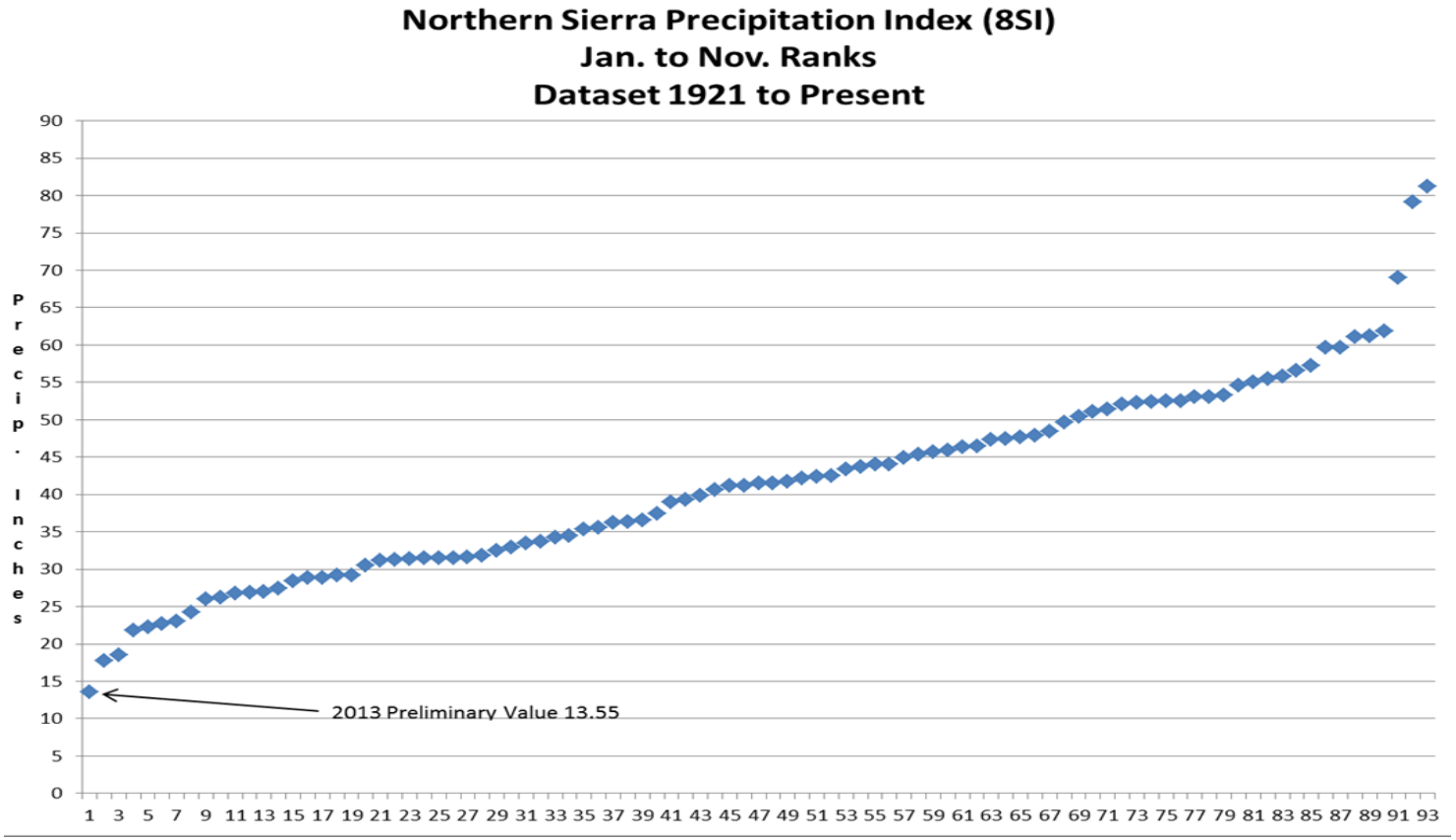
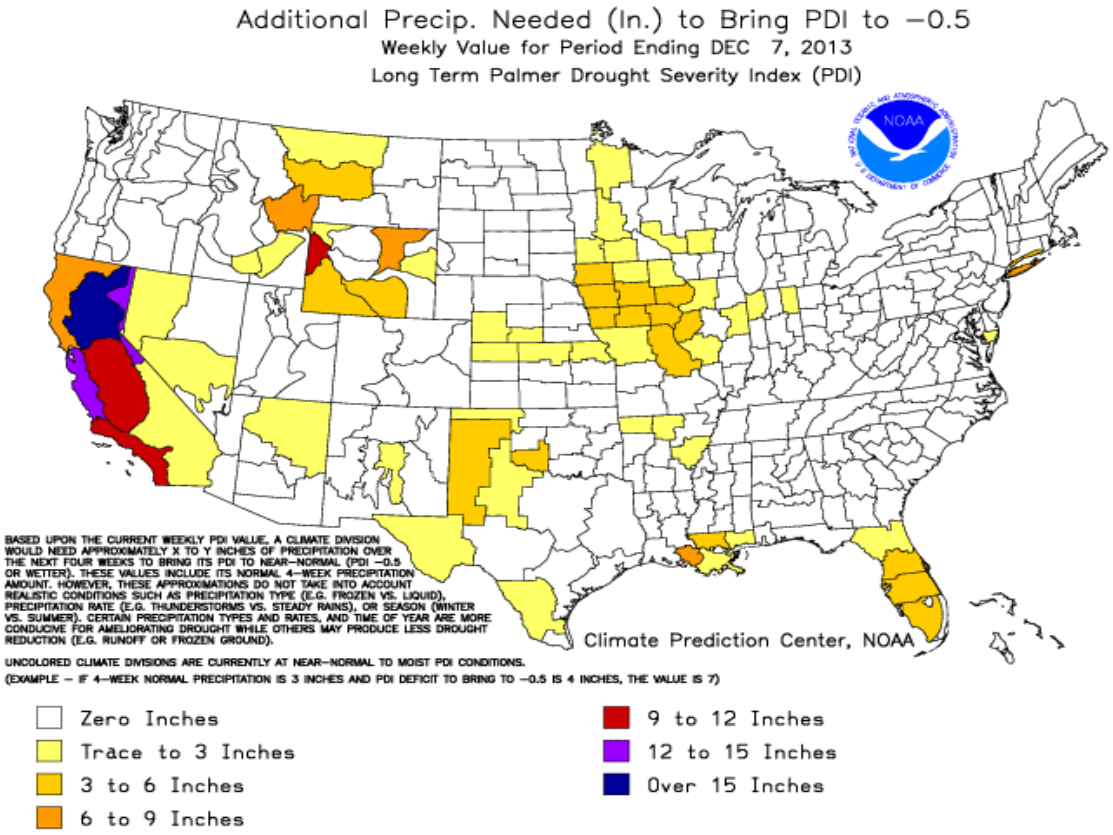
December 2013 Hydrology Status

Calfed Ops Dec. 11

Northern Sierra Precipitation 8 Station Index (8SI)
Jan. 1 thru Nov. remains at historically low values



Note: Need approx. 5” of precipitation in Dec. in order to surpass Cal. Year 1976 at 18.89 inches as the lowest Cal. Year in the 1921-2013 dataset.

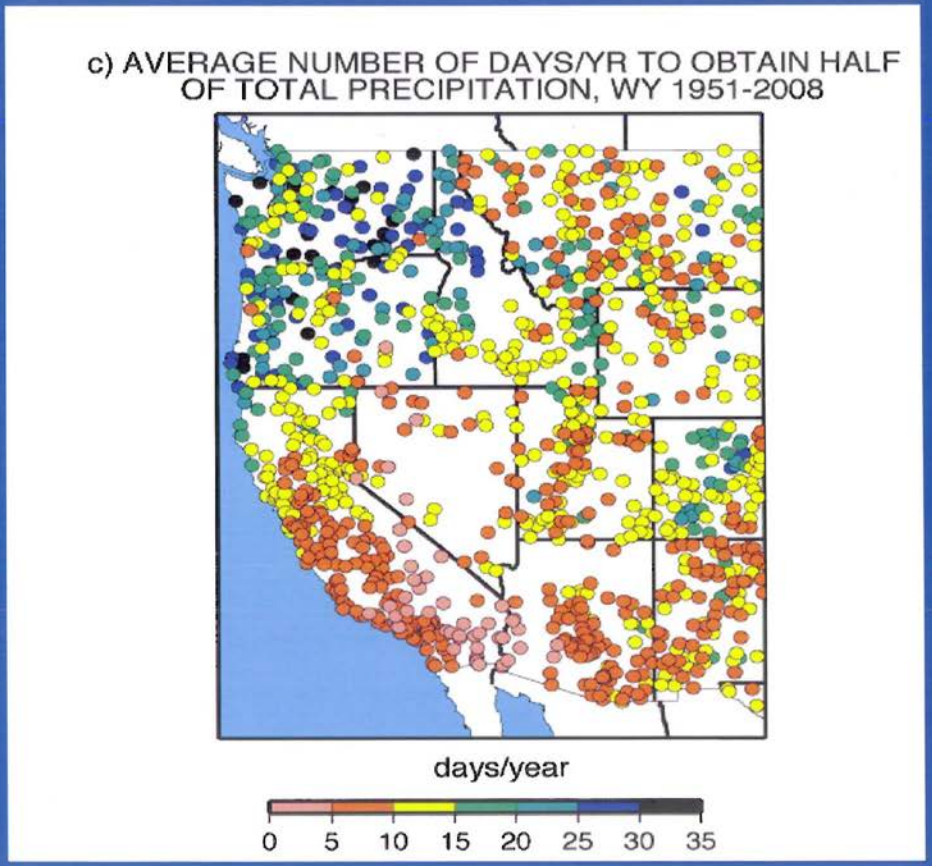


Current Rainfall “Deficit” Illustration

Key Point – Rainfall “Deficit” is on the order of approx. 2 average winter months for the Sacramento and San Joaquin Basins in order to return to more normal rainfall/flow expectations.

Key Point – Precipitation in California is HIGHLY variable and changes to precipitation totals and water supply projections for Cal. hydrologic basins can occur in relatively short timeframes this winter.

Storms and California Water Supply



Just a few storms each year are the core of California's water supplies

Dettinger et al, 2011

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. BUREAU OF RECLAMATION-CENTRAL VALLEY PROJECT-CALIFORNIA

DAILY CVP WATER SUPPLY REPORT

DECEMBER 9, 2013

RUN DATE: December 10, 2013

RESERVOIR RELEASES IN CUBIC FEET/SECOND

RESERVOIR	DAM	WY 2013	WY 2014	15YR MEDIAN
TRINITY	LEWISTON	322	317	300
SACRAMENTO	KESWICK	4,616	3,974	4,616
FEATHER	OROVILLE (SWP)	2,075	1,250	2,000
AMERICAN	NIMBUS	1,914	1,266	1,914
STANISLAUS	GOODWIN	278	205	281
SAN JOAQUIN	FRIANT	351	445	122

STORAGE IN MAJOR RESERVOIRS IN THOUSANDS OF ACRE-FEET

RESERVOIR	CAPACITY	15YR AVG	WY 2013	WY 2014	% OF 15 YR AVG
TRINITY	2,448	1,529	1,900	1,206	79
SHASTA	4,552	2,557	3,015	1,687	66
OROVILLE (SWP)	3,538	1,810	2,277	1,373	76
FOLSOM	977	413	584	221	53
NEW MELONES	2,420	1,502	1,542	1,040	69
FED. SAN LUIS	966	561	588	295	53
MILLERTON	520	245	263	238	97
TOT. N. CVP	11,360	6,563	7,629	4,449	68

ACCUMULATED INFLOW FOR WATER YEAR TO DATE IN THOUSANDS OF ACRE-FEET

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	15 YR AVG	% OF 15 YR AVG
TRINITY	18	21	123	71	25
SHASTA	403	531	773	636	63
FOLSOM	68	94	601	183	37
NEW MELONES	69	0	262	96	72
MILLERTON	33	58	323	117	28

ACCUMULATED PRECIPITATION FOR WATER YEAR TO DATE IN INCHES

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	AVG (N YRS)	% OF AVG	LAST 24 HRS
TRINITY AT FISH HATCHERY	1.87	1.25	11.94	8.23 (51)	23	0.00
SACRAMENTO AT SHASTA DAM	2.53	1.63	16.17	14.38 (56)	18	0.00
AMERICAN AT BLUE CANYON	5.61	3.27	27.02	14.84 (38)	38	0.00
STANISLAUS AT NEW MELONES	2.32	0.00	11.21	5.58 (35)	42	0.00
SAN JOAQUIN AT HUNTINGTON LK	2.07	1.80	19.80	8.00 (38)	26	0.00

Current Project Hydrologic Conditions

- Major reservoir storage to date is significantly lower than year ago
- Cumulative inflow to major reservoirs to date is quite weak
- Precipitation to date is at low percentages of normal rates.
- Storage water supply is becoming concerning under continued dry conditions.

December 1st Water Supply Index Projections

December 1st 2013 Water Supply Index Projections

Exceedence Forecast	Sacramento Valley Index (SVI)		San Joaquin Valley Index (SJI)		Sac. River Index *
	Value	Yeartype	Value	Yeartype	Value (MAF)
50%	5.6	Dry	2.1	Crit/Dry line	12.2
75%	4.4	Critical	1.4	Critical	8.4
90%	3.7	Critical	1.0	Critical	6.2
99%	2.9	Critical	0.7	Critical	3.8

Note: SWRCB D-1641 has unique objectives and conditions for any single year projected at less than 8.1 MAF at an 90% exceedence value. Values below 8.1 MAF are indicators of extreme or extraordinary dry hydrologic conditions

Hydrologic Conditional Delta Objectives in the near future

1) January Delta Outflow is conditioned based on the Eight River Index (8RI) in December. If the 8RI is less than or equal to 800 TAF then January Delta Outflow objective remains at 4500 cfs, otherwise the January Delta Outflow objective increases to 6000 cfs.

Based on December 1st forecast projections

Dec 1 Exceedence Level	Estimate of 8RI for December 2013 (TAF)
50%	1226
75%	746
90%	527
99%	297

Hydrologic Conditional Delta Objectives in the near future

1) February Delta Outflow objectives are conditioned based on the 8RI in January. The minimum Delta Outflow objective is 7100 cfs on a 3 day average. The number of Chipps Island X2 days objective is linearly interpolated based on the January 8RI between the values of 800 TAF and 1 MAF (0 to 28 days).

   Additionally, "The Salinity Starting Gate" objective at the Collinsville gage in D-1641 is conditioned based on the 8RI in January. Values less than 650 TAF, no starting gate is required. In the range of 650 TAF to 900 TAF, the Executive Director of the SWRCB is delegated authority to decide this objective. Greater than 900 TAF, the "The Salinity Starting Gate" objective applies.

Based on December 1st forecast projections

Dec 1 Exceedence Level	Estimate of 8RI for January 2014 (TAF)
50%	1757
75%	970
90%	676
99%	372

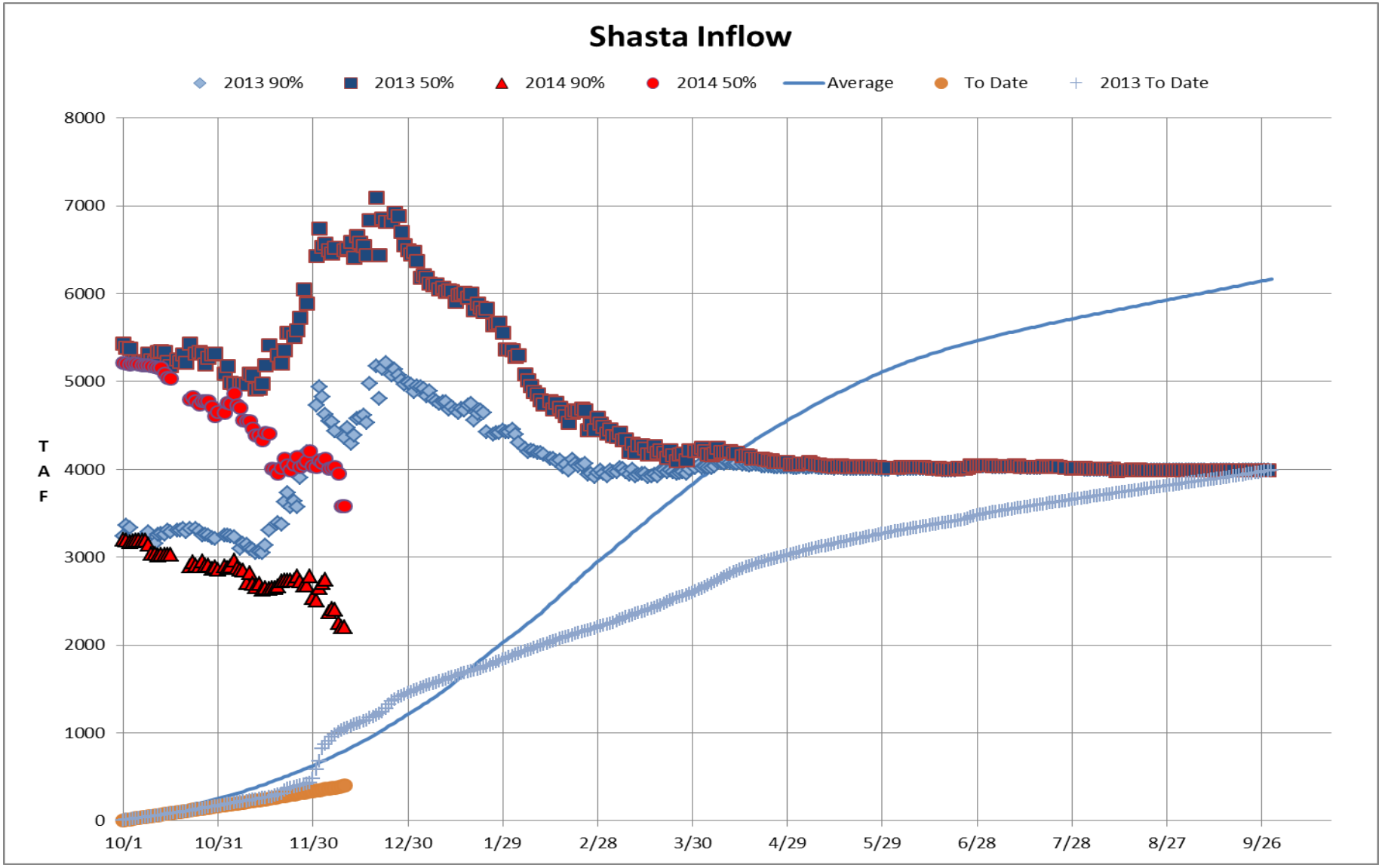
Hydrologic “Tracking”

- Useful new products and projections from NOAA – River Forecast Center (RFC) – for “tracking” hydrologic projections and trends in near real time.
- There is a wealth of water supply information at http://www.cnrfc.noaa.gov/water_supply.php
- The information for next slides is readily available and easily updated.

RFC Ensemble Water Supply Projections

- RFC ensemble methodology allows for “tracking” of projection exceedences by day of year.
- Useful for communication of hydrologic trends and to evaluate response to active hydrology changes of significance.
- Helps to answer the; How much did the storms of XX date help in the big annual water supply picture of hydrology or exceedence evaluation.

Example Sac Basin WY2013 RFC trace vs. WY2014 RFC trace



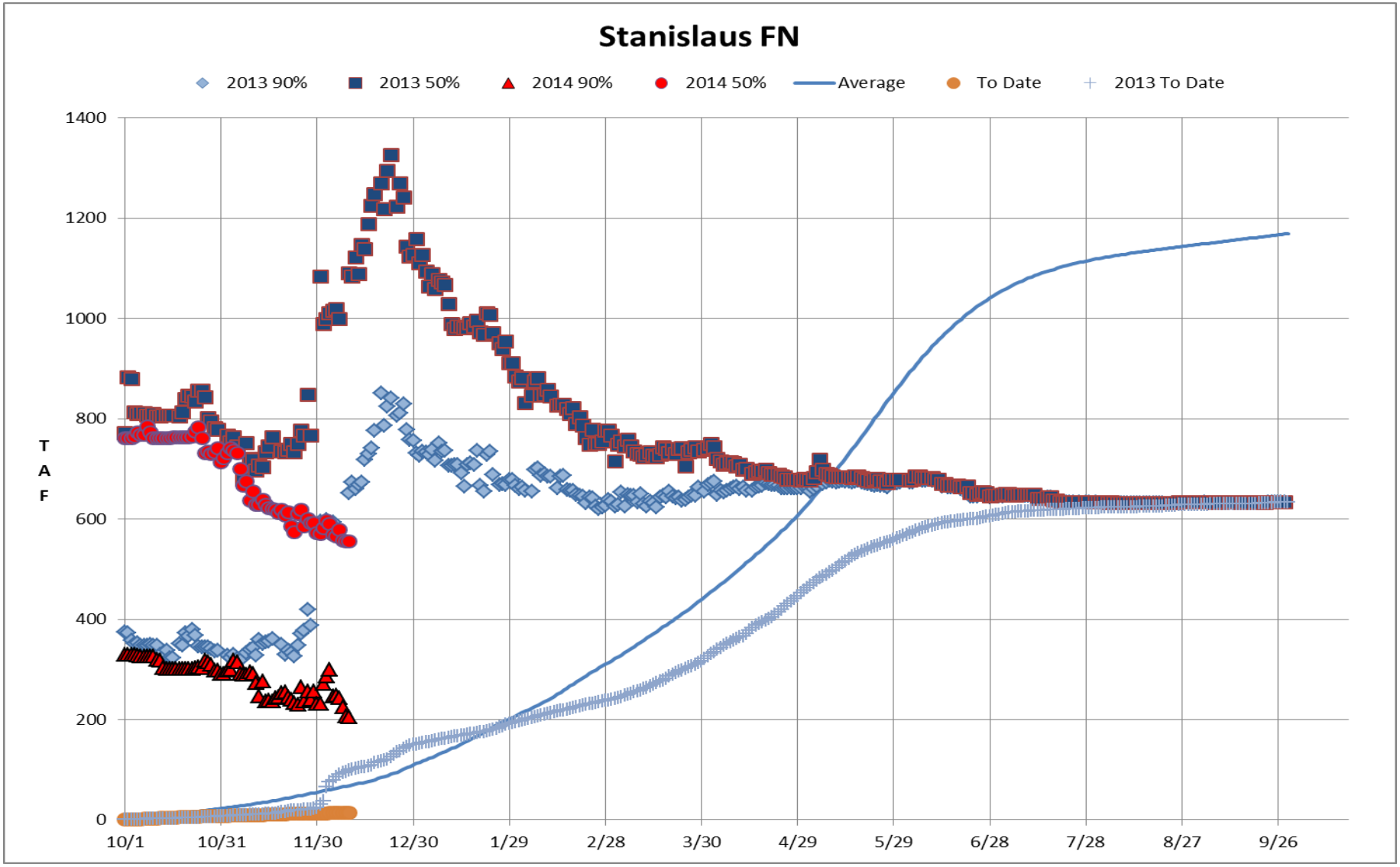
Key Points

- WY 2013 50% and 90% exceedence tracing reflect the wet conditions of Nov./Dec. 2012 followed by the extreme dry trend after Jan. 1.
- The “spread” difference between the 50% and 90% is based on longterm statistical relationships that generally narrow between Jan. 1 and Apr. 1.
- WY 2014 exceedence tracings reflect the continuing dry conditions and low natural flows being experienced due to the prolonged dry precipitation trend.

Key Points

- The WY2014 50% exceedence projection is currently nearly the same annual water supply production as WY2013 actual water supply production.
- The current 90% exceedence “trend” has a negative slope indicating that current hydrologic conditions are running below longterm 90% exceedence trends.

Example San Joaq. Basin WY2013 RFC trace vs. WY2014 RFC trace



Key Usefulness of “Tracking” Plots

- WY2014, to date, is currently exceptionally dry and with little historical precedence for the extreme antecedent conditions.
- There is still time to for storms to change the “picture” for California water supply this winter.
- Common communication of the hydrologic projections in near real time.