-1.8	-3.0	-1.9	-5.6	-11.6	-19.9	-18.1	-22.4	-9.6	-6.2	-6.3	-8.9	-115.4
1981	-6.4	-6.5	-3.7	-2.4	-2.3	-1.6	-2.4	-5.7	-4.1	-1.8	-1.9	-0.5	-39.5
1982	-1.7	-1.1	-2.0	-2.0	-1.2	-8.5	-18.2	-25.9	-9.9	-5.1	-2.3	-6.4	-84.3
1983	-21.9	-15.0	-36.6	-34.0	-52.9	-59.0	-61.2	-53.9	-66.7	-43.2	-14.0	-30.4	-489.0
1984	-50.1	-5.9	-36.5	-2.0	-2.3	-2.6	-2.5	0.0	1.8	4.9	4.8	3.3	-87.2
1985	0.6	-1.5	0.0	1.1	-0.1	-3.9	-3.2	-2.3	-1.4	-0.3	-1.0	-0.1	-12.1
1986	-1.7	-1.2	-1.1	-1.4	1.4	13.7	14.2	6.2	0.6	0.9	0.6	0.2	32.6
1987	-0.7	-1.5	-1.5	-0.4	0.0	-0.3	-1.2	0.5	1.9	2.9	4.2	3.3	7.3
1988	-2.8	-0.2	-1.2	-1.3	-1.3	-0.7	-1.1	0.2	2.2	2.5	4.1	2.2	2.7
1989	-0.3	0.9	1.6	1.6	1.5	1.4	-4.0	4.0	-2.3	5.2	11.6	6.6	28.0
1990	-0.3	1.1	0.5	0.6	0.4	0.1	-1.6	-2.1	-7.3	-6.0	2.0	0.2	-12.3
1991	-0.3	1.1	1.5	0.3	0.3	1.5	0.0	1.1	-4.8	5.1	12.2	5.4	23.3
1992	0.1	1.6	1.5	0.6	0.9	-0.2	-3.0	-9.4	-7.2	2.0	6.9	11.6	5.4
1993	2.7	1.0	-1.6	-2.7	0.6	-0.9	18.5	13.7	7.7	7.3	9.4	13.1	68.9
1994	45.9	-0.1	0.0	0.6	0.8	3.0	8.5	1.5	8.5	7.8	8.9	2.0	87.4
1995	-1.3	-1.0	-0.7	1.6	0.3	-3.1	-8.2	-9.6	-14.2	-31.4	2.5	0.2	-65.0
1996	-12.0	-2.9	-2.1	0.0	-12.4	-19.4	-9.5	-12.7	-6.3	-4.2	-2.0	-1.3	-84.8
1997	-4.0	-1.3	-5.0	6.2	-8.7	-1.9	3.3	-8.3	0.2	-0.7	-0.8	-1.2	-22.1
1998	-3.1	-0.2	-0.2	-0.3	-2.4	-6.5	-9.1	-13.5	-17.6	-10.8	-3.5	-6.4	-73.5
1999	-2.4	0.4	1.8	1.1	0.0	-1.1	-4.8	-3.5	-1.7	-1.2	-1.1	-0.6	-13.1
Avg.	-1.4	-0.5	-2.3	-0.4	-2.4	-3.4	-3.1	-5.2	-4.6	-2.9	0.7	0.0	-25.5
Max	45.9	6.5	6.9	14.0	10.5	13.7	18.5	13.7	8.5	7.8	12.2	13.1	87.4
Min	-50.1	-15.0	-36.6	-34.0	-52.9	-59.0	-61.2	-53.9	-66.7	-43.2	-14.0	-30.4	-489.0

MRSIM Control Point 295
Crocker-Huffman Dam to Snelling Gage Accretions and Depletions

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	-14.0	-9.2	-8.5	-1.0	-9.3	-1.6	-3.1	-4.2	-5.2	-5.4	-5.5	-4.8	-71.9
1971	-3.3	-2.5	-4.0	-3.2	-2.4	-2.6	-3.9	-4.8	-5.0	-6.1	-6.0	-4.8	-48.6
1972	-4.8	-2.6	-2.4	-10.2	-5.6	-4.9	-3.4	-4.9	-6.4	-6.3	-6.5	-17.5	-75.5
1973	-5.8	-2.5	-2.4	-2.5	-2.9	-0.6	-2.8	-3.9	-4.4	-5.1	-5.5	-4.5	-42.9
1974	-11.2	-10.5	-3.3	-14.2	-2.6	-1.6	-1.7	-3.2	-10.4	-2.0	-3.0	-3.8	-67.4
1975	-2.1	-1.6	-1.7	-5.6	-9.0	-6.9	-7.0	-8.7	-0.5	-2.5	-4.4	-13.0	-63.1
1976	-11.4	-5.0	-5.6	-2.1	-1.1	-1.4	-2.2	-2.2	-3.0	-3.0	-3.0	-1.7	-41.8
1977	-1.7	-2.5	-2.1	-0.4	-0.5	-1.9	-2.5	-2.1	-2.7	-3.1	-3.2	-1.9	-24.6
1978	-1.3	-1.6	-0.5	1.6	0.9	-10.9	-3.7	-12.4	-10.7	-3.2	-4.0	-11.7	-57.5
1979	-15.3	-4.6	-1.3	1.6	6.4	8.4	0.1	2.0	-0.5	-2.6	-3.1	-2.1	-11.0
1980	1.9	1.3	1.1	-10.7	6.1	15.7	9.2	8.8	-0.3	-2.2	-2.4	1.8	30.3
1981	2.1	1.8	0.4	1.5	0.9	0.7	-0.3	-1.7	-2.2	-3.2	-2.5	-1.7	-4.1
1982	-1.3	0.7	0.9	1.8	2.3	6.9	12.9	21.7	8.3	3.5	-1.3	0.4	56.6
1983	15.3	14.4	42.3	31.8	44.4	64.4	58.1	44.4	37.4	27.9	9.1	25.3	414.8
1984	43.6	5.4	37.4	-0.6	5.3	-0.9	-2.1	-2.3	-2.7	-2.6	-1.9	-0.3	78.4
1985	1.6	1.4	4.3	0.7	1.1	1.7	-1.9	-3.3	-2.6	-2.0	-1.0	0.3	0.4
1986	2.0	1.5	0.6	1.8	0.3	-7.6	-5.3	-3.0	-1.6	-2.5	-1.5	0.0	-15.4
1987	0.5	1.8	1.7	0.7	0.6	1.0	-1.2	-2.9	-5.0	-4.1	-3.6	-1.6	-12.1
1988	1.0	-0.7	0.9	0.9	0.5	-1.1	-2.4	-3.5	-3.0	-3.0	-2.8	-0.3	-13.5
1989	-1.9	-2.0	-2.3	-2.4	-1.7	-2.2	-3.1	-14.2	-4.7	-4.9	-4.2	-2.5	-46.1
1990	-3.4	-3.7	-2.5	-2.1	-1.1	-1.5	-3.3	-3.5	-4.0	-4.1	-4.2	-2.4	-35.9
1991	-2.1	-2.7	-2.5	-1.5	-1.3	-0.5	-2.3	-3.9	-4.4	-4.8	-6.0	-5.5	-37.6
1992	-2.9	-2.6	-2.0	-0.6	-0.5	-0.7	-2.4	-4.8	-4.9	-2.6	-4.7	-3.6	-32.2
1993	-6.5	-1.8	1.5	4.5	-0.5	0.3	-20.8	-17.3	-11.2	-8.3	-12.4	-11.3	-83.8
1994	-28.1	-1.8	-1.3	-1.8	-0.6	-1.9	-2.7	-7.1	-3.4	-5.0	-4.2	-2.4	-60.3
1995	-2.7	-1.0	-0.4	0.6	-0.4	-2.0	5.3	6.9	10.6	1.9	-2.9	-2.0	13.6
1996	6.6	-2.6	-2.3	-1.5	7.9	19.1	1.6	6.0	-3.6	-5.8	-6.9	-6.4	12.2
1997	-3.8	-1.2	0.0	3.2	27.8	-1.7	-3.2	-0.7	-6.6	-5.8	-5.4	-5.0	-2.5
1998	-3.5	-3.7	-2.2	-4.9	0.7	2.8	2.1	-0.9	3.2	-9.1	-9.1	-5.1	-29.7
1999	4.3	-4.0	-6.3	0.4	5.4	1.9	3.4	0.1	-3.4	-5.0	-4.3	-4.2	-11.6
Avg.	-1.6	-1.4	1.2	-0.5	2.4	2.3	0.4	-0.9	-1.8	-2.7	-3.9	-3.1	-9.4
Max	43.6	14.4	42.3	31.8	44.4	64.4	58.1	44.4	37.4	27.9	9.1	25.3	414.8
Min	-28.1	-10.5	-8.5	-14.2	-9.3	-10.9	-20.8	-17.3	-11.2	-9.1	-12.4	-17.5	-83.8

MRSIM Control Point 395
Snelling Gage to Cressey Gage Accretions and Depletions

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	-6.9	0.0	2.1	11.7	10.9	8.0	3.7	2.1	1.6	0.3	0.8	2.9	37.4
1971	4.2	3.6	2.8	5.1	3.3	2.5	4.5	3.6	0.4	0.1	0.0	3.8	33.9
1972	5.2	3.5	4.5	-0.1	4.4	2.4	2.1	0.9	0.7	0.4	0.1	-0.6	23.5
1973	4.8	4.2	5.0	9.7	21.0	14.4	4.6	2.5	1.3	-0.5	0.2	3.3	70.4
1974	12.3	4.4	-1.2	6.1	3.8	4.8	4.1	0.5	0.2	0.3	1.2	4.5	41.0
1975	3.0	1.4	3.8	3.9	10.8	7.8	6.6	2.0	-8.9	2.1	2.1	2.0	36.6
1976	7.7	2.2	3.4	4.5	3.6	2.3	2.0	0.8	-0.6	-2.4	-1.4	1.0	23.1
1977	1.7	1.8	2.1	3.0	1.2	1.6	-0.1	0.0	-3.0	-4.0	-3.4	-0.9	0.0
1978	-0.7	-1.7	1.3	7.6	15.3	2.7	-0.6	-6.8	-1.9	-0.4	-2.4	-1.7	10.6
1979	-4.1	4.2	3.1	14.5	3.1	10.0	3.9	-5.1	-0.4	-1.8	-1.3	-1.1	25.1
1980	4.3	0.8	2.0	18.4	10.6	1.4	-0.6	-1.3	0.7	-0.9	-1.5	-0.9	32.9
1981	6.5	2.1	4.7	5.4	4.6	10.0	2.3	-0.6	-2.1	-2.1	-1.9	-0.1	28.8
1982	2.7	2.5	0.7	6.3	7.8	17.2	2.3	-7.6	-4.1	3.9	1.0	2.5	35.2
1983	1.7	4.2	-2.7	20.1	17.3	14.8	-2.5	2.1	4.4	7.1	0.8	-1.9	65.5
1984	5.3	6.0	8.3	11.8	0.3	5.1	2.7	0.6	0.5	-2.7	-0.6	-0.4	36.9
1985	2.1	-1.1	-4.0	4.6	3.7	3.2	2.2	-1.3	-1.9	-1.2	-0.2	-1.1	5.0
1986	3.1	1.2	3.1	1.4	11.2	0.0	-3.9	-5.5	-1.8	-1.9	-1.3	-0.7	4.7
1987	2.3	0.3	0.5	0.5	1.4	5.8	0.2	-2.0	-1.9	-2.3	-0.4	3.0	7.5
1988	-0.7	1.2	1.2	1.2	0.0	1.0	2.4	-0.2	-0.5	-3.8	-2.7	-1.9	-2.6
1989	-0.9	0.3	0.0	0.5	0.4	2.7	-0.7	-0.9	-0.9	-3.6	-3.2	-0.5	-6.8
1990	1.6	1.2	0.7	-1.0	1.0	0.3	-0.2	-1.9	-2.6	-4.5	-3.9	-1.3	-10.7
1991	-1.6	-1.1	-0.3	-0.4	-1.5	5.0	-0.1	-2.6	-4.3	-4.2	-4.4	-1.6	-17.2
1992	-0.9	-0.5	-0.3	0.2	2.8	1.8	-0.5	-2.8	-2.3	-5.3	-4.0	-1.4	-13.3
1993	-0.3	-0.6	-0.7	19.3	6.5	3.6	-2.3	0.6	-3.5	-4.4	-3.4	-0.2	14.6
1994	0.9	-0.1	-0.7	0.8	5.0	0.0	-0.1	-1.6	-3.6	-6.0	-3.2	-1.9	-10.5
1995	-1.1	0.3	-0.9	19.2	2.9	16.4	0.0	-0.8	-6.7	-5.6	0.0	-5.8	17.9
1996	5.5	0.3	-1.6	5.7	8.2	1.1	3.2	0.0	-1.1	-3.6	-3.1	-1.0	13.5
1997	0.6	0.2	-1.9	-31.9	-18.6	13.3	-1.2	0.4	-1.8	-2.5	-3.5	-0.7	-47.6
1998	-0.5	-0.1	1.6	6.5	22.3	15.3	10.1	1.4	-6.0	2.1	-2.7	-5.9	44.0
1999	-4.5	1.3	1.7	-2.6	-0.6	-0.4	0.1	-2.0	-2.0	-2.5	-2.5	-2.3	-16.3
Avg.	1.8	1.4	1.3	5.1	5.4	5.8	1.5	-0.9	-1.7	-1.7	-1.5	-0.4	16.1
Max	12.3	6.0	8.3	20.1	22.3	17.2	10.1	3.6	4.4	7.1	2.1	4.5	70.4
Min	-6.9	-1.7	-4.0	-31.9	-18.6	-0.4	-3.9	-7.6	-8.9	-6.0	-4.4	-5.9	-47.6

MRSIM Control Point 200
Merced ID Operational Target Flow at Crocker-Huffman Dam
Merced River Flow Requirements

1000 Acre Feet

water year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	total
1970	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1971	5.3	16.1	16.6	16.6	15.0	19.7	14.0	17.5	15.8	14.8	11.7	9.8	172.8
1972	5.3	16.1	16.6	16.6	15.0	19.7	14.0	17.5	15.5	14.1	11.4	8.6	170.4
1973	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1974	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1975	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1976	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	161.0
1977	5.4	14.8	14.5	16.0	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	156.9
1978	3.7	15.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	174.4
1979	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1980	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1981	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.9	13.0	10.8	6.2	165.7
1982	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1983	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1984	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1985	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.8	12.7	10.6	5.7	164.6
1986	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1987	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	161.0
1988	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.4	12.0	10.3	4.3	161.8
1989	3.7	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.9	13.0	10.8	6.2	164.0
1990	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	161.0
1991	3.3	16.0	15.3	16.2	15.0	19.7	14.0	17.5	15.8	14.8	11.7	9.8	169.1
1992	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	161.0
1993	5.0	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	176.7
1994	5.4	16.1	16.6	16.6	15.0	19.7	14.0	17.5	14.4	12.0	10.3	4.3	161.8
1995	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1996	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1997	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1998	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
1999	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
Avg.	5.6	16.0	16.5	16.6	15.0	19.7	14.5	18.0	15.7	14.2	11.6	8.4	171.7
Max	6.2	16.1	16.6	16.6	15.0	19.7	14.9	18.4	16.4	15.4	12.3	10.4	177.9
Min	3.3	14.8	14.5	16.0	15.0	19.7	14.0	17.5	14.3	11.8	10.2	3.9	156.9