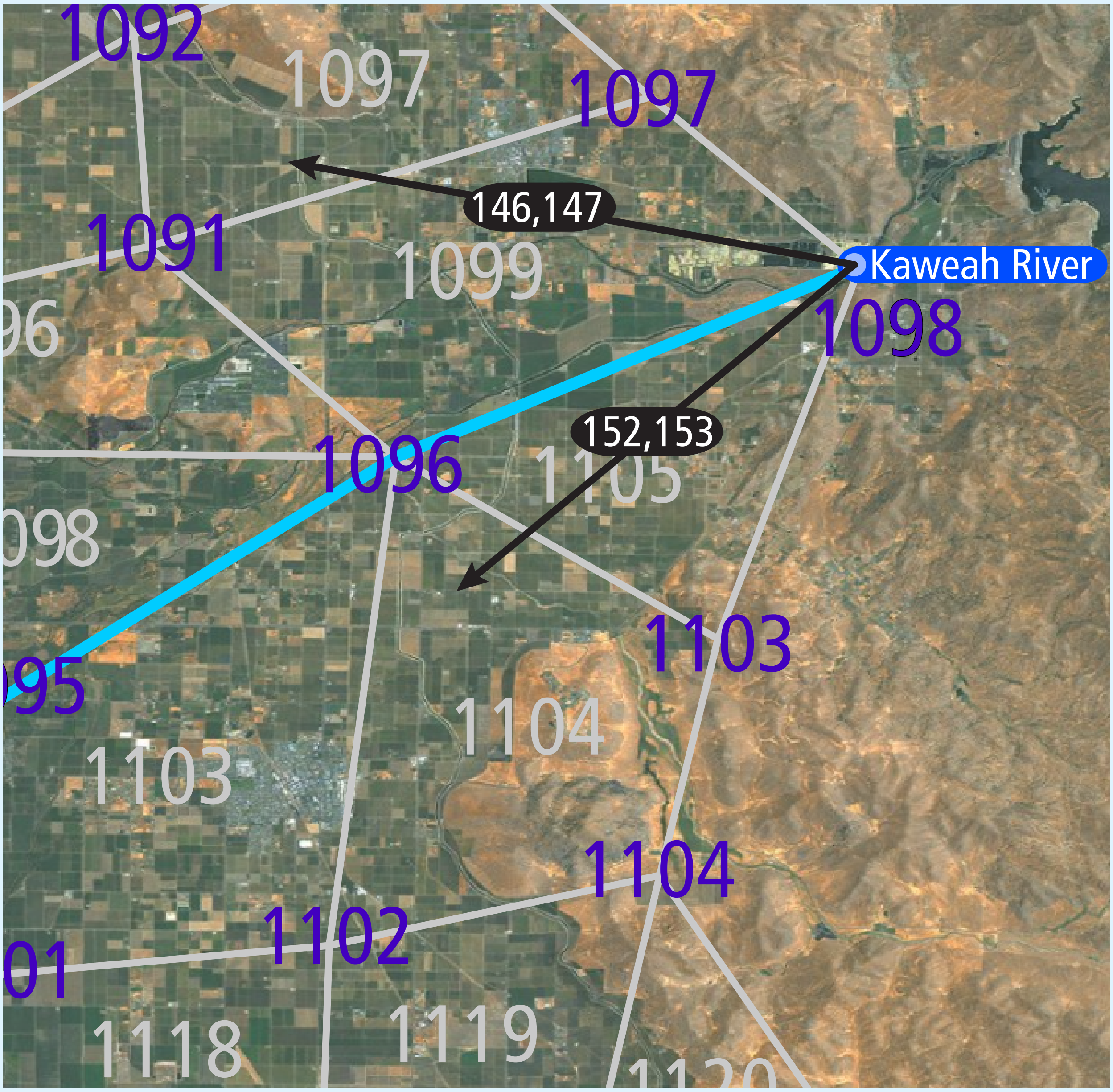
DWR Technical Memorandum

Historical Rim Inflows, Surface Water Diversions and Bypass Flows

for the

California Central Valley Groundwater-Surface Water Simulation Model (C2VSim), Version 3.02-CG

Charles F. Brush



Bay-Delta Office, California Department of Water Resources, 1416 Ninth Street, Sacramento, CA 95814

C2VSim-CG Version R374, released June 2013

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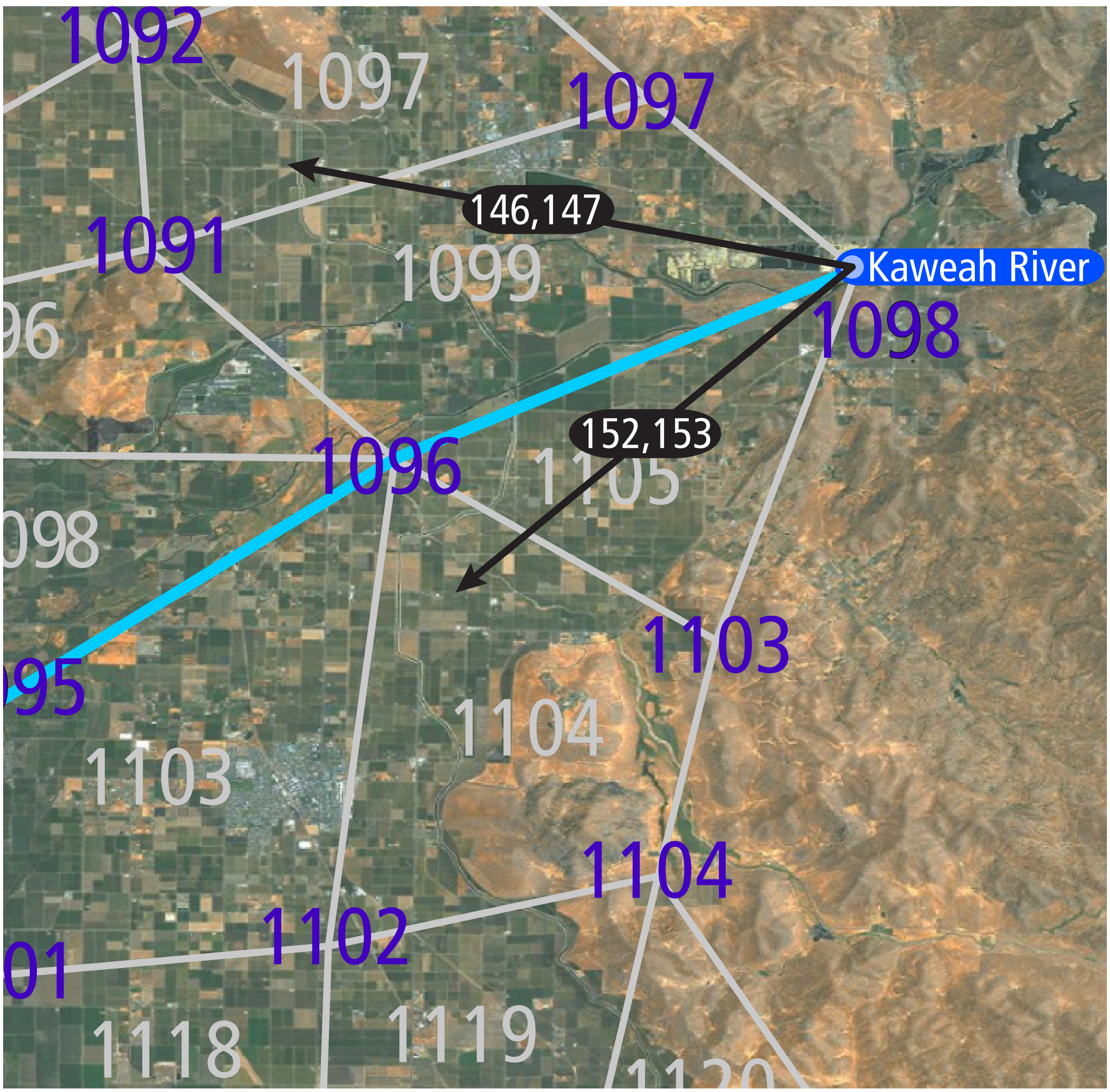

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DWR Technical Memorandum: Historical Rim Inflows, Surface Water Diversions and Bypass Flows for the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim), Version 3.02-CG
Author: Charles F. Brush
Modeling software and documentation originated and maintained by the Bay-Delta Office, California Department of Water Resources, 1416 Ninth Street, Sacramento, CA 95814
http://baydeltaoffice.water.ca.gov/modeling/hydrology/c2vsim/index_c2vsim.cfm
This report describes version R374 of the C2VSim-CG model, last updated in June 2013.

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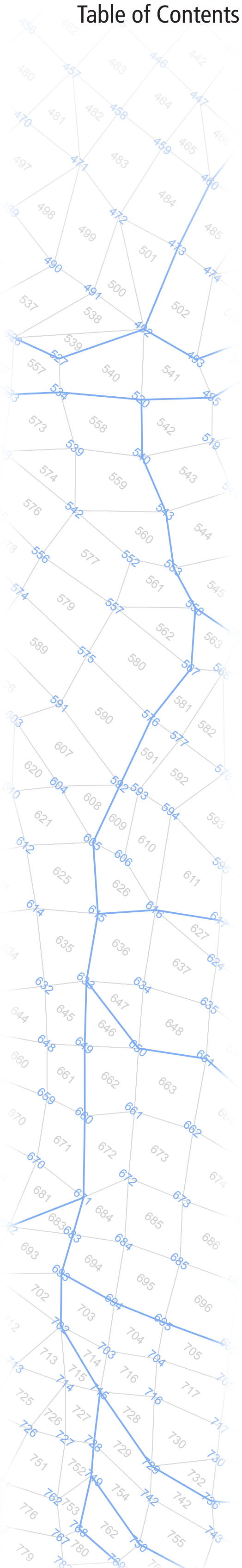

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Acronyms and Abbreviations

Ag	Agricultural
ASR	Aquifer Storage and Recovery Program
C2VSim	California Central Valley Groundwater-Surface Water Model
CalSim	California Central Valley Project and State Water Project Operations Model
CCWD	Contra Costa Water District
CVC	Cross-Valley Canal
CDEC	California Data Exchange Center
CFS	Cubic Feet per Second
CSD	Community Services District
CVGSM	Central Valley Groundwater-Surface Water Model
CVP	Central Valley Project
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
FKC	Friant-Kern Canal
FRSA	Feather River Service Area
IC	Irrigation Company
ID	Irrigation District
IWFM	Integrated Water Flow Model
M&I	Municipal and Industrial
MWC	Municipal Water Company
NL	Non-recoverable loss (evaporation and transpiration)
Q_x	Flow rate at location x
r^2	Coefficient of determination
RD	Reclamation District
RL	Recoverable loss (groundwater recharge)
RM	River mile (distance from river mouth)
SWP	California State Water Project
SWRCB	California State Water Resources Control Board
TAF	Thousand Acre-Feet
USACOE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey
WCD	Water Conservation District
WD	Water District
WSC	Water Service Company
YCFCWCD	Yolo County Flood Control and Water Conservation District

Introduction

This report describes the historical rim inflows and surface water diversions for the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim). This includes the sources of observed flow values and the methods used to estimate flow values for periods for which no observations are available. C2VSim is an integrated numerical model simulating land surface processes and groundwater and surface water flows in the main alluvial aquifer system of California's Central Valley (figure 1). C2VSim was developed using the Integrated Water Flow Model (IWFM) application, which couples a three-dimensional finite element groundwater simulation process with one-dimensional land surface, stream flow, lake, unsaturated zone and small-stream watershed simulation processes. The version of the C2VSim model described in this report runs with IWFM version 3.02 and and uses a coarse finite element grid, and is referred to as C2VSim version 3.02-CG. In addition, the input files for the C2VSim model are regulary updated to correct errors, incorporate imroved input data or extend the simulation time period. These updates are referred to as revisions; this report describes the data in revision R374.

The C2VSim model inputs include monthly historical precipitation, stream inflows, surface water diversions, land use and crop acreages for the simulation period, October 1921 through September 2009. Rim inflows are specified for 36 rivers and five locations where water is released from canals into river channels. Surface water diversions are specified at 246 locations, including 139 diversions from rivers, 12 of which are exported outside the model area, and 107 diversions from canals which are simulated as imports. Surface water bypasses are specified at 12 locations. The locations of rim inflows, diversions and bypasses are shown in figure 2.

The data in this report was derived from numerous sources. The U.S. Geological Survey (USGS) provides access to their extensive collection of surface water data through the National Water Information System (NWIS) web site (http://waterdata.usgs.gov/nwis). The California Data Exchange Center (CDEC) web site (http://cdec.water.ca.gov) provides access to archived data provided by over 140 Federal, State and local agencies. The U.S. Bureau of Reclamation (USBR) Central Valley Operations Office (http:// http://www.usbr.gov/mp/cvo/) publishes a Report of Operations each month detailing daily operations for the Central Valley Project. The U.S. Army Corps of Engineers (USACOE) Sacramento District's Water Control Data System collects data for the management of Corps reservoirs and flood control space in non-Corps reservoirs, and provides summary reports available from their web site (http://www.spk-wc.usace.army.mil/generic/corps_rep_mon.html). Some data was also derived from the Central Valley Ground-Surface Water Simulation Model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996).

Acknowledgements

Many people were involved in the development of the C2VSim model. Management support for development of the C2VSim model was provided by Kathy Kelly, Francis Chung, Sushil Arora and Tariq Kadir of DWR, and administrative support was provided by Sina Darabzand and Rich Juricich of DWR and Robert Leaf of CH2MHill. Numerous DWR staff contributed to the development of the C2VSim model, including Emin C. Dogrul, Michael Moncrief (currently with MBK Engineers), Guobiao Huang, Jane Shafer-Kramer, Messele Ejeta, and Liheng Zhong of the Bay-Delta Office, and Linda Bond, Chris Bonds, Dong Chen, Jeff Galef, Todd Hillaire, Abdul Khan, Seth Lawrence, Dan McManus, Paul Mendoza, Chris Montoya, Robert Niblack, Scott Olling, Eric Senter, Steven Springhorn, Jean Woods, Brett Wyckoff.

Surface water diversion data were provided by Andy Draper of MWH Global, Robert Barbato and Peter Arpin of the U.S. Army Corps of Engineers, Ben Bray of East Bay Municipal Utility District, Terry Erlewine of the State Water Contractors, Andy Florendo of Solano County Water Agency, Clifton Lollar of the Kings River Water Association, Mark McClintock of Carmichael Water District, Sue Sindt of Nevada Irrigation District, and Max Stevenson of Yolo County Flood Control and Water Conservation District. Lee Bergfeld and Water Bourez of MBK Engineers reviewed the original C2VSim input data sets and advised on their improvement.

Updates

C2VSim 3.02-CG release R374 incorporates several changes from the previous release.

- The Kings River bifurcation was changed so water naturally flows to the North Fork Kings River and a bypass routes flows to the South Fork Kings RIver. These changes were implemented in the Preprocessor file CVrivers.dat and the Simulation file CVdivspec.dat.
- Surface water diversion data for the Kings River in file CVdiversions.dat were modified. In the December 2012 release of C2VSim, winter agricultural diversions from the Kings River and flows reaching the end of the South Fork Kings were assumed to be recharged through aquifer storage and recovery (ASR) programs. These were modified so ASR diversions only occur upstream of the Kings River bifurcation, and the South Fork Kings RIver discharges to Tulare Lake. Surface water diversion volumes for water years 1981 through 1993 were also replaced with values from Kings River Watermaster Reports.
- Several parameters were modified to better simulate observed conditions. The diversion specifications for diversion 6 in file CVdivspec.dat were modified. The curve numbers for small-stream watersheds bordering model subregion 1 were increased and the maximum fraction of excess soil moisture that becomes deep percolation for subregion 1 was set to 0.250 in file CVparam.dat.

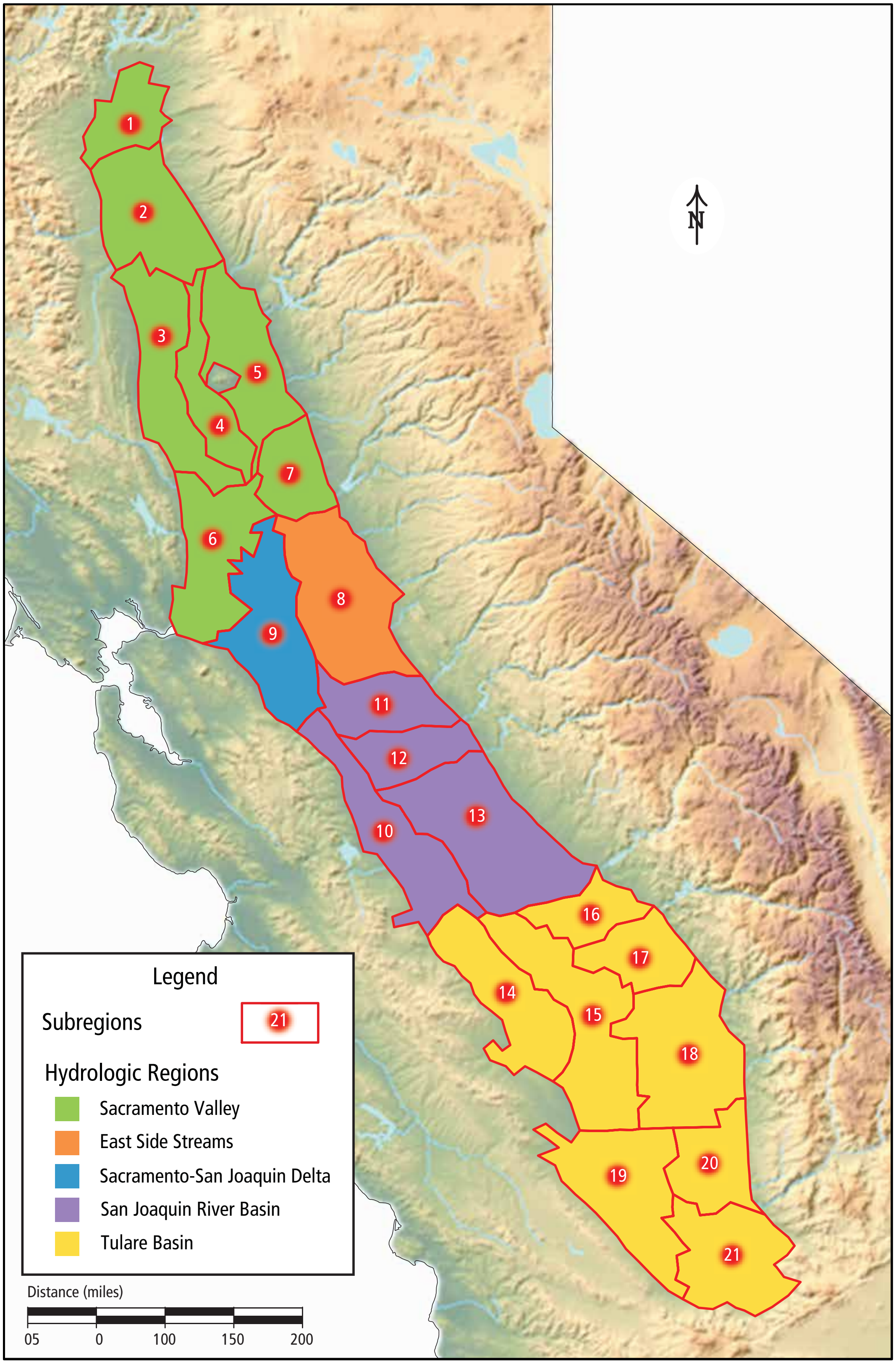
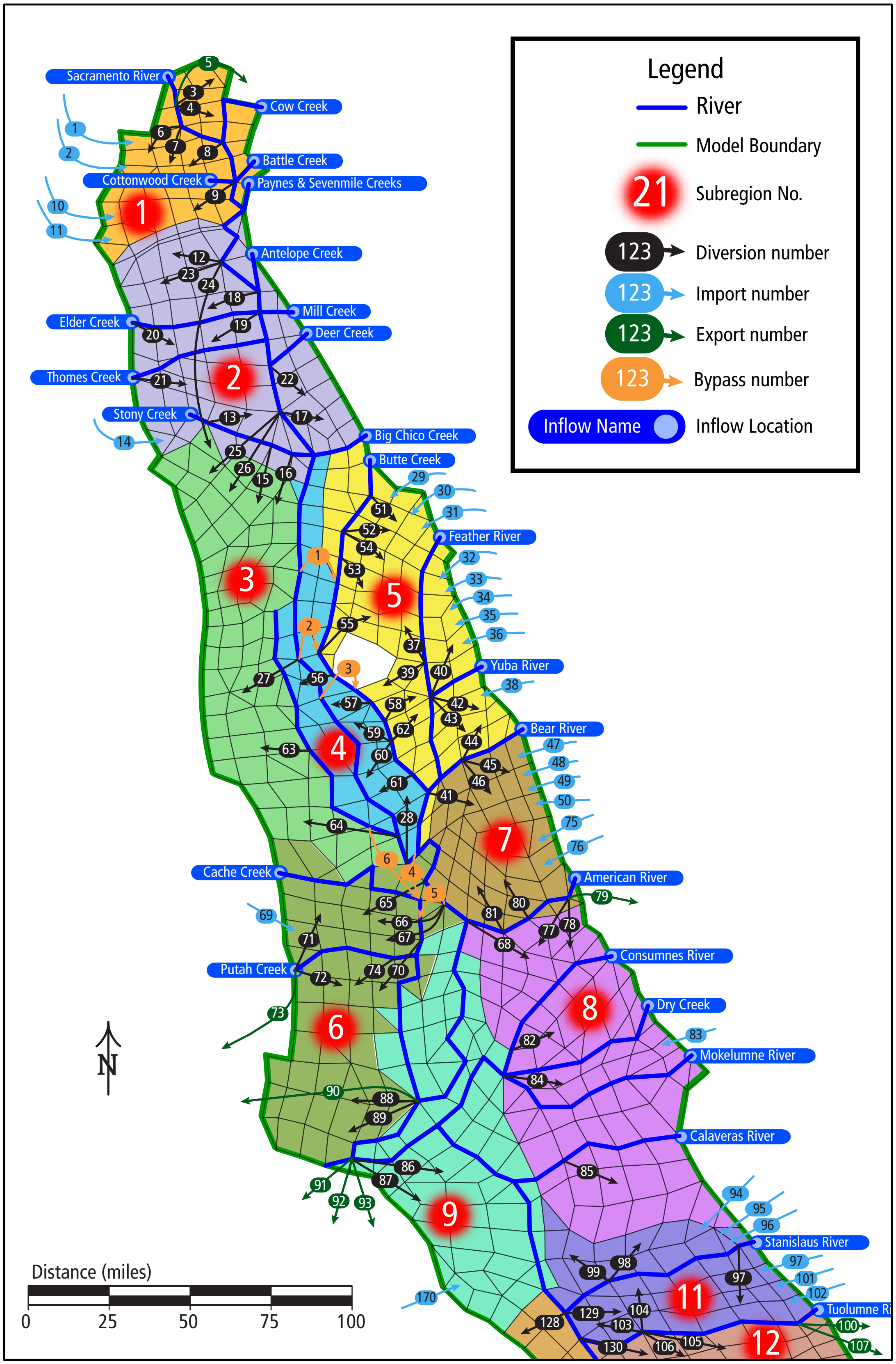


Figure 1. C2VSim model subregions and hydrologic regions.

Figure 2a. C2VSim grid with rim inflows, surface water diversions and surface water bypasses.



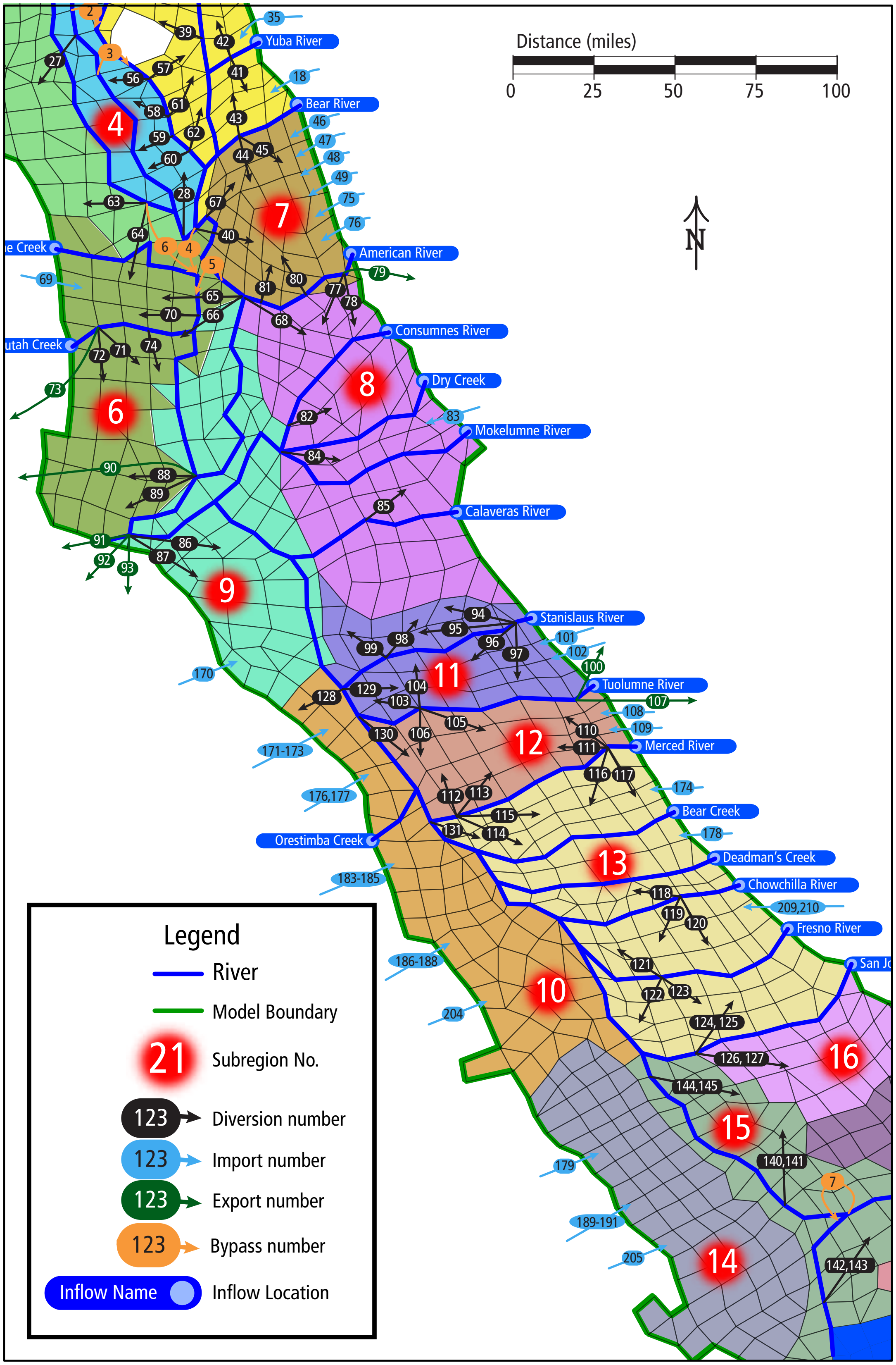
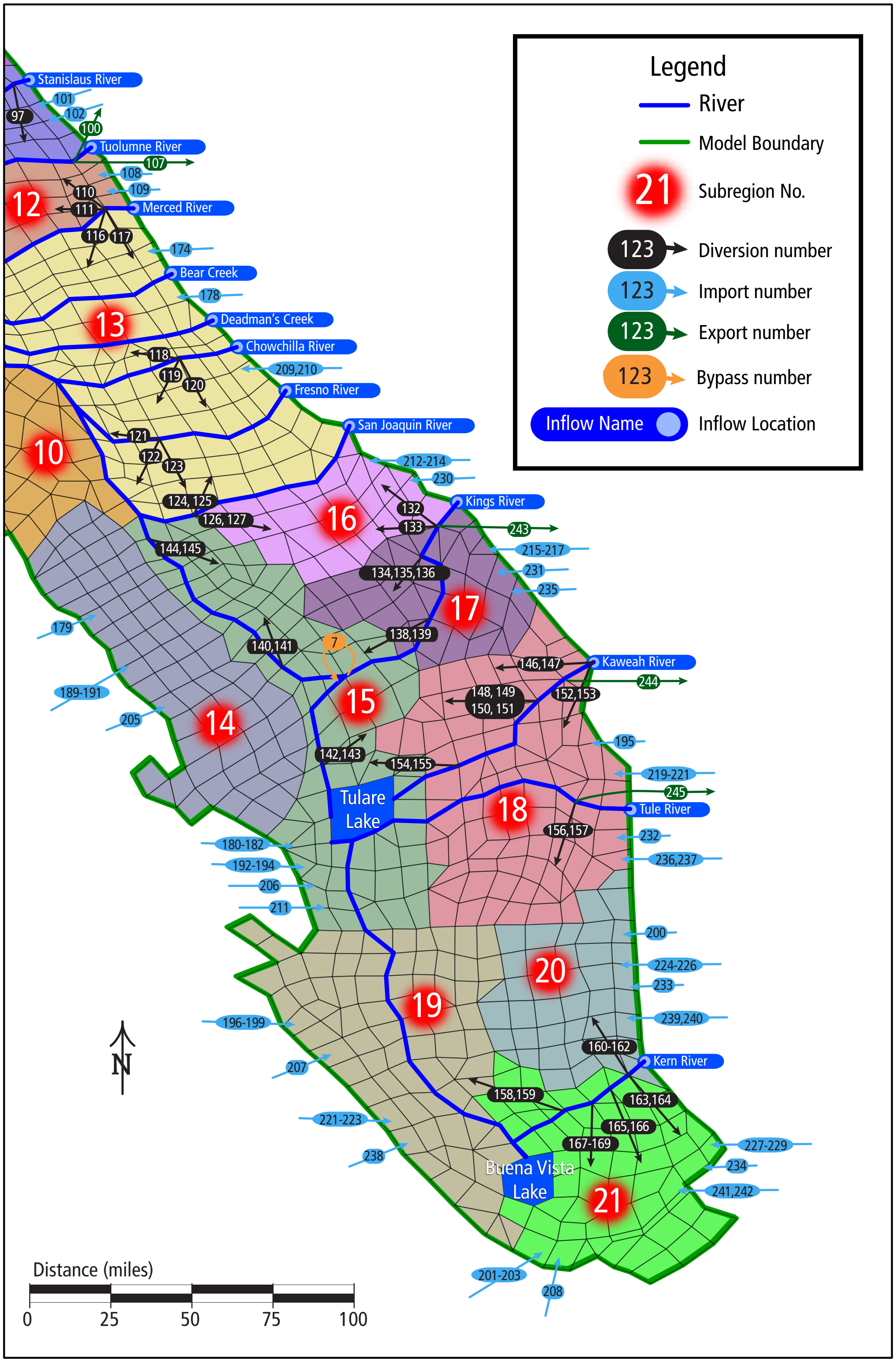


Figure 2b. C2VSim grid with rim inflows, surface water diversions and surface water bypasses.

Figure 2c. C2VSim grid with rim inflows, surface water diversions and surface water bypasses.



Rim Inflows

Historical monthly river inflow values were collected for 36 rivers that enter the Central Valley from the surrounding mountains. Several canals divert water through wasteway canals into river beds for downstream diversion to end users. These deliveries are treated as inflows to downstream river nodes in the C2VSim model. Water is diverted from the Friant-Kern Canal (FKC) into the Kings River, Kaweah River, Tule River and Kern River. Water is also diverted from the Cross-Valley Canal (CVC) into the Kern River.

Table 1. Inflows for the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim)

Inflow ID	Description
1	Sacramento River
2	Cow Creek
3	Battle Creek
4	Cottonwood Creek
5	Paynes and Sevenmile Creeks
6	Antelope Creek Group
7	Mill Creek
8	Elder Creek
9	Thomes Creek
10	Deer Creek Group
11	Stony Creek
12	Big Chico Creek
13	Butte and Little Chico Creeks
14	Feather River
15	Yuba River
16	Bear River
17	Cache Creek
18	American River
19	Putah Creek
20	Consumnes River
21	Dry Creek
22	Mokelumne River
23	Calaveras River

Inflow ID	Description
24	Stanislaus River
25	Tuolumne River
26	Oristimba Creek
27	Merced River
28	Bear Creek Group
29	Deadman’s Creek
30	Chowchilla River
31	Fresno River
32	San Joaquin River
33	Kings River
34	Kaweah River
35	Tule River
36	Kern River
37	Friant-Kern Canal Wasteway Deliveries to Kings River
38	Friant-Kern Canal Wasteway Deliveries to Tule River
39	Friant-Kern Canal Wasteway Deliveries to Kaweah River
40	Cross Valley Canal deliveries to Kern River
41	Friant-Kern Canal deliveries to Kern River

1. Sacramento River

At the point where it enters the Redding Basin, the flow in the Sacramento River is mainly derived from the Upper Sacramento River, flowing from the Klamath Mountains, and the Pit River, flowing from the Modoc Plateau. Inflow data represents flows from the upper Sacramento River watershed prior to November 1943, and releases from Shasta Dam after that date. USGS gage 11369500, Sacramento River at Kennett, located approximately 15 miles upstream of the C2VSim boundary, operated from October 1925 to September 1942. USGS gage 11370555, Sacramento River at Keswick, located approximately two miles upstream of the C2VSim boundary, has been in operation since October 1938. The ratio of the watershed area above USGS gage 11370555 to the watershed area above USGS gage 11369500 is approximately 1.02. Inflow data for the period prior to installation of the USGS flow gage at Kennett were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from October 1925 to September 1942 is the flow at USGS gage 11369500 multiplied by 1.02. Inflow for the period from October 1938 to September 2009 is the flow at USGS gage 11370500.

Start Date	End Date	Source
10/01/1921	09/30/1925	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1935	09/30/1938	USGS Gage 11369500 SACRAMENTO RIVER AT KENNETT, CA * 1.02
10/01/1938	09/30/2009	USGS Gage 11370500 SACRAMENTO RIVER AT KESWICK, CA

2. Cow Creek

Cow Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank approximately 23 miles downstream from Shasta Dam and 4 miles east of the town of Anderson at RM 277. USGS flow gage 11374000, Cow Creek near Millville, has been in operation since October 1, 1949, and is located approximately 2.9 miles upstream of the mouth and approximately 7 miles inside the C2VSim model boundary. Inflow data for the period prior to installation of the USGS gage were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow for the period from October 1949 to September 2009 is the flow at USGS gage 11374000.

Start Date	End Date	Source
10/01/1921	09/30/1949	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1949	09/30/2009	USGS Gage 11374000 COW CREEK NEAR MILLVILLE, CA

This inflow location is sited a significant distance inside the model boundary, based on the stream gage location. This inflow should be replaced with a full time series of historical rim inflow values for the individual branches of Cow Creek.

3. Battle Creek

Battle Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank at RM 269. USGS flow gage 11376550, Battle Creek below Coleman Fish Hatchery, has been in operation at this location since October 1, 1961, except for November and December 1996. This gage is located approximately 1 mile inside the C2VSim model boundary. Inflow data for the period prior to installation of the USGS gage and for the periods when the gage was not operated were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow for the period from October 1961 to September 2009 is the flow at USGS gage 11370500, except for two months in 1996 when the gage was not in operation.

Start Date	End Date	Source
10/01/1921	09/30/1961	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1961	12/31/1996	USGS Gage 11376550 BATTLE CREEK BELOW COLEMAN FISH HATCHERY NEAR COTTONWOOD, CA
01/01/1997	02/28/1997	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
03/01/1997	09/30/2009	USGS Gage 11376550 BATTLE CREEK BELOW COLEMAN FISH HATCHERY NEAR COTTONWOOD, CA

4. Cottonwood Creek

Cottonwood Creek flows from the Coast Ranges and enters the Sacramento River on the west bank at approximately RM 272. USGS flow gage 11376000, Cottonwood Creek near Cottonwood, has been in operation at this location since October 1, 1940. The USGS flow gage is located about 3 river miles upstream of the mouth, and approximately 25 miles inside the C2VSim model boundary. Inflow data for the period prior to installation of the USGS flow gage were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow for the period from October 1940 to September 2009 is the flow at USGS gage 11376000.

Start Date	End Date	Source
10/01/1921	09/30/1940	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1940	09/30/2009	USGS Gage 11376000 COTTONWOOD CREEK NEAR COTTONWOOD, CA

This inflow location is sited a significant distance inside the model boundary, based on the stream gage location. Significant streambed gains or losses may occur between the model boundary and the gage location. This inflow should be replaced with a full time series of historical rim inflow values for the North Fork and South Fork of Cottonwood Creek.

5. Paynes and Sevenmile Creeks

Paynes Creek and its tributary Sevenmile Creek flow from the Sierra Nevada foothills and enter the Sacramento River on the east bank at RM 250, between the Red Bluff diversion dam and Bend Bridge. USGS flow gage 11377500, Paynes Creek near Red Bluff, was in operation approximately 1 river mile upstream of the mouth between October 1949 and September 1966. The CalSim 3 data set I_PYN001, Historical Paynes and Sevenmile Creeks Inflow (DWR and USBR 2011), is based on the gage flow for the period of record, and a correlation with USGS gage 11381500, Mill Creek at Los Molinos, to estimate flows from October 1921 to September 1940 and from October 1982 to September 2009. Historical gage flow values were increased by 12 percent to account for the contribution from the Sevenmile Creek watershed. Inflow for the entire period is the CalSim 3 data set I_PYN001.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3 Paynes and Sevenmile Creeks (I_PYN001)

6. Antelope Creek Group

Antelope Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank at RM 232. USGS flow gage 11379000, Antelope Creek near Red Bluff, was in operation from October 1940 to September 1982 approximately 11 river miles upstream of the mouth and less than one mile outside the C2VSim boundary. The USGS gage records flows from slightly less than half of the contributing watershed area outside the C2VSim model boundary; the ratio of the total area to the gaged area is 2.06. The CalSim 3 data set I_ANT011, Historical Antelope Creek Inflow (DWR and USBR 2011), utilizes the gage flow for the period of record, and a correlation with USGS gage 11381500, Mill Creek at Los Molinos, to estimate flows from October 1921 to September 1940 and from October 1982 to September 2009. Inflow for the period from October 1921 to September 1940 and from October 1982 to September 2009 was estimated by multiplying the CalSim 3 data set I_ANT011 by 2.06. Inflow for the period from Octiber 1940 to September 1982 was estimated by multiplying the flow at USGS gage 11379000 by 2.06.

Start Date	End Date	Source
10/01/1921	09/30/1940	CalSim 3 Antelope Creek (I_ANT011)* 2.06
10/01/1940	09/30/1982	USGS gage 11379000 ANTELOPE CREEK NEAR RED BLUFF, CA * 2.06
10/01/1982	09/30/2009	CalSim 3 Antelope Creek (I_ANT011)* 2.06

7. Mill Creek

Mill Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank at RM 228. USGS flow gage 11381500, Mill Creek at Los Molinos, has been in operation since October 1928 approximately 5.5 river miles upstream of the mouth and less than one mile inside the C2VSim boundary. The CalSim 3 data set I_MLC006, Historical Mill Creek Inflow (DWR and USBR 2011), utilizes gage flow for the period of record, and flow estimates from Table 27 of the *1957 Joint Hydrology Study* (DWR and USBR 1958) for the period prior to installation of the USGS flow gage. Inflow for the period from October 1921 to September 1928 is the CalSim 3 data set I_MLC006. Inflow for the period from October 1928 to September 2009 is the flow at USGS gage 11381500.

Start Date	End Date	Source
10/01/1921	09/30/1928	CalSim 3 Mill Creek near Los Molinos (I_MLC006)
10/01/1928	09/30/2009	USGS Gage 11381500 MILL CREEK NEAR LOS MOLINOS, CA

8. Elder Creek

Elder Creek flows from the Coast Ranges and enters the Sacramento River on the west bank at RM 229. USGS flow gage 11379500, Elder Creek near Paskenta, has been in operation at this location since October 1948, within one mile of the C2VSim boundary. Inflow data for the period prior to installation of the USGS gage were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990); a minimum flow of 500 acre-feet per month was assumed for this period to meet historical diversions from Elder Creek. Inflow for the period from October 1948 to September 2009 is the flow at USGS gage 11379500.

Start Date	End Date	Source
10/01/1921	09/30/1948	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1948	09/30/2009	USGS Gage 11379500 ELDER CREEK NEAR PASKENTA, CA

9. Thomes Creek

Thomes Creek flows from the Coast Ranges and enters the Sacramento River on the west bank at approximately RM 225. USGS flow gage 11382000, Thomes Creek near Paskenta, was in operation at this location from October 1, 1920 to September 30, 1996, within one mile of the C2VSim boundary. Inflow for the period from October 1921 to September 1996 is the flow at USGS gage 11382000. Inflow data for the period from October 1996 to September 2009 is the CalSim 3 data set I_THM028, Historival Thomes Creek at Paskenta (DWR and USBR 2011).

Start Date	End Date	Source
10/01/1921	09/30/1996	USGS Gage 11382000 THOMES CREET AT PASKENTA, CA
10/01/1996	09/30/2009	CalSim 3 Thomes Creek at Paskenta (I_THM028)

10. Deer Creek Group

Deer Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank at RM 218. USGS flow gage 11383500, Deer Creek near Vina, has flow data for the entire period of interest. The USGS flow gage is located approximately 1.5 miles outside the C2VSim model boundary, and records flows from slightly more than half of the contributing watershed area outside the C2VSim model boundary; the ratio of the total area to the gaged area is 1.66. Inflow data for the period from October 1921 to September 2009 is the flow value for USGS gage 11383500 multiplied by 1.66.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS gage 11383500 DEER CREEK NEAR VINA, CA * 1.66

11. Stony Creek

Stony Creek flows from the Coast Ranges and enters the Sacramento River on the west bank at RM 190. Regulated flows released from East Park Reservoir, completed in 1910, flow into Stony Gorge Dam, completed in 1928, and then into Black Butte Dam, completed in 1963. USGS flow gage 11388000, Stony Creek below Black Butte Dam near Orland, operated from July 1955 through September 1990. Inflow data for the period from October 1921 to June 1955 and from October 1990 to December 1990 is the inflow value from the CVGSM model (James M. Montgomery Consulting Engineers, 1990) minus the Stony Creek South Canal diversion. Inflow data for the period from July 1955 to September 1990 is the flow at USGS gage 11388000. Inflow data for the period from January 1991 to September 2009 is the reported Black Butte reservoir releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	06/30/1955	CVGSM model (James M. Montgomery Consulting Engineers, 1990) minus Stony Creek South Canal diversions
07/01/1955	09/30/1990	USGS gage 11388000 STONY CREEK BELOW BLACK BUTTE DAM NEAR ORLAND, CA
10/01/1990	12/31/1990	CVGSM model (James M. Montgomery Consulting Engineers, 1990) minus Stony Creek South Canal diversions
01/01/1991	09/30/2009	Black Butte Reservoir releases (USACOE)

This inflow location is sited a significant distance inside the model boundary, based on the location of the stream gage and Black Butte Reservoir. This inflow should be replaced with a full time series of historical rim inflow values and a simulated lake for Black Butte Reservoir.

12. Big Chico Creek

Big Chico Creek flows from the Sierra Nevada foothills and enters the Sacramento River on the east bank at RM 196. USGS flow gage 11384000, Big Chico Creek near Chico, was in operation from October 1930 through September 1986 approximately 14 miles upstream of the mouth and approximately two miles outside the C2VSim model boundary. Inflow data for the period from October 1921 to September 1930 and from October 1986 to September 2009 is CalSim 3 data set I_BCC014, Historical Big Chico Creek near Chico (DWR and USBR 2011). Inflow data for the period from October 1930 to September 1986 is the flow at USGS gage 11384000.

Start Date	End Date	Source
10/01/1921	09/30/1930	CalSim 3 Big Chico Creek near Chico (I_BCC014)
10/01/1930	09/30/1986	USGS Gage 11384000 BIG CHICO CREEK NEAR CHICO, CA
10/01/1986	09/30/2009	CalSim 3 Big Chico Creek near Chico (I_BCC014)

13. Butte and Little Chico Creeks

Butte and Little Chico Creeks represents inflows from Butte Creek and Little Chico Creek whick flow from the Sierra Nevada foothills on the east side of the Sacramento Valley. Little Chico Creek joins Butte Creek, which flows into Butte Slough, which then flows to the Sutter Bypass. USGS flow gage 11390000, Butte Creek near Chico, has been in operation since October 1930 approximately 4 miles outside the C2VSim model boundary. Estimated Butte Creek flows at the gage location for the period from October 1921 to September 1930 were taken from Table 22 of the *1957 Joint Hydrology Study* (DWR and USBR 1958). The area of the Little Chico Creek watershed is approximately 24% of the area of the Butte Creek watershed. Inflow data for the period from October 1921 to September 1930 is estimated Butte Creek flow multiplied by 1.24. Inflow data for the period from October 1930 to September 2009 is the flow at USGS gage 11390000 multiplied by 1.24.

Start Date	End Date	Source
10/01/1921	09/30/1930	Historical Runoff of Butte Creek (DWR and USBR 1958) * 1.24
10/01/1930	09/30/2009	USGS Gage 11390000 BUTTE CREEK NEAR CHICO, CA * 1.24

14. Feather River

The Feather River flows from the Sierra Nevada and enters the Sacramento River near RM 80. Inflow data represents flows from the watershed above Oroville Dam prior to dam construction, and releases from Oroville Dam and the Thermalito complex after dam completion. USGS gage 11407000, Feather River at Oroville, located approximately one mile outside the C2VSim model boundary, has been in operation since October 1901. USGS gage 11406920, Thermalito Afterbay releases to Feather River near Oroville, located approximately 6 miles inside the C2VSim model boundary, has been in operation since November 1967. Inflow data for the period from October 1921 to October 1967 is the flow at USGS gage 11407000. Inflow data for the period from November 1967 to September 2009 is the sum of the flows at USGS gage 11407000 and USGS gage 11406920.

Start Date	End Date	Source
10/01/1921	10/31/1967	USGS Gage 11407000 FEATHER RIVER AT OROVILLE, CA
11/01/1967	09/30/2009	USGS Gage 11407000 FEATHER RIVER AT OROVILLE, CA + USGS Gage 11406920 THERMALITO AFTERBAY RELEASE TO FEATHER RIVER NEAR OROVILLE, CA

15. Yuba River

The Yuba River flows form the Sierra Nevada Mountains and enters the Feather River near RM 27. Inflow data represents flows from the watershed above Englebright Dam prior to dam construction, and releases from Englebright Dam after completion, plus flows from the tributaries Deer Creek and Dry Creek which enter the Yuba River between Englebright Dam and the model boundary. Estimation of historical inflow is complicated by the location of stream flow gages at a significant distance upstream of the model boundary, several surface water diversion and inflow locations between the gages, and the potential for stream-bed gains or losses. USGS flow gage 11419000, Yuba River at Smartville, located approximately 11 miles outside the C2VSim model boundary, operated from October 1903 through September 1941. USGS flow gage 11418000, Yuba River below Englebright Dam, located approximately 12 miles outside the C2VSim model boundary, has operated since October 1941. U.S. Army Corps of Engineers reported Englebright Dam outflow is used for periods when data from USGS flow gage 11418000 is not available. USGS flow gage 11418500, Deer Creek near Smartville, located approximately one mile upstream from the confluence with the Yuba River, which is one mile upstream from USGS gage 11419000 and one half mile downstream USGS gage 11418000, has operated since October 1935. USGS flow gage 11420700, Dry Creek near Browns Valley, located approximately five miles upstream from the confluence with the Yuba River, which is approximately two miles outside the C2VSim model boundary, was operated from October 1964 to October 1980. Flow from Deer Creek prior to October 1935 was estimated by correlation between USGS gages 11419000 and 11418500. Flow from Dry Creek prior to August 1964 and after November 1980 was estimated by correlation between Yuba River discharge and USGS gage 11420700. Deer Creek discharge is approximately equal to five percent of Yuba River discharge, and Dry Creek discharge is approximately equal to three percent of Yuba River discharge.

Inflow data for the period from October 1921 to September 1935 is the flow at USGS gage 11419000 plus estimated flows from Deer Creek and Dry Creek. Inflow data for the period from October 1935 to September 1941 is the sum of the flow at USGS gage 11419000 and the flow at USGS gage 11418500 plus estimated flows from Dry Creek. Inflow data for the period from October 1941 to July 1964 is the sum of the flow at USGS gage 11418000 and the flow at USGS gage 11418500 plus estimated flows from Dry Creek. Inflow data for the period from August 1964 to October 1980 is the sum of the flow at USGS gage 11418000, the flow at USGS gage 11418500 and the flow at USGS gage 11420700. Inflow data for the period from November 1980 to September 2006 and from October 2007 to September 2009 is the sum of the flow at USGS gage 11418000 and the flow at USGS gage 11418500 plus estimated flows from Dry Creek. Inflow data for the period from October 2006 to September 2007 is the sum of Englebright Dam reservoir releases, the flow at USGS gage 11418500 and estimated flows from Dry Creek.

Start Date	End Date	Source
10/01/1921	09/30/1935	USGS Gage 11419000 YUBA RIVER AT SMARTVILLE, CA + Deer Creek estimate + Dry Creek estimate
10/01/1935	09/30/1941	USGS Gage 11419000 YUBA RIVER AT SMARTVILLE, CA + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE + Dry Creek estimate
10/01/1941	07/31/1964	USGS Gage 11418000 YUBA RIVER BELOW ENGLEBRIGHT DAM, CA + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE, CA + Dry Creek estimate
08/01/1964	10/31/1980	USGS Gage 11418000 YUBA RIVER BELOW ENGLEBRIGHT DAM, CA + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE, CA + USGS Gage 11420700 DRY CREEK NEAR BROWNS VALLEY
11/01/1980	09/30/2006	USGS Gage 11418000 YUBA RIVER BELOW ENGLEBRIGHT DAM, CA + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE, CA + Dry Creek estimate
10/01/2006	09/30/2007	USACE ENGLEBRIGHT DAM OUTFLOW + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE, CA + Dry Creek estimate
10/01/2007	09/30/2009	USGS Gage 11418000 YUBA RIVER BELOW ENGLEBRIGHT DAM, CA + USGS Gage 11418500 DEER CREEK NEAR SMARTVILLE, CA + Dry Creek estimate

16. Bear River

The Bear River flows from the Sierra Nevada Mountains and enters the Feather River near RM 12. Inflow data represents flow from the watershed above Camp Far West Dam prior to dam construction, and releases from Camp Far West Reservoir after dam completion. USGS flow gage 11423500, Bear River at Van Trent, located approximately one mile outside the C2VSim model boundary, was operated from October 1905 to September 1927. USGS flow gage 11424000, Bear River near Wheatland, located approximately six miles inside the C2VSim model boundary, has been in operation since October 1928. The ratio of the watershed area of USGS gage 11424000 to the watershed area of USGS gage 11423500 is 1.05. Inflow estimation is complicated by the presence of several inflows and diversions, and the potential for stream-bed gains or losses. Inflow data for the period from October 1921 to September 1927 is the flow at USGS gage 11423500 multiplied by the ratio of watershed areas 1.05. Inflow data for the period from October 1927 to September 1928 was taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from October 1928 to September 2009 is the flow at USGS gage 11424000.

Start Date	End Date	Source
10/01/1921	09/30/1927	USGS gage 11423500 BEAR RIVER AT VAN TRENT, CA * 1.05
10/01/1927	09/30/1928	CVGSM model (James M. Montgomery Consulting Engineers, 1990)
10/01/1928	09/30/2009	USGS gage 11424000 BEAR RIVER NEAR WHEATLAND, CA

17. Cache Creek

Cache Creek flows from Clear Lake in the Coast Ranges, through the Capay Valley into the Sacramento Valley and discharges into the Yolo Bypass. The Capay Diversion Dam, operated by the Yolo County Flood Control and Water Conservation District (YCFCWCD) is located less than one mile outside the C2VSim model boundary. YCFCWCD currently diverts the entire flow of Cache Creek at this point during the irrigation season (Max Stevenson, YCFCWCD, written communication, October 20, 2011). USGS gage 11452000, Cache Creek near Capay, located approximately three miles outside the model boundary, was operated from October 1942 through November 1976. USGS gage 11451950, Cache Creek near Brooks, located approximately five miles upstream from gage 11452000, was operated from October 1983 through September 1986. USGS gage 11452500, Cache Creek at Yolo, located approximately 16 miles downstream from the model boundary, has been in operation since April 1903. Inflow data was set to zero for months with YCFCWCD diversions (Max Stevinson, YCFCWCD, written communication, April 26, 2011), and was otherwise estimated by correlation with USGS gage 11452500 ($Q_{Cache\ Creek} = 1.004 * Q_{11452500} - 1.862$, $r^2 = 0.994$).

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero if YCFCWCD diversions at the Capay Diversion Dam (YCFCWCD, 2011) are greater than zero, otherwise regression with USGS gage 11452500, CACHE CREEK AT YOLO, CA.

18. American River

The American River flows from the Sierra Nevada Mountains and enters the Sacramento River near RM 60. Inflow data represents flows from the watershed above the Folsom Lake afterbay Natoma Dam prior to dam construction, and releases from Natoma Dam after dam completion. USGS gage 11446500, American River at Fair Oaks, located six mile inside the C2VSim model boundary and less than one mile downstream from Natoma Dam, has been in operation since October 1904. Inflow data is the flow at USGS gage 11446500.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS gage 11446500 AMERICAN RIVER AT FAIR OAKS, CA

19. Putah Creek

Putah Creek flows from the Coast Ranges and discharges to the Yolo Bypass. Inflow data represents flows from the watersheds above Monticello Dam prior to dam construction, and releases from Monticello Dam after dam completion. USGS gage 11454500, Putah Creek at Winters, located approximately four miles outside the C2VSim model boundary, operated from October 1902 through September 1931. USGS gage 11454000, Putah Creek near Winters, located approximately four miles inside the C2VSim model boundary, and approximately three miles downstream of the Putah Creek Diversion Dam, has been in operation since October 1930. Inflow data for the period from October 1921 to September 1930 is the flow at USGS gage 11454500. Inflow data for the period from October 1930 to September 2009 is the flow at USGS gage 11454000 plus Putah South Canal diversions.

Start Date	End Date	Source
10/01/1921	09/30/1930	USGS gage 11454500 PUTAH CREEK AT WINTERS, CA
10/01/1930	09/30/2009	USGS gage 11454000 PUTAH CREEK NEAR WINTERS, CA + Putah South Canal Diversions

20. Cosumnes River

The Cosumnes River flows from the Sierra Nevada Mountains and enters the Mokelumne River approximately 7 miles upstream of the mouth. USGS gage 11335000, Cosumnes River at Michigan Bar, located within one mile of the C2VSim model boundary, has been in operation since October 1907. Inflow data is the flow at USGS gage 11335000.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS gage 11335000 COSUMNES RIVER AT MICHIGAN BAR, CA

21. Dry Creek

Dry Creek flows from the Sierra Nevada foothills and enters the Mokelumne River approximately 8 miles upstream of the mouth. USGS gage 11329500, Dry Creek near Galt, was in operation from October 1926 through September 1933, from October 1944 through September 1987, and from October 1995 through December 1997. Table 109 of the *1957 Joint Hydrology Study* (DWR and USBR 1958) contains estimated historical runoff of Dry Creek near Galt from October 1921 through September 1954, compiled from various sources. The watershed area upstream of the C2VSim model boundary is approximately 25.3% of the watershed area upstream of USGS gage 11329500.

Inflow data for the period from October 1921 to September 1926 and from October 1933 to September 1944 is the historical runoff from Dry Creek near Galt (DWR and USBR 1958) multiplied by 0.253. Inflow data for the period from October 1926 to September 1933, from October 1944 to September 1987, and from October 1995 to December 1997 is the flow at USGS gage 11329500 multiplied by 0.253. Inflow data for the period from October 1987 to September 1995 and from January 1998 to September 2009 was estimated by correlation with USGS gage 11335000, Cosumnes River at Michigan Bar ($Q_{\text{Dry Creek}} = 0.379 * Q_{\text{Cosumnes River}} - 3.084$, $r^2 = 0.84$) multiplied by 0.253.

Start Date	End Date	Source
10/01/1921	09/30/1926	Historical Runoff of Dry Creek near Galt (DWR 1958) * 0.253
10/01/1926	09/30/1933	USGS gage 11329500 DRY CREEK NEAR GALT, CA * 0.253
10/01/1933	09/30/1944	Historical Runoff of Dry Creek near Galt (DWR 1958) * 0.253
10/01/1944	09/30/1987	USGS gage 11329500 DRY CREEK NEAR GALT, CA * 0.253
10/01/1987	09/30/1995	Correlation with Cosumnes River at Michigan Bar
10/01/1995	12/01/1997	USGS gage 11329500 DRY CREEK NEAR GALT, CA * 0.253
01/01/1998	09/30/2009	Correlation with Cosumnes River at Michigan Bar

22. Mokelumne River

The Mokelumne River flows from the Sierra Nevada Mountains and discharges to the Sacramento-San Joaquin Delta. Inflow data represents flows from the watershed above Pardee Reservoir and Comanche Reservoir prior to their construction, and reservoir releases after construction. USGS gage 11323500, Mokelumne River below Comanche Dam, located approximately 12 miles inside the C2VSim boundary, operated from October 1904 through September 1995 and from October 2000 through the present. Comanche Reservoir release data are available from the East Bay Municipal Utilities District.

Data for the period from October 1921 to September 1993 is the flow at USGS gage 11323500. Inflow data for the period from October 1993 to September 2009 is the reported Comanche Dam releases (CDEC).

Start Date	End Date	Source
10/01/1921	09/30/1993	USGS Gage 11323500 MOKELUMNE RIVER BELOW COMANCHE DAM, CA
10/01/1993	09/30/2009	Comanche Dam release (CDEC)

23. Calaveras River

The Calaveras River flows from the Sierra Nevada Mountains and enters the San Joaquin River near where it enters the Sacramento-San Joaquin Delta. Inflow data represents flows from the watershed above New Hogan Dam prior to dam construction, and releases after construction. USGS gage 11309500, Calaveras River at Jenny Lind, located within one mile of the C2VSim model boundary, was in operation from January 1907 through September 1966. USGS gage 11308900, Calaveras River below New Hogan Dam near Valley Springs, located approximately seven miles outside the C2VSim boundary, was in operation from February 1961 through September 1990. Inflow data for the period from October 1921 to September 1996 is the flow at USGS gage 11309500. Inflow data for the period from October 1966 through September 1990 is the flow at USGS gage 11308900. Inflow data for the period from October 1990 through September 2009 is the reported New Hogan reservoir releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1966	09/30/1990	USGS Gage 11308900 CALAVERAS RIVER BELOW NEW HOGAN DAM, CA
10/01/1990	09/30/2009	New Hogan Dam release (USACOE)

24. Stanislaus River

The Stanislaus River flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 16. Inflow data represents releases from Goodwin Dam, located approximately two miles outside the C2VSim model boundary, after diversions to the Oakdale Canal and South San Joaquin Canal. USGS gage 11300000, Stanislaus River near Knights Ferry, operated from December 1915 through December 1932. USGS gage 11300500, South San Joaquin Canal near Knights Ferry, and USGS gage 11301000, Oakdale Canal near Knights Ferry, have been in operation since May 1914. USGS gage 11302000, Stanislaus River below Goodwin Dam near Knights Ferry, has been in operation since February 1957. Inflow data for the period from October 1921 to December 1932 was calculated as the flow at USGS gage 1130000 minus the flows at USGS gages 11300500 and 11301000. Inflow data for the period from January 1933 to January 1957 was Stanislaus River inflow from the CVGSM model (James M. Montgomery Consulting Engineers, 1990) minus the flows at USGS gages 11300500 and 11301000. Inflow data for the period from February 1957 to September 2009 is the flow at USGS gage 11302000.

Start Date	End Date	Source
10/01/1921	12/31/1932	USGS gage 11300000 STANISLAUS RIVER NEAR KNIGHTS FERRY, CA – USGS gage 11300500 SOUTH SAN JOAQUIN CANAL NEAR KNIGHTS FERRY, CA – USGS gage 11301000 OAKDALE CANAL NEAR KNIGHTS FERRY, CA
01/01/1933	01/31/1957	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) – USGS gage 11300500 SOUTH SAN JOAQUIN CANAL NEAR KNIGHTS FERRY, CA – USGS gage 11301000 OAKDALE CANAL NEAR KNIGHTS FERRY, CA
02/01/1957	09/30/2009	USGS gage 11302000 STANISLAUS RIVER BELOW GOODWIN DAM NEAR KNIGHTS FERRY, CA

25. Tuolumne River

The Tuolumne River flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 25. Inflow data represents releases from La Grange Dam, located approximately three miles outside the C2VSim model boundary, after diversions to the Modesto Canal and Turlock Canal. USGS gage 11288000, Tuolumne River above La Grange Dam near La Grange, located approximately six miles outside the C2VSim boundary, operated from September 1911 through October 1970. USGS gage 11289000, Modesto Canal near La Grange, has been in operation since January 1909. USGS gage 11289500, Turlock Canal near La Grange, has been in operation since August 1899. USGS gage 11289650, Tuolumne River below La Grange Dam, located approximately one mile outside the C2VSim model boundary, has been in operation since October 1970. Inflow data for the period from October 1921 to September 1970 is the flow at USGS gage 11288000 minus the flow at USGS gages 11289000 and 11289500. Inflow data for the period from October 1970 to September 2009 is the flow at USGS gage 11289660.

Start Date	End Date	Source
10/01/1921	09/30/1970	USGS gage 11288000 TUOLUMNE RIVER ABOVE LA GRANGE DAM, CA – USGS gage 11289000 MODESTO CANAL NEAR LA GRANGE, CA – USGS gage 11289500 TURLOCK CANAL NEAR LA GRANGE, CA
10/01/1970	09/30/2009	USGS gage 11289650 TUOLUMNE RIVER BELOW LA GRANGE DAM, CA

26. Oristimba Creek

Oristimba Creek flows from the Coast Ranges and enters the San Joaquin River near RM 43. USGS gage 11274500, located approximately one mile inside the C2VSim boundary, has been in operation since April 1932. Inflow data for the period from October 1921 to March 1932 were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from April 1932 to September 2009 is the flow at USGS gage 11274500.

Start Date	End Date	Source
10/01/1921	03/30/1932	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
04/01/1932	09/30/2009	USGS Gage 11274500 ORESTIMBA CREEK NEAR NEWMAN, CA

27. Merced River

The Merced River flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 48. USGS gage 11270900, Merced River below Merced Falls Dam, located approximately one mile outside the C2VSim model boundary, has been in operation since April 1904. Inflow data for the entire simulation period is the flow at USGS gage 11270900.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS gage 11270900 MEERCED RIVER BELOW MERCED FALLS DAM NEAR SNELL, CA

28. Bear Creek Group

The Bear Creek Group is several streams that flow from the Sierra Nevada Mountains into Bear Creek, and then into the San Joaquin River near RM 63. The CDEC data set BAR, Bear Creek, represents flows for approximately 26.8% of the area upstream of the C2VSim model inflow point. Inflow data for the period from October 1921 to September 1993 were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996). Inflow data for the period from October 1993 to September 2009 were taken from CDEC data set BAR, Bear Creek, multiplied by 3.72.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model (CH2MHill, 1996)
10/01/1993	09/30/2009	CDEC BEAR CREEK (BAR) * 3.72

29. Deadman's Creek

Deadman's Creek flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 71. The watershed area upstream of the C2VSim model Deadman's Creek inflow point is approximately 80% of the watershed area upstream of the C2VSim model Bear Creek Group inflow point. Inflow data for the period from October 1921 to September 1993 were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996). Inflow data for the period from October 1993 to September 2009 was estimated as 80% of the Bear Creek Group flows.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model (CH2MHill, 1996)
10/01/1921	09/30/2009	Bear Creek Group flows (above) * 0.80

30. Chowchilla River

The Chowchilla River flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 86. Inflow data represents flows from the watersheds above Buchanan Dam before dam construction, and releases from the dam after completion. USGS gage 11259000, Chowchilla River below Buchanan Dam, located approximately five miles outside the C2VSim model boundary, was operated intermittently, from October 1921 through September 1923, October 1930 through September 1972, and October 1975 through September 1990. Inflow data for the period from October 1921 to July 1923, from October 1930 to September 1972, and from October 1976 to September 1990 is the flow at USGS gage 11259000. Inflow data for the period from August 1923 to September 1930 was taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from October 1972 to September 1976 is the flow at USGS gage 11269300. Inflow data for the period from October 1990 to September 2009 is Buchanan Reservoir releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	07/31/1923	USGS gage 11259000 CHOWCHILLA RIVER BELOW BUCHANAN DAM NEAR RAYMOND, CA
08/01/1923	09/30/1930	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1930	09/30/1972	USGS gage 11259000 CHOWCHILLA RIVER BELOW BUCHANAN DAM NEAR RAYMOND, CA
10/01/1972	09/30/1975	USGS gage 11259300 CHOWCHILLA RIVER BELOW RAYNOR CREEK NEAR RAYMOND, CA
10/01/1975	09/30/1990	USGS gage 11259000 CHOWCHILLA RIVER BELOW BUCHANAN DAM NEAR RAYMOND, CA
10/01/1990	09/30/2009	Buchanan Reservoir releases (USACOE)

31. Fresno River

The Fresno River flows from the Sierra Nevada Mountains and enters the San Joaquin River near RM 90. Inflow data represents flows from the watersheds above Hidden Dam prior to dam construction, and Hidden Dam releases after dam completion. USGS gage 11258000, Fresno River below Hidden Dam near Daulton, located approximately one mile outside the C2VSim model boundary, was operated from October 1941 through September 1990. Inflow data for the period from October 1921 to September 1941 was taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from October 1941 to September 1990 is the flow at USGS gage 11257500. Inflow data for the period from October 1990 to September 2009 is Hidden Dam releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	09/30/1941	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1941	09/30/1990	USGS gage 11257500 FRESNO R BELOW HIDDEN DAM NEAR DAULTON, CA
10/01/1990	09/30/2009	Hidden Dam Releases (USACOE)

32. San Joaquin River

The San Joaquin River flows from the Sierra Nevada Mountains into the San Joaquin Valley, and then to the northwest to eventually discharge into the Sacramento-San Joaquin Delta. Inflow data represents flows from the watersheds above Friant Dam before dam construction, and Friant Dam releases after dam completion. USGS gage 11251000, San Joaquin River below Friant, has been in operation since October 1907. Inflow data for the period from October 1921 to September 2009 is the flow at USGS gage 11251000.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS gage 11251000 SAN JOAQUIN RIVER BELOW FRIANT, CA

33. Kings River

The Kings River flows from the Sierra Nevada Mountains into the San Joaquin Valley, where it bifurcates into the North Fork Kings River and South Fork Kings River. The North Fork Kings River flows to the northwest to Fresno Slough, the James Bypass, and eventually to the Mendota Pool, entering the San Joaquin River near RM 106. The South Fork Kings River flows to the south into Tulare Lake. Inflow data represents flows from the watersheds above Pine Flat Dam before dam construction, and Pine Flat Dam releases after dam completion. USGS gage 11222000, Kings River at Piedra, located approximately three miles outside the C2VSim model boundary, was in operation from October 1895 to September 1959. USGS gage 11221500, Kings River below Pine Flat Dam, located approximately six miles outside the C2VSim model boundary, was in operation from October 1954 through September 1990. Inflow data for the period from October 1921 to September 1958 is the flow at USGS gage 11222000. Inflow data for the period from October 1958 to September 1990 is the flow at USGS gage 11221500. Inflow data for the period from October 1990 to September 2009 is Pine Flat Dam releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	09/30/1958	USGS gage 11222000 KINGS RIVER AT PIEDRA, CA
10/01/1958	09/30/1990	USGS gage 11221500 KINGS RIVER BELOW PINE FLAT DAM, CA
10/01/1990	09/30/2009	Pine Flat Dam Releases (USACOE)

34. Kaweah River

The Kaweah River flows from the Sierra Nevada Mountains into the internally drained Tulare Lake Basin. Inflow data represents flows from the watersheds above Terminus Dam prior to dam completion, and Terminus Dam releases after dam completion. USGS gage 11210500, Kaweah River near Three Rivers, located approximately six miles outside the C2VSim model boundary, was in operation from May 1903 to September 1961. USGS gage 11210950, Kaweah River below Terminus Dam, located approximately two miles outside the C2VSim model boundary, was in operation from October 1961 to September 1990. Inflow data for the period from October 1921 to September 1961 is the flow at USGS gage 11210500. Inflow data for the period from October 1961 to September 1990 is the flow at USGS gage 11210950. Inflow data for the period from October 1990 to September 2009 is Terminus Dam releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	09/30/1961	USGS gage 11210500 KAWEAH RIVER NEAR THREE RIVERS, CA
10/01/1961	09/30/1990	USGS gage 11210950 KAWEAH RIVER BELOW TERMINUS DAM, CA
10/01/1990	09/30/2009	Terminus Dam Releases (USACOE)

35. Tule River

The Tule River flows from the Sierra Nevada Mountains into the internally drained Tulare Lake Basin. Inflow data represents flows from the watersheds above Success Dam prior to dam construction and releases from Success Dam since dam completion. USGS gage 11203500, Tule River near Porterville, located approximately four miles outside the C2VSim model boundary, was in operation from November 1911 to September 1960. USGS gage 11204900, Tule River below Success Dam, located approximately one mile outside the C2VSim model boundary, was in operation from October 1960 to September 1990. Inflow data for the period from October 1921 to September 1960 is the flow at USGS gage 11203500. Inflow data for the period from October 1960 to September 1990 is the flow at USGS gage 11204900. Inflow data for the period from October 1990 to September 2009 is Success Dam releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	09/30/1960	USGS gage 11203500 TULE RIVER NEAR PORTERVILLE, CA
10/01/1960	09/30/1990	USGS gage 11204900 TULE RIVER BELOW SUCCESS DAM, CA
10/01/1990	09/30/2009	Success Dam Releases (USACOE)

36. Kern River

The Kern River flows from the Sierra Nevada Mountains into the internally drained Tulare Lake Basin. Inflow data represents flows from the watersheds above the First Point of Measurement near the City of Bakersfield. USGS gage 11194000, Kern River near Bakersfield, located approximately two miles inside the C2VSim model boundary, was in operation from October 1893 through September 1976. Inflow data for the period from October 1921 to September 1976 is the flow at USGS gage 11940000. Inflow data for the period from October 1976 to September 1990 1941 was taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990). Inflow data for the period from October 1990 to September 2009 is Isabella Dam releases (USACOE 1990-2010).

Start Date	End Date	Source
10/01/1921	09/30/1976	USGS gage 11194000 KERN RIVER NEAR BAKERSFIELD, CA
10/01/1976	12/31/1989	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/31/1990	09/30/2009	Isabella Dam Releases (USACOE)

37. Friant-Kern Canal Wasteway Deliveries to Kings River

Friant-Kern Canal Wasteway Deliveries to the Kings River represents water that is discharged into the Kings River for downstream diversion. Inflow data for the period from October 1921 to September 1995 is set to zero. Inflow data for the period from October 1995 to December 2001 was taken from reports of the Kings River Watermaster. Inflow data for the period from January 2002 to September 2009 were provided by the Friant-Kern Water Authority (written communication, August 15, 2011).

Start Date	End Date	Source
10/01/1921	09/30/1995	No flow
10/01/1995	12/31/2001	Kings River Watermaster reports
01/01/2002	09/30/2009	Friant-Kern Water Authority

38. Friant-Kern Canal Wasteway Deliveries to Tule River

Friant-Kern Canal Wasteway Deliveries to the Tule River represents water that is discharged into the Tule River for downstream diversion. Inflow data for the period from October 1921 to September 1993 were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill 1996). Inflow data for the period from October 1993 to September 1995 was estimated from USBR Reports of Operations. Inflow data for the period from October 1995 to December 2001 was taken from reports of the Tule River Watermaster. Inflow data for the period from January 2002 to September 2009 were provided by the Friant-Kern Water Authority (written communication, August 15, 2011).

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Extension (CH2M Hill, 1996)
10/01/1993	09/30/1995	Estimated from USBR Reports of Operations
10/01/1995	12/31/2001	Tule River Watermaster Reports
01/01/2002	09/30/2009	Friant-Kern Water Authority

39. Friant-Kern Canal Wasteway Deliveries to Kaweah River

Friant-Kern Canal Wasteway Deliveries to the Kaweah River represents water that is discharged into the Kaweah River for downstream diversion. Inflow data for the period from October 1921 to September 1993 were taken from the CVGSM model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill 1996). Inflow data for the period from October 1993 to December 2001 was estimated from USBR Reports of Operations. Inflow data for the period from January 2002 to September 2009 were provided by the Friant-Kern Water Authority (written communication, August 15, 2011).

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Extension (CH2M Hill, 1996)
10/01/1993	12/31/2001	Estimated from USBR Reports of Operations
01/01/2002	09/30/2009	Friant-Kern Water Authority

40. Cross Valley Canal Deliveries to Kern River

Cross Valley Canal Deliveries to Kern River represents water that is discharged into the Kern River for downstream diversion. Inflow data for the period from October 1921 to September 1975 is zero. Inflow data for the period from October 1975 to September 2009 were taken from Kern River Watermaster reports.

Start Date	End Date	Source
10/01/1921	09/30/1975	No flow
10/01/1990	09/30/2009	Kern River Watermaster

41. Friant-Kern Canal Deliveries to Kern River

Friant-Kern Canal Deliveries to Kern River represents water that is discharged into the Kern River for downstream diversion. Inflow data for the period from October 1921 to September 1969 is zero. Inflow data for the period from October 1969 to September 2009 were taken from Kern River Watermaster reports.

Start Date	End Date	Source
10/01/1921	09/30/1969	No flow
10/01/1969	09/30/2009	Kern river Watermaster

Surface Water Diversions

The C2VSim diversions are described in the Simulation application's Surface Water Diversion Specification File. This file contains data specifying the locations, properties and recharge zones for surface water diversions and bypasses. The properties for each diversion include the river node where water is diverted, the recoverable and non-recoverable losses, the model subregion the water is delivered to, and the land use type that the water is used for. The recoverable loss fraction refers to the portion that leaks from canals and pipes and enters the groundwater system as recharge. The non-recoverable loss fraction refers to the portion that evaporates.

Numerous canals deliver water that originates outside the C2VSim model area to users within the model area. These deliveries are treated as imports in the C2VSim model, and are specified by setting the originating river node to zero. These include the Delta-Mendota Canal, Modesto Canal, Friant-Kern Canal and Cross-Valley Canal. Several canals divert water from rivers in the C2VSim model area and deliver this water to users located outside the model area. These deliveries are treated as exports in the C2VSim model, and are specified by setting the destination subregion to zero. These include the Putah South Canal, North Bay Aqueduct and Contra Costa Canal. Several canals that divert water from rivers in the C2VSim model area to regulating reservoirs before delivery to users within the model area are simulated as a diversion and one or more imports.

Surface water diversion and import data sets are divided into five classes in the C2VSim model: agricultural (Ag), municipal and industrial (M&I), refuges, spreading and seepage. Within the IWFM Land and Water Use Process, agricultural water is utilized to meet agricultural demands and M&I water is used to meet urban demands. Refuge water is utilized within the current C2VSim version to meet agricultural demands, but was separated in the data files to facilitate proposed future development of a refuge land class in the IWFM Land and Water Use Process. Spreading represents diversions and imports that flow to recharge ponds for direct recharge to the groundwater. Seepage represents estimates of canal leakage that flow directly to the groundwater. Spreading and seepage generally have a recoverable loss factor between 0.95 and 1.00.

Table 2. Surface water diversions in the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim)

ID	Description	SR	Use	RL	NL
1	Whiskeytown and Shasta for Ag	1	Ag	0.03	0.01
2	Whiskeytown and Shasta for M&I	1	M&I	0.03	0.01
3	Sacramento River to Bella Vista conduit for Ag	1	Ag	0.03	0.02
4	Sacramento River to Bella Vista conduit for M&I	1	M&I	0.03	0.01
5	Sacramento River to Bella Vista conduit for export	Export	Export	0.03	0.00
6	Sacramento River, Keswick Dam to Red Bluff, for Ag	1	Ag	0.30	0.10

ID	Description	SR	Use	RL	NL
7	Sacramento River, Keswick Dam to Red Bluff, for M&I	1	M&I	0.03	0.01
8	Cow Creek riparian diversions	1	Ag	0.10	0.02
9	Battle Creek riparian diversions	1	Ag	0.10	0.02
10	Cottonwood Creek riparian diversions	1	Ag	0.10	0.02
11	Clear Creek riparian diversions	2	Ag	0.10	0.02
12	Sacramento River diversions to the Corning Canal	2	Ag	0.03	0.02
13	Stony Creek to North Canal	2	Ag	0.04	0.02
14	Stony Creek to South Canal	2	Ag	0.04	0.02
15	Stony Creek to the Tehama-Colusa Canal	3	Ag	0.03	0.02
16	Stony Creek to the Glenn-Colusa Canal	3	Ag	0.03	0.02
17	Sacramento River to Subregion 2	2	Ag	0.10	0.02
18	Antelope Creek riparian diversions	2	Ag	0.10	0.02
19	Mill Creek riparian diversions	2	Ag	0.10	0.02
20	Elder Creek riparian diversions	2	Ag	0.10	0.02
21	Thomes Creek riparian diversions	2	Ag	0.10	0.02
22	Deer Creek riparian diversions	2	Ag	0.10	0.02
23	Sacramento River to the Tehama-Colusa Canal to Subregion 2	2	Ag	0.03	0.02
24	Sacramento River to the Tehama-Colusa Canal to Subregion 3	3	Ag	0.03	0.02
25	Sacramento River to the Glenn-Colusa Canal for Ag	3	Ag	0.03	0.02
26	Sacramento River to the Glenn-Colusa Canal for Refuges	3	Refuge	0.03	0.02
27	Sacramento River to Subregion 3	3	Ag	0.10	0.02
28	Sacramento River to Subregion 4	4	Ag	0.10	0.02
29	Little Chico Creek	5	Ag	0.10	0.02
30	Tarr Ditch	5	Ag	0.10	0.02
31	Miocine and Wilenor Canals	5	Ag	0.10	0.02
32	Palermo Canal	5	M&I	0.03	0.02
33	Oroville-Wyandotte ID through Forbestown Ditch	5	Ag	0.10	0.02
34	Little Dry Creek	5	Ag	0.10	0.02
35	Bangor Canal	5	Ag	0.10	0.02
36	Thermalito Afterbay	5	Ag	0.10	0.02
37	Feather River to Subregion 5 for Ag (replaced by Thermalito Afterbay)	5	Ag	0.10	0.02
38	Feather River to Thermalito ID	5	M&I	0.03	0.02
39	Feather River to Subregion 5 for Ag	5	Ag	0.10	0.02
40	Feather River to Yuba City	5	M&I	0.03	0.01
41	Feather River to Subregion 7 for Ag	7	Ag	0.10	0.02
42	Yuba River for Ag	5	Ag	0.10	0.02

ID – Diversion Identification Number, SR – Subregion, RL – Recoverable loss, NL – Non-recoverable loss, Ag – Agriculture, M&I – Municipal and Industrial

ID	Description	SR	Use	RL	NL
43	Yuba River for M&I	5	M&I	0.03	0.01
44	Bear River to Camp Far West ID North Side	5	Ag	0.10	0.02
45	Bear River to Camp Far West ID South Side	7	Ag	0.10	0.02
46	Bear River to South Sutter WD	7	Ag	0.10	0.02
47	Bear River Canal to South Sutter WD	7	Ag	0.10	0.02
48	Boardman Canal	7	Ag	0.10	0.02
49	Combie (Gold Hill) Canal	7	Ag	0.10	0.02
50	Cross Canal	7	Ag	0.10	0.02
51	Butte Creek at Parrott-Phelan Dam	5	Ag	0.10	0.02
52	Butte Creek at Durham Mutual Dam	5	Ag	0.10	0.02
53	Butte Creek at Adams & Gorrill Dams	5	Ag	0.10	0.02
54	Butte Creek to RD 1004	4	Ag	0.10	0.02
55	Butte Creek to Sutter and Butte Duck Clubs	5	Refuge	0.10	0.02
56	Butte Slough	4	Ag	0.10	0.02
57	Sutter Bypass East Borrow Pit to Sutter NWR	4	Refuge	0.10	0.02
58	Sutter Bypass West Borrow Pit North of Tisdale Bypass	4	Ag	0.10	0.02
59	Sutter Bypass East Borrow Pit to lands within Sutter Bypass	4	Ag	0.10	0.02
60	Sutter Bypass East Borrow Pit from North of Wadsworth Canal to Gilsizer Slough	4	Ag	0.10	0.02
61	Sutter Bypass East Borrow Pit South of Gilsizer Slough to	5	Ag	0.10	0.02
62	Colusa Basin Drain to Subregion 3 for Ag	3	Ag	0.10	0.02
63	Colusa Basin Drain to Subregion 3 for Refuges	3	Refuge	0.10	0.02
64	Knights Landing Ridge Cut	6	Ag	0.10	0.02
65	Sacramento River between Knights Landing and Sacramento to Subregion 6 for Ag	6	Ag	0.10	0.02
66	Sacramento River to City of West Sacramento	6	M&I	0.03	0.01
67	Sacramento River between Knights Landing and Sacramento to Subregion 7 for Ag	7	Ag	0.10	0.02
68	Sacramento River to City of Sacramento	8	M&I	0.03	0.01
69	Cache Creek	6	Ag	0.10	0.02
70	Yolo Bypass	6	Ag	0.10	0.02
71	Putah South Canal for Ag	6	Ag	0.03	0.02
72	Putah South Canal for M&I	6	M&I	0.03	0.02
73	Putah South Canal exports	Export	Export	0.03	0
74	Putah Creek riparian diversions	6	Ag	0.10	0.02
75	Folsom Lake for Ag	7	Ag	0.10	0.02
76	Folsom Lake for M&I	7	M&I	0.05	0.01
77	Folsom South Canal for Ag	8	Ag	0.10	0.02
78	Folsom South Canal for M&I	8	M&I	0.05	0.01

ID	Description	SR	Use	RL	NL
79	Folsom South Canal exports	Export	Export	0.10	0.01
80	American River to Carmichael WD	7	M&I	0.03	0.01
81	American River to City of Sacramento	7	M&I	0.03	0.01
82	Cosumnes River	8	Ag	0.10	0.02
83	Mokelumne River from Comanche Reservoir	8	Ag	0.10	0.02
84	Mokelumne River	8	Ag	0.10	0.02
85	Calaveras River	8	Ag	0.10	0.02
86	Sacramento-San Joaquin Delta for Ag	9	Ag	0.10	0.02
87	Sacramento-San Joaquin Delta for M&I	9	M&I	0.05	0.02
88	Sacramento-San Joaquin Delta to North Bay Aqueduct for Ag	6	Ag	0.10	0.02
89	Sacramento-San Joaquin Delta to North Bay Aqueduct for M&I	6	M&I	0.05	0.02
90	Sacramento-San Joaquin Delta to North Bay Aqueduct export	Export	Export	0.02	0
91	Sacramento-San Joaquin Delta to Contra Costa Canal	Export	Export	0.02	0
92	Sacramento-San Joaquin Delta to CVP	Export	Export	0.02	0
93	Sacramento-San Joaquin Delta to SWP	Export	Export	0.02	0
94	Stanislaus River to South San Joaquin Canal for Ag	11	Ag	0.15	0.03
95	Stanislaus River to South San Joaquin Canal for M&I	11	M&I	0.05	0.01
96	Stanislaus River to Oakdale Canal for Ag	11	Ag	0.15	0.03
97	Stanislaus River to Oakdale Canal for M&I	11	M&I	0.05	0.01
98	Stanislaus River riparian for Ag	11	Ag	0.15	0.03
99	Stanislaus River riparian for M&I	11	M&I	0.05	0.01
100	Tuolumne River to Modesto Canal	Export	Export	0.10	0
101	Modesto Canal for Ag	11	Ag	0.15	0.03
102	Modesto Canal for M&I	11	M&I	0.05	0.01
103	Tuolumne River right bank riparian diversions for Ag	11	Ag	0.15	0.03
104	Tuolumne River right bank riparian diversions for M&I	11	M&I	0.05	0.01
105	Tuolumne River left bank riparian diversions for Ag	12	Ag	0.15	0.03
106	Tuolumne River left bank riparian diversions for M&I	12	M&I	0.05	0.01
107	Tuolumne River to Turlock Canal	Export	Export	0.05	0
108	Turlock Canal for Ag	12	Ag	0.15	0.03
109	Turlock Canal for M&I	12	M&I	0.05	0.01
110	Merced River to Merced ID Northside Canal for Ag	12	Ag	0.15	0.03
111	Merced River to Merced ID Northside Canal for M&I	12	M&I	0.05	0.01
112	Merced River right bank riparian diversions for Ag	12	Ag	0.15	0.03
113	Merced River right bank riparian diversions for M&I	12	M&I	0.05	0.01
114	Merced River left bank riparian diversions for Ag	13	Ag	0.15	0.03
115	Merced River left bank riparian diversions for M&I	13	M&I	0.05	0.01

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ID	Description	SR	Use	RL	NL
116	Merced River to Merced ID Main Canal for Ag	13	Ag	0.15	0.03
117	Merced River to Merced ID Main Canal for M&I	13	M&I	0.05	0.01
118	Madera Canal to Chowchilla WD	13	Ag	0.15	0.03
119	Chowchilla River riparian diversions for Ag	13	Ag	0.15	0.03
120	Chowchilla River diversions for Spreading	13	Spreading	0.95	0.01
121	Madera Canal to Madera ID	13	Ag	0.15	0.03
122	Fresno River riparian diversions for Ag	13	Ag	0.15	0.03
123	Fresno River diversions for Spreading	13	Spreading	0.95	0.05
124	San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 13 for Ag	13	Ag	0.15	0.03
125	San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 13 for M&I	13	M&I	0.05	0.01
126	San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 16 for Ag	16	Ag	0.15	0.03
127	San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 16 for M&I	16	M&I	0.05	0.01
128	San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 10 for Ag	10	Ag	0.15	0.03
129	San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 11 for Ag	11	Ag	0.15	0.03
130	San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 12 for Ag	12	Ag	0.15	0.03
131	San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 13 for Ag	13	Ag	0.15	0.03
132	Kings River to Fresno ID for Ag	16	Ag	0.12	0.03
133	Kings River to Fresno ID for Spreading	16	Spreading	0.95	0.05
134	Kings River to Consolidated ID for Ag	17	Ag	0.16	0.04
135	Kings River to Consolidated ID for Spreading	17	Spreading	0.95	0.05
136	Kings River to Alta ID for Ag	17	Ag	0.16	0.04
137	Kings River to Alta ID for Spreading	17	Spreading	0.95	0.05
138	Kings River Main Stem for Ag	15	Ag	0.16	0.04
139	Kings River Main Stem for Spreading	15	Spreading	0.95	0.05
140	Kings River North Fork for Ag	15	Ag	0.16	0.04
141	Kings River North Fork for Spreading	15	Spreading	0.95	0.05
142	Kings River South Fork for Ag	15	Ag	0.16	0.04
143	Kings River South Fork for Spreading	15	Spreading	0.95	0.05
144	Kings River Fresno Slough for Ag	15	Ag	0.16	0.04
145	Kings River Fresno Slough for Spreading	15	Spreading	0.95	0.05
146	Kaweah River Partition A for Ag	18	Ag	0.14	0.03
147	Kaweah River Partition A for Spreading	18	Spreading	0.95	0.05

ID	Description	SR	Use	RL	NL
148	Kaweah River Partition B for Ag	18	Ag	0.14	0.03
149	Kaweah River Partition B for Spreading	18	Spreading	0.95	0.05
150	Kaweah River Partition C for Ag	18	Ag	0.14	0.03
151	Kaweah River Partition C for Spreading	18	Spreading	0.95	0.05
152	Kaweah River Partition D for Ag	18	Ag	0.14	0.03
153	Kaweah River Partition D for Spreading	18	Spreading	0.95	0.05
154	Kaweah River to Corcoran ID for Ag	18	Ag	0.14	0.03
155	Kaweah River to Corcoran ID for Spreading	18	Spreading	0.95	0.05
156	Tule River for Ag	18	Ag	0.14	0.03
157	Tule River for Spreading	18	Spreading	0.95	0.05
158	Kern River to Subregion 19 for Ag	19	Ag	0.07	0.01
159	Kern River to Subregion 19 for Spreading	19	Spreading	0.95	0.05
160	Kern River to Subregion 20 for Ag	20	Ag	0.13	0.03
161	Kern River to Subregion 20 for M&I	20	M&I	0.05	0.01
162	Kern River to Subregion 20 for Spreading	20	Spreading	0.95	0.05
163	Kern River at Rocky Point Weir for Ag	21	Ag	0.08	0.02
164	Kern River at Rocky Point Weir for M&I	21	M&I	0.05	0.01
165	Kern River at Calloway River Weir for Ag	21	Ag	0.08	0.02
166	Kern River at Calloway River Weir for M&I	21	M&I	0.05	0.01
167	Kern River at Calloway River Weir for Spreading	21	Spreading	0.95	0.05
168	Kern River at River Canal Weir for Ag	21	Ag	0.08	0.02
169	Kern River at River Canal Weir for M&I	21	M&I	0.05	0.01
170	Kern River at River Canal Weir for Spreading	21	Spreading	0.95	0.05
171	Delta Mendota Canal to Subregion 9 for Ag	9	Ag	0.05	0.02
172	Delta Mendota Canal to Subregion 10 for Ag	10	Ag	0.05	0.02
173	Delta Mendota Canal to Subregion 10 for M&I	10	M&I	0.05	0.01
174	Delta Mendota Canal to Subregion 10 for Refuges	10	Refuge	0.05	0.02
175	Delta Mendota Canal to Subregion 13 for Ag	13	Ag	0.05	0.02
176	Delta Mendota Canal seepage	-	Seepage	1.00	0
177	Mendota Pool to Subregion 10 for Ag	10	Ag	0.16	0.02
178	Mendota Pool to Subregion 10 for Refuges	10	Refuge	0.16	0.02
179	Mendota Pool to Subregion 13 for Ag	13	Ag	0.16	0.02
180	Mendota Pool to Subregion 14 for Ag	14	Ag	0.16	0.02
181	Mendota Pool to Subregion 15 for Ag	15	Ag	0.16	0.02
182	Mendota Pool to Subregion 15 for M&I	15	M&I	0.08	0.01
183	Mendota Pool to Subregion 15 for Refuges	15	Refuge	0.16	0.02
184	O'Neill Forebay for Ag	10	Ag	0.10	0.02

ID – Diversion Identification Number, SR – Subregion, RL – Recoverable loss, NL – Non-recoverable loss, Ag – Agriculture, M&I – Municipal and Industrial

ID	Description	SR	Use	RL	NL
185	O'Neill Forebay for M&I	10	M&I	0.05	0.01
186	O'Neill Forebay for Refuges	10	Refuge	0.10	0.02
187	San Luis Canal to Subregion 10 for Ag	10	Ag	0.05	0.02
188	San Luis Canal to Subregion 10 for M&I	10	M&I	0.05	0.01
189	San Luis Canal to Subregion 10 for Refuges	10	Refuge	0.05	0.02
190	San Luis Canal to Subregion 14 for Ag	14	Ag	0.05	0.02
191	San Luis Canal to Subregion 14 for M&I	14	M&I	0.05	0.01
192	San Luis Canal to Subregion 14 for Refuges	14	Refuge	0.05	0.02
193	San Luis Canal to Subregion 15 for Ag	15	Ag	0.05	0.02
194	San Luis Canal to Subregion 15 for M&I	15	M&I	0.05	0.01
195	San Luis Canal to Subregion 15 for Refuges	15	Refuge	0.05	0.02
196	California Aqueduct to Subregion 18 for Ag	18	Ag	0.05	0.02
197	California Aqueduct to Subregion 19 for Ag	19	Ag	0.05	0.02
198	California Aqueduct to Subregion 19 for Spreading	19	Spreading	0.95	0.05
199	California Aqueduct to Subregion 19 for M&I	19	M&I	0.05	0.01
200	California Aqueduct to Subregion 19 for Refuges	19	Refuge	0.05	0.02
201	California Aqueduct to Subregion 20 for Ag	20	Ag	0.05	0.02
202	California Aqueduct to Subregion 21 for Ag	21	Ag	0.05	0.02
203	California Aqueduct to Subregion 21 for Spreading	21	Spreading	0.95	0.05
204	California Aqueduct to Subregion 21 for M&I	21	M&I	0.05	0.01
205	San Luis Canal seepage losses, Subregion 10	10	Seepage	1.00	0
206	San Luis Canal seepage losses, Subregion 14	14	Seepage	1.00	0
207	San Luis Canal seepage losses, Subregion 15	15	Seepage	1.00	0
208	California Aqueduct seepage losses, Subregion 19	19	Seepage	1.00	0
209	California Aqueduct seepage losses, Subregion 21	21	Seepage	1.00	0
210	Madera Canal for Ag	13	Ag	0.05	0.02
211	Madera Canal for M&I	13	M&I	0.05	0.01
212	Friant-Kern Canal to Subregion 15	15	Ag	0.05	0.02
213	Friant-Kern Canal to Subregion 16 for Ag	16	Ag	0.05	0.02
214	Friant-Kern Canal to Subregion 16 for Spreading	16	Spreading	0.95	0.05
215	Friant-Kern Canal to Subregion 16 for M&I	16	M&I	0.05	0.01
216	Friant-Kern Canal to Subregion 17 for Ag	17	Ag	0.05	0.02
217	Friant-Kern Canal to Subregion 17 for Spreading	17	Spreading	0.95	0.05
218	Friant-Kern Canal to Subregion 17 for M&I	17	M&I	0.05	0.01
219	Friant-Kern Canal to Subregion 18 for Ag	18	Ag	0.05	0.02
220	Friant-Kern Canal to Subregion 18 for Spreading	18	Spreading	0.95	0.05
221	Friant-Kern Canal to Subregion 18 for M&I	18	M&I	0.05	0.01
222	Friant-Kern Canal to Subregion 19 for Ag	19	Ag	0.05	0.02

ID	Description	SR	Use	RL	NL
223	Friant-Kern Canal to Subregion 19 for Spreading	19	Spreading	0.95	0.05
224	Friant-Kern Canal to Subregion 19 for Refuges	19	Refuge	0.05	0.02
225	Friant-Kern Canal to Subregion 20 for Ag	20	Ag	0.05	0.02
226	Friant-Kern Canal to Subregion 20 for Spreading	20	Spreading	0.95	0.05
227	Friant-Kern Canal to Subregion 20 for M&I	20	M&I	0.05	0.01
228	Friant-Kern Canal to Subregion 21 for Ag	21	Ag	0.05	0.02
229	Friant-Kern Canal to Subregion 21 for Spreading	21	Spreading	0.95	0.05
230	Friant-Kern Canal to Subregion 21 for M&I	21	M&I	0.05	0.01
231	Friant-Kern Canal seepage losses, Subregion 16	16	Seepage	1.00	0
232	Friant-Kern Canal seepage losses, Subregion 17	17	Seepage	1.00	0
233	Friant-Kern Canal seepage losses, Subregion 18	18	Seepage	1.00	0
234	Friant-Kern Canal seepage losses, Subregion 20	20	Seepage	1.00	0
235	Friant-Kern Canal seepage losses, Subregion 21	21	Seepage	1.00	0
236	Cross-Valley Canal Subregion 17	17	Ag	0.00	0.02
237	Cross-Valley Canal to Subregion 18 for Ag	18	Ag	0.00	0.02
238	Cross-Valley Canal to Subregion 18 for M&I	18	M&I	0.00	0.01
239	Cross-Valley Canal to Subregion 19 for Refuges	19	Refuge	0.05	0.02
240	Cross-Valley Canal to Subregion 20 for Ag	20	Ag	0.05	0.02
241	Cross-Valley Canal to Subregion 20 for Spreading	20	Spreading	0.95	0.05
242	Cross-Valley Canal to Subregion 21 for Ag	21	Ag	0.05	0.02
243	Cross-Valley Canal to Subregion 21 for Spreading	21	Spreading	0.95	0.05
244	Kings River diversions to Friant-Kern Canal	Export	Export	0.00	0
245	Kaweah River diversions to Friant-Kern Canal	Export	Export	0.00	0
246	Tule River diversions to Friant-Kern Canal	Export	Export	0.00	0

ID – Diversion Identification Number, SR – Subregion, RL – Recoverable loss, NL – Non-recoverable loss, Ag – Agriculture, M&I – Municipal and Industrial

1. Whiskeytown and Shasta for Ag

Surface water is imported into the C2VSim model area for agricultural use from Whiskeytown Dam through the Muletown Conduit to Centerville CSD, Clear Creek CSD, Keswick CSD and Shasta CSD. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%. The CalSim 3 historical data set D_WTPCSD_02_PA_SV is reduced by 3% to remove deliveries to Keswick CSD, which is outside the model area.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Spring Creek Conduit from Whiskeytown to Centerville CSD, Clear Creek CSD, Keswick CSA, Shasta CSD (D_WTPCSD_02_PA_SV)*0.97

2. Whiskeytown and Shasta for M&I

Surface water is imported into the C2VSim model area for municipal and industrial use from Whiskeytown Dam and Shasta Dam. Imports from Whiskeytown Dam flow through the Spring Creek Conduit to the City of Redding and through the Muletown Conduit to Centerville CSD, Clear Creek CSD and Shasta CSD. Water from Shasta Dam flows through the Toyon Pipeline to the City of Redding. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%. The CalSim 3 historical data sets D_WKYTN_02_PU_SV and D_WTPCSD_02_PU_SV are reduced by 3% to deliveries to Keswick CSD, which is outside the model area.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Spring Creek Conduit from Whiskeytown to City of Redding (D_WKYTN_WTPBUK_SV) CalSim 3: Spring Creek Conduit from Whiskeytown to Centerville CSD, Clear Creek CSD, Keswick CSA, Shasta CSD (D_WKYTN_02_PU_SV)*0.97 CalSim 3: Muletown Conduit from Whiskeytown to Centerville CSD, Clear Creek CSD, Keswick CSA, Shasta CSD (D_WTPCSD_02_PU_SV)*0.97 City of Redding, Toyon Pipeline (1966-1981 est, 1982-2009 USBR)

3. Sacramento River to Bella Vista Conduit for Ag

Water from the Sacramento River is diverted via the Wintu Pumping Plant at River Mile 244.4L for delivery to Bella Vista Water District for agricultural use. An estimated 80% of this water is used inside the C2VSim model boundary. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Bella Vista WD Ag Water only (D_SAC294_03_PA_SV)*0.80

4. Sacramento River to Bella Vista Conduit for M&I

Water from the Sacramento River is diverted via the Wintu Pumping Plant at River Mile 244.4L for delivery to Bella Vista Water District for municipal and industrial use. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Bella Vista WD M&I Water only (D_SAC294_03_PU2_SV)

5. Sacramento River to Bella Vista Conduit for export

Approximately 20% of the water diverted by the Wintu Pumping Plant at River Mile 244.4L for agricultural use is delivered to lands outside the C2VSim model area. Recoverable losses are assumed to be 3% as the water passes through the model area, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Bella Vista WD Ag Water only (D_SAC294_03_PA_SV)*0.20

6. Sacramento River diversions, Keswick Dam to Red Bluff, for Ag

Sacramento River diversions between Keswick Dam and Red Bluff for agricultural use include riparian diversions and diversions by Anderson-Cottonwood Irrigation District. Recoverable losses are assumed to be 30%, and non-recoverable losses are assumed to be 10%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River to Anderson-Cottonwood ID & misc. settlement contractors (Rio Alto Rancho) (D_SAC296_02_SA_SV) CalSim 3: Sacramento River to Anderson-Cottonwood ID (D_SAC289_03_SA_SV) CalSim 3: Sacramento River riparian (D_SAC281_02_NA_SV) CalSim 3: Sacramento River riparian (D_SAC273_03_NA_SV)

7. Sacramento River diversions, Keswick Dam to Red Bluff, for M&I

Sacramento River water is diverted to the City of Redding for municipal and industrial use on the right bank at RM 246.7R. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River to City of Redding RM 246.7 R (D_SAC296_WTPFTH_SV)

8. Cow Creek riparian diversions

Water is diverted from Cow Creek for agricultural use. Half of the diverted water is estimated to be used within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Cow Creek (D_COW014_03_NA_SV)*0.50

9. Battle Creek riparian diversions

Water is diverted from Battle Creek for agricultural use. Half of the diverted water is estimated to be used within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Battle Creek (D_BTL006_03_NA_SV)*0.50

10. Cottonwood Creek riparian diversions

Water is diverted from Cottonwood Creek for agricultural use. Diversions are assumed to occur at points inside the C2VSim model boundary but upstream of the C2VSim inflow point, which is located at USGS flow gage 11376000, Cottonwood Creek near Cottonwood, and are therefore simulated as an import. Half of the diverted water is estimated to be used within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Cottonwood Creek (D_CWD009_02_NA_SV)*0.50

11. Clear Creek riparian diversions

Water is diverted from Clear Creek for agricultural use. The diversion point is outside the C2VSim model area. Half of the diversions are estimated to be used within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Clear Creek riparian (D_CLR009_02_NA_SV)*0.50

12. Sacramento River diversions to the Corning Canal

A portion of the water diverted from the Sacramento River into the Tehama-Colusa Canal at the Red Bluff Diversion Dam is pumped into the Corning Canal for delivery to lands at altitudes that are too high to be served from the Tehama-Colusa Canal. All lands served by the Corning Canal are in C2VSim subregion 2. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: T-C Canal to Corning Canal (D_TCC001_CCL005_SV)

13. Stony Creek diversions to North Canal

Water is diverted from Stony Creek to the Orland Unit of the USBR Central Valley Project via the North Canal for agricultural use. Recoverable losses are assumed to be 4%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Stony Creek diversion - North Canal (D_STN021_06_PA_SV)

14. Stony Creek diversions to South Canal

Water is diverted from Stony Creek to the Orland Unit of the USBR Central Valley Project via the South Canal. This diversion has occurred at Black Butte Reservoir since 1963, and is modeled as an import in C2VSim as the diversion occurs upstream of the simulated inflow (which is the water released from Black Butte Reservoir). Recoverable losses are assumed to be 4%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Stony Creek diversion - South Canal (D_STN026_06_PA_SV)

15. Stony Creek diversions to the Tehama-Colusa Canal

Water is occasionally diverted from Stony Creek to the Tehama-Colusa Canal, for delivery to districts in C2VSim subregion 3. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Stony Creek to TCC (D_STN014_TCC031_SV)

16. Stony Creek diversions to the Glenn-Colusa Canal

Water is occasionally diverted from Stony Creek to the Glenn-Colusa Canal, for delivery to districts in C2VSim subregion 3. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Stony Creek to GCC (D_STN004_GCC007_SV)

17. Sacramento River diversions to Subregion 2

Water is diverted form the Sacramento River to agricultural users in C2VSim subregion 2 including Los Molinos MWC, Princeton-Cordua-Glenn ID, and miscellaneous CVP Settlement Contractors and riparian users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River riparian (D_SAC224_04_NA_SV) CalSim 3: Sacramento River to Los Molinos MWC, non-district (including CVP settlement contractors) (D_SAC240_05_NA_SV)

18. Antelope Creek riparian diversions

Water is diverted from Antelope Creek to agricultural users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Antelope Creek (D_ANT010_05_NA_SV)

19. Mill Creek riparian diversions

Water is diverted from Mill Creek to agricultural users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Mill Creek (D_MLC006_05_NA_SV)

20. Elder Creek riparian diversions

Water is diverted from Elder Creek to agricultural users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Elder Creek (D_ELD012_04_NA_SV)

21. Thomes Creek riparian diversions

Water is diverted from Thomes Creek to agricultural users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Riparian Diversions Thomes Creek (D_THM012_04_NA_SV)

22. Deer Creek riparian diversions

Water is diverted from Deer Creek to agricultural users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Deer Creek to Stanford Vina Ranch IC (D_DRC006_05_NA_SV) CalSim 3: Deer Creek to Deer Creek ID (D_DRC010_05_NA_SV)

23. Sacramento River to the Tehama-Colusa Canal for delivery to Subregion 2

The Tehama-Colusa Canal carries water diverted from the Sacramento River at the Red Bluff Diversion Dam. This C2VSim diversion includes deliveries to areas in model subregion 2. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: T-C Canal to Kirkwood WD (D_TCC022_04_PA2_SV)

24. Sacramento River to the Tehama-Colusa Canal for delivery to Subregion 3

The Tehama-Colusa Canal carries water diverted from the Sacramento River at the Red Bluff Diversion Dam. This diversion includes deliveries to lands in C2VSim subregion 3. This diversion is calculated as the total Tehama-Colusa Canal diversion from the Sacramento River minus deliveries to the Corning Canal (diversion 12) and to lands in C2VSim subregion 2 (diversion 23). Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: T-C Canal from Sacramento River (D_SAC240_TCC001_SV) – [T-C Canal deliveries to subregion 2] – [T-C Canal to Corning Canal]

25. Sacramento River to the Glenn-Colusa Canal for Ag

The Glenn Colusa Canal carries water diverted from the Sacramento River near Hamilton City, to lands in the Glenn-Colusa Irrigation District. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River to GCC (D_SAC207_GCC007_SV) - Sacramento River GCC deliveries for Refuges

26. Sacramento River to the Glenn-Colusa Canal for Refuges

The Glenn Colusa Canal carries water diverted from the Sacramento River near Hamilton City, to several wildlife refuges. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: GCC to Sacramento NWR (D_GCC027_08N_PR1_SV) CalSim 3: GCC to Delevan NWR (D_GCC039_08N_PR2_SV) CalSim 3: GCC to Refuges (D_GCC056_08S_PR_SV)

27. Sacramento River diversions to Subregion 3

Sacramento River diversions for agricultural use in C2VSim subregion 3 include diversions to Maxwell ID, River Garden Farms, RD 108, Los Molinos MWC, miscellaneous CVP Settlement Contrators, and other riparian diversions. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River riparian (D_SAC185_08N_NA1_SV) CalSim 3: Sacramento River (D_SAC178_08N_SA1_SV) CalSim 3: Sacramento River to Maxwell ID (D_SAC159_08N_SA1_SV)

28. Sacramento River diversions to Subregion 4

Sacramento River diversions for agricultural use in C2VSim subregion 4 include diversions to Sutter MWC, Pelger MWC, Bardis et al., Meridian Farms WC, Lomo Cold Storage, Tisdale IDC, Butte Slough IC, Sutter Butte MWC, RD 1004, Carter MWC, Jack Baber, MTC, miscellaneous CVP Settlement Contractors and other riparian diversions. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River to Sutter MWC (94%), Pelger MWC, Bardis et al., Misc. Settlement Contractors (D_SAC091_19_SA_SV, D_SAC099_19_SA_SV, D_SAC109_19_SA_SV, D_SAC115_19_SA_SV, D_SAC122_19_SA_SV) CalSim 3: Sacrmento River to misc. non-project diverters (D_SAC129_08S_NA2_SV) CalSim 3: Sacramento River to Meridian Farms WC, Lomo Cold Storage, Sutter MWC (5%), Tisdale IDC, misc. settlement contractors (D_SAC122_18_SA_SV, D_SAC136_18_SA_SV) CalSim 3: Sacramento River to Butte Slough IC, Sutter Butte MWC, Non-District (D_SAC136_18_NA_SV) CalSim 3: Sacramento River to RD 1004, Carter MWC, Jack Baber, Misc. Settlement Contractors (D_SAC162_09_SA2_SV) CalSim 3: Sacramento River diversions (D_SAC185_09_NA_SV) CalSim 3: Sacramento River to misc. diverters (Odysseus Farms, Roberts Ditch IC, Colusa IC, Swinford Tract IC, Olive Percy Davis) (D_SAC159_08S_SA1_SV) CalSim 3: Sacramento River riparian (D_SAC146_08S_NA1_SV) CalSim 3: Sacramento River riparian (D_SAC129_08S_NA2_SV) CalSim 3: Sacramento River to RD 108 (D_SAC121_08S_SA3_SV) CalSim 3: Sacramento River to MTC (D_SAC196_MTC000_SV) CalSim 3: Sacramento River to River Garden Farms (D_SAC109_08S_SA3_SV)

29. Little Chico Creek

Water is diverted from Little Chico Creek outside the C2VSim model area and delivered to agricultural users in subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: LCC to LLano Seco, Dayton MWC, Non-District (D_LCC024_09_NA_SV) CalSim 3: LCC to Pacific Realty Assoc. (M&T Chico Ranch) Inc. (D_LCC029_09_SA1_SV)

30. Tarr Ditch

Nevada Irrigation District's Tarr Ditch carries water diverted from Wolf Creek via the D-S canal, and delivers it to the C2VSim model area in the vicinity of Beale Air Force Base. Approximately 55% of the area served by Tarr Ditch is within the C2VSim model area, so it is assumed that 55% of Tarr Ditch flow is delivered within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Tarr Ditch (D_WLF013_TARRD_SV)*0.55

31. Miocene and Wilenor Canals

Miocene Canal carries water from Lake Wilenor and water from the North Fork of the Feather River to agricultural water users in C2VSm subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Miocene Canal to Non-District Part Only (D_MIO023_10_NA_SV)

32. Palermo Canal

The Palermo Canal carries water from Lake Oroville to municipal and industrial water users in C2VSim subregion 5. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Palermo Canal from Oroville Dam (D_OROVL_13_NU1_SV)

33. Oroville-Wyandotte ID through Forbestown Ditch

Forbestown Ditch carries water from Thermalito Afterbay to agricultural users in the Oroville-Wyandotte Irrigation District. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Oroville-Wyandotte Canal (D_OWC000_13_NA_SV)

34. Little Dry Creek

Water is diverted from Little Dry Creek outside the C2VSim model area and delivered to Richdale ID for agricultural use. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: LDC to Richvale ID (D_LDC007_11_SA2_SV)

35. Bangor Canal

Bangor Canal conveys irrigation water from Miners Ranch Reservoir, which receives water from Ponderosa Reservoir on the South Fork of the Feather River via Miners Ranch Conduit. Water is delivered to agricultural users in C2VSim subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Bangor Canal (D_MNRRH_13_NA_SV)

36. Thermalito Afterbay

Diversions from Thermalito Afterbay to C2VSim subregion 5 for agricultural use. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sutter-Butte Canal at Intake (D_THERM_JBC000_SV) CalSim 3: Western Canal (D_THERM_WRO000_SV)

37. Feather River to Subregion 5 for Ag (replaced by Thermalito Afterbay)

Feather River diversions to C2VSim subregion 5 for agricultural use. This diversion was abandoned after construction of Thermalito Afterbay. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1967	DWR reports: Western Canal Company Intake Abandoned after construction of Thermalito DWR reports: Richvale ID DWR reports: Biggs West Gridley DWR reports: Joint Water District Intake Abandoned after construction of Thermalito
10/01/1967	09/30/2009	No flow

38. Feather River to Thermalito ID

Feather River diversions to Oroville via Thermalito ID for municipal and industrial use. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: PCL to Oroville via Thermalito ID (D_PCL000_11_NU1_SV)

39. Feather River to Subregion 5 for Ag

Feather River diversions to C2VSim subregion 5 for agricultural use. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Feather River to misc. riparian and appropriative diverters (D_FTR008_16_SA_SV) CalSim 3: Feather River to Oswald WD (D_FTR014_16_SA_SV) CalSim 3: Feather River to Tudor ID (D_FTR018_16_SA_SV) CalSim 3: Feather River to Feather WD (D_FTR021_16_PA_SV) CalSim 3: Feather River to misc. Settlement Contractors (D_FTR003_17_SA_SV) CalSim 3: Feather River to Garden Highway MWC (D_FTR021_16_SA_SV) CalSim 3: Feather River to Plumas MWC (D_FTR018_15S_SA_SV) CalSim 3: Feather River to FRSA settlement diverters (D_FTR028_15S_SA_SV) CalSim 3: Feather River to FRSA settlement diverters (D_FTR045_15N_SA_SV) CalSim 3: Feather River to FRSA settlement diverters (D_FTR059_12_SA_SV) CalSim 3: Feather River to Sunset Pumps (D_FTR039_SEC009_SV)

40. Feather River to Yuba City

Feather River diversions to Yuba City for municipal and industrial use. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Feather River to Yuba City (D_FTR031_WTPCYC_SV)

41. Feather River to Subregion 7 for Ag

Feather River diversions to Plumas MWC and FRSA settlement diverters in C2VSim subregion 7 for agricultural use. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Feather River to FRSA settlement diverters (D_FTR003_22_SA2_SV)

42. Yuba River for Ag

Yuba River diversions at Daguerre Point Dam to Cordua ID, Hallwood ID, Ramirez WD, Brophy WD, Dry Creek MWC, and South Yuba WD in C2VSim subregion 5 for agricultural use. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Yuba River, diversion at Daguerre Point Dam to Cordua ID, Hallwood ID, Ramirez WD (D_YUB011_15N_NA2_SV) CalSim 3: Yuba River, diversion at Daguerre Point Dam to Brophy WD, Dry Creek MWC, South Yuba WD (D_YUB011_15S_NA2_SV)

43. Yuba River for M&I

Yuba River diversions to Marysville and small communities served by California Water Service Company for municipal and industrial use in C2VSim subregion 5. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Yuba River to Marysville and small communities from California WSC (D_YUB003_15N_NU_SV)

44. Bear River to Camp Far West ID North Side

Camp Far West diverts water from the Bear River into the North Canal for delivery to agricultural users in C2VSim subregion 5. Approximately 46% of Camp Far West ID is on the north side of the Bear River. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	08/31/1992	CVGSM Model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996) * 0.46
09/01/1992	09/30/2009	South Sutter WD: Camp Far West ID North Canal

45. Bear River to Camp Far West ID South Side

Camp Far West diverts water from the Bear River into the South Canal for delivery to agricultural users in C2VSim subregion 7. Approximately 54% of Camp Far West ID is on the south side of the Bear River. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	08/31/1992	CVGSM Model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996) * 0.54
09/01/1992	09/30/2009	South Sutter WD: Camp Far West ID South Canal

46. Bear River to South Sutter WD

Bear River diversions to South Sutter Water District for delivery to agricultural users in C2VSim subregion 7. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	08/31/1992	CVGSM Model (James M. Montgomery Consulting Engineers, 1990; CH2M Hill, 1996)
09/01/1992	09/30/2009	South Sutter WD

47. Bear River Canal to South Sutter WD

The Bear River Canal delivers water from Rollins Lake to South Sutter Water District for delivery to agricultural users in C2VSim subregion 7. 43% of the deliveries are assumed to be within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Bear River Canal (D_BRR050_BEC000_SV) * 0.428

48. Boardman Canal

Boardman Canal carries deliveries from Placer County Water Agency to agricultural users in C2VSim subregion 7. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Lower Boardman Canal diversion from Little Bear River (D_LBO002_LBC001_SV)

49. Combie (Gold Hill) Canal

Bear River diversions to Gold Hill Canal (1921-October 1974) and Combie Canal (November 1974 to present) for delivery to agricultural users in C2VSim subregion 7. It is assumed that ten percent of the flow was used within the C2VSim model area. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Combie Canal to CBC (D_CMBIE_CBC000_SV) * 0.10

50. Cross Canal

Water diverted into Cross Canal outside the C2VSim model boundary and delivered to agricultural users in C2VSim subregion 7. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Cross Canal to Natomas Central MWD, Pleasant Grove-Verona MWC, misc. settlement contractors (D_CRC002_22_SA1_SV)

51. Butte Creek at Parrot-Phelan Dam

Water diverted from Butte Creek at Parrot-Phelan Dam for delivery to agricultural users in C2VSim subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Butte Creek at Parrott-Phelan Dam (D_BTC045_ESL008_SV)

52. Butte Creek at Durham Mutual Dam

Water diverted from Butte Creek at Durham Mutual Dam for delivery to agricultural users in C2VSim subregion 5 including Rancho Esquon and Durham MWC. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Butte Creek at Durham Mutual Dam (Rancho Esquon, Durham MWC, Non-district) (D_BTC043_10_NA_SV)

53. Butte Creek at Adams Dam and Gorrill Dam

Water diverted from Butte Creek at Adams Dam, Gorrill Dam, and other minor diversions for delivery to agricultural users in C2VSim subregion 5 including Rancho Esquon and Durham MWC. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Butte Creek at Adams and Gorrill Dams (Rancho Esquon, Durham MWC, Non-district) (D_BTC036_10_NA_SV)

54. Butte Creek to RD 1400

Water diverted from Butte Creek to Reclamation District 1400 for delivery to agricultural users in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Butte Creek to RD 1004 (D_BTC012_09_SA2_SV)

55. Butte Creek to Sutter and Butte Duck Clubs

Water diverted from lower Butte Creek to Sutter Duck Club and Butte Duck Club. Both duck clubs are signatories to a 1922 water allocation agreement. Water is delivered to lands on the left bank of Butte Creek in C2VSim subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sutter and Butte Duck Clubs, Signatories to 1922 Agreement (D_CRK005_17N_NR_SV)

56. Butte Slough

Water diverted from Butte Slough to lands between Butte Slough-Sutter Bypass and the Sacramento River for delivery to agricultural users in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Butte Slough to misc. Butte Slough Diverters (D_BSL001_18_NA_SV)

57. Sutter Bypass East Borrow Pit to Sutter NWR

Water diverted from the Sutter Bypass East Borrow Pit for delivery to the Sutter National Wildlife Refuge, located in the Sutter Bypass in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim3: Sutter Bypass to Sutter NWR (D_SBP028_17S_PR_SV)

58. Sutter Bypass West Borrow Pit north of Tisdale Bypass

Water diverted from the Sutter Bypass West Borrow Pit north of the Tisdale Bypass for delivery to agricultural lands between the Sutter Bypass and the Sacramento River in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sutter Bypass to Butte Slough WUA (D_SBP014_17S_NA_SV)

59. Sutter Bypass East Borrow Pit to lands within Sutter Bypass

Water diverted from the Sutter Bypass East Borrow Pit for delivery to agricultural lands in the Sutter Bypass in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: DWR Pump Station #1 from Sutter Bypass to Butte Slough WUA (D_DWRPS1_16_NA2_SV) DWR reports: Hamatani Brothers farm (1960-1992)

60. Sutter Bypass East Borrow Pit from north of Wadsworth Canal to Gilsizer Slough

Water diverted from the Sutter Bypass East Borrow Pit from north of Wadsworth Canal to Gilsizer Slough, to lands located east of the Sutter Bypass for agricultural use in C2VSim subregion 4. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sutter Bypass to Butte Slough IC, Sutter Butte MWC, Non-District (D_SBP031_18_NA_SV)

61. Sutter Bypass East Borrow Pit south of Gilsizer Slough

Water diverted from the Sutter Bypass East Borrow Pit south of Gilsizer Slough to areas east of the Sutter Bypass for agricultural use in C2VSim subregion 5. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: DWR Pump Station 2, Sutter Bypass to Sutter Butte MWC, Non-District (D_DWRPS2_11_NA_SV)

62. Colusa Basin Drain to Subregion 3 for Ag

The Colusa Basin Drain collects agricultural drainage water and surface runoff. Some of this water is used for irrigation on adjacent lands. Water is generally used on lands within C2VSim subregion 3, but is also available for use on lands in subregion 4. This allocation is difficult to simulate within the C2VSim model, and therefore it is assumed that all water diverted from the Colusa Basin Drain was used within subregion 3. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Colusa Drain MWC from Colusa Basin Drain (D_CBD028_08S_PA_SV) CalSim 3: Colusa Basin Drain to RD 108 and River Garden Farms (D_CBD028_08S_SA3_SV) CalSim 3: Colusa Basin Drain to Maxwell ID, Roberts Ditch IC, Sycamore Family Trust (D_CBD041_08S_SA1_SV) CalSim 3: Colusa Basin Drain to Glenn-Colusa ID (D_CBD041_08S_SA2_SV) CalSim 3: Colusa Drain MWC from Colusa Basin Drain (D_CBD049_08N_PA_SV) CalSim 3: Colusa Basin Drain to Princeton-Cordora-Glenn ID, Provident ID, Maxwell ID (D_CBD049_08N_SA1_SV)

63. Colusa Basin Drain to Subregion 3 for Refuges

The Colusa Basin Drain collects agricultural drainage water and surface runoff. Some of this water is delivered to Colusa National Wildlife Refuge. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Colusa Basin Drain to Colusa NWR (D_CBD037_08S_PR_SV)

64. Knights Landing Ridge Cut

Water is diverted from Knights Landing Ridge Cut for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Knights Landing Ridge Cut to Colusa Drain Mutual Water Company (D_KLR005_21_PA_SV)

65. Sacramento River between Knights Landing and Sacramento to Subregion 6 for Ag

Water is diverted from the Sacramento River for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River to Conaway Ranch (RD 2035) (D_SAC074_21_SA_SV) CalSim 3: Sacramento River riparaian (D_SAC081_21_NA_SV) [estimated 10/1921-09/1925 and 10/1970-09/1975] CalSim 3: Sacramento River to Sacramento River Ranch LLC (formerly Deseret Farms) and Miscellaneous Diverters, Settlement Contractors (Wallace Farms, Wallace Construction, Hershey, Layton Knaggs) (D_SAC083_21_SA_SV)

66. Sacramento River to City of West Sacramento

Water is diverted from the Sacramento River for delivery to the City of West Sacramento in C2VSim subregion 6. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River Right Bank Diversion to City of West Sacramento (D_SAC065_WTPBTB_SV)

67. Sacramento River between Knights Landing and Sacramento to Subregion 7 for Ag

Water is diverted from the Sacramento River for delivery to agricultural users in C2VSim subregion 7. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Sacramento River riparaian (D_SAC075_22_NA_SV) [estimated 10/1921-09/1925 and 10/1970-09/1975] CalSim 3: Sacramento River to Natomas Central MWD, Misc. Diverters (Lauppe, NBC, ELH, LBK, Siddiqui, Wiley, Sac Co.) (D_SAC078_22_SA1_SV) CalSim 3: Sacramento River to Natomas Central MWC, and Pleasant Grove-Verona MWC (DWR RM 19.6) (D_SAC082_22_SA1_SV)

68. Sacramento River to City of Sacramento

Water is diverted from the Sacramento River for delivery to the City of Sacramento in C2VSim subregion 8. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	06/30/1991	CalSim 3: Sacramento River Left Bank Diversion to City of Sacramento (D_SAC062_WTPSAC_SV)
07/01/1991	09/30/2009	City of Sacramento

69. Cache Creek

Water is diverted from Cache Creek for delivery to agricultural users in C2VSim subregion 6. This diversion is treated as an import from the Capay Diversion Dam, which is located less than one mile outside the model boundary. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Cache Creek to Yolo County FCWCD (D_CCH030_20_NA1_SV)

70. Yolo Bypass

Water is diverted from the Yolo Bypass for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Yolo Bypass to Conaway Ranch (RD 2035) (D_YBP023_21_SA_SV)

71. Putah South Canal for Ag

Water is diverted from Putah Creek into Putah South Canal for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	02/28/1991	CalSim 3: Putah South Canal Total Diversion (D_PTH024_PSC003_SV) * ag ratio 1991-1995
03/01/1991	09/30/2009	Solano County Water Agency

72. Putah South Canal for M&I

Water is diverted from Putah Creek to Putah South Canal for delivery to municipal and industrial users in C2VSim subregion 6. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	02/28/1991	CalSim 3: Putah South Canal Total Diversion (D_PTH024_PSC003_SV) * M&I ratio 1991-1995
03/01/1991	09/30/2009	Solano County Water Agency

73. Putah South Canal exports

Water is diverted from Putah Creek to Putah South Canal for delivery to areas outside the C2VSim model boundary. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	02/28/1991	CalSim 3: Putah South Canal Total Diversion (D_PTH024_PSC003_SV) * export ratio 1991-1995
03/01/1991	09/30/2009	Solano County Water Agency

74. Putah Creek riparian diversions

Water is diverted from Putah Creek for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	Currently a place-holder - set to zero

75. Folsom Lake for Ag

Water from Folsom Reservoir is released into the North Fork Ditch and Natomas Ditch, and delivered to agricultural users in C2VSim subregion 7. Total diversions for water years 1922 through 1955 were allocated to agricultural and M&I uses by allocating 60% to agriculture in 1922 and reducing this gradually to 18% in 1955, with the remainder allocated to M&I. Agricultural diversions for water years 1956 through 1993 are estimated as the total diversion minus M&I diversions. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1955	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * factor (0.46 in 1922 declining to 0.15 in 1955)
10/01/1955	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) – (M&I)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) – (M&I)
10/01/1993	09/30/2009	Estimated as water year 1998-2002 monthly average

76. Folsom Lake for M&I

Water from Folsom Reservoir is released into the North Fork Ditch and Natomas Ditch and delivered to municipal and industrial users in C2VSim subregion 7 including Folsom Prison, the City of Folsom, the City of Roseville, and the San Juan Suburban Water District. Total diversions for water years 1922 through 1955 were allocated to agricultural and M&I uses by allocating 40% to M&I in 1922 and increasing this gradually to 83% in 1955 (to match the M&I growth trend from 1956 to 1998), with the remainder allocated to agriculture. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/1955	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * factor (0.08 in 1922 increasing to 0.85 in 1955)
10/01/1955	09/30/2009	CalSim 3: Folsom Lake to City of Folsom (D_FOLSM_WTPFOL_SV) CalSim 3: Folsom Lake to City of Roseville (D_FOLSM_WTPRSV_SV) CalSim 3: Folsom Lake to San Juan SWD (D_FOLSM_WTPSJP_SV)

77. Folsom South Canal for Ag

Water is released from Lake Natomas into the Folsom South Canal for delivery to agricultural users in C2VSim subregion 8. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Folsom South Canal to Omochumne-Hartnell WD, Clay WD, Galt ID (D_FSC015_60N_NA2_SV)

78. Folsom South Canal for M&I

Water is released from Lake Natomas into the Folsom South Canal for delivery to municipal and industrial users in C2VSim subregion 8. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Folsom South Canal to Mather Lake (Ca Parks and Rec) (D_FSC003_26S_PU3_SV) CalSim 3: Folsom South Canal to water treatment plant (D_FSC003_WTPCOL_SV) CalSim 3: Folsom South Canal to Rancho Seco Power Plant (SMUD) (D_FSC025_60N_PU_SV)

79. Folsom South Canal exports

In the future, water may be released from Lake Natomas into the Folsom South Canal for delivery to users outside the C2VSim model area. This diversion is a placeholder, with all values set to zero. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	CalSim 3: Folsom South Canal to EBMUD (D_FSC027_EBMUD_SV)

80. American River to Carmichael Water District

Water is diverted from the American River to Carmichael Water District for delivery to municipal and industrial users in C2VSim subregion 7. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1989	CalSim 3: American River - Carmichael WD (D_AMR017_WTPBJM_SV)
01/01/1990	09/30/2009	Carmichael WD

81. American River to City of Sacramento

Water is diverted from the American River to the City of Sacramento for delivery to municipal and industrial users in C2VSim subregion 7. Recoverable losses are assumed to be 3%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	06/30/1991	CalSim 3: American River Left Banks Diversion by City of Sacramento (D_AMR007_WTPFBN_SV)
07/01/1991	09/30/2009	City of Sacramento

82. Cosumnes River

Water is diverted from the Cosumnes River for delivery to agricultural users in C2VSim subregion 8. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1992	CVGSM Model Update (CH2MHill, 1996)
10/01/1992	09/30/2009	Estimated

83. Mokelumne River from Comanche Reservoir

Water is delivered from Comanche Reservoir on the Mokelumne River to agricultural users in Johnson Valley ID. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	East Bay Municipal Utility District

84. Mokelumne River

Water is diverted from the Mokelumne River for delivery to North San Joaquin WCD, Woodbridge ID, and miscellaneous riparian users in C2VSim subregion 8. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	East Bay MUD

85. Calaveras River

Water is diverted from the Calaveras River for delivery to agricultural users in Stockton East WD in C2VSim subregion 8. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1991	CVGSM Model Update (CH2MHill, 1996)
10/01/1991	09/30/2003	Stockton East WD
10/01/2003	09/30/2009	Estimated

86. Sacramento-San Joaquin Delta for Ag

Water is diverted from the Sacramento-San Joaquin Delta for delivery to agricultural users in C2VSim subregion 9. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	Equal to C2VSim agricultural water supply requirement

87. Sacramento-San Joaquin Delta for M&I

Water is diverted from the Sacramento-San Joaquin Delta for delivery to municipal and industrial users in C2VSim subregion 9. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	Equal to C2VSim urban water supply requirement

88. Sacramento-San Joaquin Delta to North Bay Aqueduct for Ag

Water is diverted from the Sacramento-San Joaquin Delta into the North Bay Aqueduct for delivery to agricultural users in C2VSim subregion 6. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR State Water Project deliveries

89. Sacramento-San Joaquin Delta to North Bay Aqueduct for M&I

Water is diverted from the Sacramento-San Joaquin Delta into the North Bay Aqueduct for delivery to municipal and industrial users in C2VSim subregion 6. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR State Water Project deliveries

90. Sacramento-San Joaquin Delta to North Bay Aqueduct export

Water is diverted from the Sacramento-San Joaquin Delta into the North Bay Aqueduct for delivery to areas outside the C2VSim model. Recoverable losses are assumed to be 2%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR State Water Project deliveries

91. Sacramento-San Joaquin Delta to Contra Costa Canal

Water is diverted from the Sacramento-San Joaquin Delta into the Contra Costa Canal for delivery to areas outside the C2VSim model. Recoverable losses are assumed to be 2%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR DAYFLOW calculation (http://www.water.ca.gov/dayflow/)

92. Sacramento-San Joaquin Delta to CVP

Water is diverted from the Sacramento-San Joaquin Delta to the Central Valley Project. Recoverable losses are assumed to be 2%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR DAYFLOW calculation (http://www.water.ca.gov/dayflow/)

93. Sacramento-San Joaquin Delta to SWP

Water is diverted from the Sacramento-San Joaquin Delta to the State Water Project. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR DAYFLOW calculation (http://www.water.ca.gov/dayflow/)

94. Stanislaus River to South San Joaquin Canal for Ag

Water is diverted from the Stanislaus River into the South San Joaquin Canal for delivery to agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS Gage 11300500 S SAN JOAQUIN CN NR KNIGHTS FERRY CA

95. Stanislaus River to South San Joaquin Canal for M&I

Water may be diverted from the Stanislaus River into the South San Joaquin Canal for delivery to municipal and industrial users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

96. Stanislaus River to Oakdale Canal for Ag

Water is diverted from the Stanislaus River into the Oakdale Canal for delivery to agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS Gage 11301000 OAKDALE CN NR KNIGHTS FERRY CA

97. Stanislaus River to Oakdale Canal M&I

Water may be diverted from the Stanislaus River into the Oakdale Canal for delivery to agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

98. Stanislaus River riparian for Ag

Water is diverted from the Stanislaus River for delivery to riparian agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated

99. Stanislaus River riparian for M&I

Water may be diverted from the Stanislaus River for delivery to riparian municipal and industrial users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

100. Tuolumne River to Modesto Canal

Water is diverted from the Tuolumne River into the Modesto Canal. The Modesto Canal has incorporated a regulating reservoir since January 1956, and therefore this diversion is modeled as an export from the river, and imports to agricultural and municipal and industrial users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS Gage 11289000 MODESTO CN NR LA GRANGE CA

101. Modesto Canal for Ag

Water is delivered from the Modesto Canal to agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	12/31/1955	USGS Gage 11289000 MODESTO CN NR LA GRANGE CA * 1.00
01/01/1956	09/30/2009	Estimated Modesto Reservoir outflow

102. Modesto Canal for M&I

Water may be delivered from the Modesto Canal to municipal and industrial users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

103. Tuolumne River right bank riparian diversions for Ag

Water is diverted from the Tuolumne River for delivery to riparian agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated

104. Tuolumne River right bank riparian diversions for M&I

Water may be diverted from the Tuolumne River for delivery to riparian municipal and industrial users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

105. Tuolumne River left bank riparian diversions for Ag

Water is diverted from the Tuolumne River for delivery to riparian agricultural users in C2VSim subregion 12. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated

106. Tuolumne River left bank riparian diversions for M&I

Water may be diverted from the Tuolumne River for delivery to riparian municipal and industrial users in C2VSim subregion 12. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

107. Tuolumne River to Turlock Canal

Water is diverted from the Tuolumne River into the Turlock Canal. The Turlock Canal has incorporated a regulating reservoir since October 1955, and therefore this diversion is modeled as an export from the river, and imports to agricultural and municipal and industrial users. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	USGS Gage 11289500 TURLOCK CN NR LA GRANGE CA

108. Turlock Canal for Ag

Water is delivered from the Turlock Canal to agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1955	USGS Gage 11289500 TURLOCK CN NR LA GRANGE CA
10/01/1955	09/30/2009	Estimated Turlock Lake outflow

109. Turlock Canal for M&I

Water may be delivered from the Turlock Canal to municipal and industrial users in C2VSim subregion 11. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

110. Merced River to Merced ID Northside Canal for Ag

Water is diverted from the Merced River at Merced Falls Diversion Dam into the Merced Irrigation District's Northside Canal for delivery to agricultural users in C2VSim subregion 12. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	12/31/2000	Estimated
01/01/2001	09/30/2009	Merced ID

111. Merced River to Merced ID Northside Canal for M&I

Water is diverted from the Merced River at Merced Falls Diversion Dam into the Merced Irrigation District's Northside Canal for delivery to municipal and industrial users in C2VSim subregion 12. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

112. Merced River right bank riparian diversions Ag

Water is diverted from the Merced River for delivery to riparian agricultural users in C2VSim subregion 12. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	12/31/2009	Estimated

113. Merced River right bank riparian diversions for M&I

Water may be diverted from the Merced River for delivery to riparian municipal and industrial users in C2VSim subregion 12. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

114. Merced River left bank riparian diversions for Ag

Water is diverted from the Merced River for delivery to riparian agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	12/31/2009	Estimated

115. Merced River left bank riparian diversions for M&I

Water may be diverted from the Merced River for delivery to riparian municipal and industrial users in C2VSim subregion 13. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

116. Merced River to Merced ID Main Canal for Ag

Water is diverted from the Merced River at the Snelling Diversion Dam into the Merced Irrigation District's Main Canal for delivery to agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	12/31/2000	Estimated
01/01/2001	09/30/2009	Merced ID

117. Merced River to Merced ID Main Canal for M&I

Water may be diverted from the Merced River at the Snelling Diversion Dam into the Merced Irrigation District's Main Canal for delivery to municipal and industrial users in C2VSim subregion 13. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

118. Chowchilla River to Chowchilla WD

Water is diverted from the Chowchilla River by the Chowchilla Water District for delivery to agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

119. Chowchilla River riparian diversions for Ag

Water is diverted from the Chowchilla River for delivery to riparian agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	10/01/1921	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated by regression vs USACOE Buchannan Reservoir releases

120. Chowchilla River diversions for Spreading

Water is diverted from the Chowchilla River for artificial recharge in C2VSim subregion 13. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
09/30/2003	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
Estimated	09/30/2009	Estimated by regression vs USACOE Buchannan Reservoir releases

121. Fresno River to Madera ID

Water is diverted from the Fresno River by the Madera Irrigation District for delivery to agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

122. Fresno River riparian diversions for Ag

Water is diverted from the Fresno River for delivery to riparian agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

123. Fresno River diversions for spreading

Water is diverted from the Fresno River for artificial recharge in C2VSim subregion 13. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

124. San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 13 for Ag

Water is diverted from the San Joaquin River between Friant and Gravelly Ford for delivery to USBR contractors Adobe Ranch and La Branza WD and to riparian users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%. All deliveries are currently assumed to be to agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.50 USBR deliveries to Adobe Ranch and La Branza WD
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) * 0.50 USBR deliveries to Adobe Ranch and La Branza WD
10/01/1993	09/30/2009	Estimated riparian diversions USBR deliveries to Adobe Ranch and La Branza WD

125. San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 13 for M&I

Water may be diverted from the San Joaquin River between Friant and Gravelly Ford for delivery to riparian municipal and industrial users in C2VSim subregion 13. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 3%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

126. San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 16 for Ag

Water is diverted from the San Joaquin River between Friant and Gravelly Ford for delivery to riparian agricultural users in C2VSim subregion 16. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All deliveries are currently assumed to be for agricultural uses.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated

127. San Joaquin River riparian diversions, Friant to Gravelly Ford, to Subregion 16 for M&I

Water may be diverted from the San Joaquin River between Friant and Gravelly Ford for delivery to riparian municipal and industrial users in C2VSim subregion 16. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%. Municipal and industrial deliveries are currently assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Zero (placeholder)

128. San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 10 for Ag

Water is diverted from the San Joaquin River between Fremont Ford and Vernalis for delivery to West Stanislaus ID, Paterson ID and riparian agricultural users in C2VSim subregion 10. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.84
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) * 0.84
10/01/1993	09/30/2009	Estimated

129. San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 11 for Ag

Water is diverted from the San Joaquin River between Fremont Ford and Vernalis for delivery to riparian agricultural users in C2VSim subregion 11. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.06
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) * 0.06
10/01/1993	09/30/2009	Estimated

130. San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 12 for Ag

Water is diverted from the San Joaquin River between Fremont Ford and Vernalis for delivery to riparian agricultural users in C2VSim subregion 12. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.09
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) * 0.09
10/01/1993	09/30/2009	Estimated

131. San Joaquin River riparian diversions, Fremont Ford to Vernalis, to Subregion 13 for Ag

Water is diverted from the San Joaquin River between Fremont Ford and Vernalis for delivery to riparian agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 15%, and non-recoverable losses are assumed to be 3%

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.01
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996) * 0.01
10/01/1993	09/30/2009	Estimated

132. Kings River to Fresno ID for Ag

Water is diverted from the Kings River by Fresno ID for delivery to agricultural users in C2VSim subregion 16. Recoverable losses are assumed to be 12%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

133. Kings River to Fresno ID for Spreading

Water is diverted from the Kings River by Fresno ID for artificial recharge in C2VSim subregion 16. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

134. Kings River to Consolidated ID for Ag

Water is diverted from the Kings River by Consolidated ID for delivery to agricultural users in C2VSim subregion 17. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

135. Kings River to Consolidated ID for Spreading

Water is diverted from the Kings River by Consolidated ID for artificial recharge in C2VSim subregion 17. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

136. Kings River to Alta ID for Ag

Water is diverted from the Kings River by Alta ID for delivery to agricultural users in C2VSim subregion 17. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

137. Kings River to Alta ID for Spreading

Water is diverted from the Kings River by Alta ID for artificial recharge in C2VSim subregion 17. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

138. Kings River Main Stem diversions for Ag

Water is diverted from the Kings River for delivery to agricultural users in C2VSim subregion 17. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

139. Kings River Main Stem diversions for Spreading

Water is diverted from the Kings River for artificial recharge in C2VSim subregion 17. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

140. Kings River North Fork for Ag

Water is diverted from the Kings River North Fork for delivery to agricultural users in C2VSim subregion 15. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

141. Kings River North Fork for Spreading

Water is diverted from the Kings River North Fork for artificial recharge in C2VSim subregion 15. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. This is a placeholder; all values are currently set to zero.

142. Kings River South Fork for Ag

Water is diverted from the Kings River South Fork for delivery to agricultural users in C2VSim subregion 15. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

143. Kings River South Fork for Spreading

Water is diverted from the Kings River South Fork for artificial recharge in C2VSim subregion 15. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. This is a placeholder; all values are currently set to zero.

144. Kings River Fresno Slough for Ag

Water is diverted from the Kings River Fresno Slough for delivery to agricultural users in C2VSim subregion 15. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 4%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Kings River Watermaster reports

145. Kings River Fresno Slough for Spreading

Water is diverted from the Kings River Fresno Slough for artificial recharge in C2VSim subregion 15. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. This is a placeholder; all values are currently set to zero.

146. Kaweah River Partition A for Ag

Water is diverted from the Kaweah River (Partition A) for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 23.6% of reservoir release

147. Kaweah River Partition A for Spreading

Water is diverted from the Kaweah River (Partition A) for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 23.6% of reservoir release

148. Kaweah River Partition B for Ag

Water is diverted from the Kaweah River (Partition B) for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 56.7% of reservoir release

149. Kaweah River Partition B for Spreading

Water is diverted from the Kaweah River (Partition B) for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 56.7% of reservoir release

150. Kaweah River Partition C for Ag

Water is diverted from the Kaweah River (Partition C) for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 30% of reservoir release

151. Kaweah River Partition C for Spreading

Water is diverted from the Kaweah River (Partition C) for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 30% of reservoir release

152. Kaweah River Partition D for Ag

Water is diverted from the Kaweah River (Partition D) for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 14.5% of reservoir release

153. Kaweah River Partition D for Spreading

Water is diverted from the Kaweah River (Partition D) for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 14.5% of reservoir release

154. Kaweah River to Corcoran ID for Ag

Water is diverted from the Kaweah River by Corcoran ID for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 2.2% of reservoir release

155. Kaweah River to Corcoran ID for Spreading

Water is diverted from the Kaweah River by Corcoran ID for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/1993	CVGSM Model Update (CH2MHill, 1996)
10/01/1993	09/30/2009	Estimated as 2.2% of reservoir release

156. Tule River for Ag

Water is diverted from the Tule River for delivery to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 14%, and non-recoverable losses are assumed to be 3%. All deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated as equal to entire Tule River inflow

157. Tule River for Spreading

Water is diverted from the Tule River for artificial recharge in C2VSim subregion 18. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated as equal to entire Tule River inflow

158. Kern River to Subregion 19 for Ag

Water is diverted from the Kern River for agricultural use in C2VSim subregion 19. For water years 1922 to 1969, Kern River agricultural diversions to subregion 19 were taken from the CVGSM model (James M. Montgomery Consulting Engineers 1990). For water years 1970 to 2009, all water diverted from the Kern River into the James Canal, Plunkett Canal, Pioneer Canal and Rosedale Channel, 42% of the water diverted into the Big James Canal, and all water siphoned into the Cross Valley Canal is assumed to have been used in C2VSim subregion 19. In addition, all water diverted from March through September is assumed to have been used for agriculture. Recoverable losses are assumed to be 7%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

159. Kern River to Subregion 19 for Spreading

Water is diverted from the Kern River for spreading in C2VSim subregion 19. For water years 1922 to 1969, Kern River spreading diversions to subregion 19 were taken from the CVGSM model (James M. Montgomery Consulting Engineers 1990). For water years 1970 to 2009, all water diverted from the Kern River into the James Canal, Plunkett Canal, Pioneer Canal and Rosedale Channel, 42% of the water diverted into the Big James Canal, and all water siphoned into the Cross Valley Canal is assumed to have been used in C2VSim subregion 19. In addition, all water diverted from October through February is assumed to have been used for artificial recharge. Recoverable losses are assumed to be 97%, and non-recoverable losses are assumed to be 3%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

160. Kern River to Subregion 20 for Ag

Water is diverted from the Kern River for agricultural use in C2VSim subregion 20. For water years 1922 to 1969, Kern River agricultural diversions to subregion 20 were taken from the CVGSM model (James M. Montgomery Consulting Engineers 1990). For water years 1970 to 2009, 91% of the water diverted to the Beardsley Canal and 87% of the water diverted to the Calloway Canal is assumed to have been used in C2VSim subregion 20. In addition, 95% of the water diverted from March through September is assumed to have been delivered to agricultural users. Recoverable losses are assumed to be 13%, and non-recoverable losses are assumed to be 3%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

161. Kern River to Subregion 20 for M&I

Water is diverted from the Kern River for municipal and industrial use in C2VSim subregion 20. For water years 1922 to 1969, Kern River municipal and industrial diversions to subregion 20 were taken from the CVGSM model (James M. Montgomery Consulting Engineers 1990). For water years 1970 to 2009, 91% of the water diverted to the Beardsley Canal and 87% of the water diverted to the Calloway Canal is assumed to have been used in C2VSim subregion 20. In addition, 5% of the water is assumed to have been delivered to municipal and industrial users. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

162. Kern River to Subregion 20 for Spreading

Water is diverted from the Kern River for spreading in C2VSim subregion 20. For water years 1922 to 1969, Kern River spreading diversions to subregion 20 were taken from the CVGSM model (James M. Montgomery Consulting Engineers 1990). For water years 1970 to 2009, 91% of the water diverted to the Beardsley Canal and 87% of the water diverted to the Calloway Canal is assumed to have been used in C2VSim subregion 20. In addition, 95% of the water from October through February is assumed to have been used for artificial recharge. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

163. Kern River at Rocky Point Weir for Ag

Water is diverted from the Kern River at the Rocky Point Weir for agricultural use in C2VSim subregion 21. For water years 1922 to 1969, 84% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the Rocky Point weir. For water years 1970 to 2009, water diverted to the Kern Island, Castro, and Eastside canals and 9% of the water diverted to the Beardsley Canal is assumed to have been diverted at the Rocky Point weir and to have been used in C2VSim subregion 21. In addition, 95% of the water diverted from March through September is assumed to have been delivered to agricultural users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

164. Kern River at Rocky Point Weir for Ag

Water is diverted from the Kern River at the Rocky Point Weir for municipal and industrial use in C2VSim subregion 21. For water years 1922 to 1969, 84% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the Rocky Point weir. For water years 1970 to 2009, water diverted to the Kern Island, Castro, and Eastside canals and 9% of the water diverted to the Beardsley Canal is assumed to have been diverted at the Rocky Point weir and to have been used in C2VSim subregion 21. In addition, 5% of the water diverted from March through September is assumed to have been delivered to municipal and industrial users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

165. Kern River at Calloway Weir for Ag

Water is diverted from the Kern River at the Calloway Weir for agricultural use in C2VSim subregion 21. For water years 1922 to 1969, 6% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the Calloway Weir. For water years 1970 to 2009, water diverted to the Farmers, Stine and Anderson canals and 13% of the water diverted to the Calloway Canal is assumed to have been diverted at the Calloway Weir and used in C2VSim subregion 21. In addition, 95% of the water diverted from March through September is assumed to have been delivered to agricultural users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

166. Kern River at Calloway Weir for M&I

Water is diverted from the Kern River at the Calloway Weir for municipal and industrial use in C2VSim subregion 21. For water years 1922 to 1969, 6% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the Calloway Weir. For water years 1970 to 2009, water diverted to the Farmers, Stine and Anderson canals and 13% of the water diverted to the Calloway Canal is assumed to have been diverted at the Calloway Weir and used in C2VSim subregion 21. In addition, 5% of this water is assumed to have been delivered to municipal and industrial users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

167. Kern River at Calloway Weir for Spreading

Water is diverted from the Kern River at the Calloway Weir for spreading in C2VSim subregion 21. For water years 1922 to 1969, 6% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the Calloway Weir. For water years 1970 to 2009, water diverted to the Farmers, Stine and Anderson canals and 13% of the water diverted to the Calloway Canal is assumed to have been diverted at the Calloway Weir and used in C2VSim subregion 21. In addition, 95% of the water diverted from October through February is assumed to have been used for artificial recharge. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

168. Kern River at Canal River Weir for Ag

Water is diverted from the Kern River at the River Canal Weir for spreading in C2VSim subregion 21. For water years 1922 to 1969, 9% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the River Canal weir. For water years 1970 to 2009, water diverted to the Arvin-Edison Canal, Buena Vista Canal, Rio Vista Lake, the Park at River Walk, and 58% of the water diverted to the Big James Canal is assumed to have been diverted at the River Canal weir and used in C2VSim subregion 21. In addition, 95% of the water diverted from March through September is assumed to have been delivered to agricultural users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

169. Kern River at River Canal for M&I

Water is diverted from the Kern River at the River Canal Weir for municipal and industrial use in C2VSim subregion 21. For water years 1922 to 1969, 9% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the River Canal weir. For water years 1970 to 2009, water diverted to the Arvin-Edison Canal, Buena Vista Canal, Rio Vista Lake, the Park at River Walk, and 58% of the water diverted to the Big James Canal is assumed to have been diverted at the River Canal weir and used in C2VSim subregion 21. In addition, 5% of the water diverted from March through September is assumed to have been delivered to municipal and industrial users. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

170. Kern River at River Canal Weir for Spreading

Water is diverted from the Kern River at the River Canal Weir for spreading in C2VSim subregion 21. For water years 1922 to 1969, 9% of the Kern River diversions to subregion 21 from the CVGSM model (James M. Montgomery Consulting Engineers 1990) are assumed to have occurred at the River Canal weir. For water years 1970 to 2009, water diverted to the Arvin-Edison Canal, Buena Vista Canal, Rio Vista Lake, the Park at River Walk, and 58% of the water diverted to the Big James Canal is assumed to have been diverted at the River Canal weir and used in C2VSim subregion 21. In addition, all water diverted from October through February is assumed to have been used for artificial recharge. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%.

Start Date	End Date	Source
10/01/1921	09/30/1969	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1969	09/30/2009	City of Bakersfield

171. Delta Mendota Canal to Subregion 9 for Ag

Water is delivered from the Delta Mendota Canal to agricultural users in C2VSim subregion 9. Delta Mendota Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.136
10/01/1980	12/31/1986	CVGSM Model Update (CH2MHill, 1996) * 0.136
01/01/1987	09/30/2009	USBR

172. Delta Mendota Canal to Subregion 10 for Ag

Water is delivered from the Delta Mendota Canal to agricultural users in C2VSim subregion 10. Delta Mendota Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.714
10/01/1980	12/31/1986	CVGSM Model Update (CH2MHill, 1996) * 0.714
01/01/1987	09/30/2009	USBR

173. Delta Mendota Canal to Subregion 10 for M&I

Water is delivered from the Delta Mendota Canal to municipal and industrial users in C2VSim subregion 10. Delta Mendota Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.055
10/01/1980	12/31/1986	CVGSM Model Update (CH2MHill, 1996) * 0.055
01/01/1987	09/30/2009	USBR

174. Delta Mendota Canal to Subregion 10 for Refuges

Water is delivered from the Delta Mendota Canal to refuges in C2VSim subregion 10. Delta Mendota Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.098
10/01/1980	12/31/1986	CVGSM Model Update (CH2MHill, 1996) * 0.098
01/01/1987	09/30/2009	USBR

175. Delta Mendota Canal to Subregion 13 for Ag

Water is delivered from the Delta Mendota Canal to agricultural users in C2VSim subregion 13. Delta Mendota Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	Estimated (no deliveries)
01/01/1987	09/30/2009	USBR

176. Delta Mendota Canal seepage

Seepage losses from the Delta Mendota Canal are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/1980	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
10/01/1980	09/30/2009	Estimated

177. Mendota Pool to Subregion 10 for Ag

Water is delivered from the Mendota Pool to agricultural users in C2VSim subregion 10. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

178. Mendota Pool to Subregion 10 for Refuges

Water is delivered from the Mendota Pool to refuges in C2VSim subregion 10. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

179. Mendota Pool to Subregion 13 for Ag

Water is delivered from the Mendota Pool to agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

180. Mendota Pool to Subregion 14 for Ag

Water is delivered from the Mendota Pool to refuges in C2VSim subregion 14. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

181. Mendota Pool to Subregion 15 for Ag

Water is delivered from the Mendota Pool to agricultural users in C2VSim subregion 15. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

182. Mendota Pool to Subregion 15 for M&I

Water is delivered from the Mendota Pool to municipal and industrial users in C2VSim subregion 15. Recoverable losses are assumed to be 8%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

183. Mendota Pool to Subregion 15 for Refuges

Water is delivered from the Mendota Pool to refuges in C2VSim subregion 15. Recoverable losses are assumed to be 16%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

184. O'Neil Forebay for Ag

Water is delivered from the O'Neil Forebay to agricultural users in C2VSim subregion 10. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

185. O'Neil Forebay for M&I

Water is delivered from the O'Neil Forebay to municipal and industrial users in C2VSim subregion 10. Recoverable losses are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

186. O'Neil Forebay for Refuges

Water is delivered from the O'Neil Forebay to refuges in C2VSim subregion 10. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

187. San Luis Canal to Subregion 10 for Ag

Water is delivered from the San Luis Canal to agricultural users in C2VSim subregion 10. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.98
01/01/1987	09/30/2009	USBR

188. San Luis Canal to Subregion 10 for M&I

Water is delivered from the San Luis Canal to municipal and industrial users in C2VSim subregion 10. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.03
01/01/1987	09/30/2009	USBR

189. San Luis Canal to Subregion 10 for Refuges

Water is delivered from the San Luis Canal to refuges in C2VSim subregion 10. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	Estimated (no deliveries)
01/01/1987	09/30/2009	USBR

190. San Luis Canal to Subregion 14 for Ag

Water is delivered from the San Luis Canal to agricultural users in C2VSim subregion 14. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

191. San Luis Canal to Subregion 14 for M&I

Water is delivered from the San Luis Canal to municipal and industrial users in C2VSim subregion 14. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

192. San Luis Canal to Subregion 14 for Refuges

Water is delivered from the San Luis Canal to refuges in C2VSim subregion 14. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	Estimated (no deliveries)
01/01/1987	09/30/2009	USBR

193. San Luis Canal to Subregion 15 for Ag

Water is delivered from the San Luis Canal to agricultural users in C2VSim subregion 15. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	DWR
01/01/1987	09/30/2009	USBR & DWR

194. San Luis Canal to Subregion 15 for M&I

Water is delivered from the San Luis Canal to municipal and industrial users in C2VSim subregion 15. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR

195. San Luis Canal to Subregion 15 for Refuges

Water is delivered from the San Luis Canal to refuges in C2VSim subregion 15. San Luis Canal seepage is a separate time series. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	DWR
01/01/1987	09/30/2009	USBR & DWR

196. California Aqueduct to Subregion 18 for Ag

Water is delivered from the California Aqueduct to agricultural users in C2VSim subregion 18. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

197. California Aqueduct to Subregion 19 for Ag

Water is delivered from the California Aqueduct to agricultural users in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.987
01/01/1987	09/30/2009	USBR

198. California Aqueduct to Subregion 19 for Spreading

Water is delivered from the California Aqueduct for artificial recharge in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.987
01/01/1987	09/30/2009	USBR

199. California Aqueduct to Subregion 19 for M&I

Water is delivered from the California Aqueduct to municipal and industrial users in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.013
01/01/1987	09/30/2009	DWR

200. California Aqueduct to Subregion 19 for Refuges

Water is delivered from the California Aqueduct to refuges in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	09/30/2009	USBR & DWR

201. California Aqueduct to Subregion 20 for Ag

Water is delivered from the California Aqueduct to agricultural users in C2VSim subregion 20. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

202. California Aqueduct to Subregion 21 for Ag

Water is delivered from the California Aqueduct to agricultural users in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR

203. California Aqueduct to Subregion 21 for Spreading

Water is delivered from the California Aqueduct for artificial recharge in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR

204. California Aqueduct to Subregion 21 for M&I

Water is delivered from the California Aqueduct to municipal and industrial users in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 5%, and non-recoverable losses are assumed to be 1%.

Start Date	End Date	Source
10/01/1921	09/30/2009	DWR

205. San Luis Canal seepage losses, Subregion 10

Seepage losses from the San Luis Canal in C2VSim subregion 10 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

206. San Luis Canal seepage losses, Subregion 14

Seepage losses from the San Luis Canal in C2VSim subregion 14 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

207. San Luis Canal seepage losses, Subregion 15

Seepage losses from the San Luis Canal in C2VSim subregion 15 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

208. California Aqueduct seepage losses, Subregion 19

Seepage losses from the California Aqueduct in C2VSim subregion 19 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

209. California Aqueduct seepage losses, Subregion 21

Seepage losses from the California Aqueduct in C2VSim subregion 21 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	09/30/2009	Estimated

210. Madera Canal for Ag

Water is delivered from the Madera Canal to agricultural users in C2VSim subregion 13. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.994
01/01/1987	09/30/2009	USBR

211. Madera Canal for M&I

Water is delivered from the Madera Canal to municipal and industrial users in C2VSim subregion 13. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)*0.006
01/01/1987	09/30/2009	USBR

212. Friant-Kern Canal to Subregion 15

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 15. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

213. Friant-Kern Canal to Subregion 16 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 16. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

214. Friant-Kern Canal to Subregion 16 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 16. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

215. Friant-Kern Canal to Subregion 16 for M&I

Water is delivered from the Friant-Kern Canal to municipal and industrial users in C2VSim subregion 16. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

216. Friant-Kern Canal to Subregion 17 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 17. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

217. Friant-Kern Canal to Subregion 17 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 17. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

218. Friant-Kern Canal to Subregion 17 for M&I

Water is delivered from the Friant-Kern Canal to municipal and industrial users in C2VSim subregion 17. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

219. Friant-Kern Canal to Subregion 18 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 18. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

220. Friant-Kern Canal to Subregion 18 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 18. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

221. Friant-Kern Canal to Subregion 18 for M&I

Water is delivered from the Friant-Kern Canal to municipal and industrial users in C2VSim subregion 18. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

222. Friant-Kern Canal to Subregion 19 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

223. Friant-Kern Canal to Subregion 19 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

224. Friant-Kern Canal to Subregion 19 for Refuges

Water is delivered from the Friant-Kern Canal to refuges in C2VSim subregion 19. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

225. Friant-Kern Canal to Subregion 20 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 20. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

226. Friant-Kern Canal to Subregion 20 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 20. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

227. Friant-Kern Canal to Subregion 20 for M&I

Water is delivered from the Friant-Kern Canal to municipal and industrial users in C2VSim subregion 20. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

228. Friant-Kern Canal to Subregion 21 for Ag

Water is delivered from the Friant-Kern Canal to agricultural users in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

229. Friant-Kern Canal to Subregion 21 for Spreading

Water is delivered from the Friant-Kern Canal for artificial recharge in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

230. Friant-Kern Canal to Subregion 21 for M&I

Water is delivered from the Friant-Kern Canal to municipal and industrial users in C2VSim subregion 21. Recoverable losses in distribution canals are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

231. Friant-Kern Canal seepage losses, Subregion 16

Seepage losses from the Friant-Kern in C2VSim subregion 16 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	Estimated

232. Friant-Kern Canal seepage losses, Subregion 17

Seepage losses from the Friant-Kern in C2VSim subregion 17 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	Estimated

233. Friant-Kern Canal seepage losses, Subregion 18

Seepage losses from the Friant-Kern in C2VSim subregion 18 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	Estimated

234. Friant-Kern Canal seepage losses, Subregion 20

Seepage losses from the Friant-Kern in C2VSim subregion 20 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	Estimated

235. Friant-Kern Canal seepage losses, Subregion 21

Seepage losses from the Friant-Kern in C2VSim subregion 21 are simulated as a separate time series. Recoverable losses are assumed to be 100%, and non-recoverable losses are assumed to be zero.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	Estimated

236. Cross-Valley Canal to Subregion 17

Water is delivered from the Cross-Valley Canal to agricultural users in C2VSim subregion 17. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

237. Cross-Valley Canal to Subregion 18 for Ag

Water is delivered from the Cross-Valley Canal to agricultural users in C2VSim subregion 18. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

238. Cross-Valley Canal to Subregion 18 for M&I

Water is delivered from the Cross-Valley Canal to municipal and industrial users in C2VSim subregion 18. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

239. Cross-Valley Canal to Subregion 19 for Refuges

Water is delivered from the Cross-Valley Canal to refuges in C2VSim subregion 19. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

240. Cross-Valley Canal to Subregion 20 for Ag

Water is delivered from the Cross-Valley Canal to agricultural users in C2VSim subregion 20. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

241. Cross-Valley Canal to Subregion 20 for Spreading

Water is delivered from the Cross-Valley Canal for artificial recharge in C2VSim subregion 20. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

242. Cross-Valley Canal to Subregion 21 for Ag

Water is delivered from the Cross-Valley Canal to agricultural users in C2VSim subregion 21. Recoverable losses are assumed to be 10%, and non-recoverable losses are assumed to be 2%. All agricultural deliveries from March through September and half of the deliveries in October are assumed to be used for agriculture.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

243. Cross-Valley Canal to Subregion 21 for Spreading

Water is delivered from the Cross-Valley Canal for artificial recharge in C2VSim subregion 21. Recoverable losses are assumed to be 95%, and non-recoverable losses are assumed to be 5%. Half of the agricultural deliveries in October and all deliveries from November to February are assumed to be recharged.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	09/30/2009	USBR

244. Kings River diversions to Friant-Kern Canal

Water is diverted from the Kings River into the Friant-Kern Canal. Recoverable and non-recoverable losses are assumed to be negligible.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	12/31/2001	Estimated
01/01/2002	09/30/2009	Friant-Kern Water Authority

245. Kaweah River diversions to Friant-Kern Canal

Water is diverted from the Kaweah River into the Friant-Kern Canal. Recoverable and non-recoverable losses are assumed to be negligible.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	12/31/2001	Estimated
01/01/2002	09/30/2009	Friant-Kern Water Authority

246. Tule River diversions to Friant-Kern Canal

Water is diverted from the Tule River into the Friant-Kern Canal. Recoverable and non-recoverable losses are assumed to be negligible.

Start Date	End Date	Source
10/01/1921	12/31/1986	CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1987	12/31/2001	Estimated
01/01/2002	09/30/2009	Friant-Kern Water Authority

Bypass Flows

The C2VSim model includes 12 surface water bypasses. Five bypasses use historical time series to simulate the operation of weirs that route flood flows in the Sacramento River Basin: Moulton Weir, Colusa Weir, Tisdale Weir, Fremont Weir and Sacramento Weir. One bypass uses historical time series to simulate the Knights Landing Ridge Cut flows to the Yolo Bypass. One bypass uses a historical time series to simulate the Kings River bifurcation, routing water to the South Fork Kings River at the Island Weir and Army Weir. Four bypasses use rating tables to simulate aquifer storage programs on the Kaweah River, Tule River, South Fork Kings River and Kern River Flood Channel. One bypass uses a historical time series (currently set to zero owing to a lack of data) to route water from the Kern River flow to Buena Vista Lake.

Table 3. Surface water bypasses in the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim)

No.	Col.	Description
1	248	Moulton Weir Spill from Sacramento River to Butte Basin
2	249	Colusa Weir Spill from Sacramento River to Butte Basin
3	250	Tisdale Weir from Sacramento River to Butte Basin
4	251	Fremont Weir from Sacramento River to Yolo Bypass
5	252	Sacramento Weir from Sacramento River to Yolo Bypass
6	253	Knights Landing Ridge Cut to Yolo Bypass
7	*	Kings River flows to South Fork at the Island Weir/Army Weir bifurcation
8	*	End of Kaweah River to Kaweah River Fan as recharge
9	*	End of Tule River to Tule River Fan as recharge
10	*	End of Kern River Flood Channel to be spread as recharge
11	*	End of South Fork Kings River to be spread as recharge (inactive)
12	258	Kern River to Buena Vista Lake (inactive)

1. Moulton Weir Spill from Sacramento River to Butte Basin

The Moulton Weir is located on the Sacramento River at River Mile 103, upstream of Colusa. When the water level in the Sacramento River rises above the level of the weir, water flows over the weir and into the Sutter Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Combined Sutter Weir Flows, CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.08
01/01/1940	09/30/2009	DWR

2. Colusa Weir Spill from Sacramento River to Buttte Basin

The Colusa Weir is located on the Sacramento River at River Mile 92, upstream of Colusa. When the water level in the Sacramento River rises above the level of the weir, water flows over the weir and into the Sutter Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Combined Sutter Weir Flows, CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.63
01/01/1940	09/30/2009	DWR

3. Tisdale Weir from Sacramento River to Butte Basin

The Tidale Weir is located on the Sacramento River at River Mile 64, downstream of Colusa. When the water level in the Sacramento River rises above the level of the weir, water flows over the weir and into the Sutter Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Combined Sutter Weir Flows, CVGSM Model (James M. Montgomery Consulting Engineers, 1990) * 0.39
01/01/1940	09/30/2009	DWR

4. Fremont Weir from Sacramento River to Yolo Bypass

The Fremont Weir is located on the Sacramento River upstream of the confluence with the Feather River. When the water level in the Sacramento River rises above the level of the weir, water flows over the weir and into the Yolo Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Fremont Weir Flows, CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1940	09/30/2009	DWR

5. Sacramento Weir from Sacramento River to Yolo Bypass

The Sacramento Weir is located on the Sacramento River upstream of West Sacramento. The Sacramento Weir has gates that can be opened and closed to manipulate the stage of the Sacramento River. When the weir gates are opened, some of the water in the Sacramento River may flow through the weir and into the Yolo Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Sacramento Weir Flows, CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1940	09/30/2009	USGS Gage 11426000 Sacramento Weir Spill to Yolo Bypass near Sacramento CA

6. Knights Landing Ridge Cut to Yolo Bypass

The Knights Landing Ridge Cut is a man-made channel that diverts water from the Colusa Basin Drain into the Yolo Bypass.

Start Date	End Date	Source
10/01/1921	12/31/1939	Knights Landing Ridge Cut Flood Flow, CVGSM Model (James M. Montgomery Consulting Engineers, 1990)
01/01/1940	09/30/2009	DWR

7. Kings River flows to South Fork at the Island Weir/Army Weir bifurcation

The Kings River splits into two main branches on the San Joaquin Valley floor. The South Fork flows towards Tulare Lake, and the North Fork flows through the Fresno Slough, James Bypass, and Mendota Pool to join the San Joaquin River. The Army Weir controls flow into the South Fork.

Start Date	End Date	Source
10/01/1921	12/31/1952	Regression from 1953-2009 flow data
01/01/1953	09/30/2009	Kings River Watermaster Reports

8. End of Kaweah River to Kaweah River Fan as recharge

The Kaweah River terminates in Tulare Lake. Kaweah River flows in excess of required diversions are generally diverted into distribution canals and recharged. Very little water from the Kaweah River has discharged to Tulare Lake since the late 1800s. A bypass is used to simulate this within the C2VSim model, routing any flows reaching the end of the simulated Kaweah River reach to direct recharge in model elements adjacent to the river reach.

9. End of Tule River to Tule River Fan as recharge

The Tule River terminates in Tulare Lake. Tule River flows in excess of required diversions are generally diverted into distribution canals and recharged. Very little water from the Tule River has discharged to Tulare Lake since the late 1800s. A bypass is used to simulate this within the C2VSim model, routing any flows reaching the end of the simulated Tule River reach to direct recharge in model elements adjacent to the river reach.

10. End of Kern River Flood Channel to be spread as recharge

The Kern River Flood Channel terminates in Tulare Lake. Kern River Flood Channel flows in excess of required diversions are generally diverted into distribution canals and recharged. Very little water from the Kern River Flood Channel has discharged to Tulare Lake since the late 1800s. A bypass is used to simulate this within the C2VSim model, routing any flows reaching the end of the simulated Kern River Flood Channel reach to direct recharge in model elements adjacent to the river reach.

11. End of South Fork Kings River to be spread as recharge

The South Fork Kings River terminates in Tulare Lake. South Fork Kings River flows in excess of required diversions can be diverted into distribution canals and recharged through aquifer storage and recovery (ASR) programs. A bypass can be used to simulate ASR diversions in tehC2VSim model. Bypass 11 can simulate these ASR operations by using a rating table to route all flows reaching the end of the South Fork Kings River to direct recharge in model elements adjacent to the river. This bypass is included in the C2VSim model, but is inactivated, so currently all water reaching teh end of the South Fork Kings River flows into Tulare Lake.

12. End of Kern River Flood Channel to be spread as recharge

Water occasionally flowed from the Kern River into Buena Vista Lake prior to construction of Isabella Dam. A bypass is used to simulate this within the C2VSim model, routing flows from the Kern River to Buena Vista Lake. All values are currently set to zero as no data set detailing Kern River flows to Buena Vista Lake was identified.

Comparison between C2VSim and CVGSM Rim Inflows

The inflow data for the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim) is based on the inflow data of the Central Valley Ground-Surface Water Model (CVGSM). The original CVGSM model was developed by James M. Montgomery Consulting Engineers (1990) and simulated hydrologic conditions for the period October 1921 to September 1980. The CVGSM model was updated for the period October 1980 to September 1993 by CH2M Hill (1996). CVGSM model data for the peroid from October 1993 to September 1998 is undocumented. Inflow data sources for many data sets in the CVGSM model update report are listed as a personal communication and are therefore difficult to replicate. This section explains differences between the C2VSim and CVGSM inflow data sets for the period October 1921 to September 1998.

1. Sacramento River

The C2VSim and CVGSM data sets are identical, with minor round-off error.

2. Cow Creek

The C2VSim and CVGSM data sets are identical, with minor round-off error.

3. Battle Creek near Cottonwood

The C2VSim and CVGSM data sets are identical, with minor round-off error.

4. Cottonwood Creek

The C2VSim and CVGSM data sets are identical, with minor round-off error.

5. Paynes and Sevenmile Creeks

The C2VSim input data is based on the CalSim 3 data set Historical Paynes and Sevenmile Creek Inflows, which is based on flow records from USGS gages during the periods of gage records. The original CVGSM data set was based on the DWR depletion model studies for the period when gage data is unavailable, and is not well documented. The C2VSim and CVGSM data sets are very close in total volume and differ by up to 30 TAF per month.

6. Antelope Creek Group

The C2VSim input data is based on the CalSim 3 data set Historical Antelope Creek Inflow, which follows USGS gage 11379000, Antelope Creek near Red Bluff, during the period of gage record. The original CVGSM data set was based on the DWR depletion model studies for the period when gage data is unavailable, and is not well documented. The C2VSim and CVGSM data sets are very close in total volume and differ by up to 5 TAF per month.

7. Mill Creek

The C2VSim and CVGSM data sets are identical, with minor round-off error.

8. Elder Creek

C2VSim inflow data for the period October 1921 to September 1948 were taken from the CVGSM model. Inflow data for the original CVGSM model are identical to the values of USGS gage 11379500, Elder Creek near Paskenta, for the period October 1948 to September 1980. Inflow data for the CVGSM model show no relation to the values of USGS gage 11379500 for the period from October 1980 to September 1992, and are identical to the gage values after October 1992.

9. Thomes Creek

Inflow data for the CVGSM model are identical to flow values for USGS gage 11382000, Thomes Creek at Paskenta, for the period from October 1921 to September 1980, with minor round-off error. Inflow data for the CVGSM model show no relation to the values of USGS gage 11382000 for the period from October 1980 to September 1992, and are identical to the gage values after October 1992.

10. Deer Creek Group

The annual flow volumes of the CVGSM data set are similar to those of USGS gage 11383500, but the monthly volumes differ slightly with no recognizable pattern. The C2VSim and CVGSM data sets are very close in total volume and differ by up to 82 TAF per month.

11. Stony Creek

Diversions from Stony Creek to Stony Creek South Canal occurred from Stony Creek prior to construction of Black Butte Reservoir, and directly from the reservoir after completion. The CVGSM and C2VSim models simulate this diversion differently. In the CVGSM model, this diversion occurs at a river node on Stony Creek, and stream reach inflow is equal to the sum of reservoir releases and South Canal diversions. In the C2VSim model, this diversion is simulated as an import, and stream reach inflow is equal to the reservoir releases. The annual flow volumes of the CVGSM reservoir releases (inflow minus South Canal diversion) are similar to those of USGS gage 11388000, Stony Creek below Black Butte Dam, but the monthly volumes differ by up to 14 TAF per month with no recognizable pattern.

12. Big Chico Creek

The annual flow volumes of the CVGSM data set are similar to those of USGS gage 11384000, Big Chico Creek near Chico, but the monthly volumes differ by up to 40 TAF per month with no recognizable pattern.

13. Butte and Little Chico Creeks

The annual flow volumes of the CVGSM data set for the period from October 1921 to September 1930 are similar to those of the 1957 Joint Hydrology Study (DWR and USBR 1958), but the monthly volumes differ by up to 8 TAF per month with no recognizable pattern. The annual flow volumes of the CVGSM data set for the period from October 1930 to September 1980 are similar to those of USGS gage 11390000 multiplied by 1.24 (the method used for the C2VSim data set), but the monthly volumes differ by up to 11 TAF per month with no recognizable pattern. The annual flow volumes of the CVGSM data set for the period from October 1980 to September 1992 are also similar to those of USGS gage 11390000 multiplied by 1.24, but the monthly volumes differ by up to 7 TAF per month with no recognizable pattern.

14. Feather River

The CVGSM and C2VSim models simulate inflows from the Oroville-Thermalito complex differently. The method used to prepare the CVGSM data set is not well documented, but appears to equal the sum of the outflow from Oroville Lake and the Kelly Ridge Powerhouse, with no mention of the inflows to and outflows from Thermalito Afterbay. The C2VSim data set uses the flow values from USGS gages 11407000, Feather River at Oroville, and 11406920, Thermalito Afterbay release to Feather River near Oroville, to estimate Feather River flow below the Thermalito Complex. The monthly flow volumes of the CVGSM data set are similar to those of USGS gage 11407000 for the period from October 1921 to September 1967. The monthly flow volumes of the CVGSM data set are on average 60 TAF greater than the sum of USGS gages 11407000 and 11406920 for the period from October 1967 to September 1980, with individual monthly flow values up to 1,053 TAF greater than gage flow.

15. Yuba River

Yuba River inflow incorporates flow from the Yuba River at Englebright Dam and two streams, Deer Creek and Dry Creek, discharging to the Yuba River between Englebright Dam and the model boundary. Methods used to estimate inflows from Deer Creek and Dry Creek for the CVGSM model are not well documented. The total flow volume calculated for the C2VSim model is slightly higher than the CVGSM inflow volume, with monthly flow volumes differing by as much as 113 TAF.

16. Bear River

Annual flow volumes of the CVGSM data for the period from October 1921 to September 1927 set are similar to USGS gage 11423500, Bear River at VanTrent, multiplied by 1.05, but monthly flow volumes differ by up to 1.5 TAF with no recognizable pattern. Annual flow volumes of the CVGSM data set from October 1928 to September 1980 are slightly lower than USGS gage 11424000, Bear River near Wheatland, plus total Bear River diversions, and monthly flow volumes differ by up to 16 TAF with no recognizable pattern. Annual and monthly flow volumes of the CVGSM data set from October 1980 to September 1993 are similar to USGS gage 11424000 plus total Bear River diversions.

17. Cache Creek

Water is diverted from Cache Creek at a diversion dam located approximately one mile outside the model boundary. The CVGSM and C2VSim models simulate the Cache Creek diversion differently. The CVGSM model diverts this water from a river node inside the model, and the C2VSim model simulates this diversion as an import. Thus the CVGSM data includes diverted water in the inflow, and the C2VSim data omits it. The average annual C2VSim inflow value is slightly higher than the CVGSM value minus Cache Creek diversions.

18. American River

The CVGSM and C2VSim models simulate the Folsom South Canal diversions differently. The CVGSM model diverts this water from a river node inside the model, and the C2VSim model simulates these diversions as imports. The CVGSM documentation states that the American River inflow was computed as the flow at USGS gage 11446500, American River at Fair Oaks, plus Folsom South Canal diversions. The monthly flow volumes of the CVGSM data set are similar to the USGS gage from October 1921 to September 1993, and do not include the Folsom South Canal diversions from June 1973 to September 1993. The monthly flow volumes of the CVGSM data set equal the sum of the USGS gage and the Folsom South Canal diversion after October 1993.

19. Putah Creek

The C2VSim and CVGSM data sets are identical, with minor round-off error.

20. Cosumnes River

The CVGSM data set is identical to USGS gage 11335000, Cosumnes River at Michigan Bar, from October 1921 to September 1980, with minor round-off error. Annual flow volumes of the CVGSM data are higher than the USGS gage for the period from October 1980 to September 2003.

21. Dry Creek

The annual flow volumes of the CVGSM data set are significantly larger than those of the C2VSim data set.

22. Mokelumne River

The annual flow volumes of the CVGSM data set are similar to the C2VSim data set, but the monthly volumes are different and do not follow an identifiable pattern.

23. Calaveras River

The annual flow volumes of the CVGSM data set are similar to the C2VSim data set, but the monthly volumes are different and do not follow an identifiable pattern.

24. Stanislaus River

The CVGSM and C2VSim models simulate Stanislaus River inflow and the Oakdale Canal and South San Joaquin Canal diversions differently. The CVGSM model simulates diversions to the Oakdale Canal and South San Joaquin Canal at a river node inside the model, and the C2VSim model simulates these diversions as imports. The CVGSM inflow value should equal the C2VSim inflow value plus the diversions to the Oakdale Canal and South San Joaquin Canal. The annual flow volumes of the CVGSM data set are similar to the C2VSim data set, but the monthly volumes are different and do not follow an identifiable pattern, with occasional large differences.

25. Tuolumne River

The CVGSM and C2VSim models simulate Tuolumne River inflow and the Modesto Canal and Turlock Canal diversions differently. The CVGSM model simulates diversions to the Modesto Canal and Turlock Canal at a river node inside the model, and the C2VSim model simulates these diversions as imports. The CVGSM inflow value should equal the C2VSim inflow value plus the diversions to the Modesto Canal and Turlock Canal. The annual flow volumes of the CVGSM data set are similar to the C2VSim data set, but the monthly volumes are different and do not follow an identifiable pattern, with occasional large differences.

26. Orestimba Creek

The C2VSim value is equal to the CVGSM value through March 1932. The CVGSM value is equal to the flow at USGS gage 11274500, Orestimba Creek near Newman, from April 1932 to September 1993, with occasional large differences that do not follow an identifiable pattern.

27. Merced River

The C2VSim data set is equal to the flow at USGS gage 11270900, Merced River below Merced Falls Dam, for the entire simulation period. The CVGSM data set has similar annual volumes with monthly differences that do not follow an identifiable pattern.

28. Bear Creek Group

The CVGSM data set is equal to the C2VSim data set from October 1921 to September 1993. Annual CVGSM inflow values are equal to C2VSim values from October 1993 to September 2003, but monthly values differ and do not follow an identifiable pattern.

29. Deadman's Creek

The CVGSM data source is not well documented, and is equal to the Bear Creek Group value from October 1921 to September 1980.

30. Chowchilla River

The C2VSim and CVGSM data sets are identical, with minor round-off error, from October 1921 to September 1980. The annual flow volumes of the C2VSim and CVGSM data sets are identical for the period from October 1980 to September 2003, but monthly volumes differ with no identifiable pattern.

31. Fresno River

C2VSim uses the CVGSM data set from October 1921 to September 1941. The C2VSim and CVGSM data sets are identical, with minor round-off error, for most months from October 1941 to September 1990, with occasional differences with no identifiable pattern. The C2VSim and CVGSM data sets are identical, with minor round-off error, from October 1990 to September 2003.

32. San Joaquin River

The C2VSim and CVGSM data sets are identical, with minor round-off error, from October 1921 to September 2003.

33. Kings River

Differences between the C2VSim and CVGSM data sets for the period from October 1921 to September 1958 appear to be due to typographical errors in the CVGSM data set. (For example, the February 1933 value of CVGSM is 2,938 TAF, and the USGS gage value is 29.75 TAF). The CVGSM and C2VSim data sets are identical from October 1958 to September 2003, with minor round-off error and occasional differences with no identifiable pattern.

34. Kaweah River

The C2VSim and CVGSM data sets are identical, with minor round-off error. There are occasional differences with no identifiable pattern.

35. Tule River

The C2VSim and CVGSM data sets are identical, with minor round-off error. There are occasional differences with no identifiable pattern.

36. Kern River

The C2VSim and CVGSM data sets are identical, with minor round-off error. There are occasional differences with no identifiable pattern.

37. Friant-Kern Canal Wasteway Deliveries to Kings River

The inflow data set Friant-Kern Canal Deliveries to Kern River was not used in the CVGSM model.

38. Friant-Kern Canal Wasteway Deliveries to Tule River

C2VSim uses the CVGSM data set from October 1921 to September 1995. The C2VSim and CVGSM data sets have the same annual volume but different monthly volumes from October 1995 to September 2003 with no identifiable pattern.

39. Friant-Kern Canal Wasteway Deliveries to Kaweah River

C2VSim uses the CVGSM data set from October 1921 to December 2001. The C2VSim and CVGSM data sets differ from January 2002 to September 2003 with no identifiable pattern.

40. Cross Valley Canal Deliveries to Kern River

The inflow data set Cross Valley Canal Deliveries to Kern River was not used in the CVGSM model.

41. Friant-Kern Canal Deliveries to Kern River

The inflow data set Friant-Kern Canal Deliveries to Kern River was not used in the CVGSM model.

Comparison between C2VSim and CVGSM Surface Water Diversions and Bypass Flows

The California Central Valley Groundwater-Surface Water Simulation Model (C2VSim) was derived from the Central Valley Ground-Surface Water Model (CVGSM). The original CVGSM model was developed by James M. Montgomery Consulting Engineers (1990) and simulated hydrologic conditions for the period October 1921 to September 1980. The CVGSM model was updated for the period October 1980 to September 1993 by CH2M Hill (1996). CVGSM input data for the period from October 1993 to September 1998 is undocumented. Inflow data sources for many data sets in the CVGSM model reports are poorly documented and are therefore difficult to replicate. In the C2VSim model, diversions are separated into six classes (agricultural, municipal and industrial, refuges, spreading, seepage and export) that are generally aggregated to a single data set in the CVGSM model. This section explains differences between the C2VSim and CVGSM diversion data sets for the period October 1921 to September 1993.

Whiskeytown and Shasta imports

The C2VSim data set includes some M&I imports that were not included in the CVGSM data set.

Sacramento River to Bella Vista conduit

The C2VSim and CVGSM data sets are similar. There are some round-off differences, and occasional differences with no identifiable pattern.

Sacramento River, Keswick Dam to Red Bluff

The C2VSim and CVGSM data sets are similar. There are some round-off differences, and occasional differences with no identifiable pattern.

Cow Creek, Battle Creek, Cottonwood Creek and Clear Creek riparian diversions

These diversions were not included in the CVGSM model.

Sacramento River to the Corning Canal

The C2VSim and CVGSM data sets are generally identical, with some round-off differences. There are significant differences for several months in water years 1981-1993.

Stony Creek diversions

Stony Creek diversions to the North Canal and South Canal are identical for the C2VSim and CVGSM data sets through 1963, and are then smaller in the C2VSim data set. The CVGSM model does not include diversions to the Tehama-Colusa Canal and Glenn-Colusa Canal, which are significant. The total Stony Creek diversions are greater for the C2VSim model than for the CVGSM model.

Sacramento River to Subregion 2

This diversion was not included in the CVGSM model.

Antelope Creek, Mill Creek, Elder Creek, Thomes Creek and Deer Creek diversions

These diversions were not included in the CVGSM model.

Sacramento River to the Tehama-Colusa Canal

Values in the C2VSim and CVGSM models are very different. Diversion values in the C2VSim model are significantly larger than diversion values in the CVGSM model.

Sacramento River to the Glenn-Colusa Canal

The average value of the C2VSim diversions is generally greater than the average value of the CVGSM diversions for water years 1922 to 1963 and smaller for water years 1964 to 1993. Values in the CVGSM model appear to be estimated and repeated for several years in a row.

Sacramento River to Subregion 3

Annual diversion rates of the C2VSim data set are generally slightly larger than the CVGSM data set. The CVGSM data set also has no diversions for water years 1934 to 1942.

Sacramento River to Subregion 4

Annual diversion rates of the C2VSim data set are generally significantly larger than the CVGSM data set.

Little Chico Creek

This diversion was not included in the CVGSM model.

Tarr Ditch

The C2VSim and CVGSM data sets are equivalent. The C2VSim data set is multiplied by 0.55 before incorporation into the diversion file, and the CVGSM data set is multiplied by 0.55 via the diversion specifications file.

Miocine and Wilenor Canals

All diversion rates in the CVGSM data set equal zero.

Palermo Canal

The C2VSim and CVGSM data sets contain similar diversion rates, with C2VSim rates generally higher for water years 1922 to 1968, generally lower for water eyars 1969 to 1980, and generally higher for water years 1981 to 1993.

Oroville-Wyandotte ID through Forbestown Ditch

The C2VSim and CVGSM data sets are similar.

Little Dry Creek

This diversion was not included in the CVGSM model.

Bangor Canal

The C2VSim and CVGSM data sets are similar.

Feather River to Subregion 5, including from Thermalito Afterbay

The C2VSim and CVGSM data sets are similar for water years 1922 to 1980, differing by less than 3% per year, with the C2VSim data set slightly larger. The C2VSim and CVGSM data sets differ significantly for water years 1981 to 1993.

Feather River to Subregion 7

The C2VSim data set uses a constant value for each month, repeated for water years 1922 to 2009 from CalSim3. The C2VSim value is generally greater than the CVGSM value for water years 1922 to 1969, and generally smaller for water years 1970 to 1993.

Yuba River

The C2VSim and CVGSM diversion rates are similar for water years 1922 to 1967, and the C2VSim rates are generally smaller than CVGSM rates for water years 1968 to 1993.

Bear River to Camp Far West ID

The C2VSim and CVGSM data sets are identical.

Bear River to South Sutter WD

The C2VSim and CVGSM data sets are identical.

Bear River Canal to South Sutter WD

The total volume of the C2VSim and CVGSM data sets for water years 1922 to 1980 is similar, but the monthly values are very different.

Boardman Canal

The total volume of the C2VSim and CVGSM data sets for water years 1922 to 1980 is similar but monthly values differ by up to 1.7 TAF. All values for the CVGSM data set are zero for water years 1987 to 1993.

Combie (Gold Hill) Canal

The C2VSim and CVGSM data sets are similar.

Cross Canal

This diversion was not included in the CVGSM model.

Butte Creek, Butte Slough and Sutter Bypass

These diversions were not included in the CVGSM model.

Colusa Basin Drain

The C2VSim and CVGSM data sets are similar, with significant differences in some months. The C2VSim values for water year 1969 are repeated for water years 1970 to 1975, and the values for 1976 are repeated for water years 1977 to 2009.

Knights Landing Ridge Cut

The C2VSim diversions are generally smaller than the CVGSM diversions for water years 1922 to 1980.

Sacramento River between Knights Landing and Sacramento to Subregion 6

The total C2VSim diversion volume is slightly larger than the CVGSM diversion volume for water years 1922 to 1980. Monthly diversion volumes are generally similar but occasionally differ.

Sacramento River between Knights Landing and Sacramento to Subregion 7

The total C2VSim diversion volume is smaller than the CVGSM diversion volume for water years 1922 to 1980.

Sacramento River to City of Sacramento

The C2VSim and CVGSM data sets are similar.

Cache Creek

The C2VSim and CVGSM data sets are similar.

Yolo Bypass

This diversion was not included in the CVGSM model.

Putah South Canal

The C2VSim diversion rates are similar to but generally slightly larger than the CVGSM diversion rates for water years 1922 to 1980. The C2VSim diversion rates are similar to the CVGSM diversion rates for water years 1981 to 1993 with occasional large differences.

Putah Creek

This diversion was not included in the CVGSM model.

Folsom Lake

The C2VSim and CVGSM data sets are identical for water years 1922 to 1954. The C2VSim values are slightly larger than the CVGSM values for water years 1955 to 1980, and significantly larger for water years 1981 to 1993.

Folsom South Canal

The C2VSim and CVGSM data sets are similar, with large differences in several months in 1984 that appear to be errors in the CVGSM data set.

American River to Carmichael WD

The C2VSim and CVGSM data sets are similar.

American River to City of Sacramento

The C2VSim and CVGSM data sets are similar.

Cosumnes River

The C2VSim and CVGSM data sets are similar.

Mokelumne River

There are significant differences between the C2VSim and CVGSM data sets. The C2VSim data set uses reported diversions for the entire time series.

Calaveras River

The C2VSim and CVGSM data sets are similar.

Sacramento-San Joaquin Delta to Subregion 9

The C2VSim flow rates are smaller than the CVGSM flow rates. C2VSim diversion rates are equal to the calculated water demands.

Sacramento-San Joaquin Delta to North Bay Aqueduct

This diversion was not included in the CVGSM model.

Sacramento-San Joaquin Delta exports to Contra Costa Canal, CVP and SWP

These diversions were not included in the CVGSM model.

Stanislaus River to South San Joaquin Canal

The C2VSim and CVGSM data sets are similar.

Stanislaus River to Oakdale Canal

The C2VSim and CVGSM data sets are similar.

Stanislaus River riparian

The C2VSim and CVGSM data sets are similar.

Tuolumne River to Modesto Canal

The C2VSim and CVGSM data sets are similar.

Modesto Canal

The C2VSim and CVGSM data sets are similar.

Tuolumne River right bank riparian

The C2VSim and CVGSM data sets are similar.

Tuolumne River left bank riparian

The C2VSim and CVGSM data sets are similar.

Tuolumne River to Turlock Canal

The C2VSim and CVGSM data sets are similar.

Turlock Canal

The C2VSim and CVGSM data sets are similar.

Merced River to Merced ID Northside Canal

The C2VSim and CVGSM data sets are similar.

Merced River right bank riparian

The C2VSim and CVGSM data sets are similar.

Merced River left bank riparian diversions

The C2VSim and CVGSM data sets are similar.

Merced River to Merced ID Main Canal

The C2VSim and CVGSM data sets are similar.

Chowchilla River to Chowchilla WD

The C2VSim and CVGSM data sets are similar.

Chowchilla River

The C2VSim and CVGSM data sets are similar.

Fresno River to Madera ID

The C2VSim and CVGSM data sets are similar.

Fresno River

The C2VSim and CVGSM data sets are similar.

San Joaquin River, Friant to Gravelly Ford

The C2VSim and CVGSM data sets are similar.

San Joaquin River, Fremont Ford to Vernalis

The C2VSim and CVGSM data sets are similar.

Kings River

The C2VSim flow volumes are similar to CVGSM flow volumes for water years 1922 to 1980.

Kaweah River

The C2VSim and CVGSM data sets are similar.

Tule River

The C2VSim flow volumes are significantly larger than the CVGSM flow volumes. The C2VSim diversion data incorporates the assumption that virtually all Tule River water is diverted and utilized before it reaches Tulare Lake. This water is either applied as irrigation, or diverted to ponds where it is recharged.

Kern River

The C2VSim and CVGSM data sets are similar for water years 1922 to 1969. C2VSim uses diversion data from Kern River Watermaster Reports for water years 1970 to 2009.

Delta Mendota Canal

The C2VSim and CVGSM data sets are similar for water years 1922 to 1986. The C2VSim flow volumes for water years 1987 to 2009 were derived from USBR Reports of Operations.

Mendota Pool

The C2VSim and CVGSM flow volumes are similar for water years 1922 to 1986. Allocation to subregions differs. C2VSim uses reported deliveries to each subregion. CVGSM allocates a fixed percentage of the total volume to each subregion. The C2VSim flow volumes are slightly greater for water years 1986 to 1993, and are derived from USBR Reports of Operations.

O'Neill Forebay

The C2VSim and CVGSM data sets are similar.

San Luis Canal and California Aqueduct

The C2VSim and CVGSM flow volumes differ. C2VSim uses reported deliveries to each subregion from DWR State Water Project accounts and USBR monthly Reports of Operations.

Madera Canal

This diversion was not included in the CVGSM model.

Friant-Kern Canal

The C2VSim and CVGSM flow volumes differ. C2VSim uses reported deliveries to each subregion from DWR State Water Project accounts and USBR monthly Reports of Operations.

Cross-Valley Canal

These diversions were not included in the CVGSM model.

Kings River to Friant-Kern Canal

This diversion was not included in the CVGSM model.

Kaweah River to Friant-Kern Canal

This diversion was not included in the CVGSM model.

Tule River to Friant-Kern Canal

This diversion was not included in the CVGSM model.

Sutter Bypasses

The C2VSim and CVGSM data sets differ. C2VSim treats the three weirs allowing water to flow from the Sacramento River to the Sutter Bypass (Moulton Weir, Colusa Weir and Tisdale Weir) as separate bypasses. CVGSM combined the three weirs into a single bypass, and this may have been accomplished through some means other than directly adding the flow volumes.

Fremont Weir

The C2VSim and CVGSM data sets are similar.

Sacramento Weir

The C2VSim and CVGSM data sets are similar.

Knights Landing Ridge Cut

The C2VSim and CVGSM data sets are similar.

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