CalSimII Logic Updates and CalLite Development

Nancy Parker

Bureau of Reclamation

February 24th, 2014

CalSimII Logic Updates

February 24th, 2014

Introduction

- CalSimII Baselines (formal, de facto)
  - 2002, 2004 OCAP, Common Assumptions
  - BDCP 040110, BDCP 081711
- Numerous updates since August 2011
- Implemented in
  - DRR studies
  - Remand studies
- Summary of issues; implementation status

Updates vs. Assumptions

- Updates
  - Model structure / basis
  - Bug fixes
  - Logic and input data
  - Committed changes
- Assumptions
  - Logic and input data
  - Not universally adopted (yet)

Updates – Structure

- Two-Step -> Single-Step
  - Multi-step tool allows full-year accounting to inform successive re-operation – determination of new criteria or facility rules
  - Transfer priorities can use cycles within single-step studies
  - (b)(2), EWA, NODOS – not dynamic in current studies
  - Dynamic decisions better reflect real world (and uncertainty)
  - Single-step studies are computationally more efficient

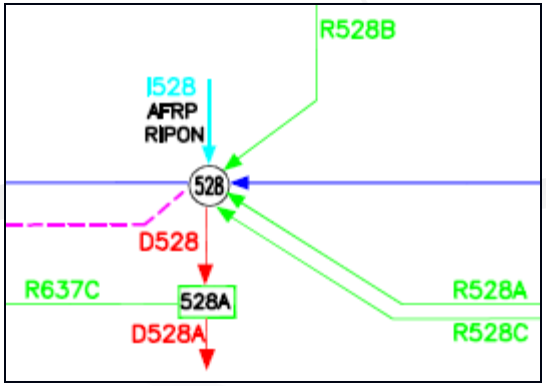
- EWA structure placeholders removed

Updates – Basis

- Phase-out use of 2005 LOD inputs
  - 2005----------2014----------2020
  - 2030 LOD projections mirror 2020 conditions
  - SWP using full Table A demands in all studies
  - CVP using current or full contract amounts in all studies
    - DSA70 hydrology considerations

Updates – Small Fixes

- Removed Kratzer equation parameters for Vernalis WQ - ACCR, WestSide, MainStem
  - ACCR kept D528 < sum(R528*) when I528<0
- D528A connectivity correction
  - GP528A now included
  - D528A_MI supply (~2 taf/yr) had been diverting in error from the Sanislaus



- COSMA_MIDMD – time series modified to allow D520A for SEWD to match monthly pattern and intended annual volume.

Updates – Large Fixes

Sharing export capacity

- CVP storage release for SWP export when:
  - Jones exporting to full DMC capacity
  - E/I not controlling total exports
  - Banks export of state share under COA is 50% of E/I control
  - SWP San Luis below rule curve
- SWP release for CVP export of unused state share
- Resolution
  - Preliminary cycle solution determines E/I control
  - Project releases for export tracked to assure propriety

Updates – Large Fixes

Sharing export capacity (cont.)

- Additional Issues
  - Sharing under OMR export control refined to allow sharing flexibility if one project does not use entire share
  - No longer impose "penalty" for *not* sharing E/I capacity if one project releasing for flood or minimum flows

Hood "MIF" implementation

- CVP storage release for SWP export when:
  - C400_MIF is a mechanism for pulling estimated exports for allocated water supply from NOD storage into the delta
  - SWP estimate set too high for Oroville to support
- Resolution
  - SWP export estimates now consider Oroville resources

Updates – Logic/Inputs

- Feather basin rice decomposition demand
  - Initial data set
    - Demand 168 taf/yr; Return 49 taf/yr
  - Revised data set
    - Demand 291 taf/yr; Return 136 taf/yr
- Tuolumne basin operations/data
  - CUAW increase 35.7 taf/yr (7.5%)
  - New Don Pedro inflow revision (pattern)
  - FERC flow requirement refinement (selected years)
  - Flood control levels lowered July-Sept

Updates – Logic/Inputs

- Folsom September flood control rule
  - Changed from 650 to 760 to avoid dumping water
  - Coordination with CVP reservoir balancing rules
- UARM (Upper American River Model)
  - Input modified to reflect latest available data
  - Most revisions to 1994-2003
- Limit D168A
  - Limited to an estimate of “running gain” to avoid pulling Shasta water for DSA70
- San Luis CVP rule curve
  - Greater emphasis on early fall filling to accommodate later fall export restrictions

Assumptions

- San Joaquin River Restoration
  - Interim
  - Full
- VAMP
- EBMUD demands
- New Melones Operations
  - Vernalis WQ
  - Vernalis base flows

Selected Effects

	EI Sharing w C400_MIF	SJRR and Tuolumne	Feather R Rice Decomp	American R Updates	Folsom & DSA70	CVP SL Rule
Delta Outflow	3	85	-81	-2	20	-11
CVP SOD Delivery	2	11	-36	14	8	11
SWP SOD Delivery	-25	30	-36	-8	-3	0
Trinity EOSept	2	5	-11	5	10	-3
Shasta EOSept	27	8	-30	11	21	-4
Folsom EOSept	11	-3	-7	19	21	-2
CVP NOD EOSept Stor	40	0	-48	35	52	-9
Oroville EOSept	-34	3	-75	-5	-1	-1
Flow at Hood	4	-1	-101	9	27	7
Hood "MIF"	-453	-42	-153	5	0	12
Feather R to Sac	-3	-1	-285	-1	-6	0
American R to Sac	3	0	1	-93	-1	1
SJR at Vernalis	0	160	0	0	0	0
Millerton Lake EOSept	0	-14	0	0	0	0
Millerton Release	0	199	0	0	0	0
SJR thru Mendota Pool	0	-43	0	0	0	0
New Don Pedro EOSept	0	-48	0	0	0	0
Tuolumne R to SJR	0	8	0	0	0	0

Still Under Construction

- San Luis operations improvements
- American River overhaul
  - Hydrology extension/update
  - Demand representation (DSA -> WBA)
- Flexible CVP/SWP sharing framework
  - Test COA alternatives
  - Borrow/Payback

CalLite Development

February 24th, 2014

Background

- CalLite is a screening model version of CalSim
- Key features:
  - Replicates CalSim results
  - Faster run-time (5-10 minutes)
  - Same WRIMS model platform (free)
  - User-friendly GUI for
    - managing scenarios
    - viewing results

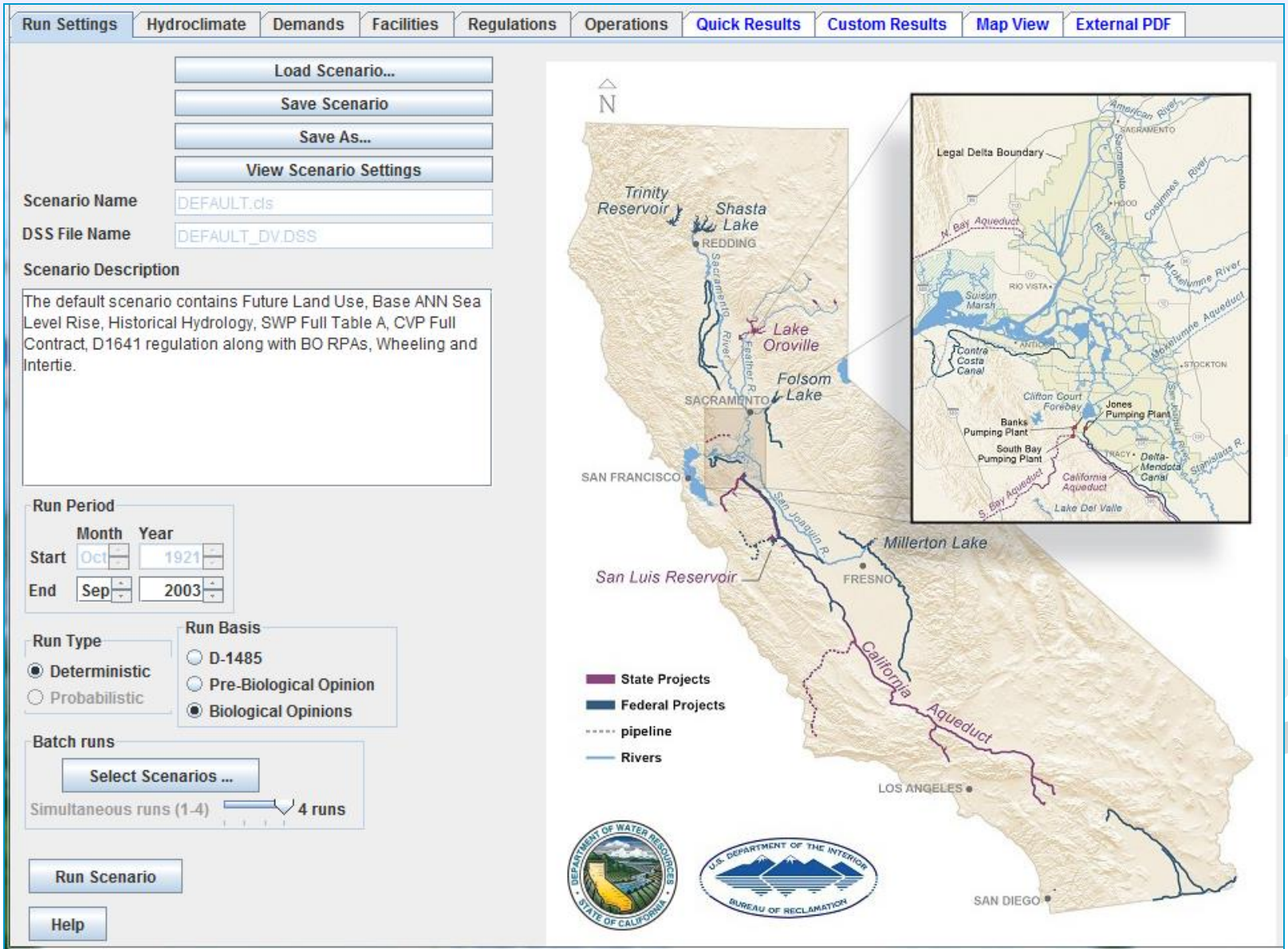
Background

- Typical CalLite users:
  - Stakeholders who benefit from greater ease of use
    - GUI facilitates scenario development
  - Model developers and other water resources professionals benefit from faster run time
    - Facilitates screening analyses
    - Efficient environment for code development
- Presentation covers updates since last CalLite Release

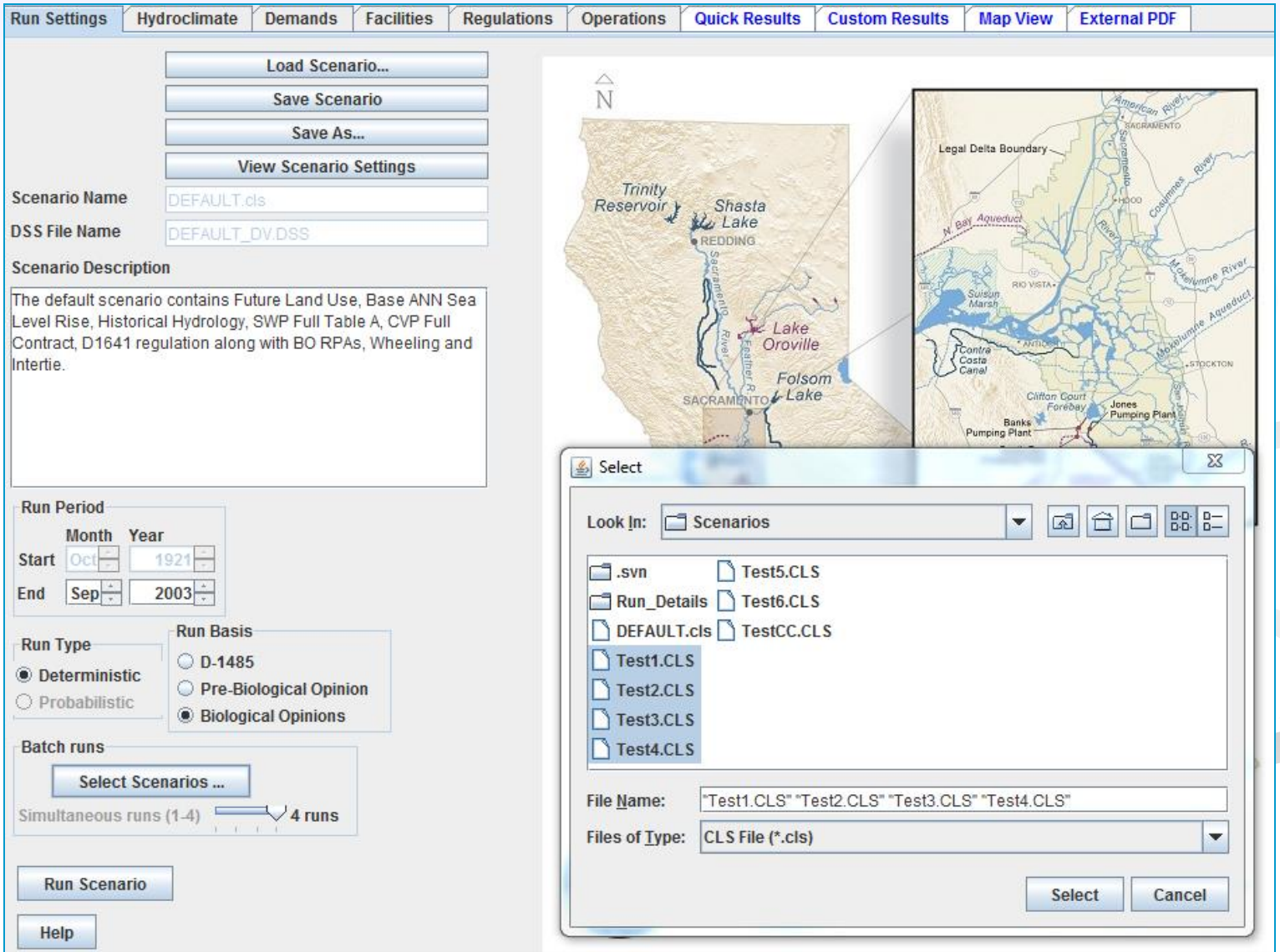
New Features

- D-1485 Run Basis
- Batch Runs
- WSI-DI Generation
- Custom Results
- Facilities
  - BDCP Isolated Facility
  - Shasta Reservoir Enlargement
  - Los Vaqueros Reservoir Enlargement

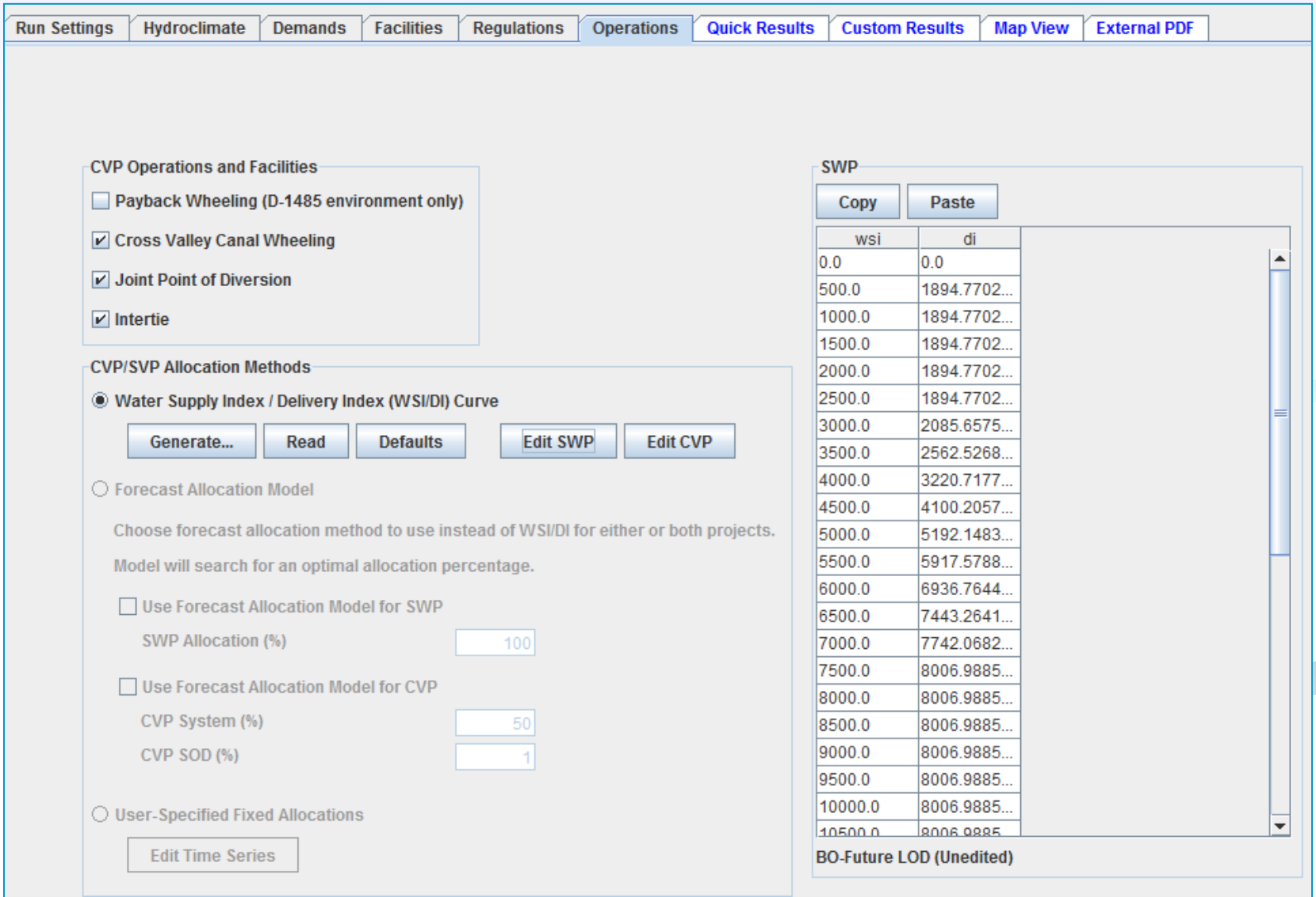
D-1485 Run Basis



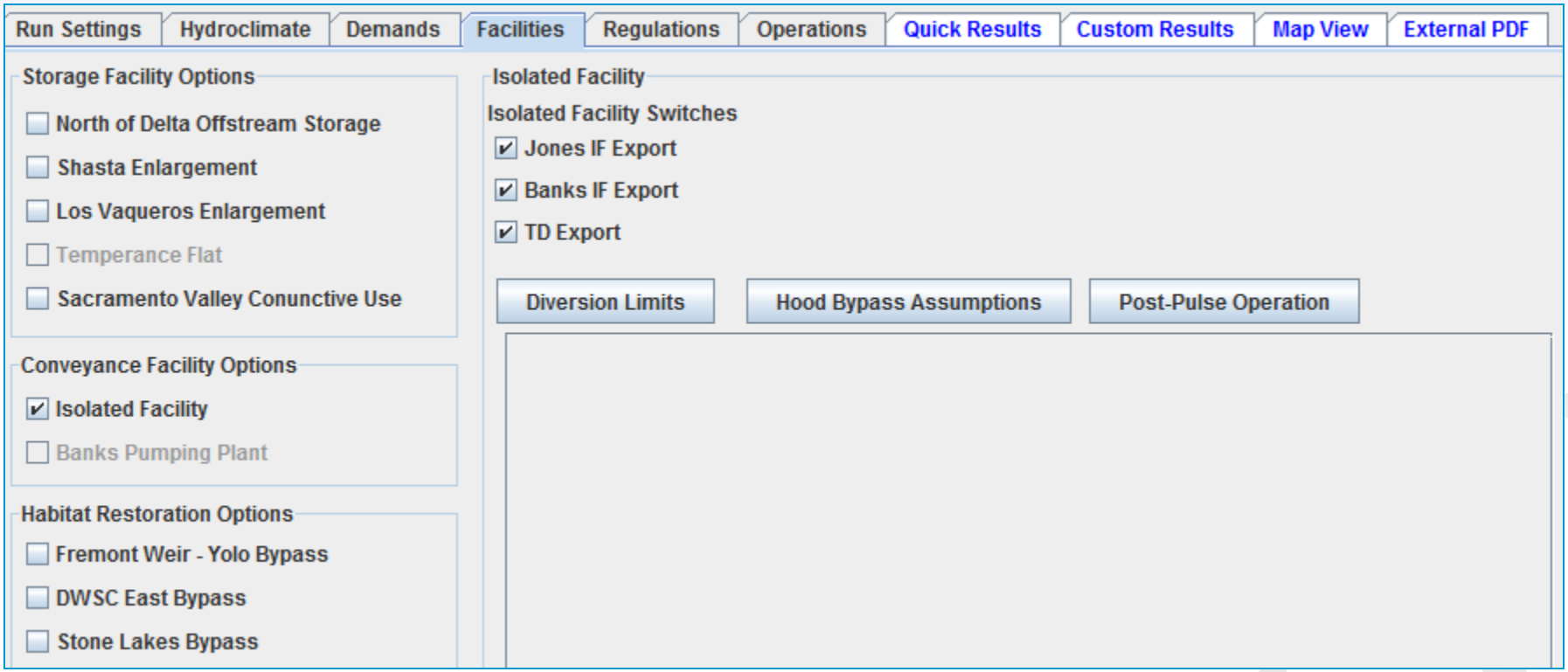
Batch Runs


Run Settings
Hydroclimate
Demands
Facilities
Regulations
Operations
Quick Results
Custom Results
Map View
External PDF
Load Scenario...
Save Scenario
Save As...
View Scenario Settings
Scenario Name
DEFAULT.cls
DSS File Name
DEFAULT_DV.DSS
Scenario Description
The default scenario contains Future Land Use, Base ANN Sea Level Rise, Historical Hydrology, SWP Full Table A, CVP Full Contract, D1641 regulation along with BO RPAs, Wheeling and Intertie.
Run Period
Month
Year
Start
Oct
1921
End
Sep
2003
Run Type
Deterministic
Probabilistic
Run Basis
D-1485
Pre-Biological Opinion
Biological Opinions
Batch runs
Select Scenarios ...
Simultaneous runs (1-4)
4 runs
Run Scenario
Help
N
Trinity Reservoir
Shasta Lake
REDDING
Lake Oroville
Folsom Lake
SACRAMENTO
Legal Delta Boundary
Suisun Marsh
RIO VISTA
Contra Costa Canal
Clifton Court Forebay
Jones Pumping Plant
Banks Pumping Plant
STOCKTON
Select
Look In:
Scenarios
.svn
Run_Details
DEFAULT.cls
Test1.CLS
Test2.CLS
Test3.CLS
Test4.CLS
Test5.CLS
Test6.CLS
TestCC.CLS
File Name:
"Test1.CLS" "Test2.CLS" "Test3.CLS" "Test4.CLS"
Files of Type:
CLS File (*.cls)
Select
Cancel

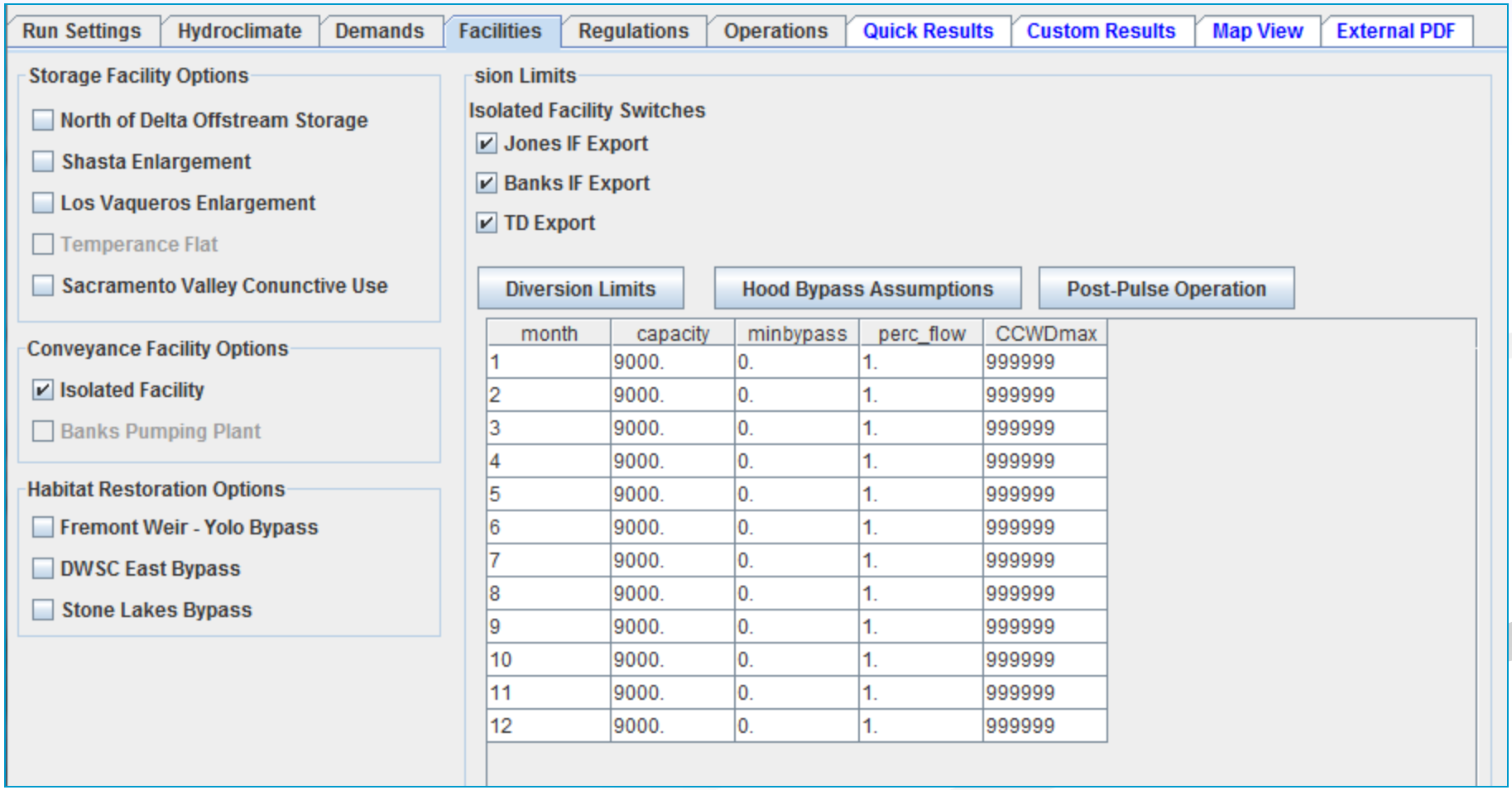
WSI-DI


Run Settings
Hydroclimate
Demands
Facilities
Regulations
Operations
Quick Results
Custom Results
Map View
External PDF
CVP Operations and Facilities
Payback Wheeling (D-1485 environment only)
Cross Valley Canal Wheeling
Joint Point of Diversion
Intertie
CVP/SVP Allocation Methods
Water Supply Index / Delivery Index (WSI/DI) Curve
Generate...
Read
Defaults
Edit SWP
Edit CVP
Forecast Allocation Model
Choose forecast allocation method to use instead of WSI/DI for either or both projects.
Model will search for an optimal allocation percentage.
Use Forecast Allocation Model for SWP
SWP Allocation (%)
100
Use Forecast Allocation Model for CVP
CVP System (%)
50
CVP SOD (%)
1
User-Specified Fixed Allocations
Edit Time Series
SWP
Copy
Paste
wsi
di
0.0
0.0
500.0
1894.7702...
1000.0
1894.7702...
1500.0
1894.7702...
2000.0
1894.7702...
2500.0
1894.7702...
3000.0
2085.6575...
3500.0
2562.5268...
4000.0
3220.7177...
4500.0
4100.2057...
5000.0
5192.1483...
5500.0
5917.5788...
6000.0
6936.7644...
6500.0
7443.2641...
7000.0
7742.0682...
7500.0
8006.9885...
8000.0
8006.9885...
8500.0
8006.9885...
9000.0
8006.9885...
9500.0
8006.9885...
10000.0
8006.9885...
BO-Future LOD (Unedited)

Isolated Facility



Isolated Facility – Diversion Limits



month	capacity	minbypass	perc_flow	CCWDmax
1	9000.	0.	1.	999999
2	9000.	0.	1.	999999
3	9000.	0.	1.	999999
4	9000.	0.	1.	999999
5	9000.	0.	1.	999999
6	9000.	0.	1.	999999
7	9000.	0.	1.	999999
8	9000.	0.	1.	999999
9	9000.	0.	1.	999999
10	9000.	0.	1.	999999
11	9000.	0.	1.	999999
12	9000.	0.	1.	999999

Isolated Facility – Hood Bypass Assumptions

Run Settings | Hydroclimate | Demands | Facilities | Regulations | Operations | Quick Results | Custom Results | Map View | External PDF

Storage Facility Options

- [ ] North of Delta Offstream Storage
- [ ] Shasta Enlargement
- [ ] Los Vaqueros Enlargement
- [ ] Temperance Flat
- [ ] Sacramento Valley Conunctive Use

Conveyance Facility Options

- [x] Isolated Facility
- [ ] Banks Pumping Plant

Habitat Restoration Options

- [ ] Fremont Weir - Yolo Bypass
- [ ] DWSC East Bypass
- [ ] Stone Lakes Bypass

Bypass Assumptions

Isolated Facility Switches

- [x] Jones IF Export
- [x] Banks IF Export
- [x] TD Export

Diversion Limits | Hood Bypass Assumptions | Post-Pulse Operation

Sac_Flow	month	Level_I	Level_II	Level_III
0	4	0	0	0
5000	4	5000	5000	5000
7000	4	7000	7000	7000
9000	4	9000	9000	9000
11000	4	11000	11000	10000
15000	4	15000	13400	12000
17000	4	16600	14400	12400
20000	4	18400	15900	13000
999999	4	312399.7	211899.8	13000
0	5	0	0	0
5000	5	5000	5000	5000
7000	5	7000	7000	7000
9000	5	9000	9000	9000
11000	5	11000	11000	10000
15000	5	15000	13400	12000
17000	5	16600	14400	12400
20000	5	18400	15900	13000
999999	5	312399.7	211899.8	13000
0	6	0	0	0

Shasta Enlargement

Run Settings | Hydroclimate | Demands | Facilities | Regulations | Operations | Quick Results | Custom Results | Map View

Storage Facility Options

- [ ] North of Delta Offstream Storage
- [x] Shasta Enlargement
- [ ] Los Vaqueros Enlargement
- [ ] Temperance Flat
- [ ] Sacramento Valley Conunctive Use

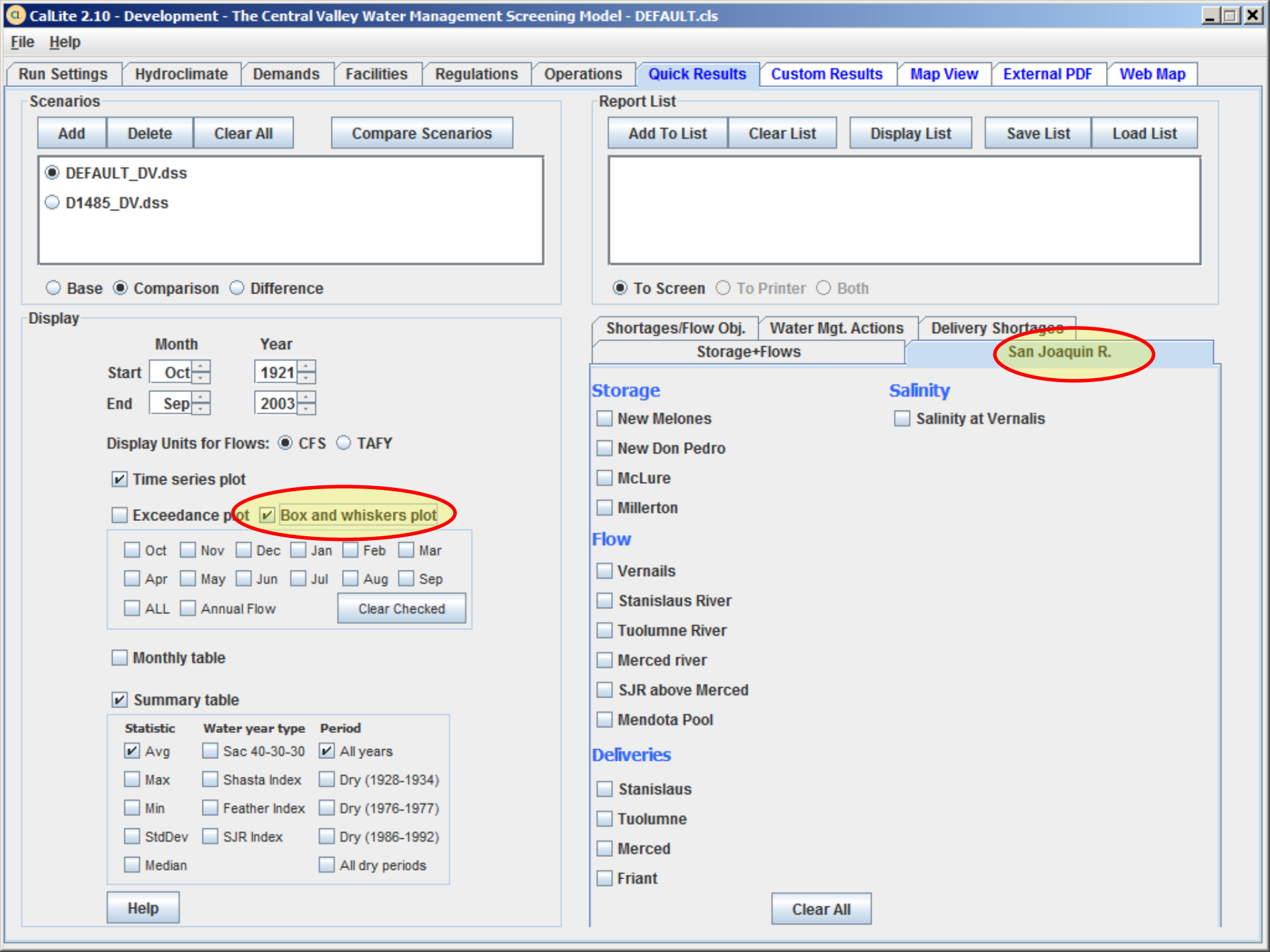
Conveyance Facility Options

- [ ] Isolated Facility
- [ ] Banks Pumping Plant

Shasta Enlargement Options

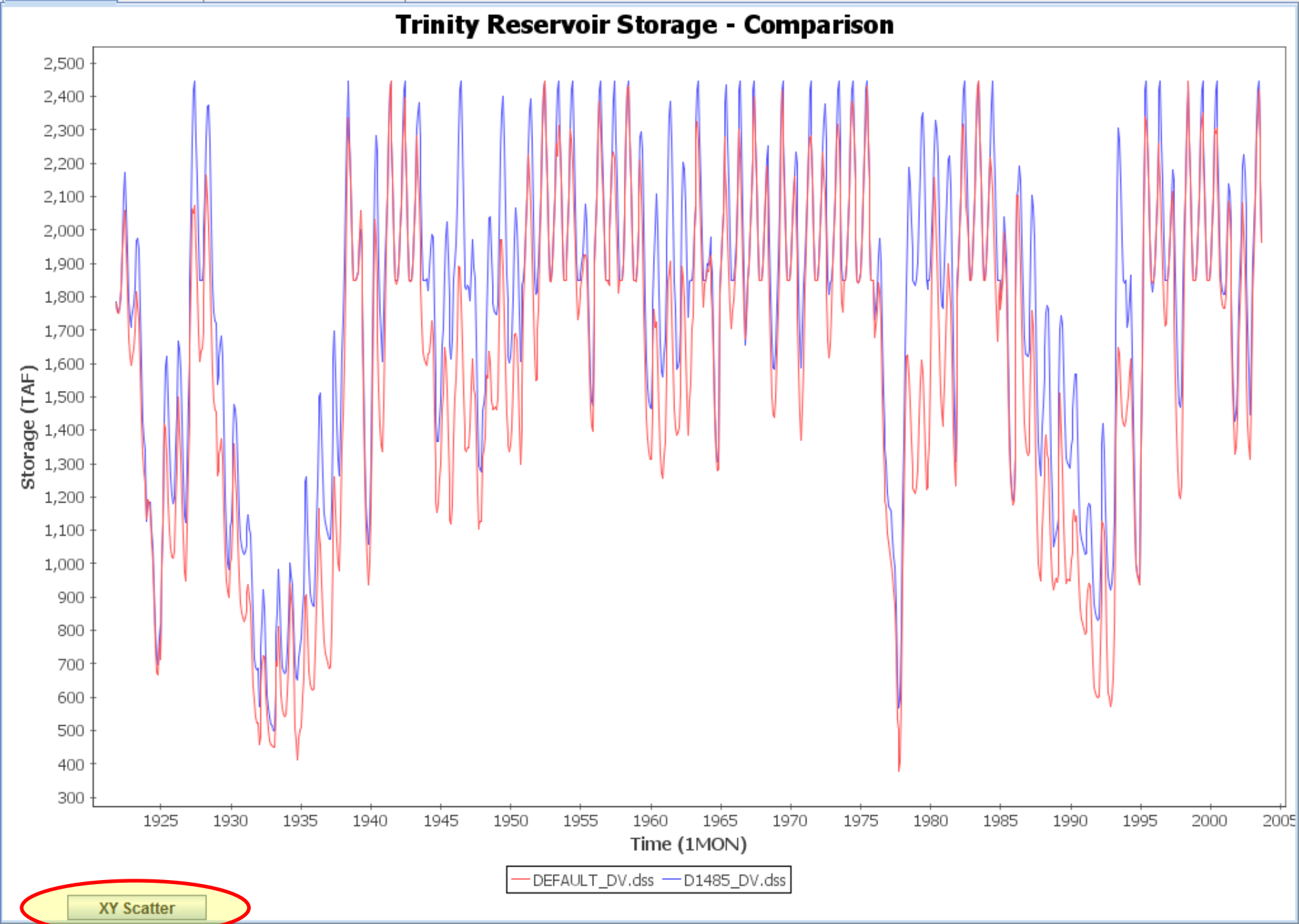
- ( ) Shasta Dam raise of 6.5 feet (additional 256 TAF)
- ( ) Shasta Dam raise of 12.5 feet (additional 443 TAF)
- ( ) Shasta Dam raise of 18.5 feet (additional 634 TAF)

Los Vaqueros Enlargement


CalLite 2.10 - Development - The Central Valley Water Management Screening Model - DEFAULT.cls
File
Help
Run Settings
Hydroclimate
Demands
Facilities
Regulations
Operations
Quick Results
Custom Results
Map View
External PDF
Web Map
Scenarios
Add
Delete
Clear All
Compare Scenarios
DEFAULT_DV.dss
D1485_DV.dss
Base
Comparison
Difference
Report List
Add To List
Clear List
Display List
Save List
Load List
To Screen
To Printer
Both
Display
Month
Year
Start
Oct
1921
End
Sep
2003
Display Units for Flows:
CFS
TAFY
Time series plot
Exceedance plot
Box and whiskers plot
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
ALL
Annual Flow
Clear Checked
Monthly table
Summary table
Statistic
Water year type
Period
Avg
Max
Min
StdDev
Median
Sac 40-30-30
Shasta Index
Feather Index
SJR Index
All years
Dry (1928-1934)
Dry (1976-1977)
Dry (1986-1992)
All dry periods
Help
Shortages/Flow Obj.
Water Mgt. Actions
Delivery Shortages
Storage+Flows
San Joaquin R.
Storage
New Melones
New Don Pedro
McLure
Millerton
Flow
Vernails
Stanislaus River
Tuolumne River
Merced river
SJR above Merced
Mendota Pool
Deliveries
Stanislaus
Tuolumne
Merced
Friant
Salinity
Salinity at Vernalis
Clear All

CalLite Results - Trinity

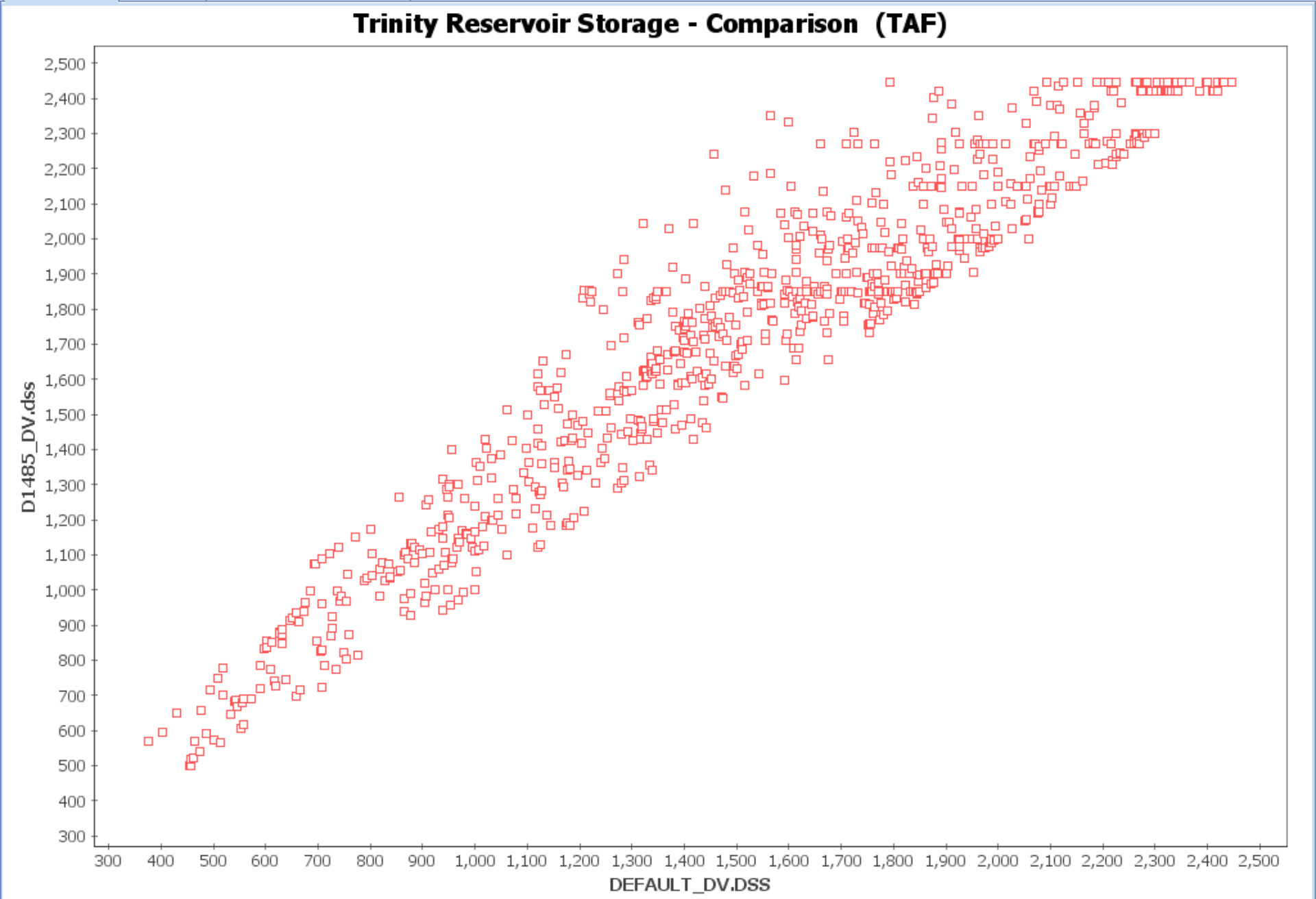
Comparison | Box Plot | Summary - DEFAULT_DV



XY Scatter

CalLite Results - Trinity

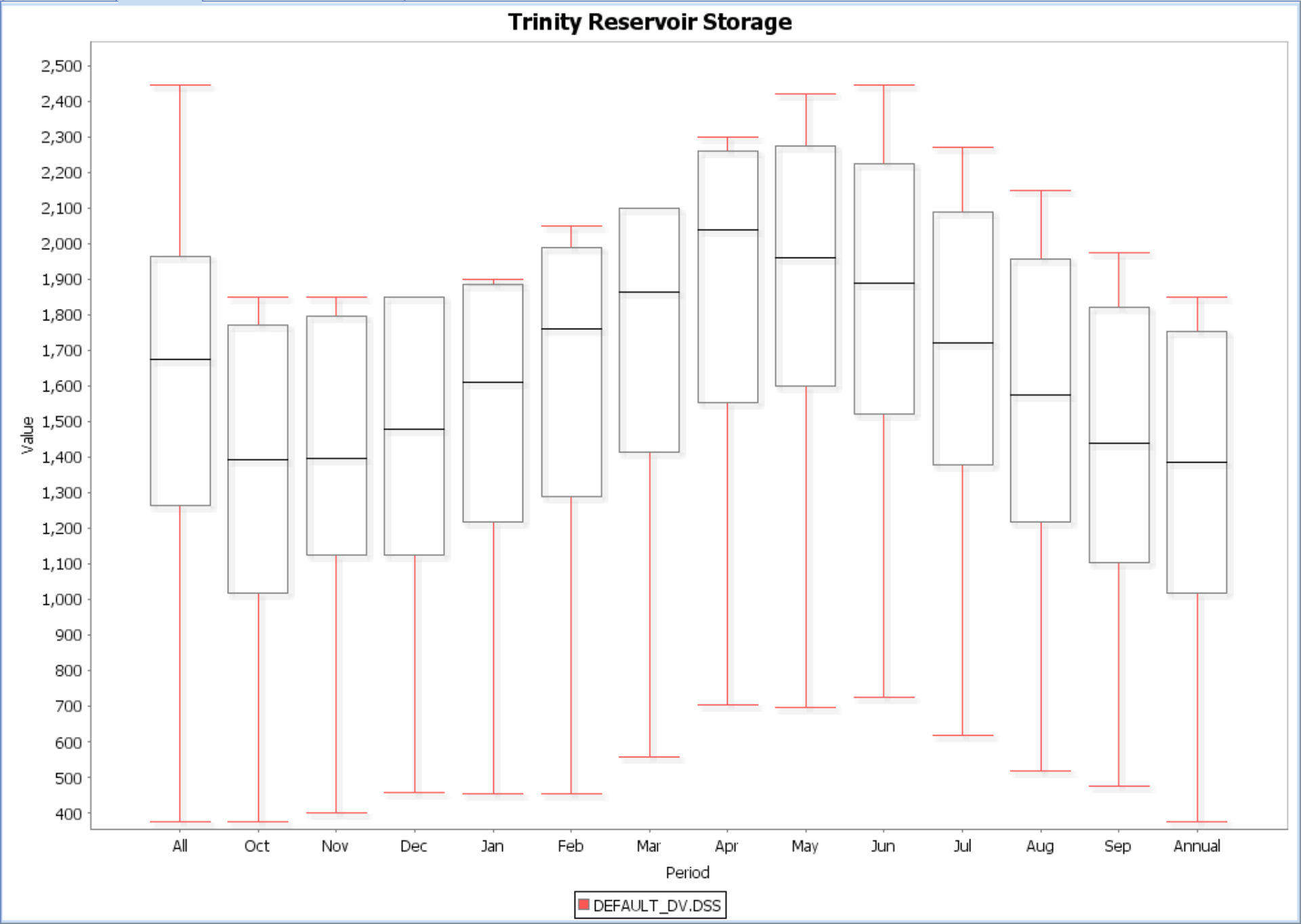
Comparison | Box Plot | Summary - DEFAULT_DV



Time Series

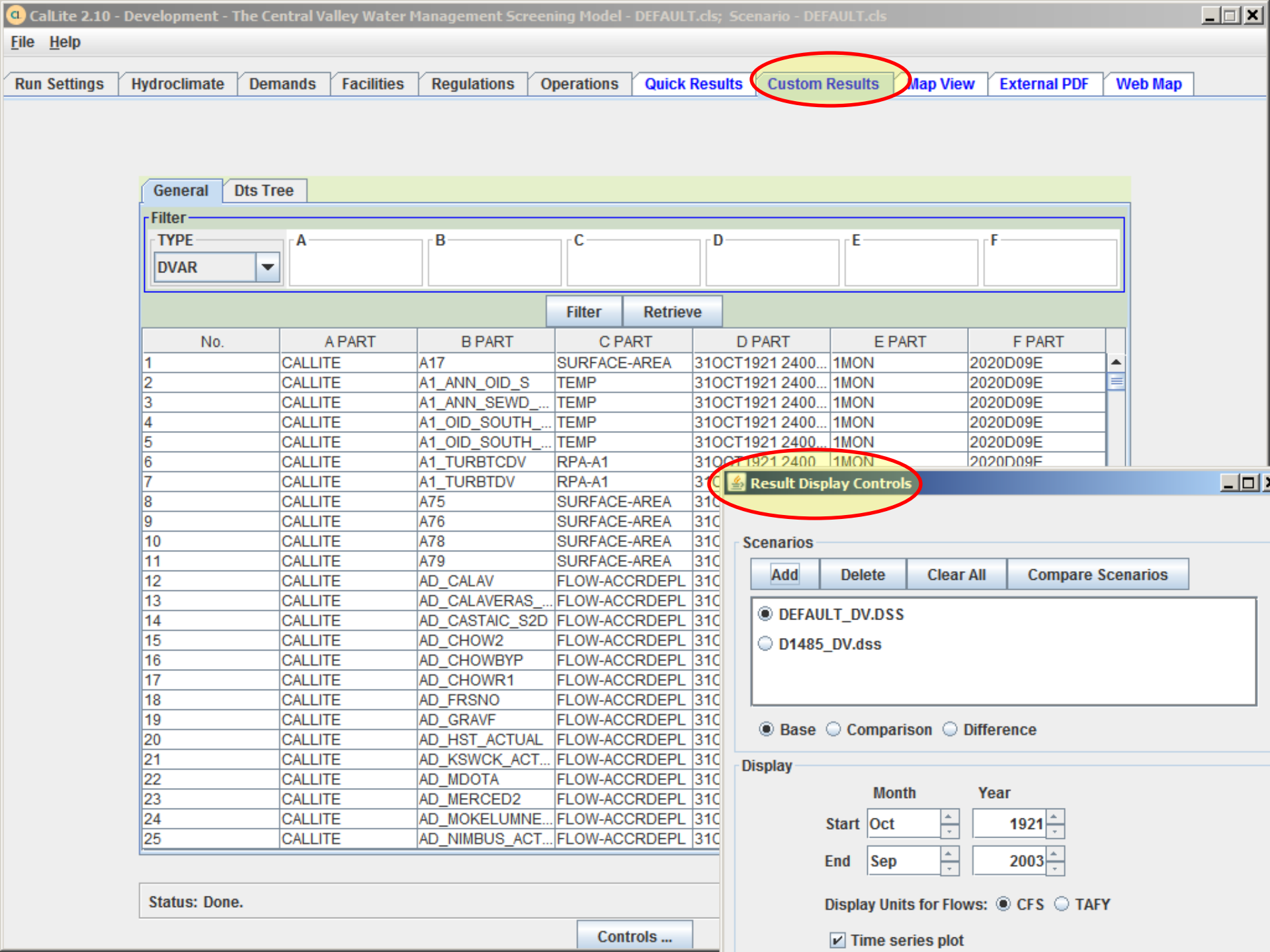
CalLite Results - Trinity

Time Series | Box Plot | Summary - DEFAULT_DV



Custom Results

- Multiple Time Series
  - List of variables to view together
  - Combine Svars and Dvars
- Derived Time Series
  - Construct an expression and plot the result
  - Use Svars, Dvars, + - * / (no parentheses)
- Use with CalLite or CalSim


CalLite 2.10 - Development - The Central Valley Water Management Screening Model - DEFAULT.cls; Scenario - DEFAULT.cls
File Help
Run Settings Hydroclimate Demands Facilities Regulations Operations Quick Results Custom Results Map View External PDF Web Map
General Dts Tree
Filter
TYPE DVAR
A B C D E F
Filter Retrieve
No. A PART B PART C PART D PART E PART F PART
1 CALLITE A17 SURFACE-AREA 31OCT1921 2400... 1MON 2020D09E
2 CALLITE A1_ANN_OID_S TEMP 31OCT1921 2400... 1MON 2020D09E
3 CALLITE A1_ANN_SEWD_... TEMP 31OCT1921 2400... 1MON 2020D09E
4 CALLITE A1_OID_SOUTH_... TEMP 31OCT1921 2400... 1MON 2020D09E
5 CALLITE A1_OID_SOUTH_... TEMP 31OCT1921 2400... 1MON 2020D09E
6 CALLITE A1_TURBTCDV RPA-A1 31OCT1921 2400 1MON 2020D09E
7 CALLITE A1_TURBTDV RPA-A1
8 CALLITE A75 SURFACE-AREA
9 CALLITE A76 SURFACE-AREA
10 CALLITE A78 SURFACE-AREA
11 CALLITE A79 SURFACE-AREA
12 CALLITE AD_CALAV FLOW-ACCRDEPL
13 CALLITE AD_CALAVERAS_... FLOW-ACCRDEPL
14 CALLITE AD_CASTAIC_S2D FLOW-ACCRDEPL
15 CALLITE AD_CHOW2 FLOW-ACCRDEPL
16 CALLITE AD_CHOWBYP FLOW-ACCRDEPL
17 CALLITE AD_CHOWR1 FLOW-ACCRDEPL
18 CALLITE AD_FRSNO FLOW-ACCRDEPL
19 CALLITE AD_GRAVF FLOW-ACCRDEPL
20 CALLITE AD_HST_ACTUAL FLOW-ACCRDEPL
21 CALLITE AD_KSWCK_ACT... FLOW-ACCRDEPL
22 CALLITE AD_MDOTA FLOW-ACCRDEPL
23 CALLITE AD_MERCED2 FLOW-ACCRDEPL
24 CALLITE AD_MOKELUMNE... FLOW-ACCRDEPL
25 CALLITE AD_NIMBUS_ACT... FLOW-ACCRDEPL
Status: Done.
Controls ...
Result Display Controls
Scenarios
Add Delete Clear All Compare Scenarios
DEFAULT_DV.DSS
D1485_DV.dss
Base Comparison Difference
Display
Month Year
Start Oct 1921
End Sep 2003
Display Units for Flows: CFS TAFY
Time series plot

CalLite 2.10 - Development - The Central Valley Water Management Screening Model - DEFAULT.cls; Scenario - DEFAULT.cls

File Help

Run Settings | Hydroclimate | Demands | Facilities | Regulations | Operations | Quick Results | Custom Results | Map View | External PDF | Web Map

General | Dts Tree

- Dts Directory
  - SJR_INFLOWS.DTS
  - NP-2.MTS

Derived Time Series: NP-2.MTS

Derived Time Series	Dvar/Svar	B part	C part
	DVAR	C_HOOD	FLOW-CHANNEL
	DVAR	C_YOLOBP	FLOW-CHANNEL
	DVAR	C_SJRSTO	FLOW-CHANNEL
	DVAR	C_SACSJR	FLOW-CHANNEL
	DVAR	C_CCWDVCOR	FLOW-CHANNEL
	DVAR	D_BANKS	FLOW-DELIVERY
	DVAR	D_JONES	FLOW-DELIVERY

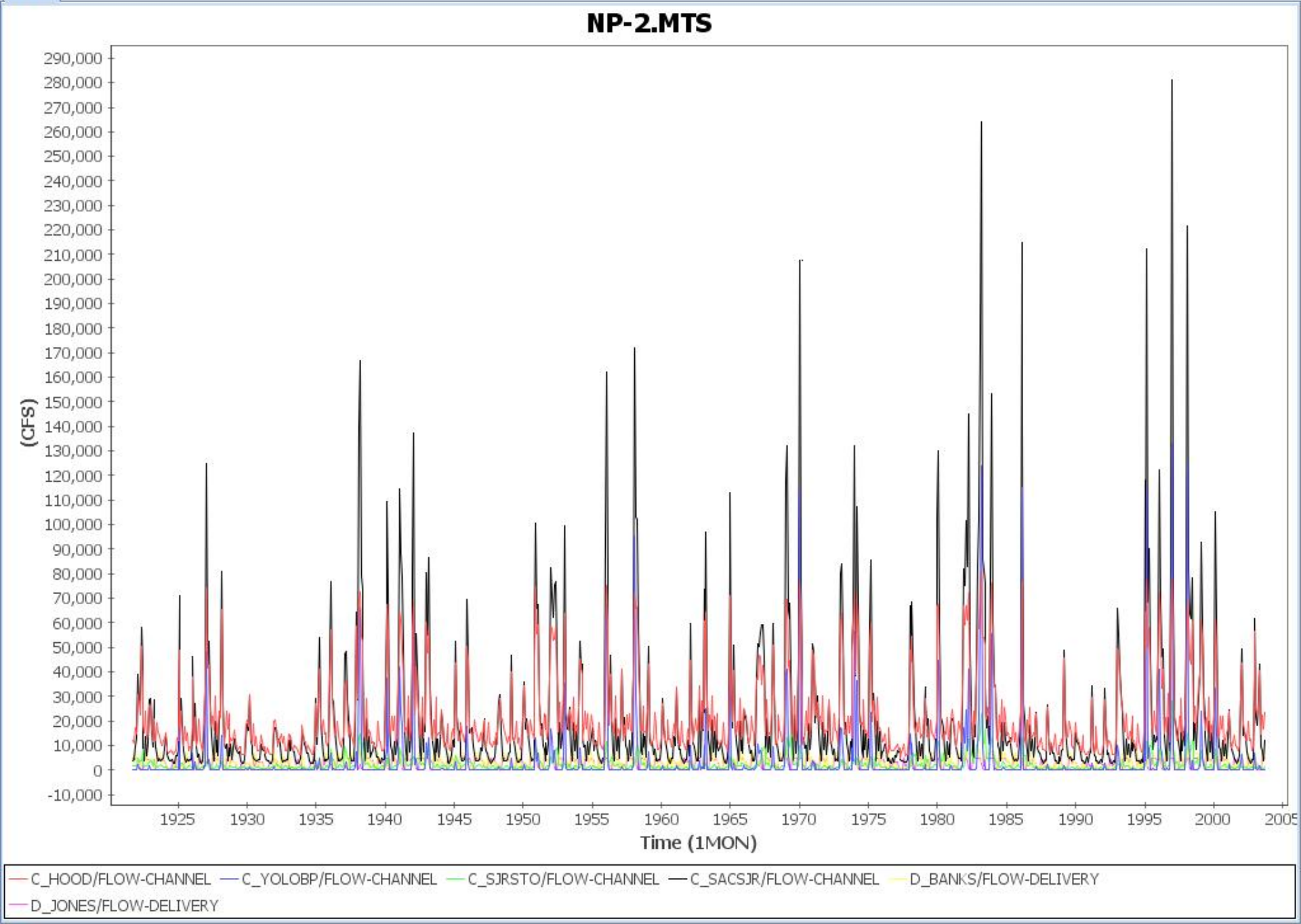
Add | Insert | Delete | Open

Status: Done.

Controls ...

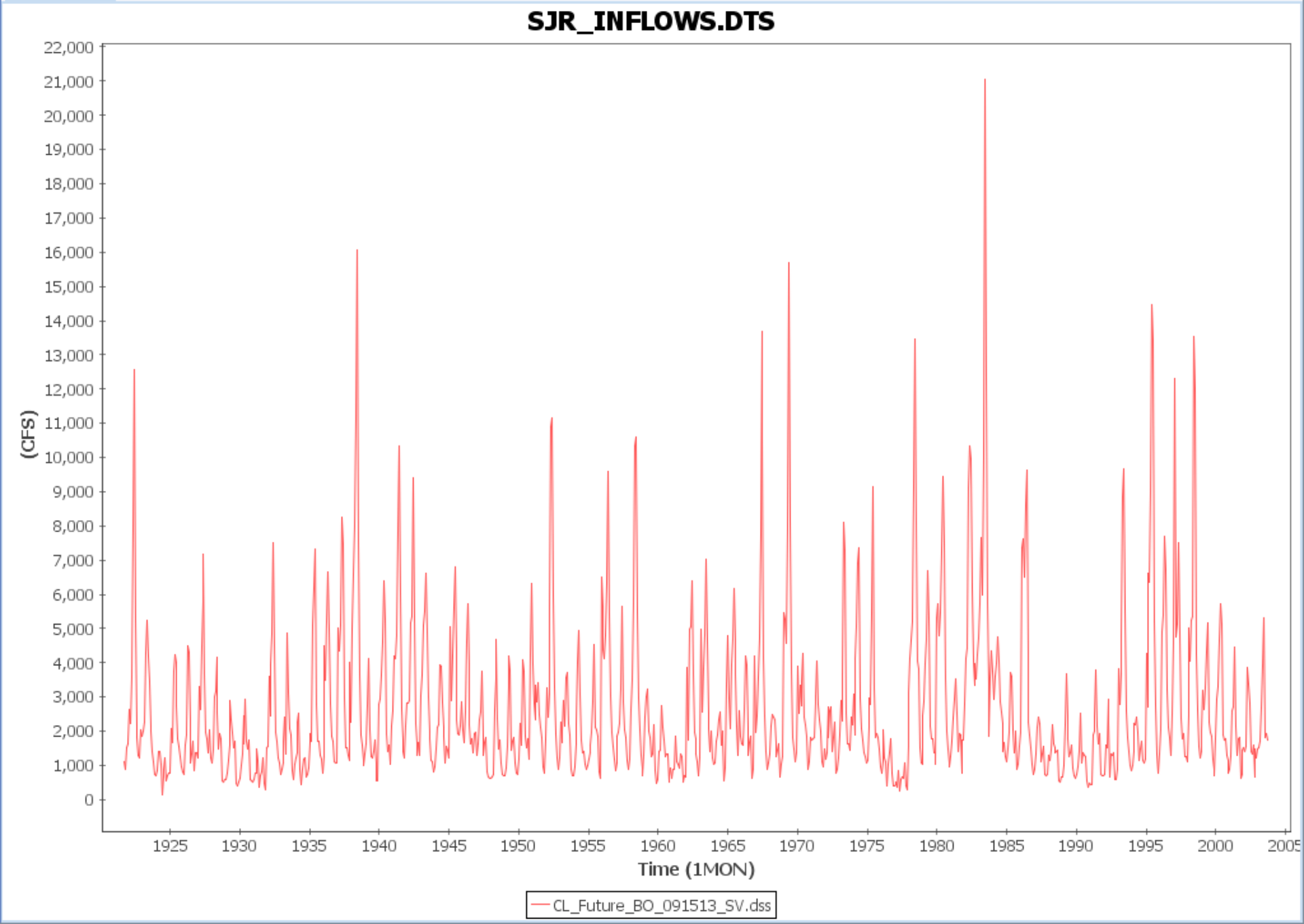
CalLite Results - WRIMS GUI

Test



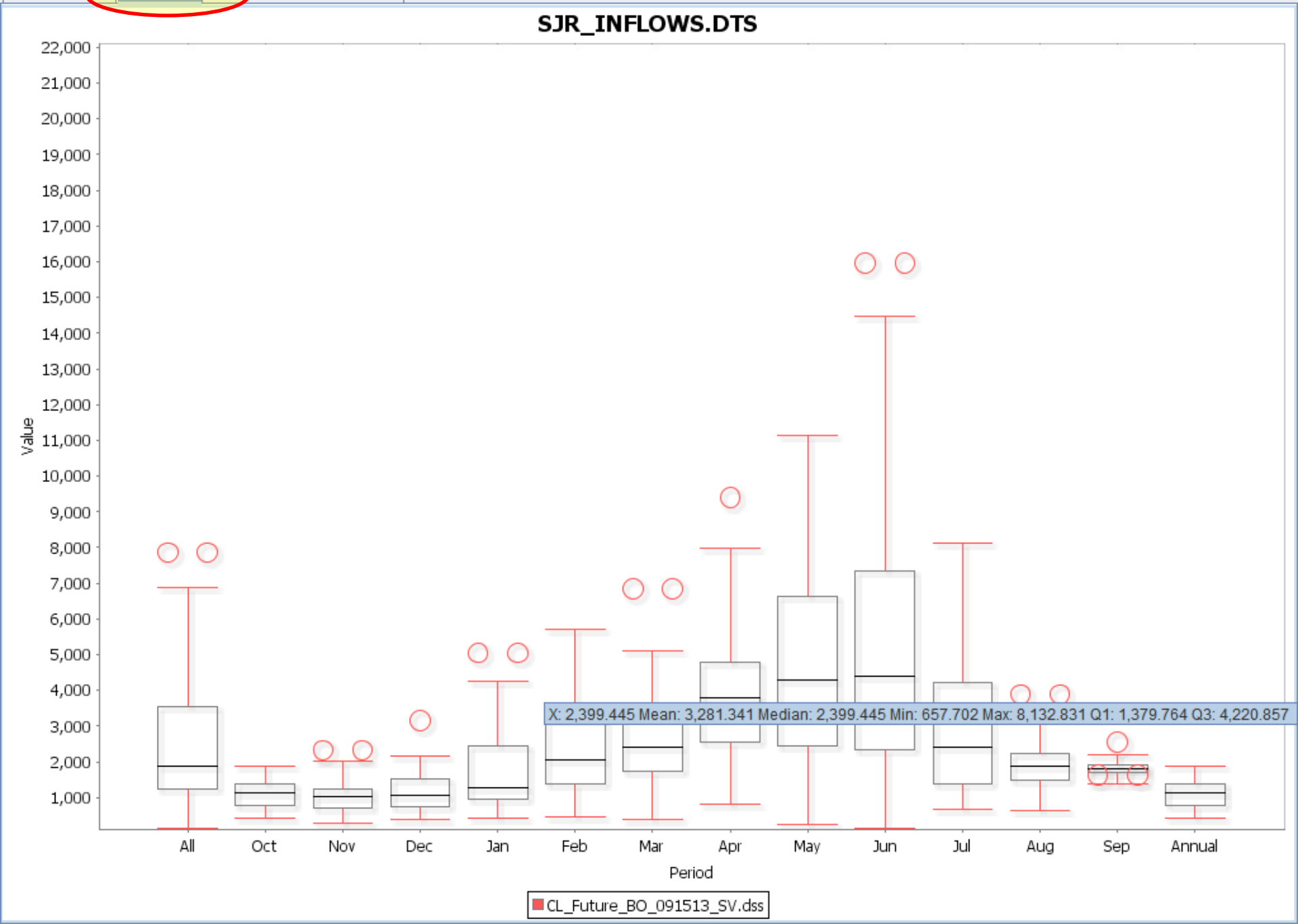
CalLite Results - WRIMS GUI

Time Series | Box Plot | Summary - DEFAULT_DV



CalLite Results - WRIMS GUI

Time Series | Box Plot | Summary - DEFAULT_DV



CalLite Results - WRIMS GUI

Time Series | Box Plot | Summary - DEFAULT_DV

SJR_INFLOWS.DTS (CFS) - CL_Future_BO_091513_SV.dss

Year Group	Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	All (TAF)
All	Avg	1118.2	1151.9	1467.9	1946.4	2493.3	2805	3820.7	4892.5	5535.9	3281.3	2108.1	1850.8	1958.5

Copy to Clipboard

Acknowledgements

CalLite 3.0 Development Team

- DWR
  - Richard Chen
  - Hao Xie
  - Kevin Kao
  - Nicky Sandhu
  - Erik Reyes
  - Nazrul Islam
  - Holly Canada
- WRIMS Consultants
  - Dan Easton
  - Andy Draper
- Reclamation
  - Nancy Parker
  - Tom FitzHugh
  - James Lu
  - Jun Wang
  - Michael Fitzmaurice
  - Junaid As-Salek
- FWS
  - Derek Hilts
- GUI Consultants
  - Tad Slawecki