What's New at the CNRFC?

California Cooperative Snow Surveys

Sixty-First Annual Meeting of Cooperators

November 2015

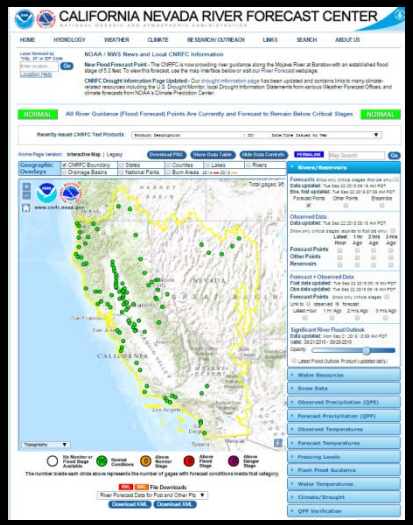
Alan Haynes
Service Coordination Hydrologist
NOAA / National Weather Service
California-Nevada River Forecast Center
Sacramento, CA

Weather Forecast
Sonora

Wed	Thu	Fri	Sat	Sun	Mon	Tue

59	37	59	40	63	40	69	45	66	45	60	45	62	40
Chance of Precip 0%		Chance of Precip 0%		Chance of Precip 0%		Chance of Precip 0%		Chance of Precip 20%		Chance of Precip 20%		Chance of Precip 0%	

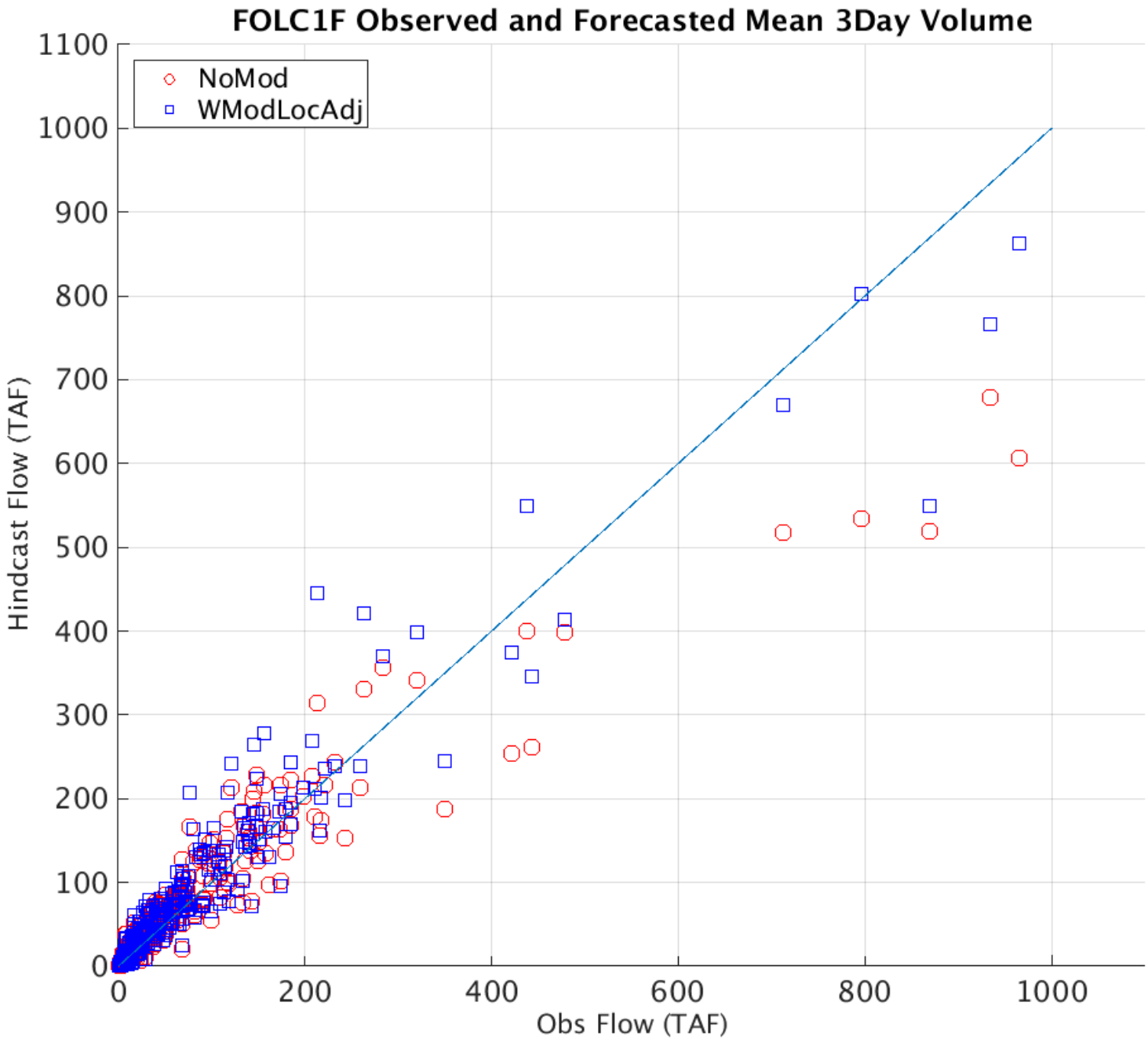
- Hydrologic Ensemble Forecast System (HEFS)
- Recalibration Efforts
- New Web Graphics

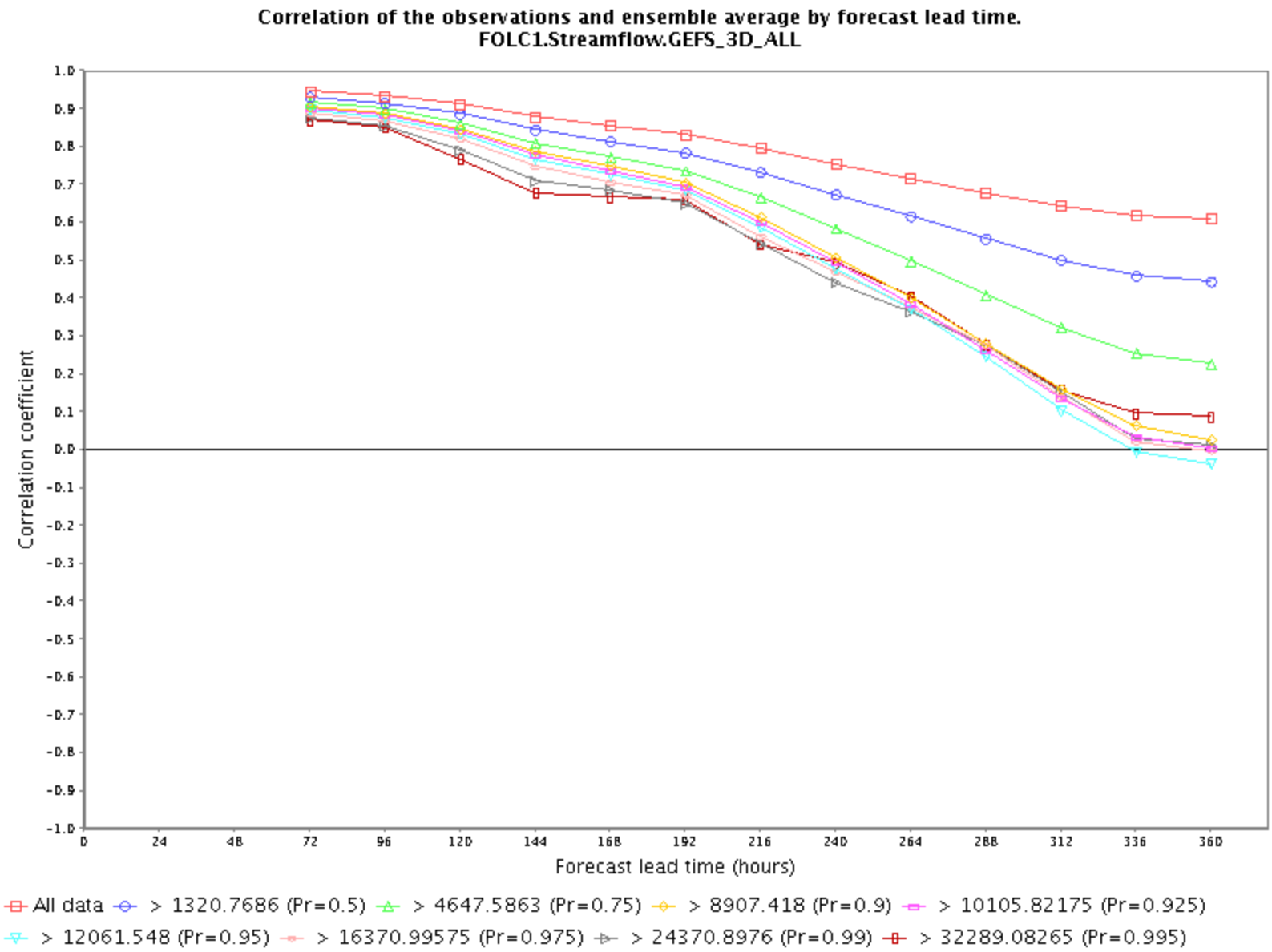


HEFS Developments

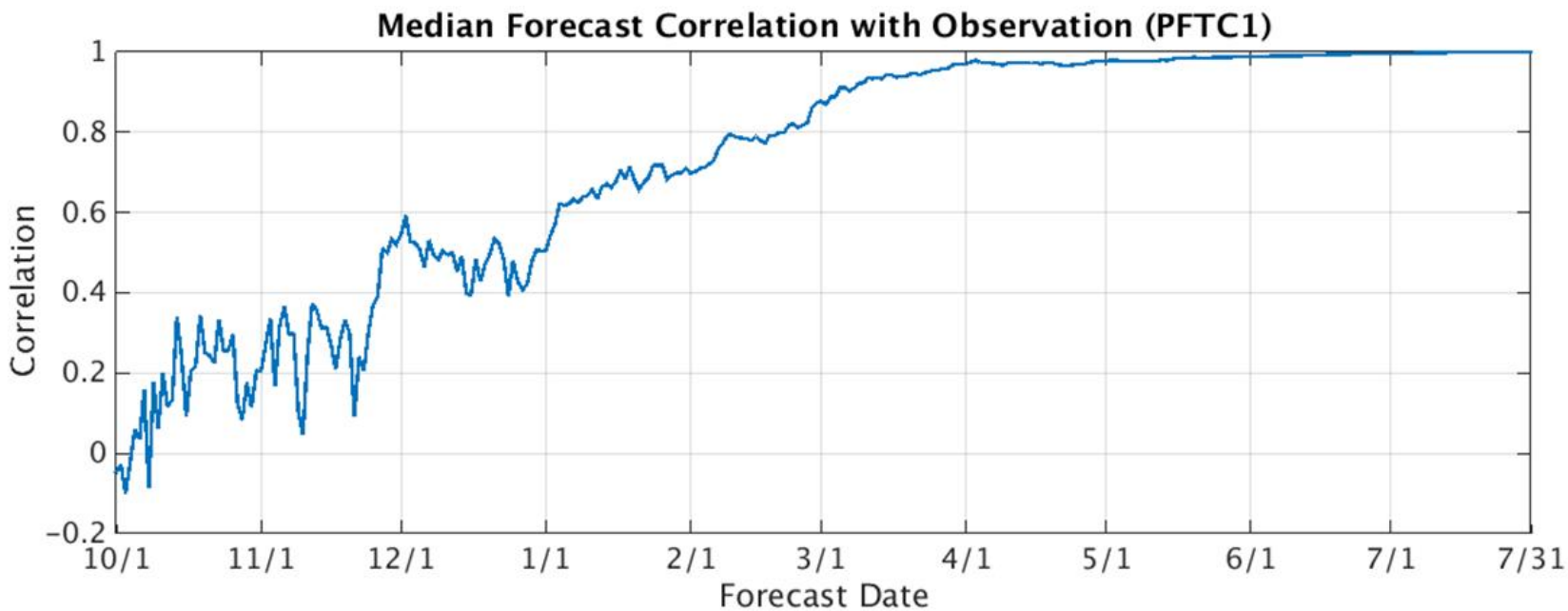
Hindcasts

- Working to develop verification statistics for monthly, seasonal (A-J), and water year forecasts at all lead times with a 365 day forecast
- Run for Period of Record (1985-2010)
- Daily time step
- Start with major “water supply” points
- Eventually do all ensemble points and short-term ens

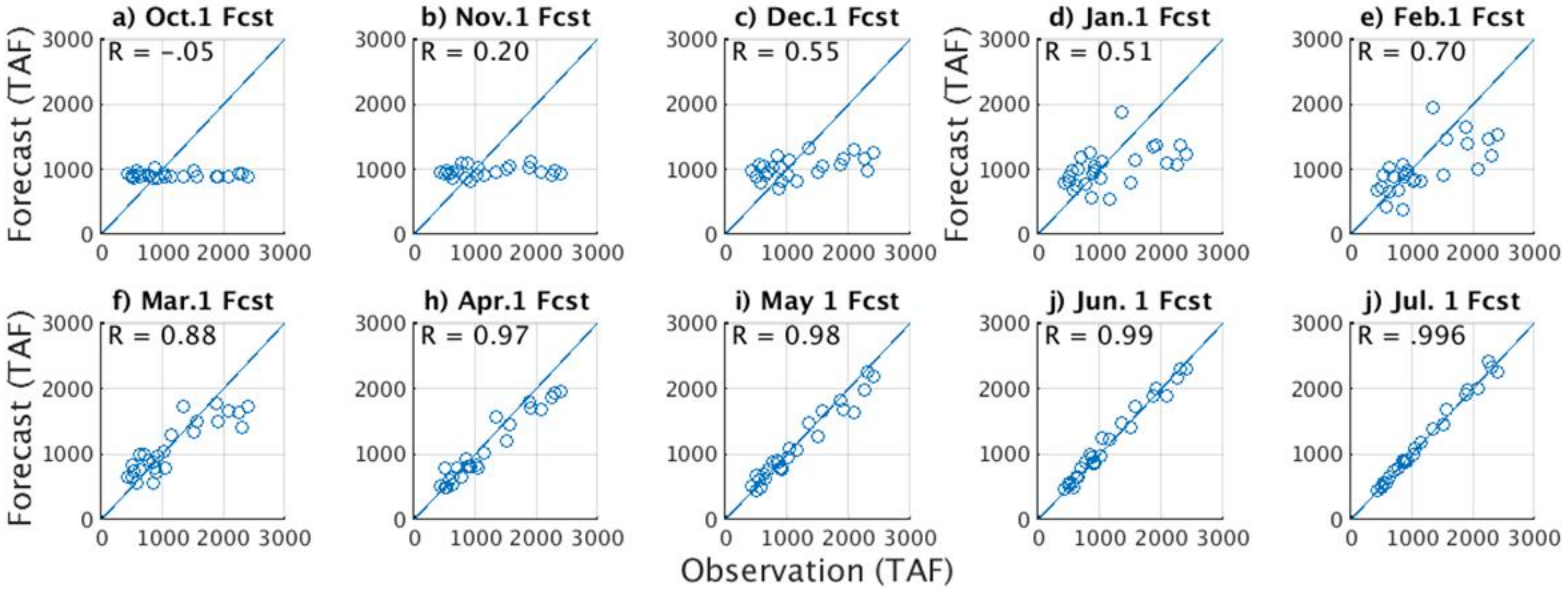

FOLC1F Observed and Forecasted Mean 3Day Volume
NoMod
WModLocAdj
Hindcast Flow (TAF)
Obs Flow (TAF)
0
100
200
300
400
500
600
700
800
900
1000
1100
0
200
400
600
800
1000


Correlation of the observations and ensemble average by forecast lead time.
FOLC1.Streamflow.GEFS_3D_ALL
Correlation coefficient
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
0
24
48
72
96
120
144
168
192
216
240
264
288
312
336
360
Forecast lead time (hours)
All data
> 1320.7686 (Pr=0.5)
> 4647.5863 (Pr=0.75)
> 8907.418 (Pr=0.9)
> 10105.82175 (Pr=0.925)
> 12061.548 (Pr=0.95)
> 16370.99575 (Pr=0.975)
> 24370.8976 (Pr=0.99)
> 32289.08265 (Pr=0.995)

Apr-Jul Verification
Pine Flat



Apr-Jul Verification
Pine Flat



Calibration

6-yr Cycle for Calibration:

1. (2011) - East Sierra & Humboldt
2. (2012) - Klamath & North Coast
3. (2013) - RussianNapa & Central Coast & American
4. (2014) - SouthernCalifornia & FeatherYuba
5. (2015) - Upper & Lower Sacramento, CachePutah
6. (2016) - San Joaquin, N_SanJoaquin, & Tulare

Re-Calibration Efforts

Breaking Up Basins Into Sub-Basins

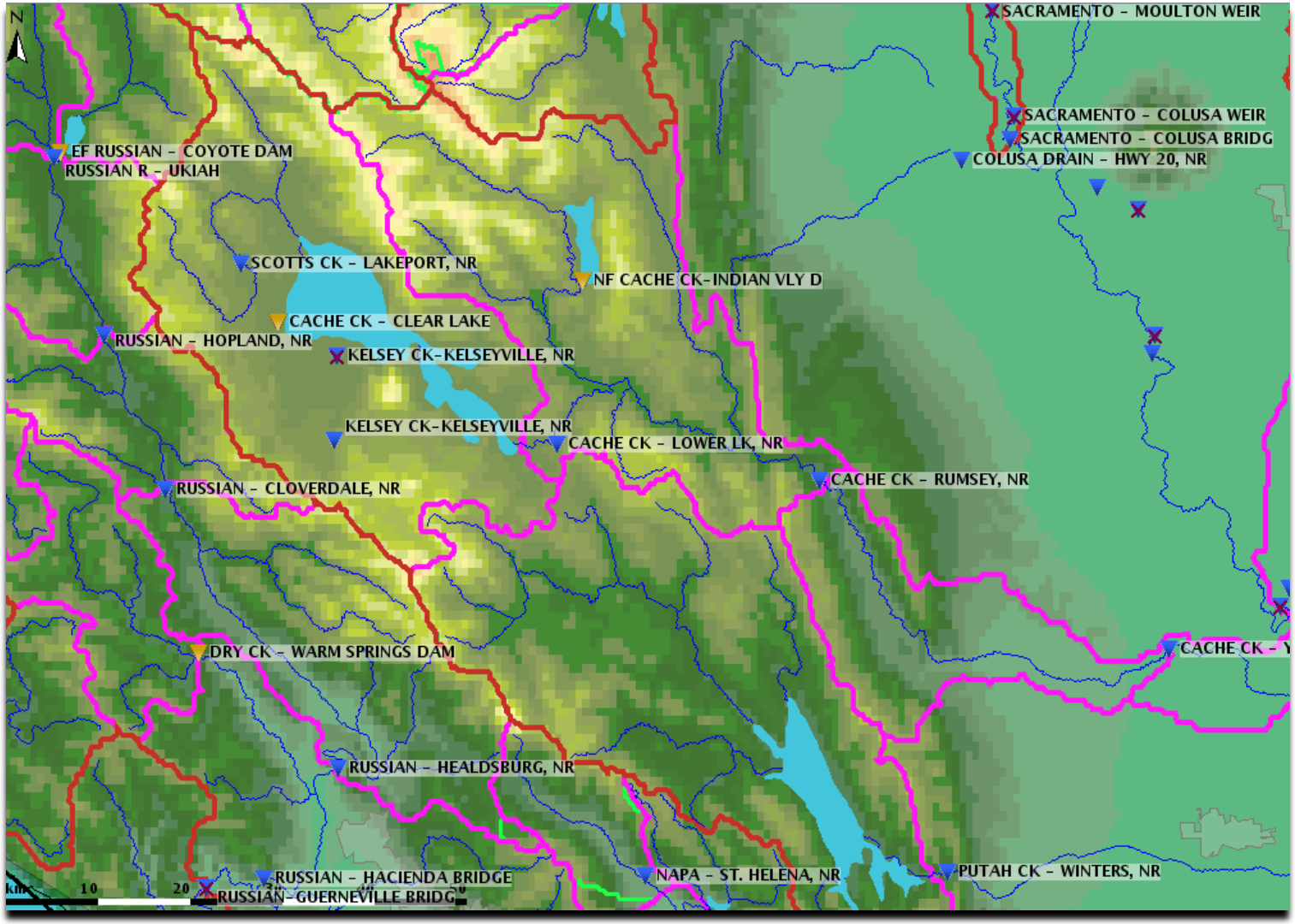
New Cache Putah Forecast Group (11 basins)

1. Clear Lake (KCKC1, SKPC1, MUPC1, CLKC1) 1 new calibration
2. NF Cache Ck (HOUC1, INVC1) - 2 new calibrations
3. Cache Ck (HCHC1, RMSC1, YLOC1) 1 new calibration
4. Putah Ck (PCGC1, LBEC1) - 2 new calibrations

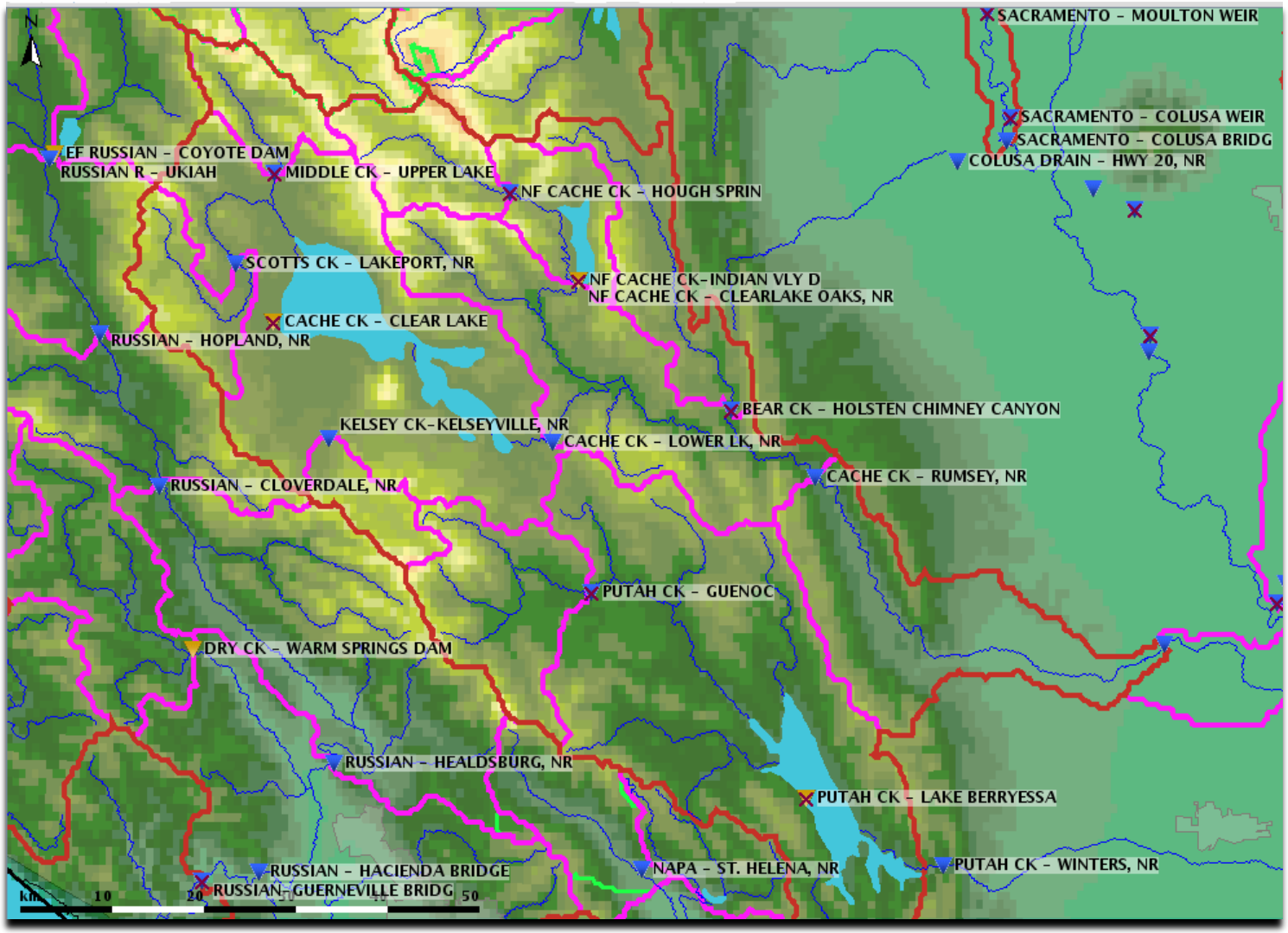
Southern California (6 basins)

1. Santa Ynez - SLUC1, LLYC1, CCHC1, and NRWC1
2. Sisquoc (SSQC1 and GARC1)

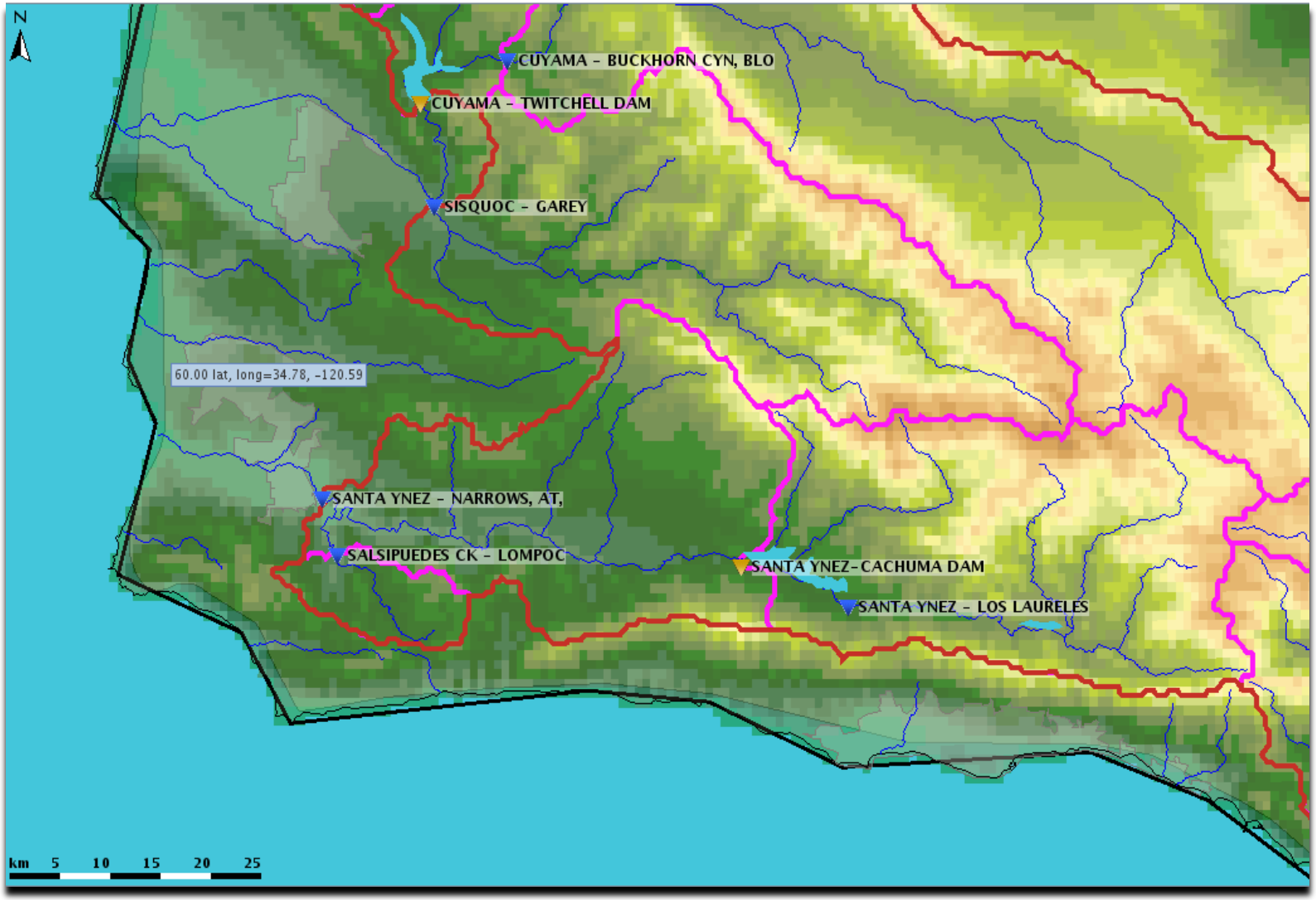
Cache Putah – Old Configuration



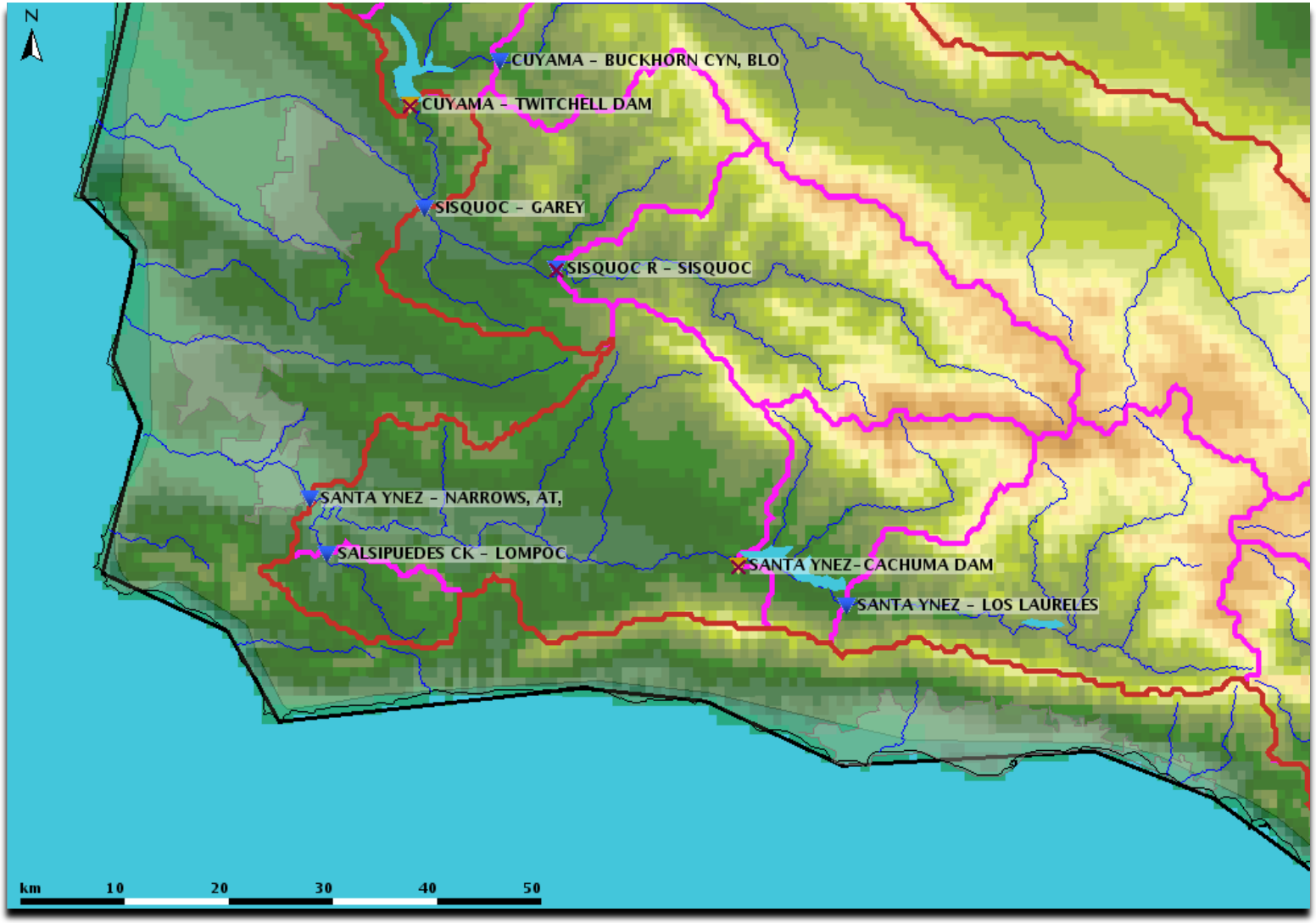
Cache Putah – New Configuration



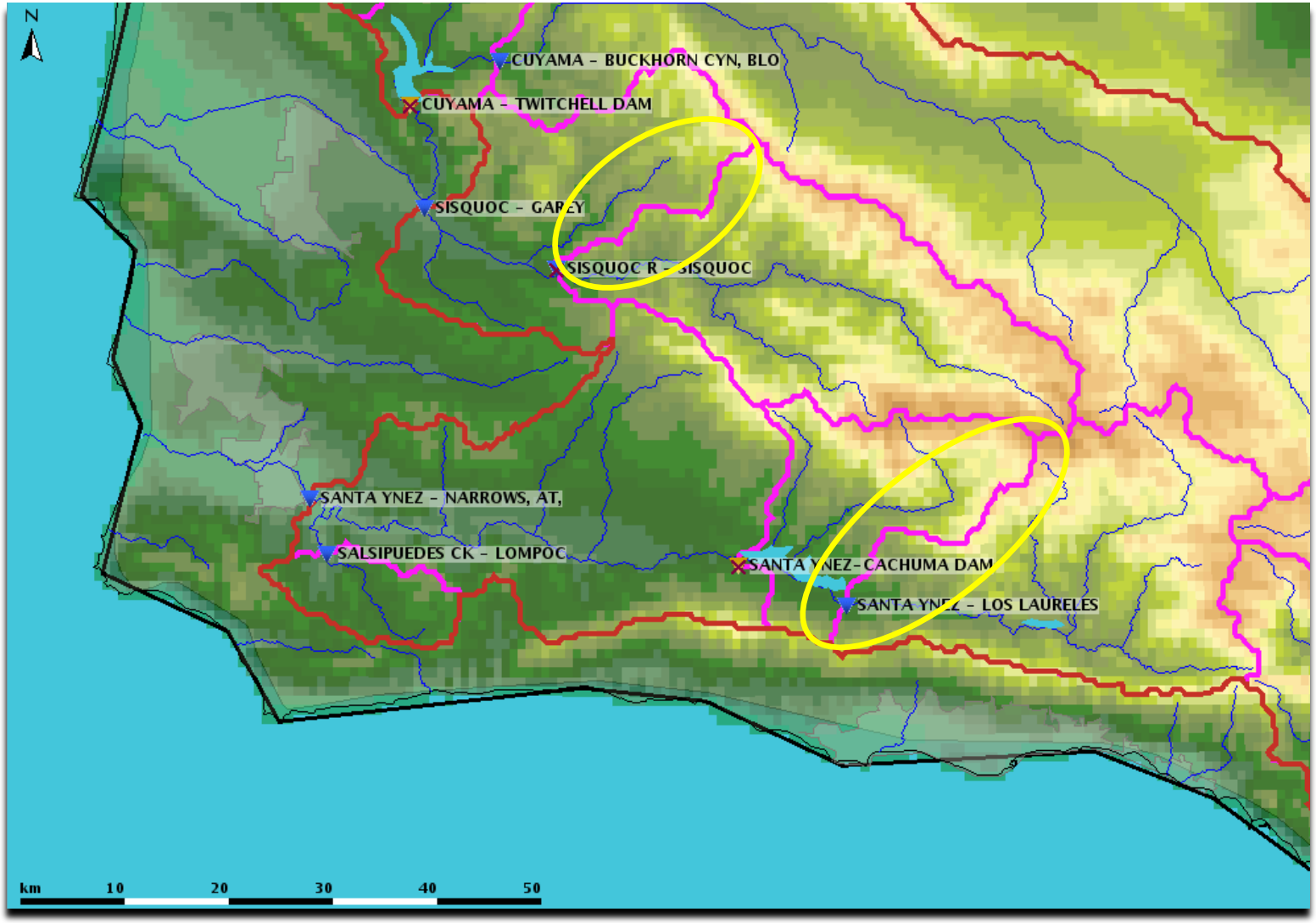
SoCal – Old Configuration



SoCal – New Configuration



SoCal – New Configuration



Basin QPF

```
.BR RSA 20151030 Z /DC10301400
.BR1  /DH18/PPQFE/DRH+06/PPQFE/DRH+12/PPQFE/DRH+18/PPQFE
.BR2 /DRH+24/PPQFE/DRH+30/PPQFE/DRH+36/PPQFE/DRH+42/PPQFE
.BR3 /DRH+48/PPQFE/DRH+54/PPQFE/DRH+60/PPQFE/DRH+66/PPQFE
:
:CNRFC Days 1-3 Basin Quantitative Precipitation Forecast (QPF)
:
:     12Z- 18Z- 00Z- 06Z- 12Z- 18Z- 00Z- 06Z- 12Z- 18Z- 00Z- 06Z-  Days
:      18Z  00Z  06Z  12Z  18Z  00Z  06Z  12Z  18Z  00Z  06Z  12Z   1-3
:      Fri  Fri  Sat  Sat  Sat  Sat  Sun  Sun  Sun  Sun  Mon  Mon   Tot
:     ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ====  ====
:----  Cache Ck / Putah ----------------------------------------------
MUPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.03/0.08/0.05/0.02/0.07: 0.26
SKPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.05/0.04/0.02/0.06: 0.19
KCVC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.03/0.02/0.06: 0.13
CLKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.03/0.03/0.02/0.05: 0.15
HOUC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.06/0.04/0.02/0.07: 0.20
INVC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.02/0.02/0.04: 0.11
HCHC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.01/0.01/0.03: 0.07
RMSC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.02/0.01/0.04: 0.09
YLOC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.01/0.03: 0.05
PCGC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.02/0.02/0.05: 0.10
LBEC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.02/0.04: 0.07
```

```
.BR RSA 20151030 Z /DC10301400
.BR1  /DH18/PPQFE/DRH+06/PPQFE/DRH+12/PPQFE/DRH+18/PPQFE
.BR2 /DRH+24/PPQFE/DRH+30/PPQFE/DRH+36/PPQFE/DRH+42/PPQFE
.BR3 /DRH+48/PPQFE/DRH+54/PPQFE/DRH+60/PPQFE/DRH+66/PPQFE
:
:CNRFC Days 1-3 Basin Quantitative Precipitation Forecast (QPF)
:
:----  Southern California ----------------------------------------------
CYBC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
HSAC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TWDC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SSQC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
GARC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
LLYC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
CCHC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SLUC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
NRWC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
VRVC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
PYMC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
LKPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SCPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SESC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
VCAC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
CLLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SRWC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TIMC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SREC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
KNBC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
YTLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
MWXC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TSLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
ADOC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TEKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
VLKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
```

Basin QPF

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.BR3 /DRH+48/PPQFE/DRH+54/PPQFE/DRH+60/PPQFE/DRH+66/PPQFE
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:CNRFC Days 1-3 Basin Quantitative Precipitation Forecast (QPF)
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:     12Z- 18Z- 00Z- 06Z- 12Z- 18Z- 00Z- 06Z- 12Z- 18Z- 00Z- 06Z-  Days
:      18Z  00Z  06Z  12Z  18Z  00Z  06Z  12Z  18Z  00Z  06Z  12Z   1-3
:      Fri  Fri  Sat  Sat  Sat  Sat  Sun  Sun  Sun  Sun  Mon  Mon   Tot
:     ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ==== ====  ====
:----  Cache Ck / Putah ----------------------------------------------
MUPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.03/0.08/0.05/0.02/0.07: 0.26
SKPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.05/0.04/0.02/0.06: 0.19
KCVC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.03/0.02/0.06: 0.13
CLKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.03/0.03/0.02/0.05: 0.15
HOUC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.06/0.04/0.02/0.07: 0.20
INVC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.02/0.02/0.04: 0.11
HCHC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.01/0.01/0.03: 0.07
RMSC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.02/0.02/0.01/0.04: 0.09
YLOC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.01/0.03: 0.05
PCGC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.02/0.02/0.05: 0.10
LBEC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.01/0.02/0.04: 0.07
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.BR RSA 20151030 Z /DC10301400
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.BR2 /DRH+24/PPQFE/DRH+30/PPQFE/DRH+36/PPQFE/DRH+42/PPQFE
.BR3 /DRH+48/PPQFE/DRH+54/PPQFE/DRH+60/PPQFE/DRH+66/PPQFE
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CYBC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
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TWDC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SSQC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
GARC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
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LKPC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
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SESC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
VCAC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
CLLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SRWC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TIMC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
SREC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
KNBC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
YTLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
MWXC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TSLC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
ADOC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
TEKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
VLKC1 0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00/0.00: 0.00
```

New “Index” Ensemble Points

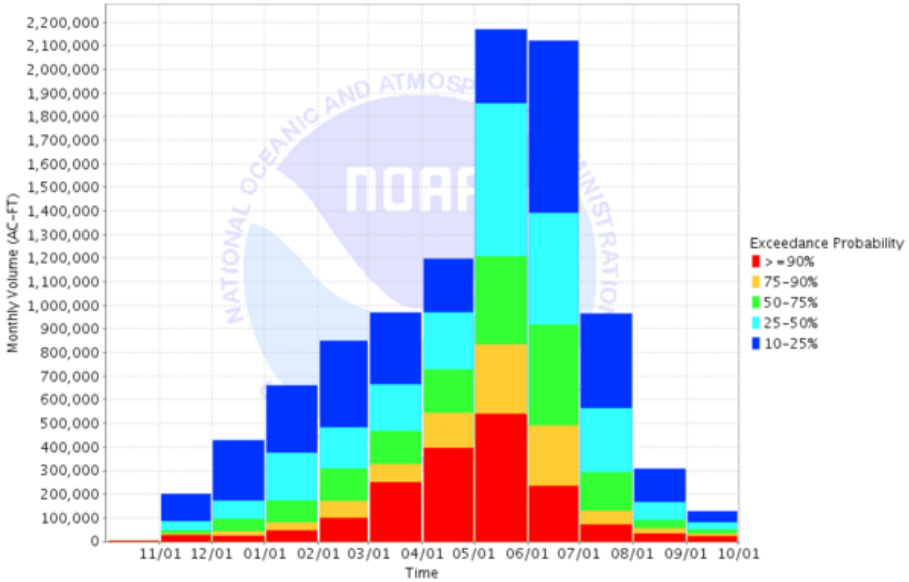
SAN JOAQUIN VALLEY - WATER RESOURCES INDEX (VNSC0)

San Joaquin River - Millerton Reservoir (FRAC1)
Merced River - Exchequer Reseroivr (EXQC1)
Tuolumne River - New Don Pedro Reservoir (NDPC1)
Stanislaus River - New Melones Reservoir (NMSC1)

Issuance Time: Oct 30 2015 at 8:09 AM PDT

Monthly Probability Plot

Monthly Volume Exceedance Values on the SAN JOAQUIN RIVER WSI - FNF
Latitude: 37.7 Longitude: -121.274
Forecast for the period 10/30/2015 - 10/01/2016
This is a conditional simulation based on the current conditions as of 10/30/2015
(src=D)



Monthly Streamflow Volume (1000s of Acre-Feet)												
Prob	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
10%	31.2	200.9	428.3	660.7	850.4	968.4	1196.9	2169.0	2121.2	964.3	307.5	126.4
25%	30.7	84.7	172.0	375.0	483.1	664.4	969.5	1855.5	1391.5	564.2	165.0	80.5
50%	30.7	46.7	95.6	173.4	309.1	466.4	727.8	1207.8	919.1	292.2	89.1	48.8
75%	30.7	33.9	43.6	80.0	169.6	326.8	543.4	833.8	489.5	129.9	54.5	32.2
90%	30.7	25.7	23.7	45.6	98.4	251.2	396.0	540.7	234.4	71.5	33.7	21.5
Avg	73.5	144.5	251.8	433.5	480.6	612.0	821.5	1374.6	1100.6	461.4	137.7	75.0
MP/Avg	41.8	32.3	38.0	40.0	64.3	76.2	88.6	87.9	83.5	63.3	64.7	65.1

Note: MP/Avg is the "Most Probable Monthly Value (50%)" divided by the "Monthly Avg" (displayed as a %)

Text Product (RNOWRKMPV)

Monthly Streamflow Volumes

SAN JOAQUIN VALLEY - WATER RESOURCES INDEX (VNSC0)

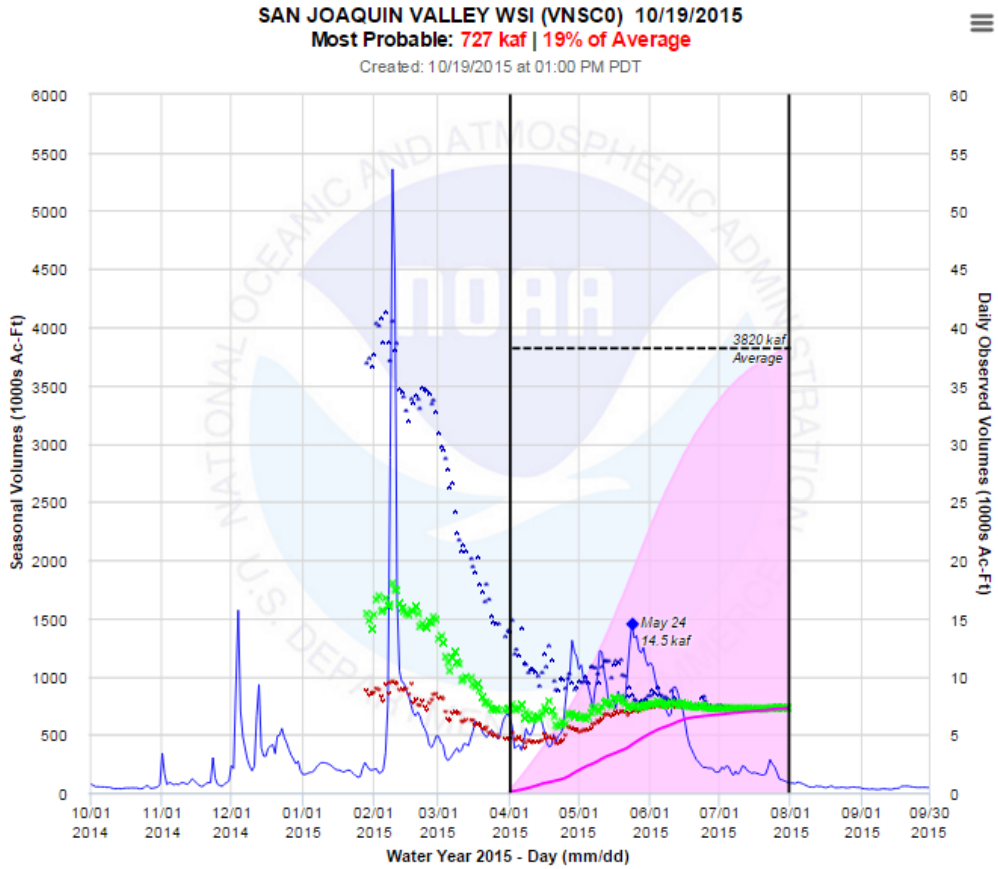
San Joaquin River - Millerton Reservoir (FRAC1)
Merced River - Exchequer Reseroivr (EXQC1)
Tuolumne River - New Don Pedro Reservoir (NDPC1)
Stanislaus River - New Melones Reservoir (NMSC1)

Issuance Time: Oct 19 2015 at 12:59 PM PDT

2015 Seasonal Trend Plot (Year View)

Tabular View | Select a Different Water Year: 2015

Switch to Seasonal View



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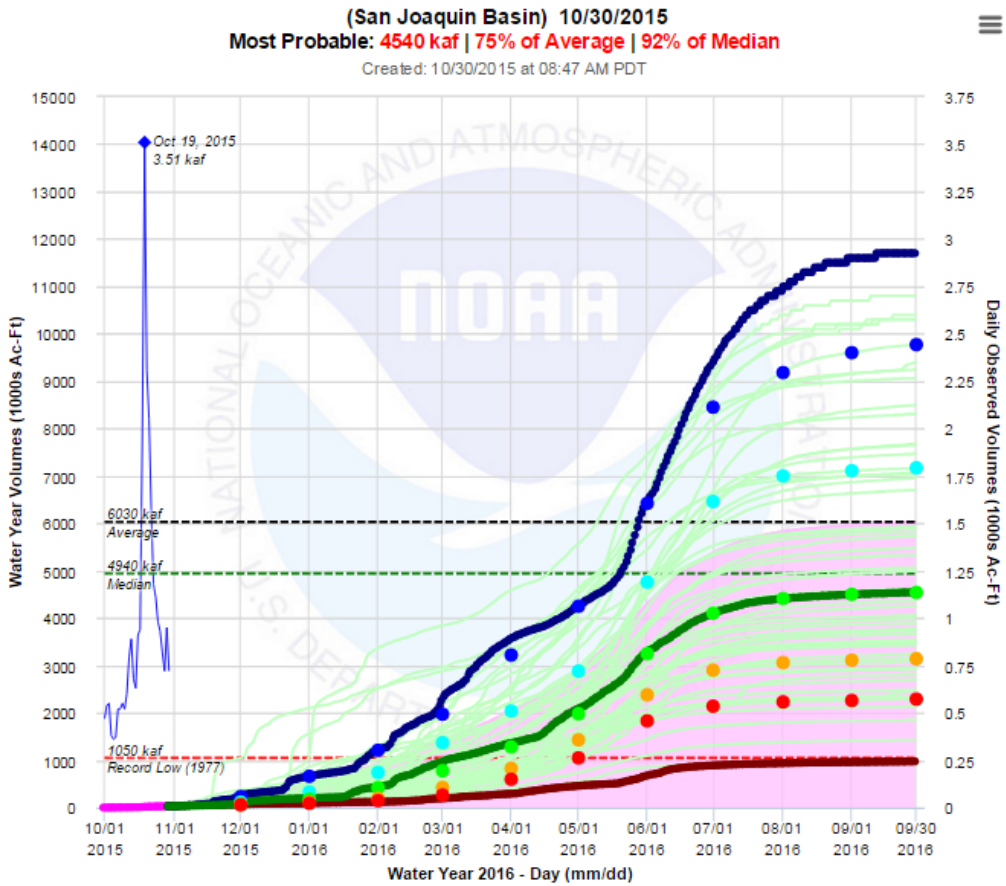
Issuance Time: Oct 30 2015 at 8:51 AM PDT

2016 Water Year Accumulated Volume Plot

CSV Ensemble File Download: Forecast Group



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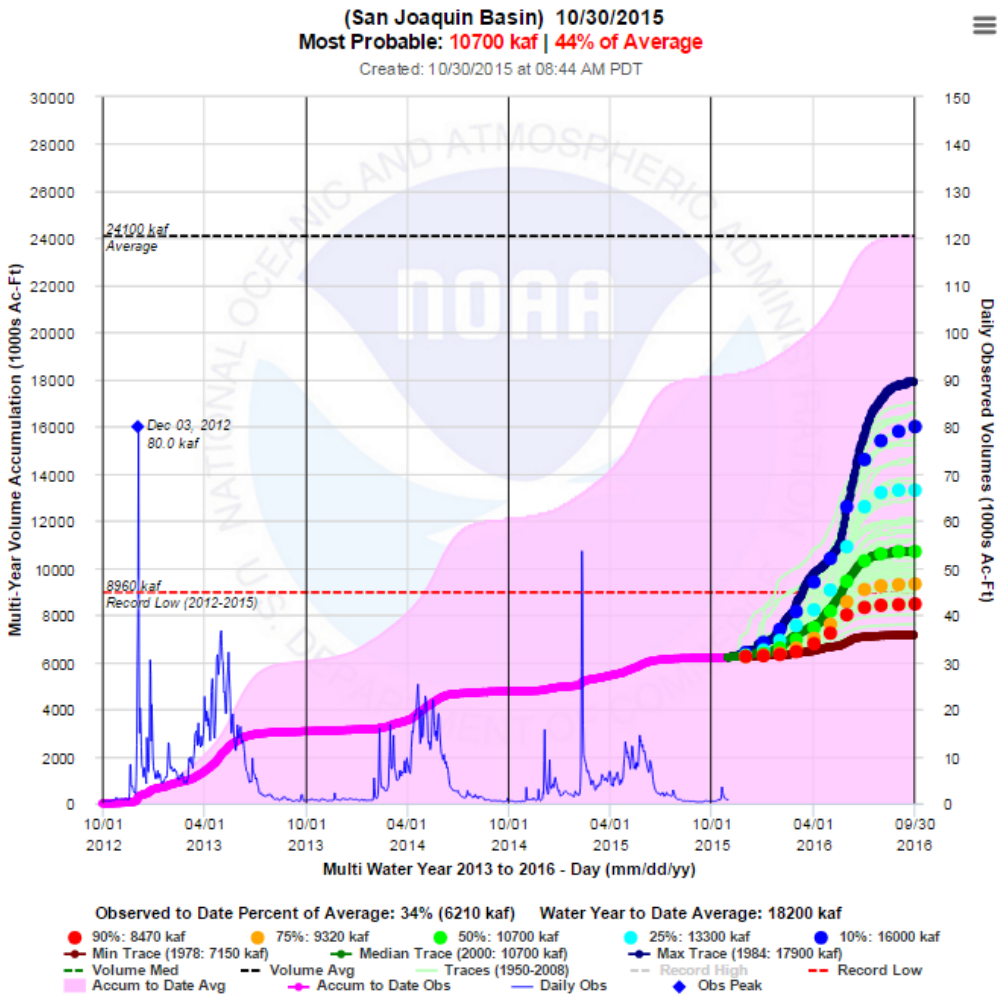
Issuance Time: Oct 30 2015 at 8:48 AM PDT

2016 Multi-Year Accumulated Volume Plot

CSV Ensemble File Download: Forecast Group



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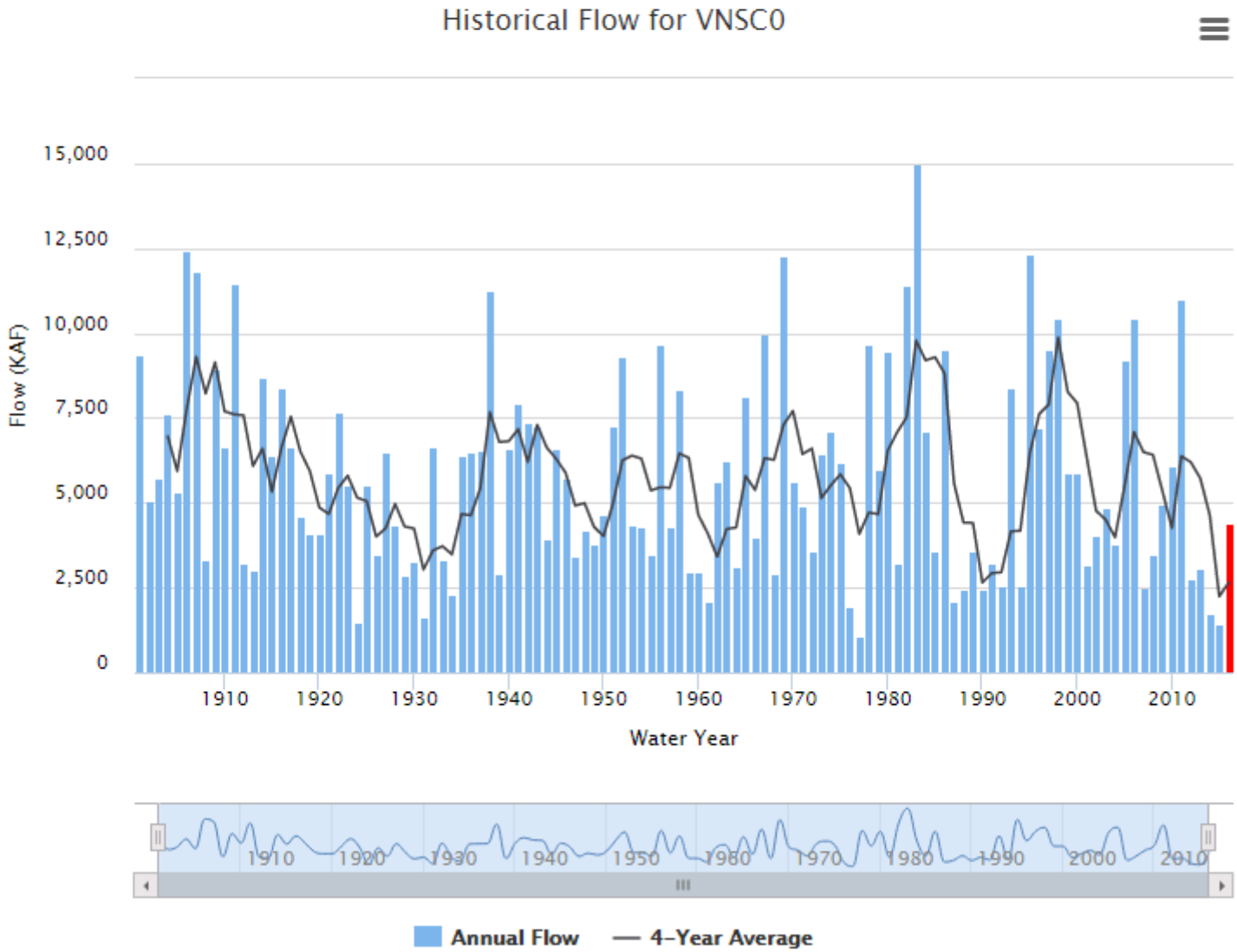
Issuance Time: Oct 29 2015 at 8:13 AM PDT



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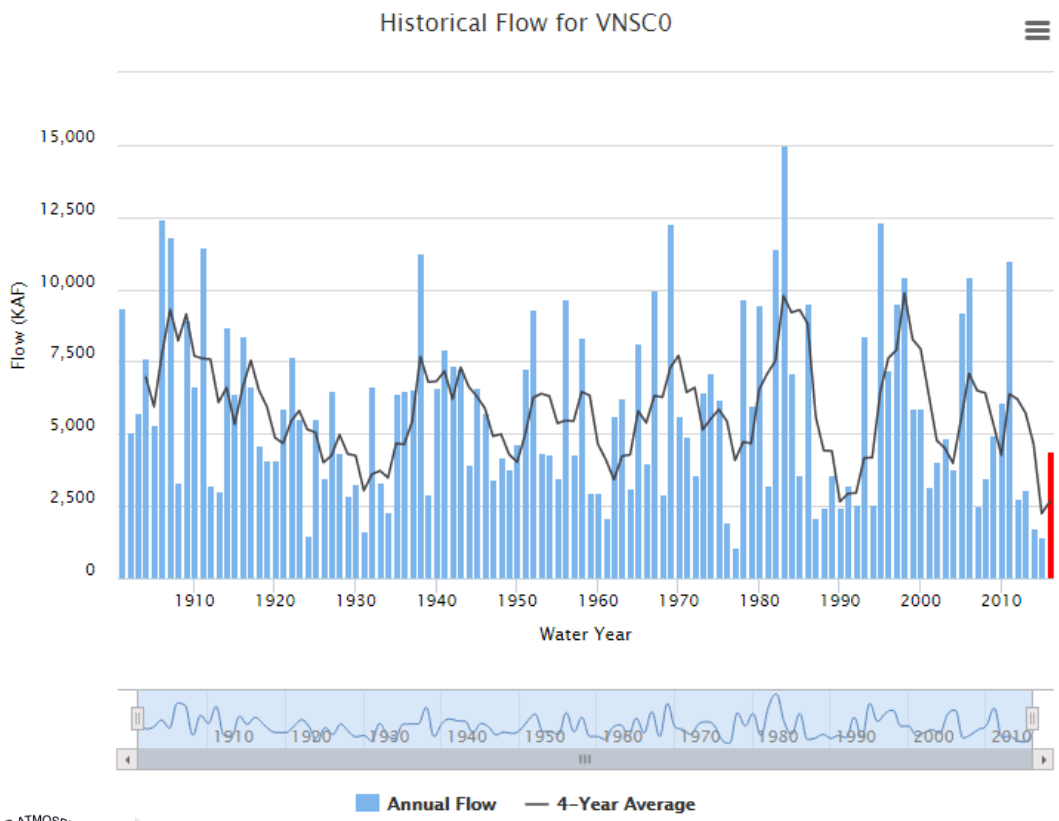

Rank	Year	Annual Flow	4-Year Average
1	1977	1049.6	
2	2015	1433.7	
3	1924	1500.0	
4	1931	1659.8	
5	2014	1719.5	
6	1976	1969.2	
7	1987	2083.0	
8	1961	2095.5	
9	1934	2283.8	
10	1990	2460.4	

Rank	Year	Annual Flow	4-Year Average
1	2015		2239.8
2	1990		2645.7
3	2016		2649.9
4	1991		2926.2
5	1992		2951.5
6	1931		3030.3
7	1962		3410.9
8	1934		3478.1
9	1932		3595.9
10	1933		3720.0

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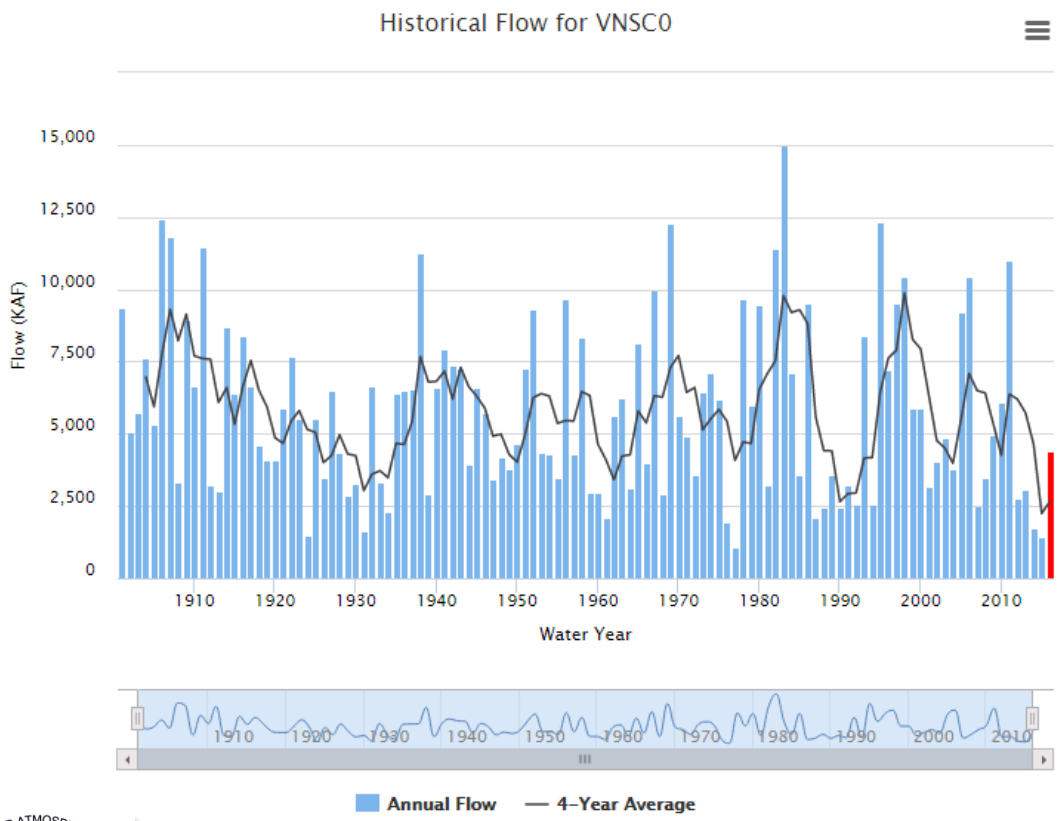

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California Nevada River Forecast Center

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