Slide 23 is stricken from Exhibit DOI-38 per oral ruling dated June 15, 2017.

CalSimII Modeling Sur-Rebuttal

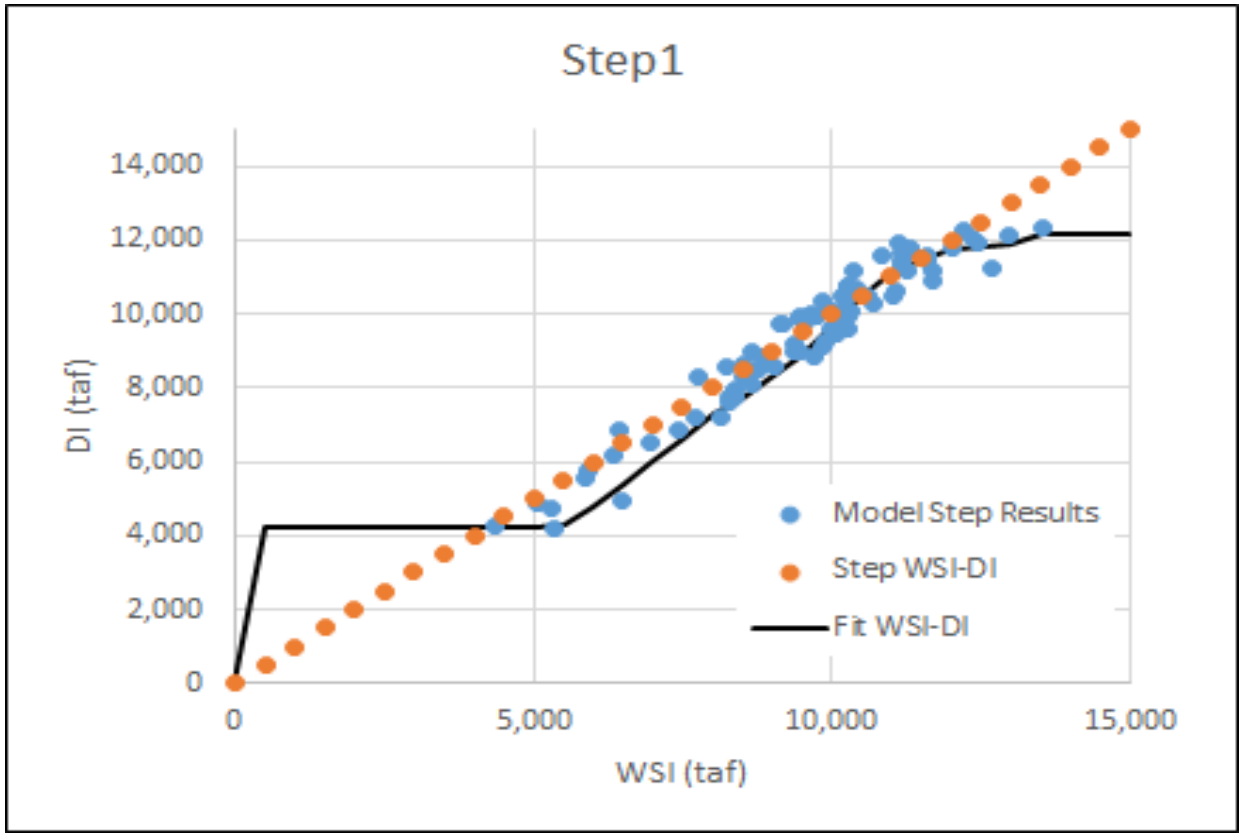
Testimony of Nancy Parker
U.S. Bureau of Reclamation

CalSimII Modeling Sur-Rebuttal Topics

- **Water Supply Index-Delivery Index (WSI-DI) curve generation is not perfect foresight**
- **CalSim allocation logic is appropriate and acceptable**
- **Reclamation operational philosophy is reflected in and consistent with Petitioners' modeling for the Water Fix**
- **Drought year CalSim results are reasonable for long term planning analysis**

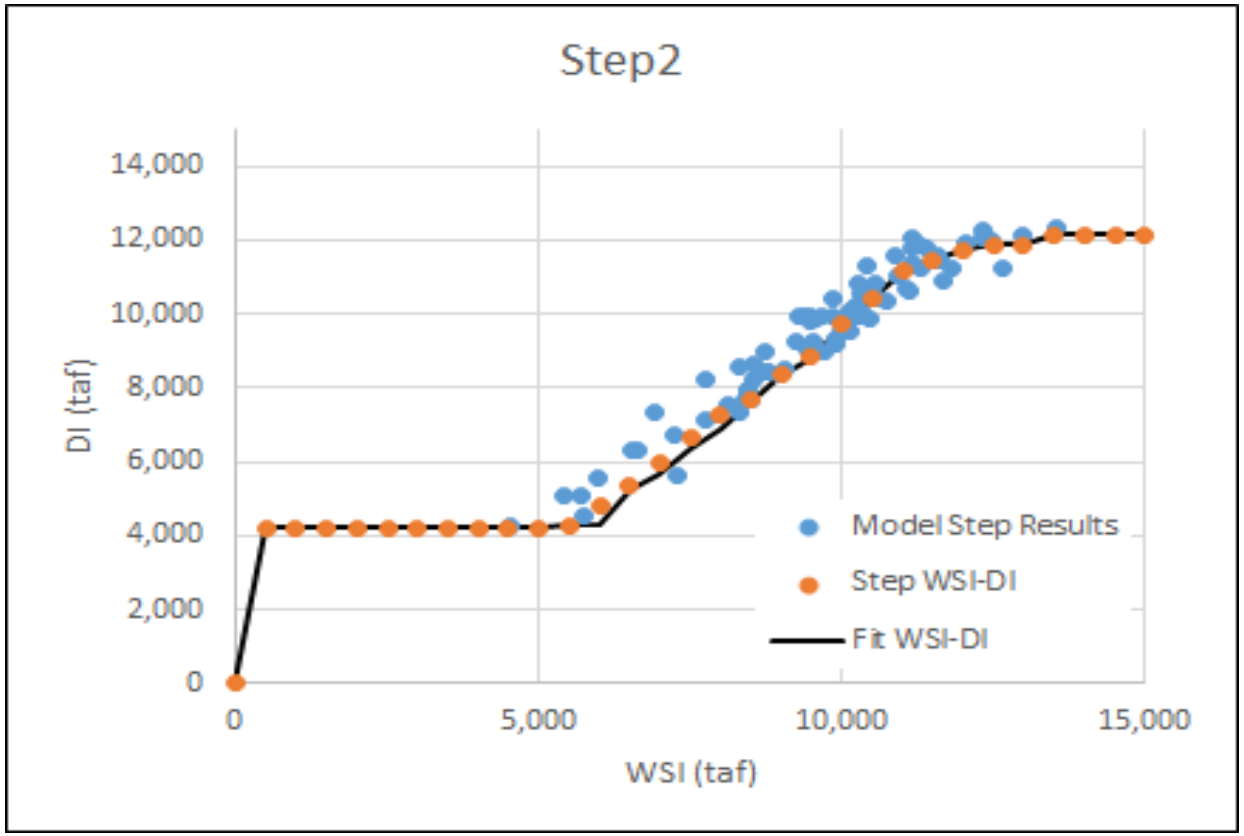
WSI-DI Training Process Step 1

- Start with 1:1 WSI-DI (orange dots)
- Run CalSim
- Calculate WSI and DI values from CalSim results
- Plot as blue points
- Fit black line through blue points
- Ready for Step2



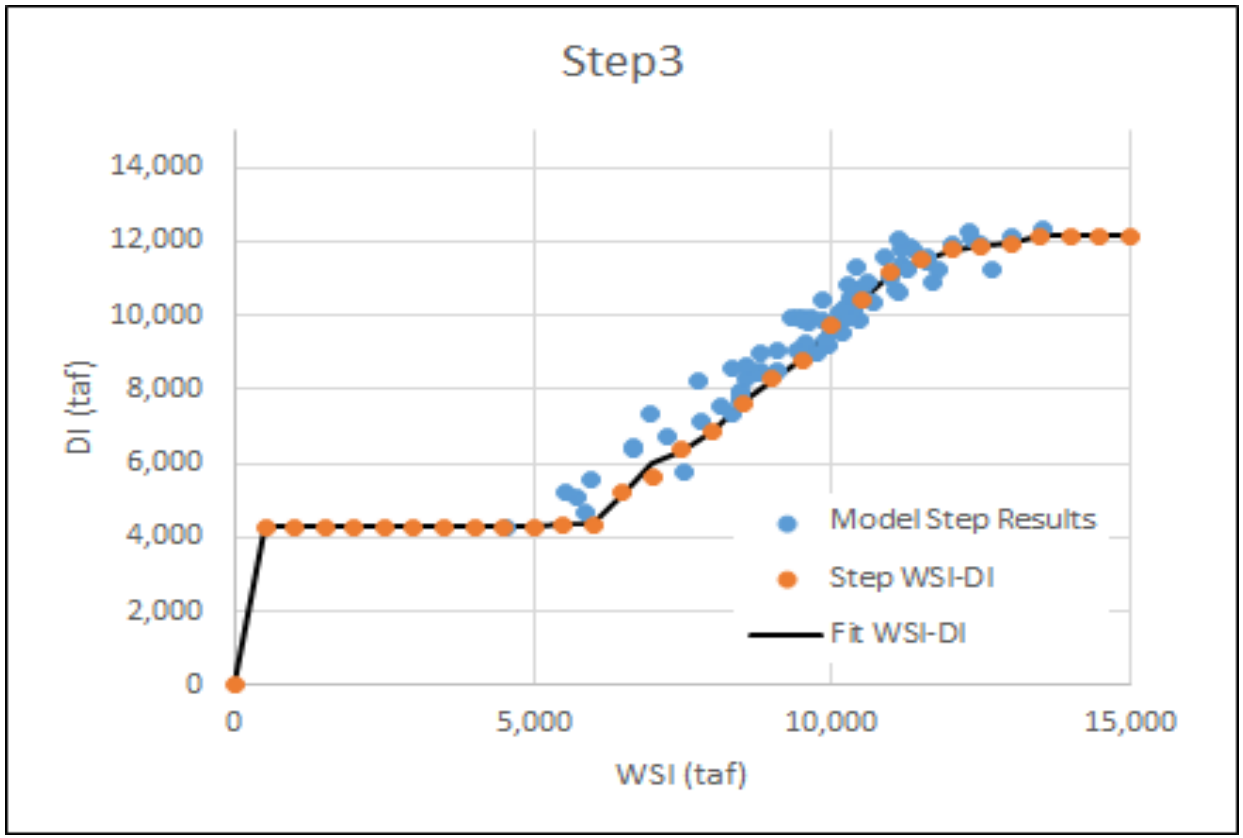
WSI-DI Training Process Step 2

- Black is the new Orange (black line from Step1 is now the WSI-DI curve)
- Run CalSim
- Calculate WSI and DI values from CalSim results
- Plot as blue points
- Fit black line through blue points
- Ready for Step3



WSI-DI Training Process Step 2

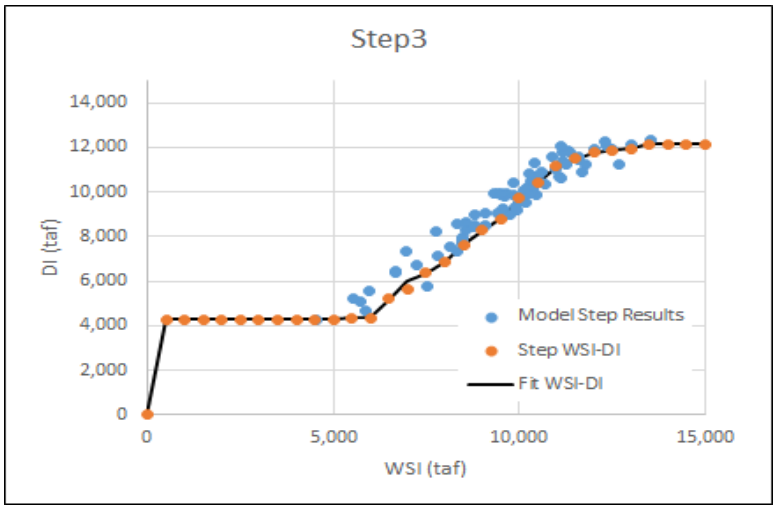
- Black line from Step2 is now the WSI-DI curve
- Run CalSim
- Calculate WSI and DI values
- Plot as blue points
- Fit black line through blue points
- Done!
- Black line is the WSI-DI relationship that works for this model



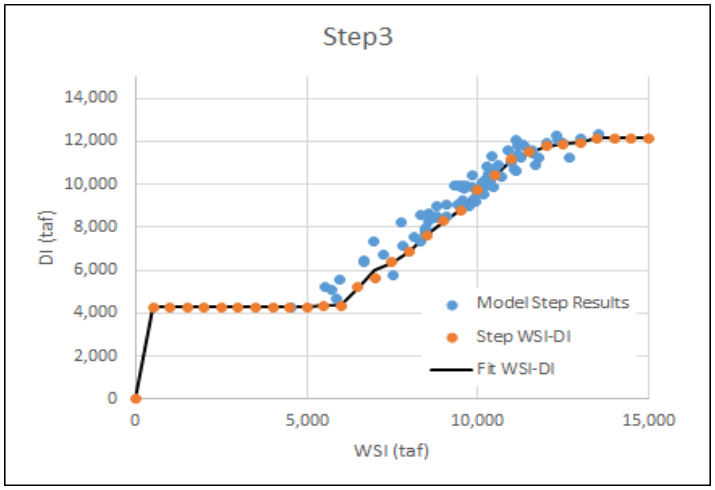
WSI-DI Training is Not Perfect Foresight

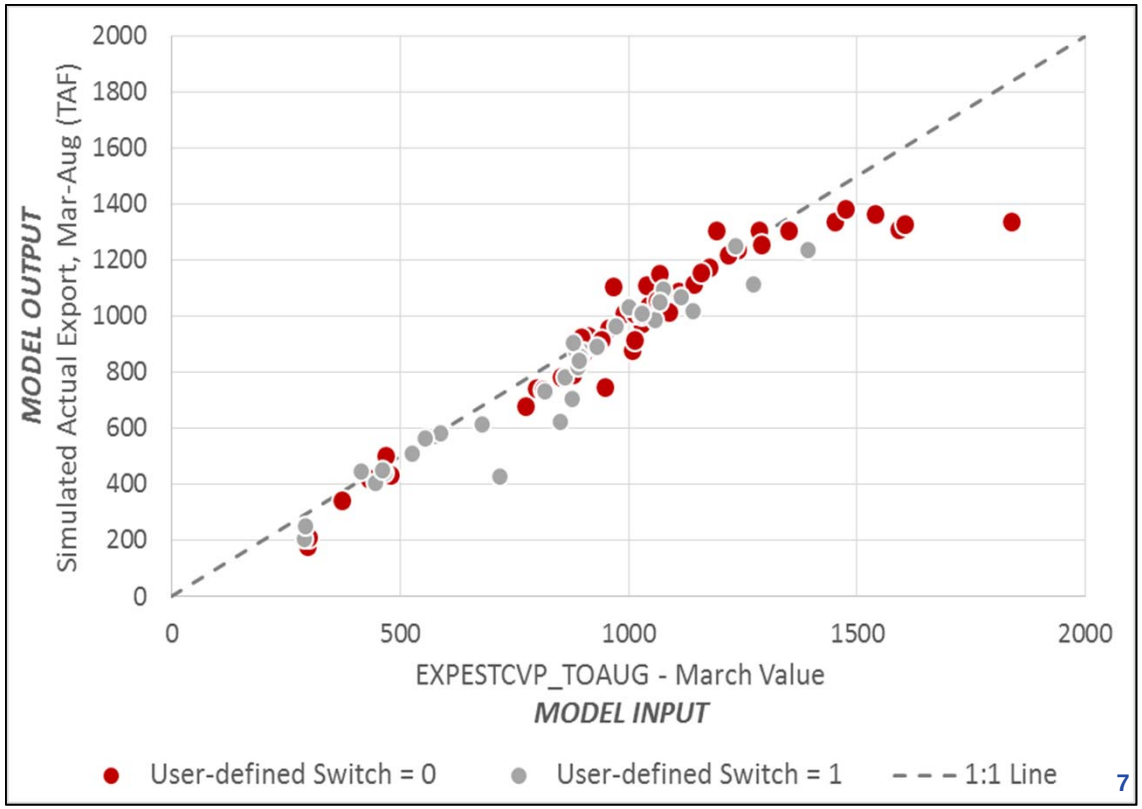
- The use of generalized rules in modeling is acceptable
- It would be perfect foresight if the blue points were used *as input to the model for the same years they represent.*
- The curve fit is conservative by design
- Standardized analytical process used for all applications

- Reproducible
- Transparent
- Consistent



Compare: WSI-DI Generation vs. MBK Export Estimate

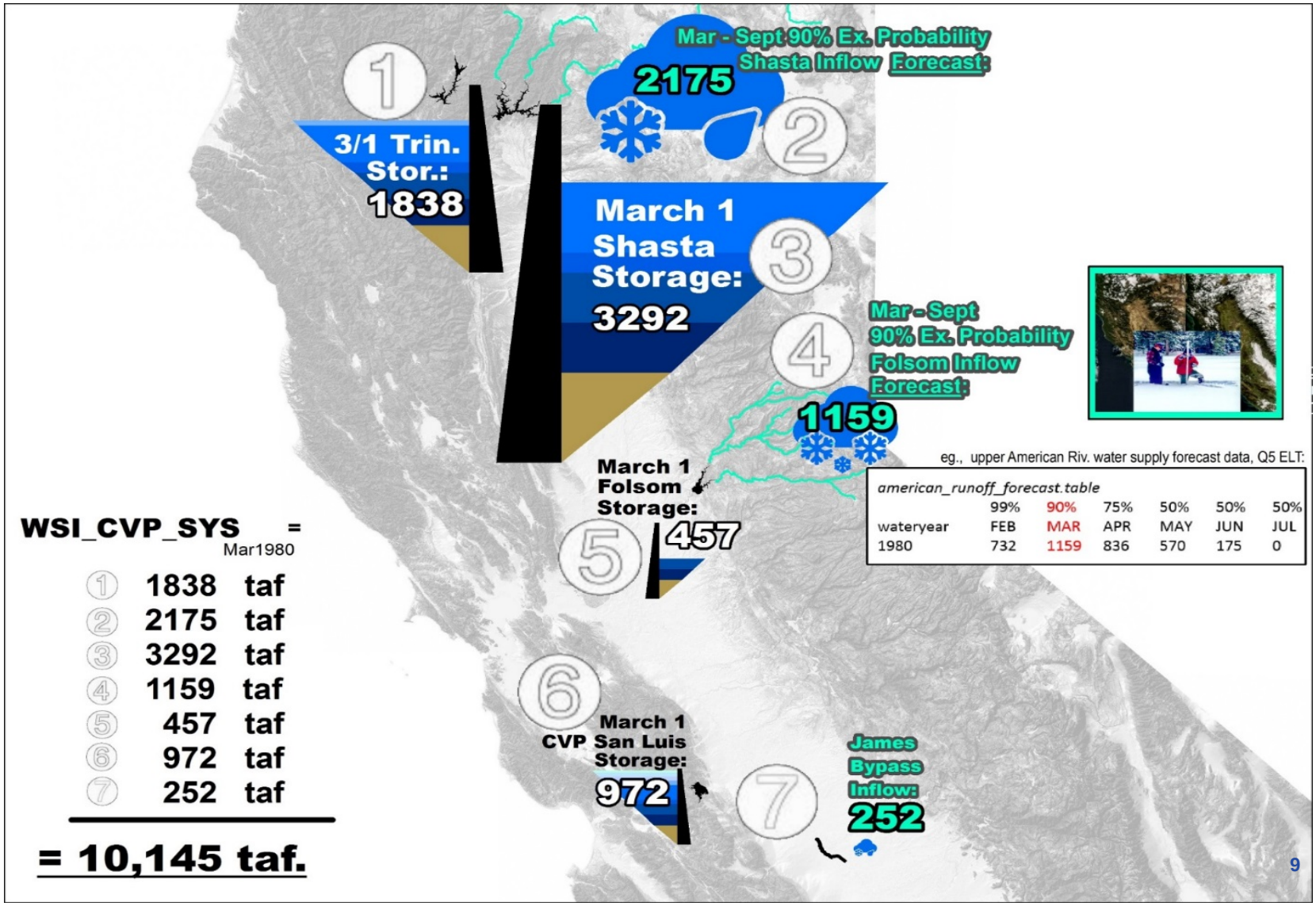




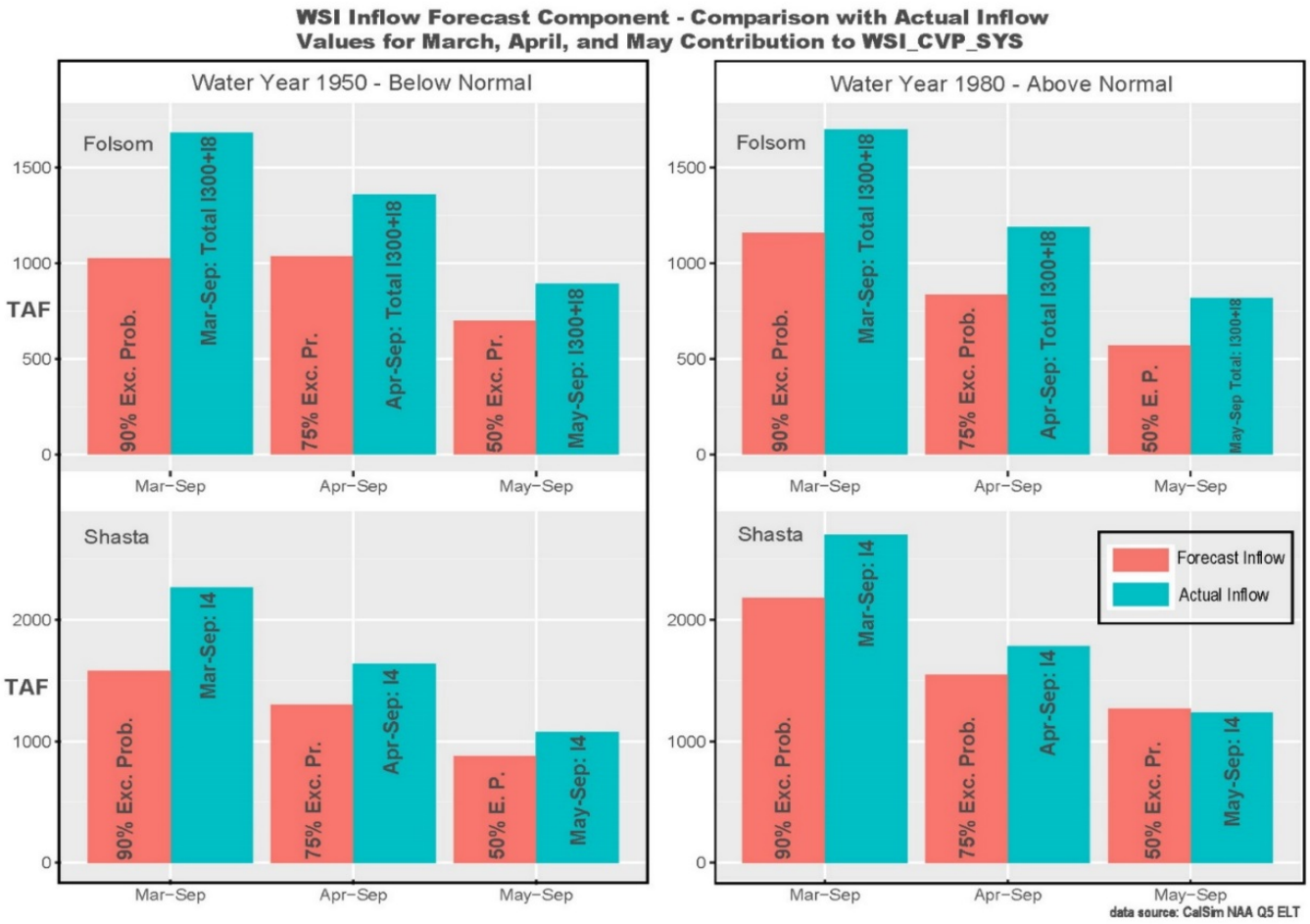
CalSimII Modeling Sur-Rebuttal Topics

- Water Supply Index-Delivery Index (WSI-DI) curve generation is not perfect foresight
- **CalSim allocation logic is appropriate and acceptable**
- Reclamation operational philosophy is reflected in and consistent with Petitioners' modeling for the Water Fix
- Drought year CalSim results are reasonable for long term planning analysis

WSI Calculation



WSI Inflow Component



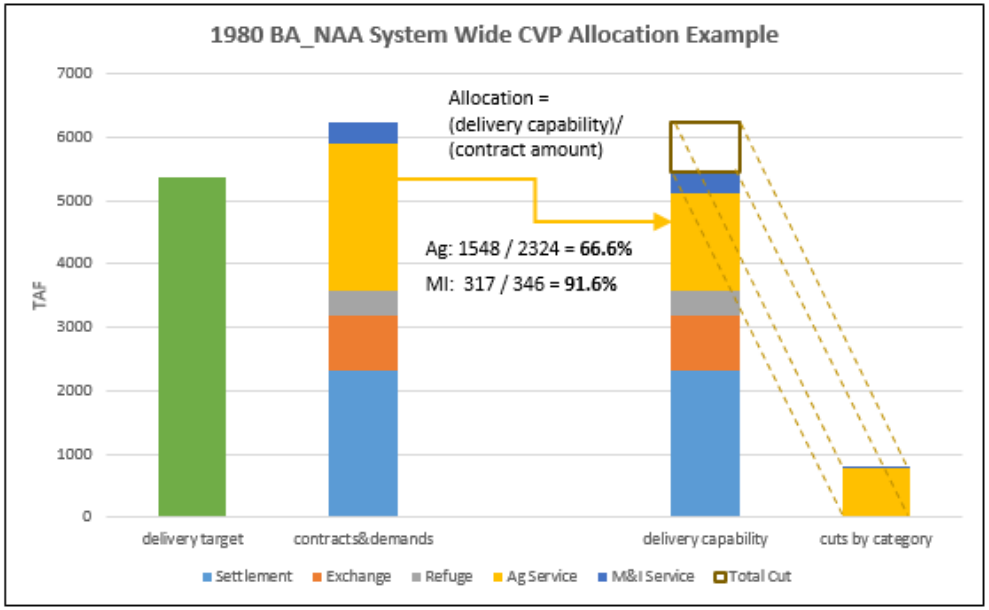
Other Information Available in Real Time

- Biological indicators
- Seasonal inflow forecast timing indicators
- Watershed variability
- Specific storage facility conditions

- CalSim does not use this information, but the WSI-DI approach to allocation is appropriate for long term planning analysis purposes

WSI -- DI -- Delivery Target

Allocation Calculation

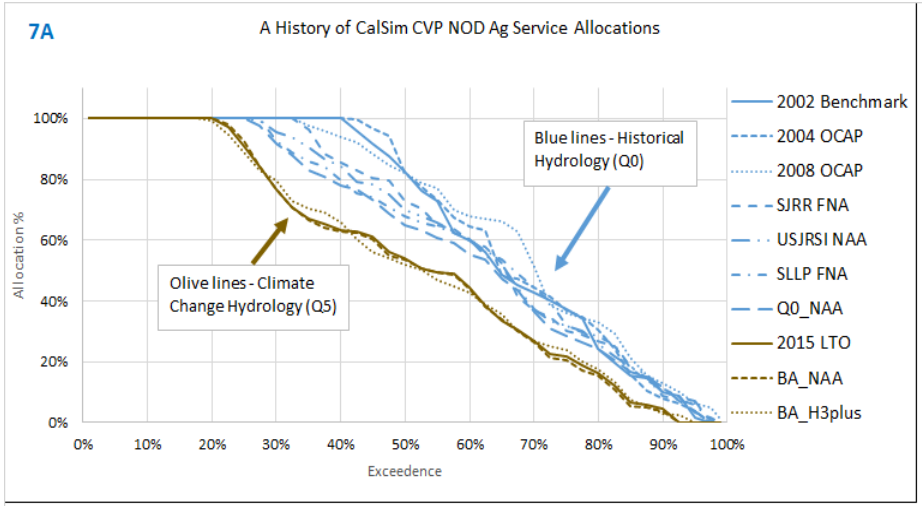


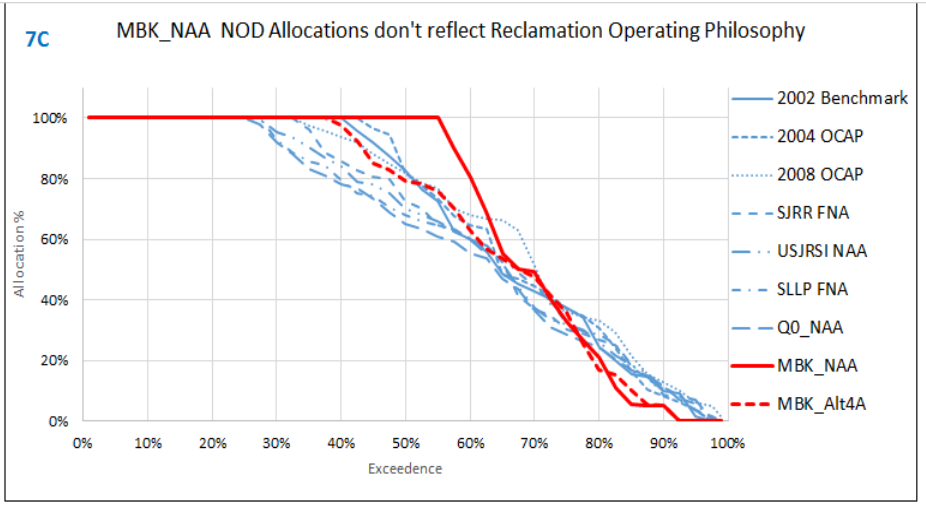
	BA_NAA	MBK_NAA	
WSI_CVP	10145	10318	
DI_CVP	9872	10162	
Delivery Target	5354	5535	
Total CVP Demand	6160	6160	
Total CVP Cuts	806	625	
Ag Cut	766	618	
NOD Ag Alloc	66.6%	73.4% →	100%
SOD Ag Alloc	66.6%	95.8%* →	100%

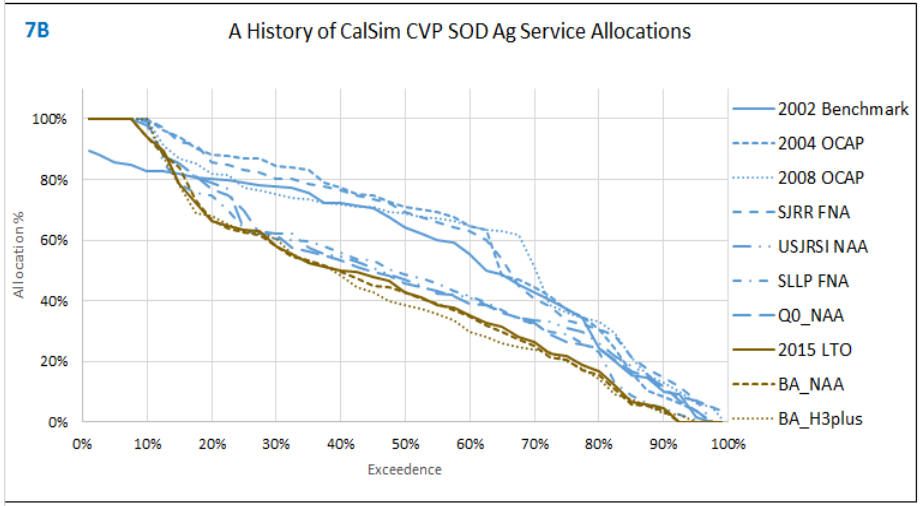
CalSimII Modeling Sur-Rebuttal Topics

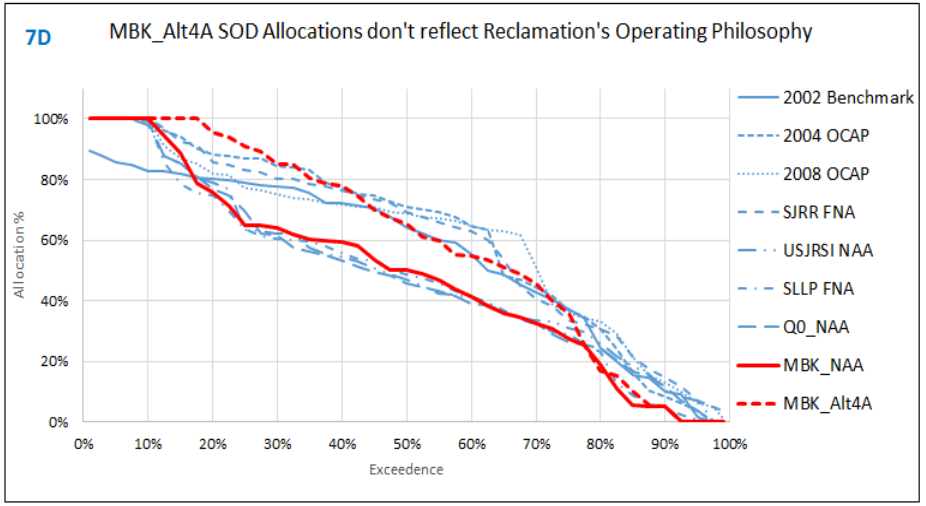
- Water Supply Index-Delivery Index (WSI-DI) curve generation is not perfect foresight
- CalSim allocation logic is appropriate and acceptable
- **Reclamation operational philosophy is reflected in and consistent with Petitioners' modeling for the Water Fix**
- Drought year CalSim results are reasonable for long term planning analysis

Reclamation Operational Philosophy





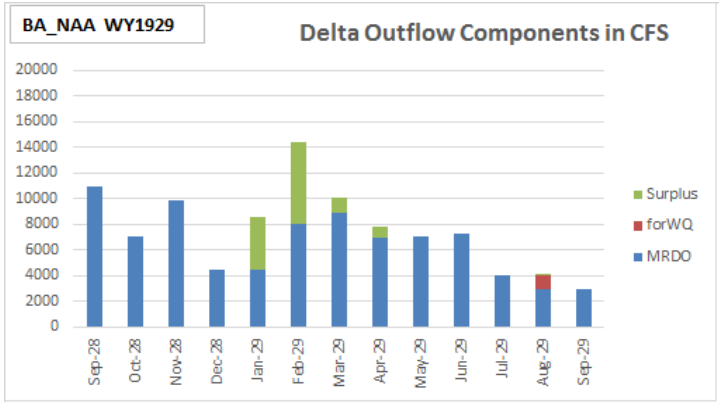


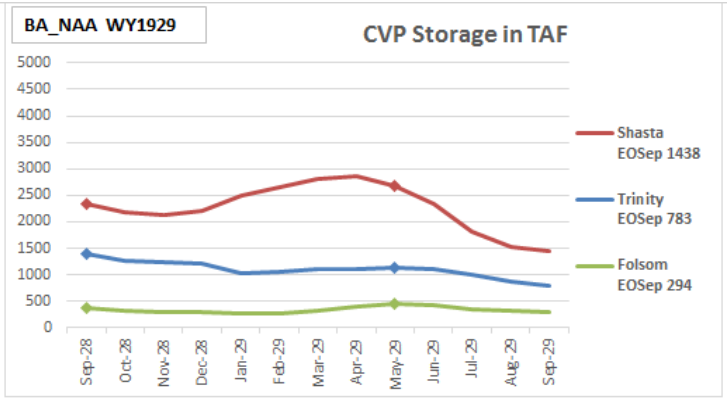


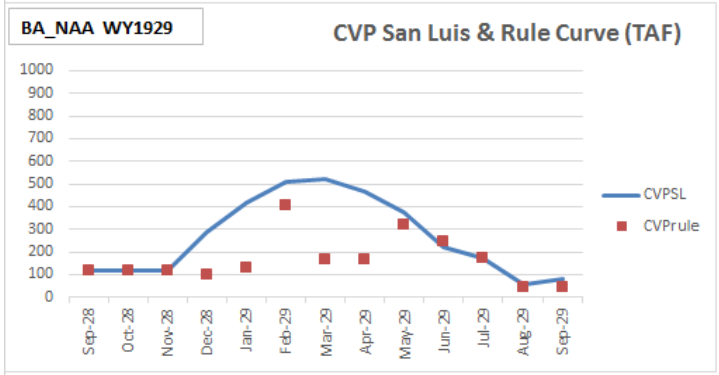
CalSimII Modeling Sur-Rebuttal Topics

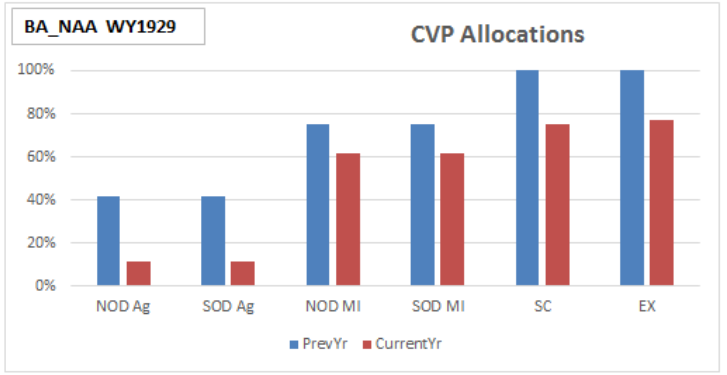
- Water Supply Index-Delivery Index (WSI-DI) curve generation is not perfect foresight
- CalSim allocation logic is appropriate and acceptable
- Reclamation operational philosophy is reflected in and consistent with Petitioners' modeling for the Water Fix
- **Drought year CalSim results are reasonable for long term planning analysis**

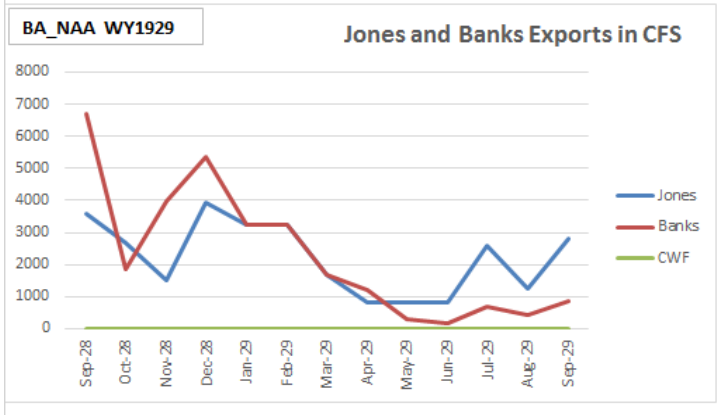
1929

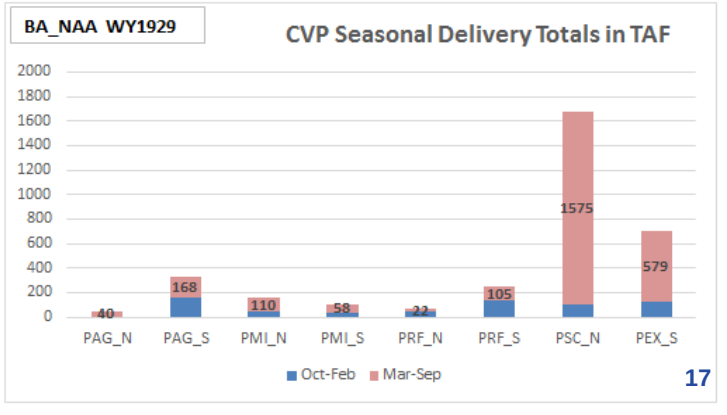

BA_NAA WY1929
Delta Outflow Components in CFS
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Sep-28
Oct-28
Nov-28
Dec-28
Jan-29
Feb-29
Mar-29
Apr-29
May-29
Jun-29
Jul-29
Aug-29
Sep-29
Surplus
forWQ
MRDO


BA_NAA WY1929
CVP Storage in TAF
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-28
Oct-28
Nov-28
Dec-28
Jan-29
Feb-29
Mar-29
Apr-29
May-29
Jun-29
Jul-29
Aug-29
Sep-29
Shasta
EOSep 1438
Trinity
EOSep 783
Folsom
EOSep 294

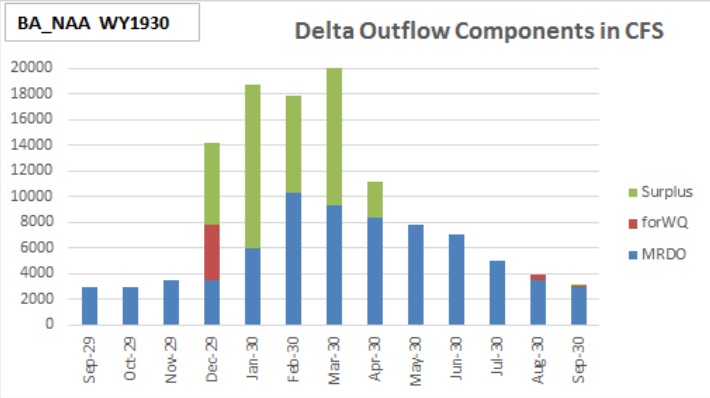

BA_NAA WY1929
CVP San Luis & Rule Curve (TAF)
1000
900
800
700
600
500
400
300
200
100
0
Sep-28
Oct-28
Nov-28
Dec-28
Jan-29
Feb-29
Mar-29
Apr-29
May-29
Jun-29
Jul-29
Aug-29
Sep-29
CVPSL
CVPrule

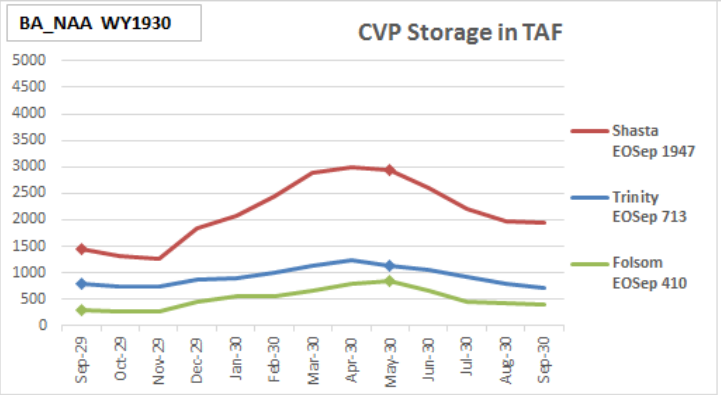

BA_NAA WY1929
CVP Allocations
100%
80%
60%
40%
20%
0%
NOD Ag
SOD Ag
NOD MI
SOD MI
SC
EX
PrevYr
CurrentYr

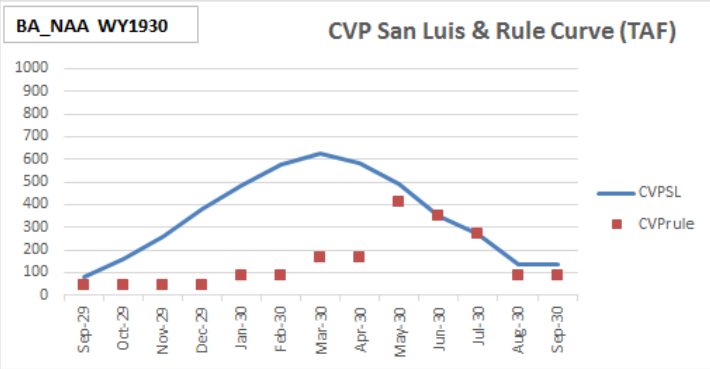

BA_NAA WY1929
Jones and Banks Exports in CFS
8000
7000
6000
5000
4000
3000
2000
1000
0
Sep-28
Oct-28
Nov-28
Dec-28
Jan-29
Feb-29
Mar-29
Apr-29
May-29
Jun-29
Jul-29
Aug-29
Sep-29
Jones
Banks
CWF

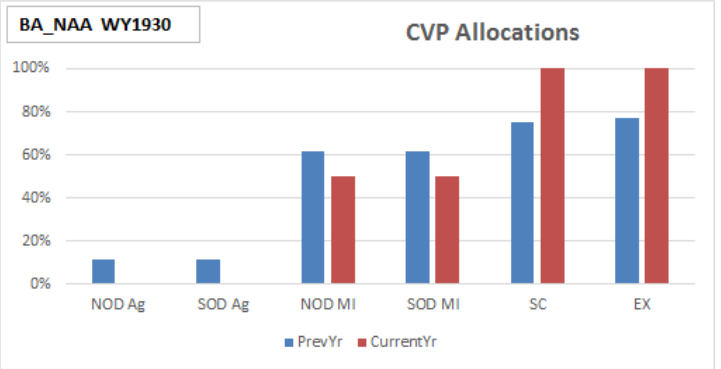

BA_NAA WY1929
CVP Seasonal Delivery Totals in TAF
2000
1800
1600
1400
1200
1000
800
600
400
200
0
40
168
110
58
22
105
1575
579
PAG_N
PAG_S
PMI_N
PMI_S
PRF_N
PRF_S
PSC_N
PEX_S
Oct-Feb
Mar-Sep

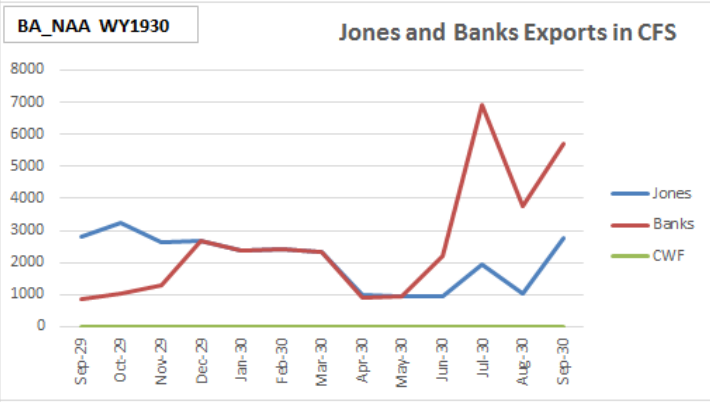
1930

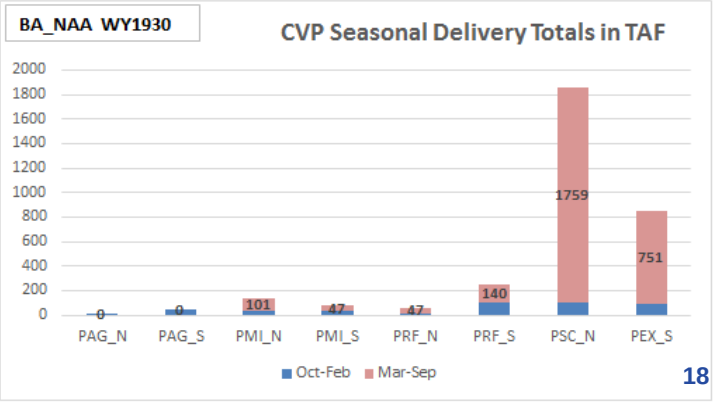

BA_NAA WY1930
Delta Outflow Components in CFS
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Sep-29
Oct-29
Nov-29
Dec-29
Jan-30
Feb-30
Mar-30
Apr-30
May-30
Jun-30
Jul-30
Aug-30
Sep-30
Surplus
forWQ
MRDO


BA_NAA WY1930
CVP Storage in TAF
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-29
Oct-29
Nov-29
Dec-29
Jan-30
Feb-30
Mar-30
Apr-30
May-30
Jun-30
Jul-30
Aug-30
Sep-30
Shasta EOSep 1947
Trinity EOSep 713
Folsom EOSep 410

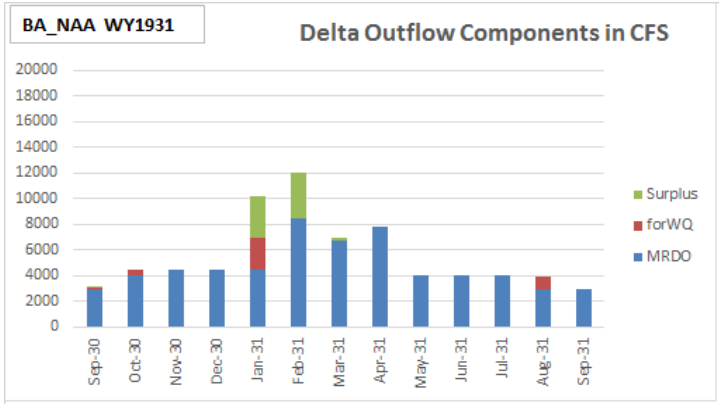

BA_NAA WY1930
CVP San Luis & Rule Curve (TAF)
1000
900
800
700
600
500
400
300
200
100
0
Sep-29
Oct-29
Nov-29
Dec-29
Jan-30
Feb-30
Mar-30
Apr-30
May-30
Jun-30
Jul-30
Aug-30
Sep-30
CVPSL
CVPrule

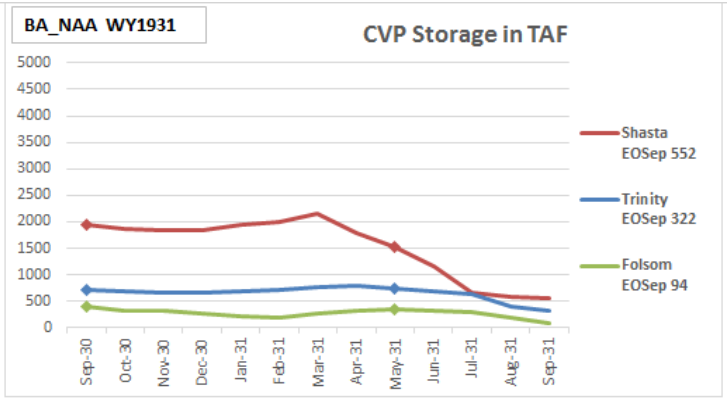

BA_NAA WY1930
CVP Allocations
100%
80%
60%
40%
20%
0%
NOD Ag
SOD Ag
NOD MI
SOD MI
SC
EX
PrevYr
CurrentYr

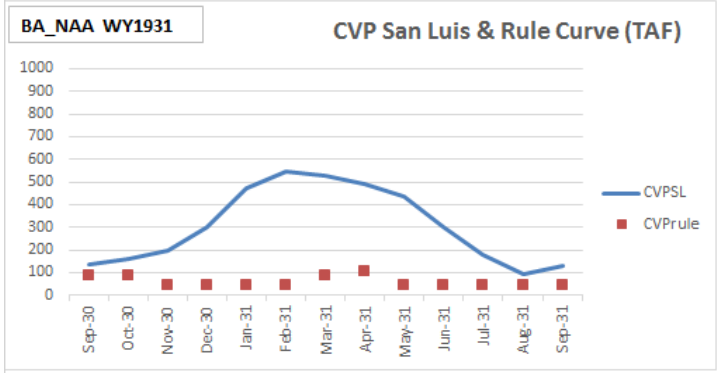

BA_NAA WY1930
Jones and Banks Exports in CFS
8000
7000
6000
5000
4000
3000
2000
1000
0
Sep-29
Oct-29
Nov-29
Dec-29
Jan-30
Feb-30
Mar-30
Apr-30
May-30
Jun-30
Jul-30
Aug-30
Sep-30
Jones
Banks
CWF

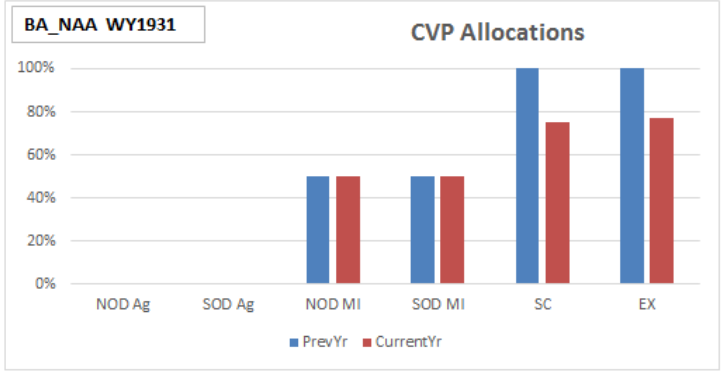

BA_NAA WY1930
CVP Seasonal Delivery Totals in TAF
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0
101
47
47
140
1759
751
PAG_N
PAG_S
PMI_N
PMI_S
PRF_N
PRF_S
PSC_N
PEX_S
Oct-Feb
Mar-Sep

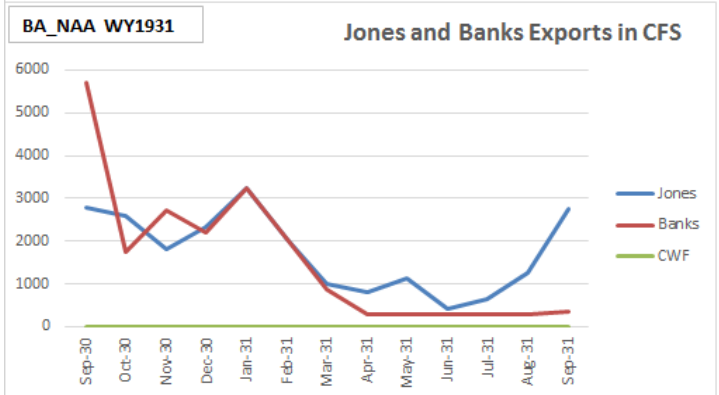
1931

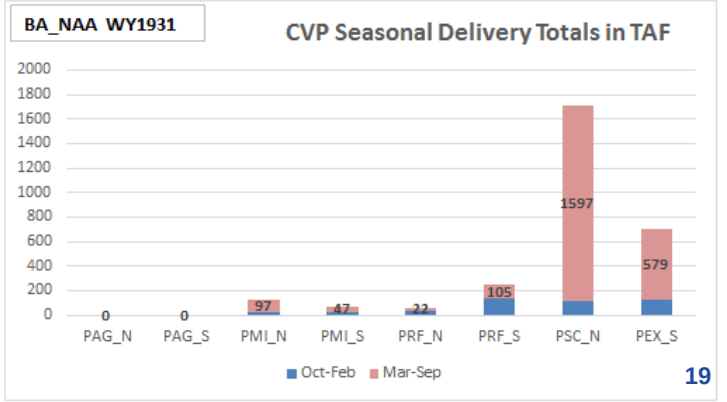

BA_NAA WY1931
Delta Outflow Components in CFS
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Sep-30
Oct-30
Nov-30
Dec-30
Jan-31
Feb-31
Mar-31
Apr-31
May-31
Jun-31
Jul-31
Aug-31
Sep-31
Surplus
forWQ
MRDO


BA_NAA WY1931
CVP Storage in TAF
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-30
Oct-30
Nov-30
Dec-30
Jan-31
Feb-31
Mar-31
Apr-31
May-31
Jun-31
Jul-31
Aug-31
Sep-31
Shasta EOSep 552
Trinity EOSep 322
Folsom EOSep 94

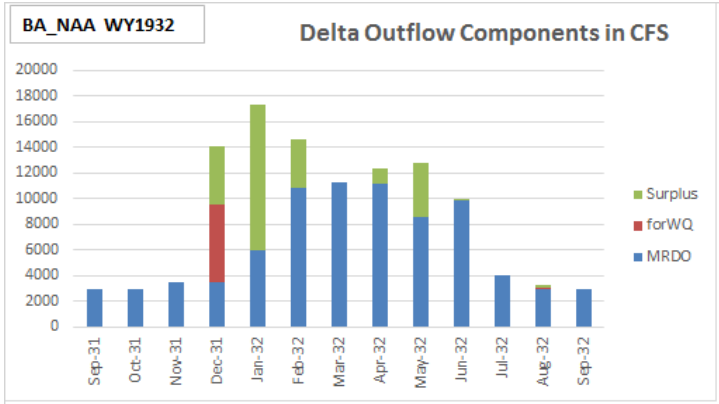

BA_NAA WY1931
CVP San Luis & Rule Curve (TAF)
1000
900
800
700
600
500
400
300
200
100
0
Sep-30
Oct-30
Nov-30
Dec-30
Jan-31
Feb-31
Mar-31
Apr-31
May-31
Jun-31
Jul-31
Aug-31
Sep-31
CVPSL
CVPrule

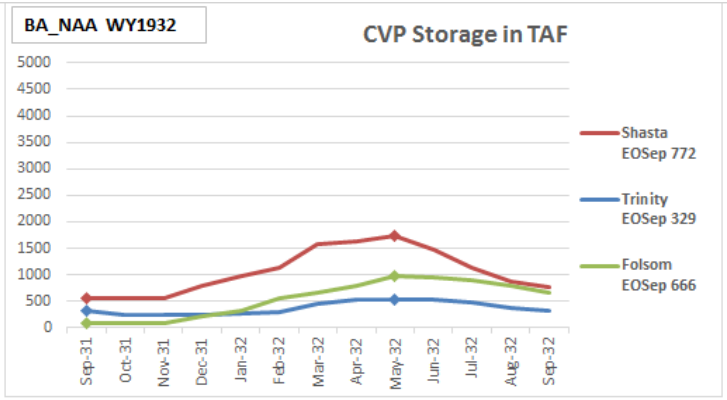

BA_NAA WY1931
CVP Allocations
100%
80%
60%
40%
20%
0%
NOD Ag
SOD Ag
NOD MI
SOD MI
SC
EX
PrevYr
CurrentYr

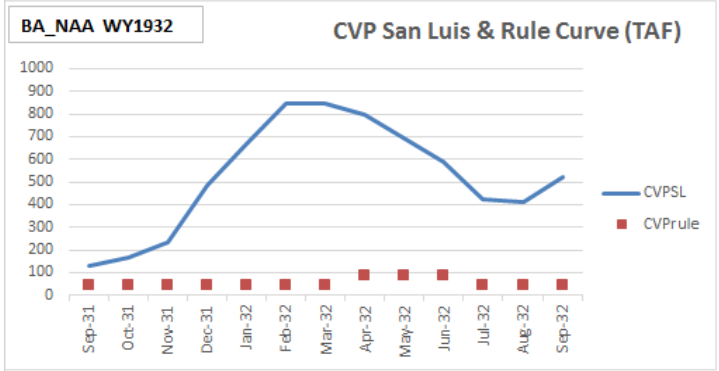

BA_NAA WY1931
Jones and Banks Exports in CFS
6000
5000
4000
3000
2000
1000
0
Sep-30
Oct-30
Nov-30
Dec-30
Jan-31
Feb-31
Mar-31
Apr-31
May-31
Jun-31
Jul-31
Aug-31
Sep-31
Jones
Banks
CWF

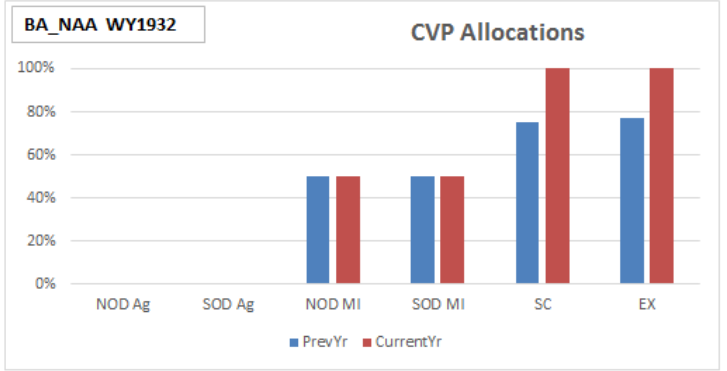

BA_NAA WY1931
CVP Seasonal Delivery Totals in TAF
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0
97
47
22
105
1597
579
PAG_N
PAG_S
PMI_N
PMI_S
PRF_N
PRF_S
PSC_N
PEX_S
Oct-Feb
Mar-Sep

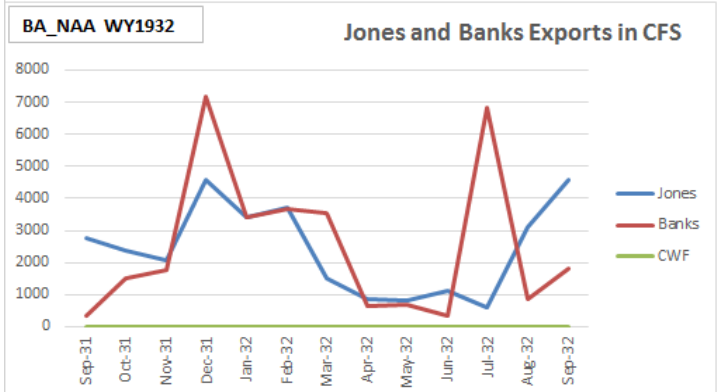
1932

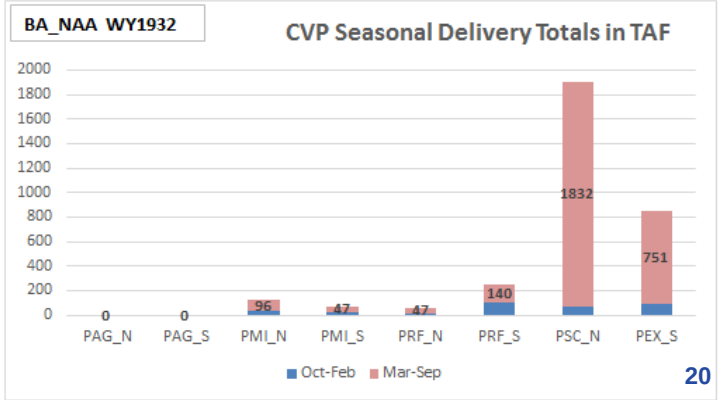

BA_NAA WY1932
Delta Outflow Components in CFS
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Sep-31
Oct-31
Nov-31
Dec-31
Jan-32
Feb-32
Mar-32
Apr-32
May-32
Jun-32
Jul-32
Aug-32
Sep-32
Surplus
forWQ
MRDO


BA_NAA WY1932
CVP Storage in TAF
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-31
Oct-31
Nov-31
Dec-31
Jan-32
Feb-32
Mar-32
Apr-32
May-32
Jun-32
Jul-32
Aug-32
Sep-32
Shasta
EOSep 772
Trinity
EOSep 329
Folsom
EOSep 666

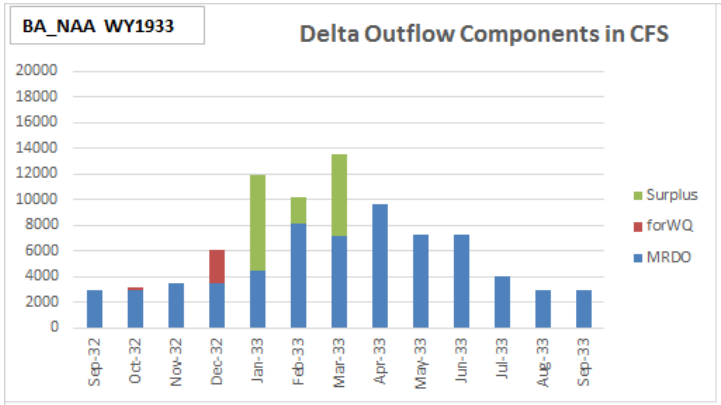

BA_NAA WY1932
CVP San Luis & Rule Curve (TAF)
1000
900
800
700
600
500
400
300
200
100
0
Sep-31
Oct-31
Nov-31
Dec-31
Jan-32
Feb-32
Mar-32
Apr-32
May-32
Jun-32
Jul-32
Aug-32
Sep-32
CVPSL
CVPrule

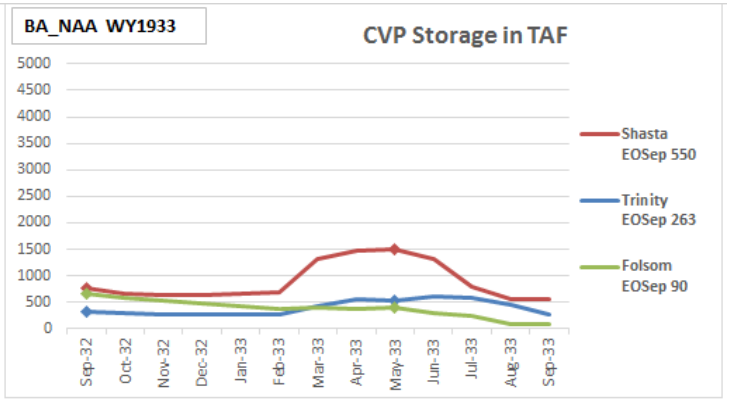

BA_NAA WY1932
CVP Allocations
100%
80%
60%
40%
20%
0%
NOD Ag
SOD Ag
NOD MI
SOD MI
SC
EX
PrevYr
CurrentYr

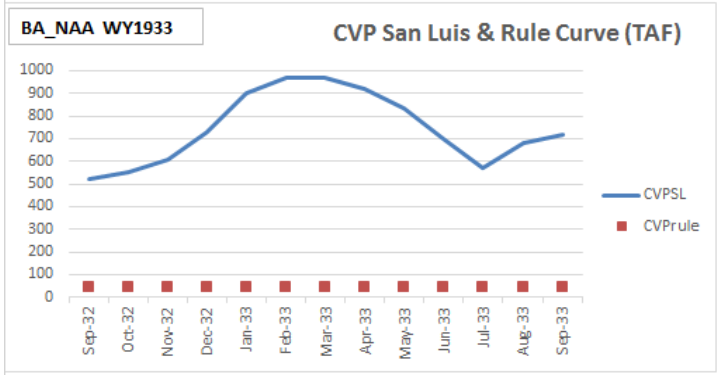

BA_NAA WY1932
Jones and Banks Exports in CFS
8000
7000
6000
5000
4000
3000
2000
1000
0
Sep-31
Oct-31
Nov-31
Dec-31
Jan-32
Feb-32
Mar-32
Apr-32
May-32
Jun-32
Jul-32
Aug-32
Sep-32
Jones
Banks
CWF

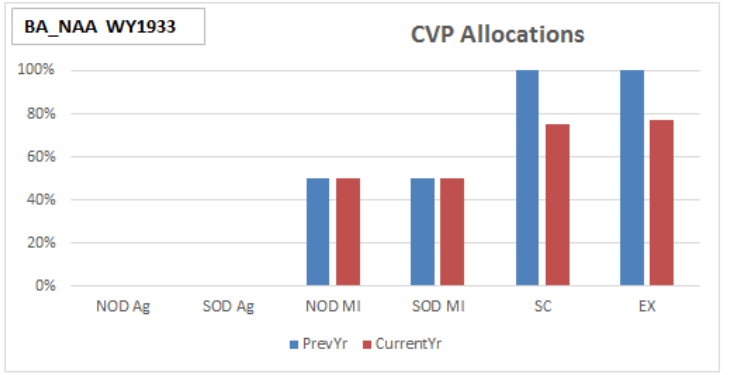

BA_NAA WY1932
CVP Seasonal Delivery Totals in TAF
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0
96
47
47
140
1832
751
PAG_N
PAG_S
PMI_N
PMI_S
PRF_N
PRF_S
PSC_N
PEX_S
Oct-Feb
Mar-Sep

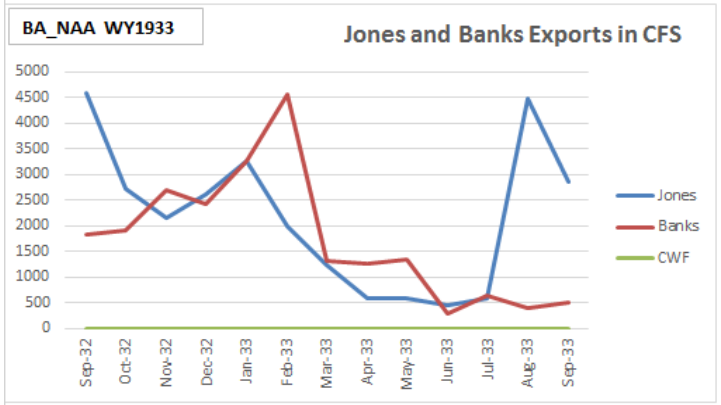
1933

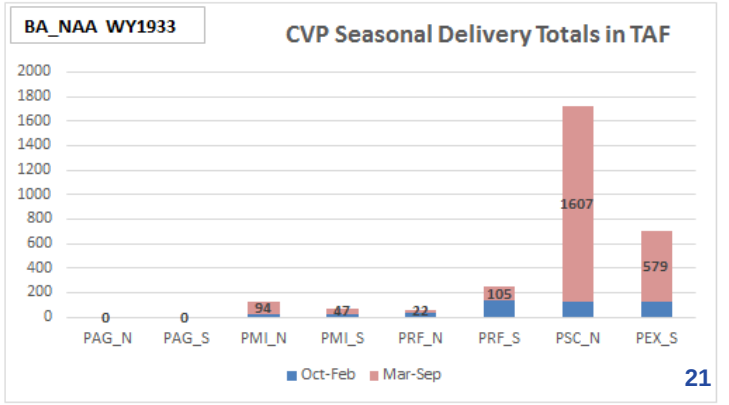

BA_NAA WY1933
Delta Outflow Components in CFS
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Sep-32
Oct-32
Nov-32
Dec-32
Jan-33
Feb-33
Mar-33
Apr-33
May-33
Jun-33
Jul-33
Aug-33
Sep-33
Surplus
forWQ
MRDO


BA_NAA WY1933
CVP Storage in TAF
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-32
Oct-32
Nov-32
Dec-32
Jan-33
Feb-33
Mar-33
Apr-33
May-33
Jun-33
Jul-33
Aug-33
Sep-33
Shasta
EOSep 550
Trinity
EOSep 263
Folsom
EOSep 90


BA_NAA WY1933
CVP San Luis & Rule Curve (TAF)
1000
900
800
700
600
500
400
300
200
100
0
Sep-32
Oct-32
Nov-32
Dec-32
Jan-33
Feb-33
Mar-33
Apr-33
May-33
Jun-33
Jul-33
Aug-33
Sep-33
CVPSL
CVPrule


BA_NAA WY1933
CVP Allocations
100%
80%
60%
40%
20%
0%
NOD Ag
SOD Ag
NOD MI
SOD MI
SC
EX
PrevYr
CurrentYr


BA_NAA WY1933
Jones and Banks Exports in CFS
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-32
Oct-32
Nov-32
Dec-32
Jan-33
Feb-33
Mar-33
Apr-33
May-33
Jun-33
Jul-33
Aug-33
Sep-33
Jones
Banks
CWF


BA_NAA WY1933
CVP Seasonal Delivery Totals in TAF
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0
94
47
22
105
1607
579
PAG_N
PAG_S
PMI_N
PMI_S
PRF_N
PRF_S
PSC_N
PEX_S
Oct-Feb
Mar-Sep

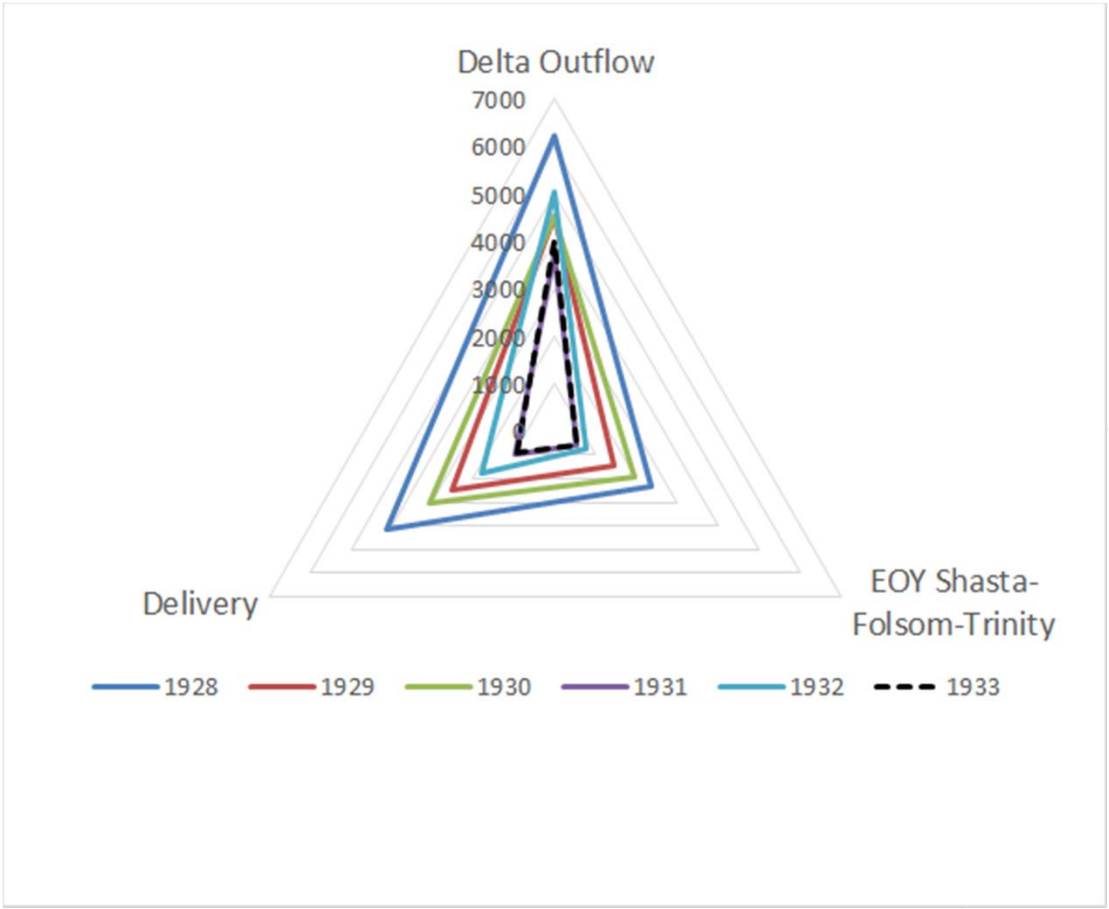
Drought Year Facts

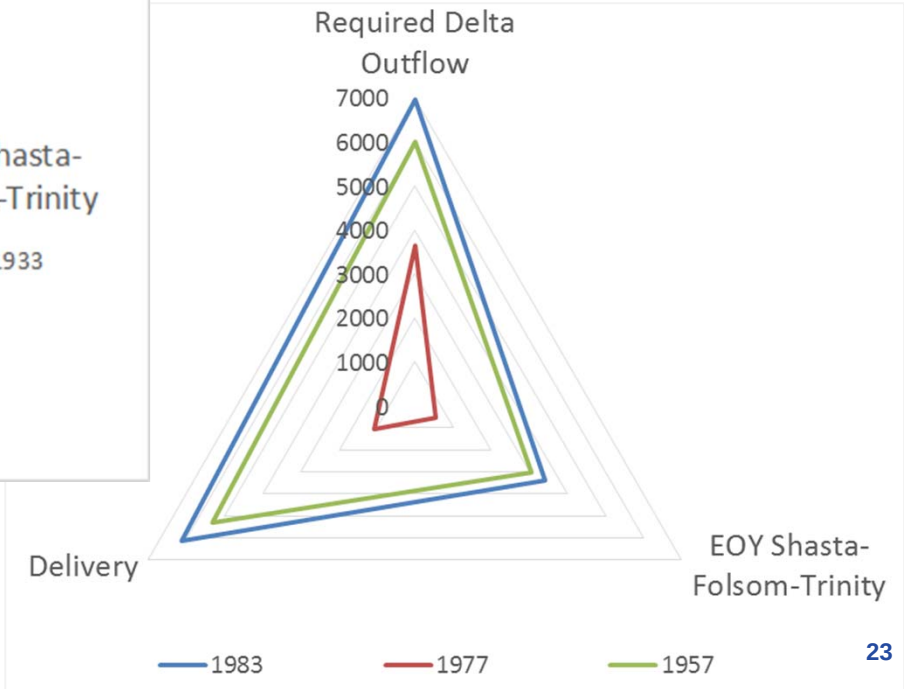
- **CalSim does not struggle in severe extended droughts because of WSI-DI based allocation logic**

- **CalSim struggles in severe extended droughts because there is not enough water to meet ALL Reclamation obligations for regulatory criteria and demands, even when Ag Service allocations are 0% for multiple consecutive years**

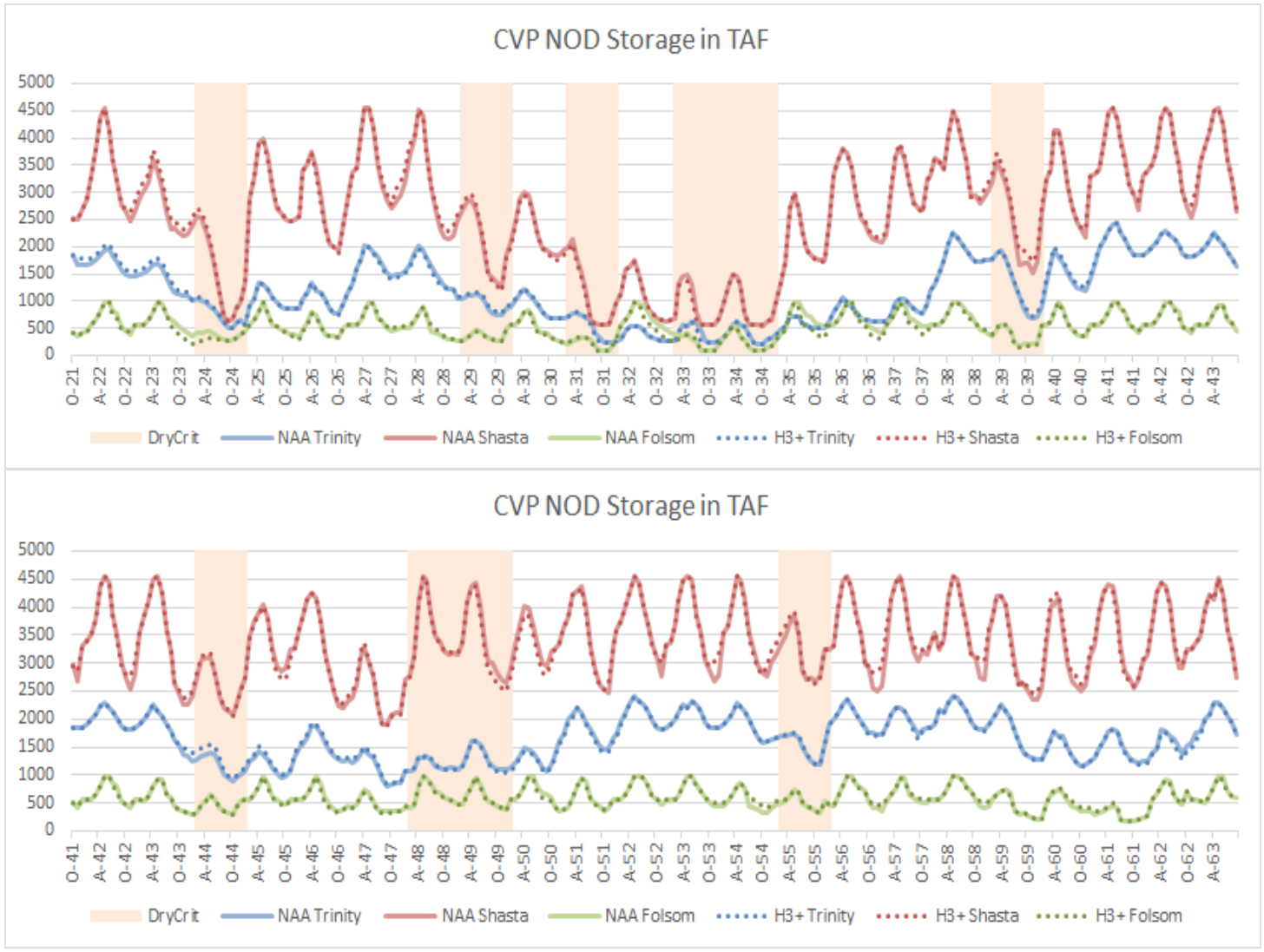
Slide 23 is stricken from Exhibit DOI-38 per oral ruling dated June 15, 2017.

Operational Obligations

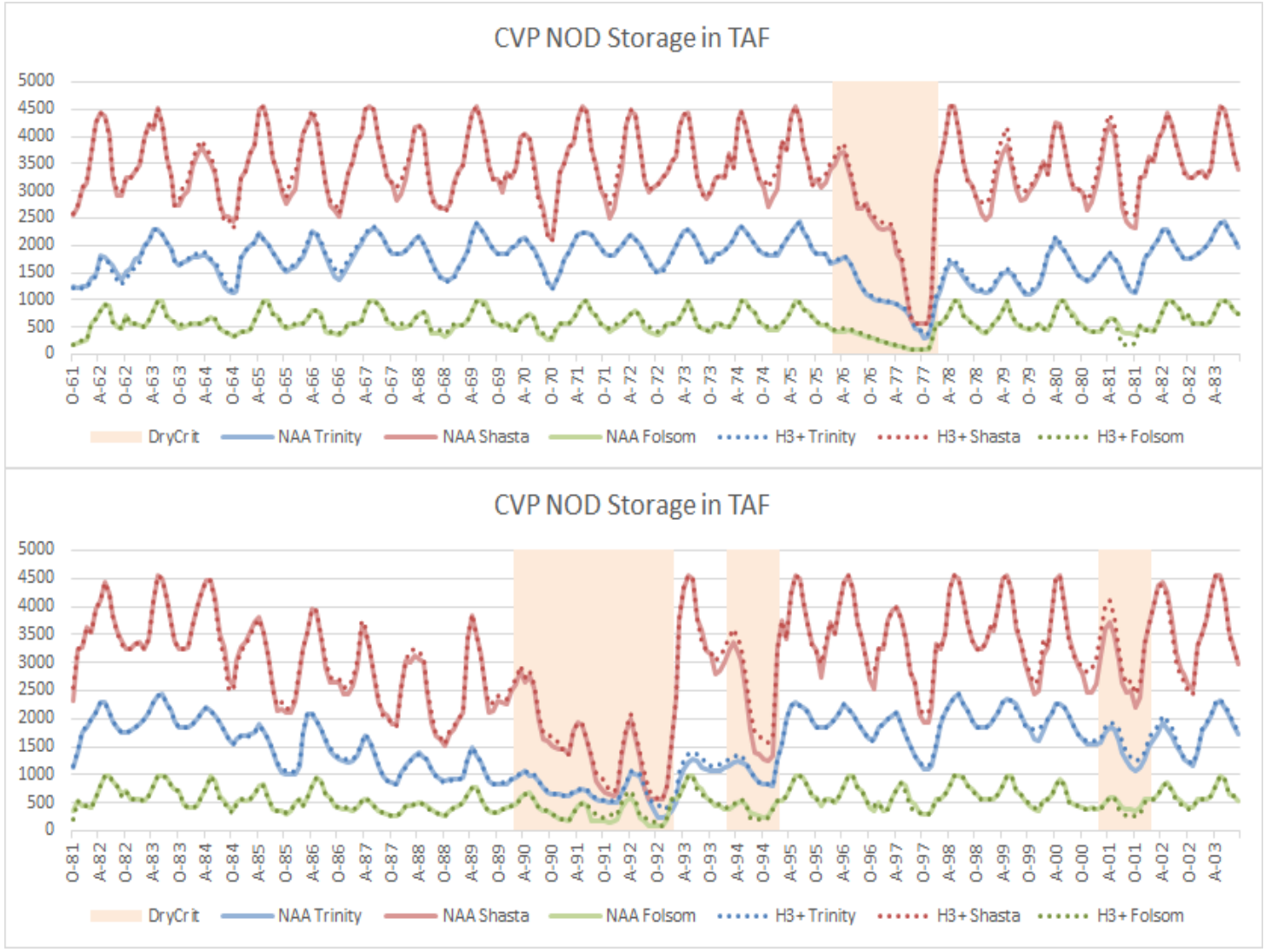




CalSim's Driest 20%



CalSim's Driest 20%



CalSimII Modeling Sur-Rebuttal Topics

- **Water Supply Index-Delivery Index (WSI-DI) curve generation is not perfect foresight**
- **CalSim allocation logic is appropriate and acceptable**
- **Reclamation operational philosophy is reflected in and consistent with Petitioners' modeling for the Water Fix**
- **Drought year CalSim results are reasonable for long term planning analysis**