



## United States Department of the Interior

BUREAU OF RECLAMATION  
Central Valley Operations Office  
3310 El Camino Avenue, Suite 300  
Sacramento, California 95821

IN REPLY  
REFER TO:

**MAR 17 2017**

CVO-100  
WTR-2.00

VIA ELECTRONIC MAIL

Ms. Maria Rea  
Assistant Regional Administrator  
California Central Valley Area Office  
National Marine Fisheries Service  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814



Subject: Transmittal of March 2017 Reservoir Operations Forecasts Per RPA I.2.3

Dear Ms. Rea:

The 2017 Water Year has been one of the wettest water years on record for the Central Valley Project (CVP), and has necessitated that Bureau of Reclamation (Reclamation) take an approach to the determination of CVP water supply allocations that has deviated from our historical practices. On February 21, 2017, Reclamation provided an email to you summarizing the extreme hydrologic conditions experienced during the month of February, and explaining why allocations to CVP contractors that take water directly from Folsom, New Melones, and Millerton Reservoirs were warranted at that time, but that allocations to portions of the CVP more directly affected by Shasta Dam operations should be deferred until March forecasts were available. This was done to ensure updated runoff forecasts could be used to project Sacramento River temperature management operations. You provided concurrence with that approach on February 23, 2017. Reclamation received updated runoff forecasts from the California Department of Water Resources on March 8, 2017, and Reclamation has used those forecasts as the basis for projections of CVP operations and Sacramento River temperature operations for the remainder of Water Year 2017.

The current status of the cold water pool at Shasta Lake is very similar to the pool conditions observed in the most recent very wet years where we have sampling available. Enclosure 1 depicts the March cold water volumes for 2006, 2011, 2012 and 2016 along with the readings for this year. As we project conditions ahead to late May this year, Enclosure 2 depicts the end

of May cold water volumes for 2006, 2011, 2012 and 2016 along with the current model projections (both the 90% and 50% exceedance hydrology) for this year. Water years 2006, 2011, 2012 and 2016 all produced excellent cold water conditions in the Sacramento River given the ample volume of cold water in the lake, higher release rates, as well as the overall volume of water allowing for full functionality of the Temperature Control Device. Based on the current projected storage values, Enclosure 3 would indicate that a seasonal temperature target location downstream of Balls Ferry is achievable based on our past experience.

Consistent with your February 23, 2017 concurrence, and the 2009 National Marine Fisheries Service (NMFS) Biological Opinion Reasonable and Prudent Actions (RPA) Action number I.2.3, please find enclosed our latest Sacramento River temperature model results for the range of projected operations over the coming spring and summer. These analyses are based on March hydrologic conditions and an updated forecast of reservoir inflows assuming both a 90% exceedance hydrology, and a 50% exceedance hydrology. In both cases, these simulations were structured to maintain a 52° F daily average temperature (DAT) for the release of water at Keswick Dam throughout the temperature management season. As was designed last year, we have targeted the 52° F Keswick release temperature as an early season surrogate to allow flexibility for in-season adjustments to temperature target metrics based on ultimate spawning locations and water temperature management strategies.

The 90% exceedance hydrologic outlook forecasts Shasta Lake storage at 4.25 million acre-feet (MAF) at the end of May 2017 and 2.90 MAF at the end of September 2017. For the 50% exceedance hydrologic outlook, Shasta Lake storage is forecasted to be 4.42 MAF at the end of May and 3.18 MAF at the end of September. For the enclosed early season temperature runs, we have used a data set to simulate meteorological conditions through the season at the historic average. The reason this exceedance was selected was that using the combination of both a 90% exceedance hydrology and historic 10% exceedance meteorology data set would produce a model run with a joint exceedance probability much higher than 90% exceedance, which does not appear to be appropriate given the current extremely wet conditions and large projected volume of cold water pool in 2017. In addition, as explained in more detail below, the focus of these model results was the release temperature at Keswick Dam, which is much less sensitive to meteorological conditions than temperature projections further downstream. Starting with next month's model updates, we anticipate using the 10% exceedance LT3M projections provided by the National Oceanic and Atmospheric Administration Climate Center, and/or other projections as appropriate.

Given the expected range of hydrology, projected system operations, and assumed meteorological conditions, maintenance of release temperatures from Keswick Dam at 52° F DAT is projected through the entire management season. As identified in previous NMFS correspondence such as your letter dated March 18, 2016, regarding forecasts in 2016, this

release temperature should be adequate to manage temperatures downstream to the gage near the confluence with Clear Creek (CCR gage location) within a 53° F DAT, as well as a target of 56° F DAT between Balls Ferry and Jellys Ferry this year. These metrics are in conformance with both the existing RPA, as well as the study described in Reclamation's January 25, 2017, letter to you. That study would provide for operations targeting 53° F DAT near the Clear Creek confluence as a surrogate for a target of 55° F seven day average daily maximum at the most downstream winter run redd this coming season.

The extremely wet hydrology this year has created very favorable water supplies conditions throughout the CVP. Based on the evolution of the hydrologic and storage conditions over the past six weeks, the management of Shasta Dam releases during the 2017 water year is projected to play much less of a role in the ability to meet CVP allocations than in most years. In 2017, we expect excess Delta outflow through the summer along with high reservoir releases throughout the system leading into next year's flood season. The South of Delta CVP allocations will also be greatly dependent on the magnitude and duration of the San Joaquin Basin snowmelt which could be at record levels this year. The runoff and operations projections for the San Joaquin River, duration of time that San Luis Reservoir is not needed to meet south of Delta water supply demands, and other operational considerations south of the Delta, are not influenced by Shasta Dam operations, but will all significantly influence the ultimate South of Delta allocations.

Given the overall projected system operations and hydrologic conditions described above, we conclude that the following initial CVP allocations are reasonable at this time:

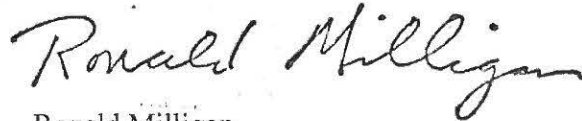
<b>March 90% Exceedance</b>				
<b>Municipal &amp; Industrial Water Service Contracts – Agricultural Water Service Contracts</b>				
	North of Delta M&I	North of Delta Agricultural	South of Delta M&I	South of Delta Agricultural
Allocation	100%	100%	90%	65%

Considering the overall conditions described above, we do not foresee any need to adjust these allocations significantly in the unlikely event that Shasta Dam operations need to be altered to continue to meet the temperature targets identified in our January 25, 2017, letter or the compliance metrics identified in RPA I.2.4. Based on the current assessment of system operations, and that the conditions discussed above are consistent with RPA I.2.3.A, we request your concurrence with our proposed operational planning efforts.

Please know that your staff has been very helpful in providing technical assistance as we prepare our temperature management operations for the coming year, and we look forward to

our continued close coordination of our final Sacramento River temperature management plan later this spring. If you have any questions, please contact Jeff Rieker at 916-979-2197.

Sincerely,



Ronald Milligan  
Operations Manager

Enclosures 4

cc: Mr. Barry Thom  
Regional Administrator  
NOAA Fisheries West Coast Region  
1201 Northeast Lloyd Blvd., Suite 1100  
Portland, OR 97232

Mr. Paul Souza  
Regional Director  
Pacific Southwest Region  
U. S. Fish and Wildlife Service  
2800 Cottage Way  
Sacramento, CA 95825

Ms. Kaylee Allen  
Field Supervisor  
Bay Delta Fish and Wildlife Office  
U.S. Fish and Wildlife Service  
650 Capitol Mall, Suite 8-300  
Sacramento, CA 95814

Mr. Chuck Bonham  
Director  
California Department of Fish and Wildlife  
1416 Ninth Street  
Sacramento, CA 95814

Mr. William Croyle  
Acting Director  
California Department of Water Resources  
1416 Ninth Street  
Sacramento, CA 95814

Ms. Cindy Messer  
Chief Deputy Director  
California Department of Water Resources  
1416 Ninth Street  
Sacramento, CA 95814

Mr. John Leahigh  
Operations Control Office  
California Department of Water Resources  
3310 El Camino Avenue, Suite 300  
Sacramento, CA 95821

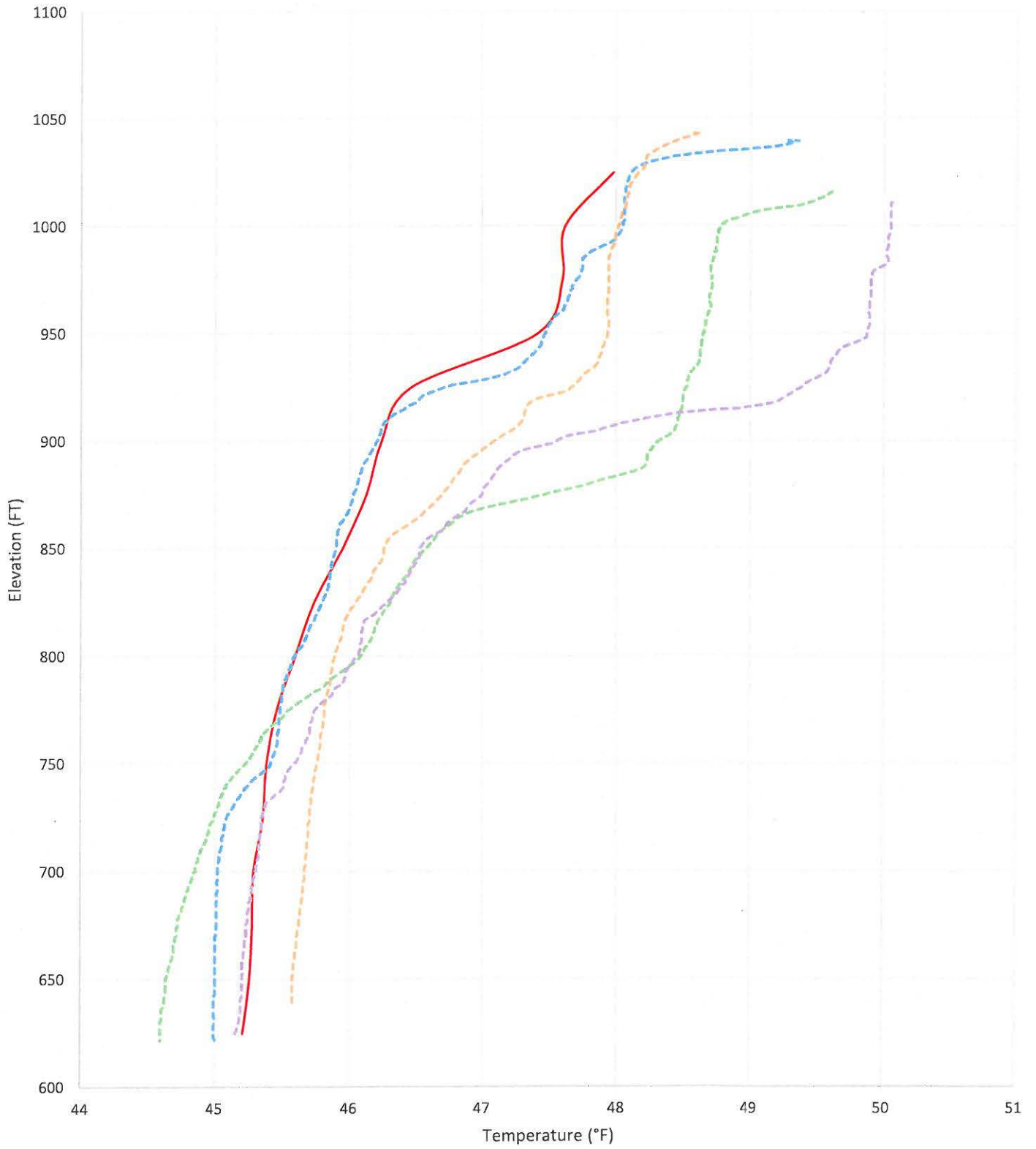
Mr. Pablo Arroyave  
Acting Regional Director  
Mid-Pacific Region  
Bureau of Reclamation  
2800 Cottage Way  
Sacramento, CA 95825

Ms. Michelle Banonis  
Area Manager  
Bay-Delta Office  
Bureau of Reclamation  
801 I Street, Suite 140  
Sacramento, CA 95814

Mr. Tom Howard  
Executive Director  
State Water Resources Control Board  
1001 I Street  
Sacramento, CA 95814

Enclosure 1

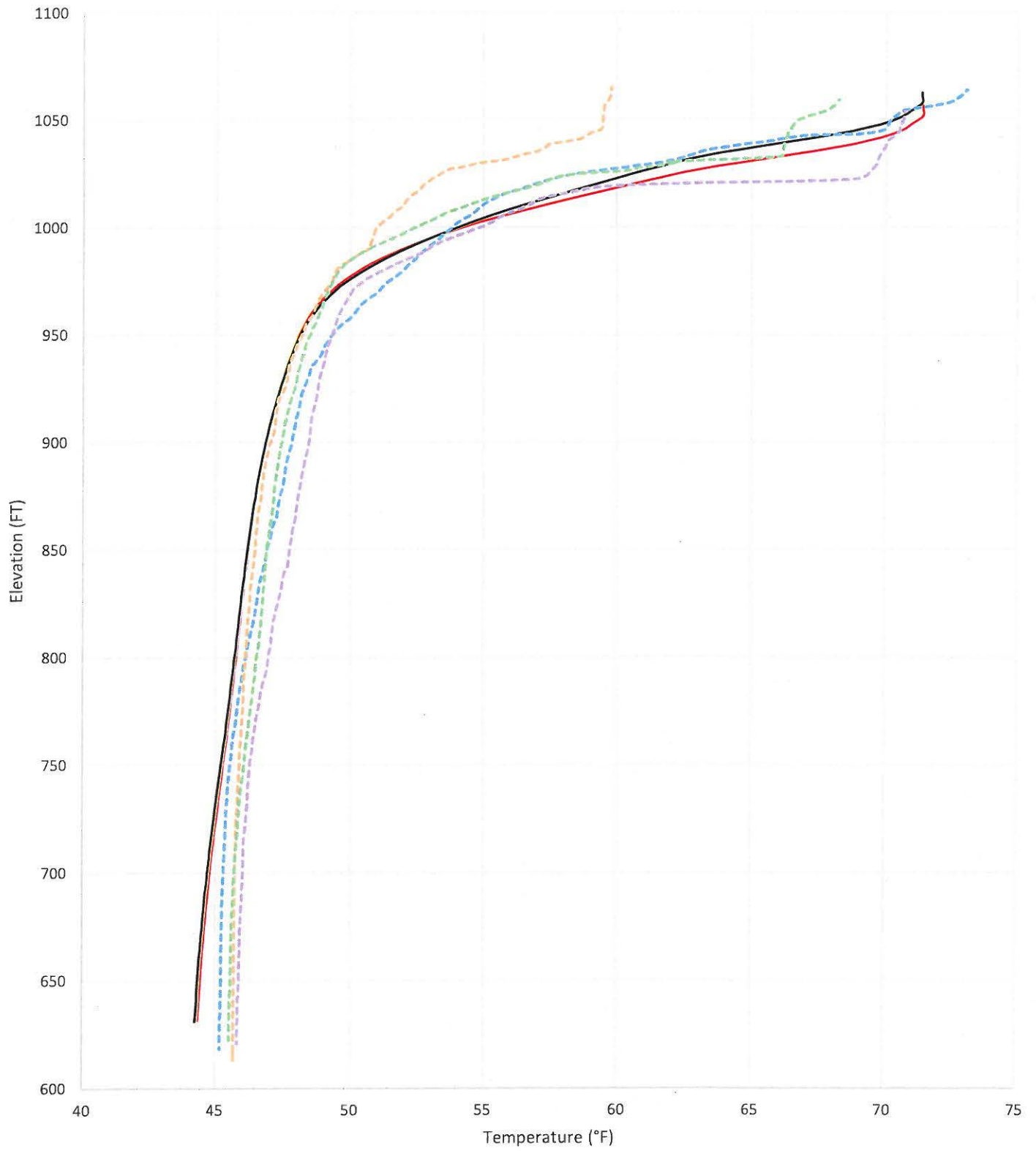
March 2017 vs Historic Shasta Temperature Profiles



— 3/8/2017    - - - 3/23/2006    - - - 3/4/2011    - - - 3/8/2012    - - - 3/8/2016

Enclosure 2

March 2017 Forecasted End of May vs Historic Shasta Temperature Profiles

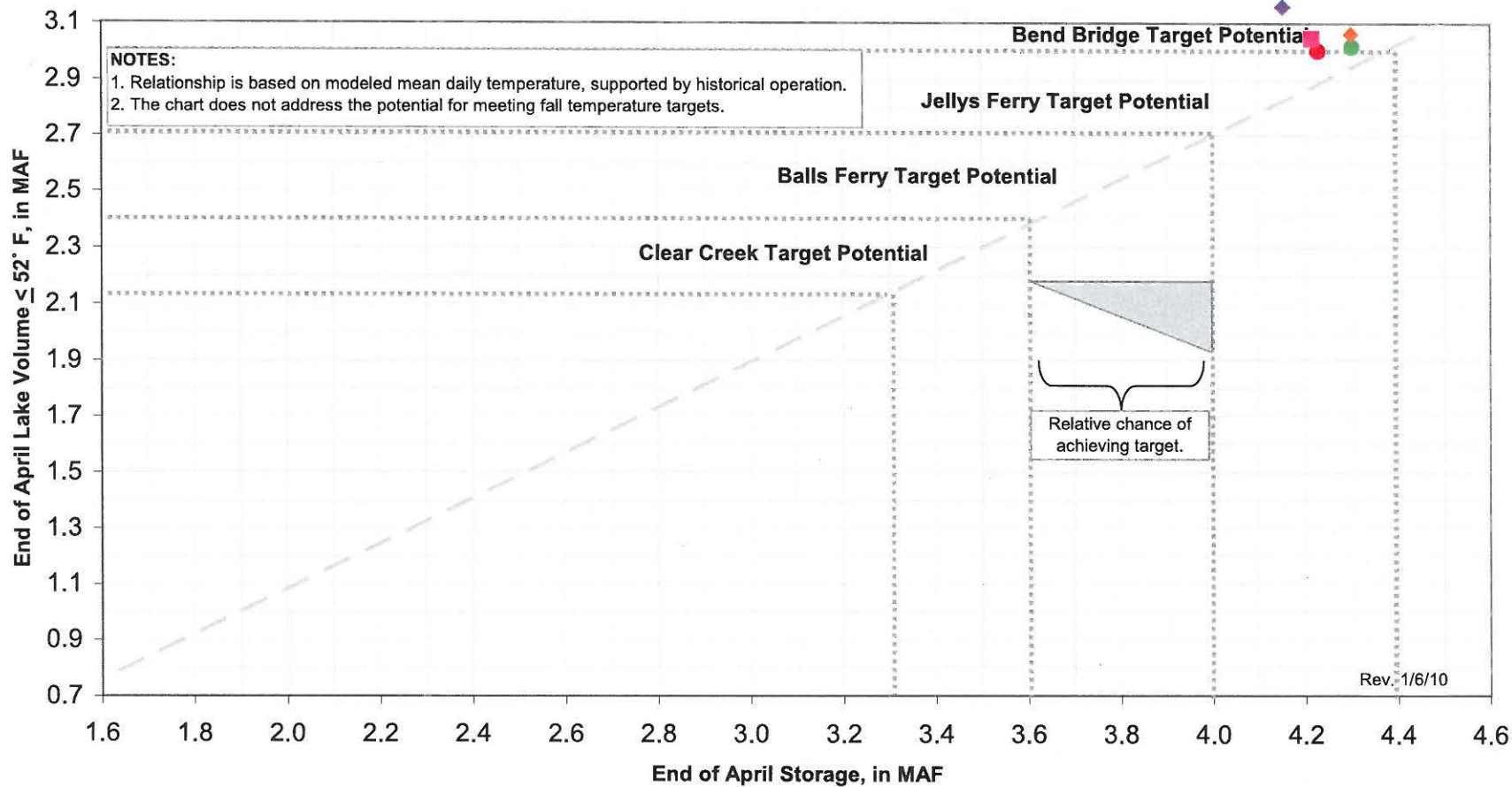


— 5/30/2017 (90%) — 5/30/2017 (50%) - - - 6/5/2006 - - - 6/2/2011 - - - 5/29/2012 - - - 5/31/2016



Enclosure 3

## Lake Shasta End of April Storage Potential for Meeting Compliance Point Target of 56° F (Apr-Sep)



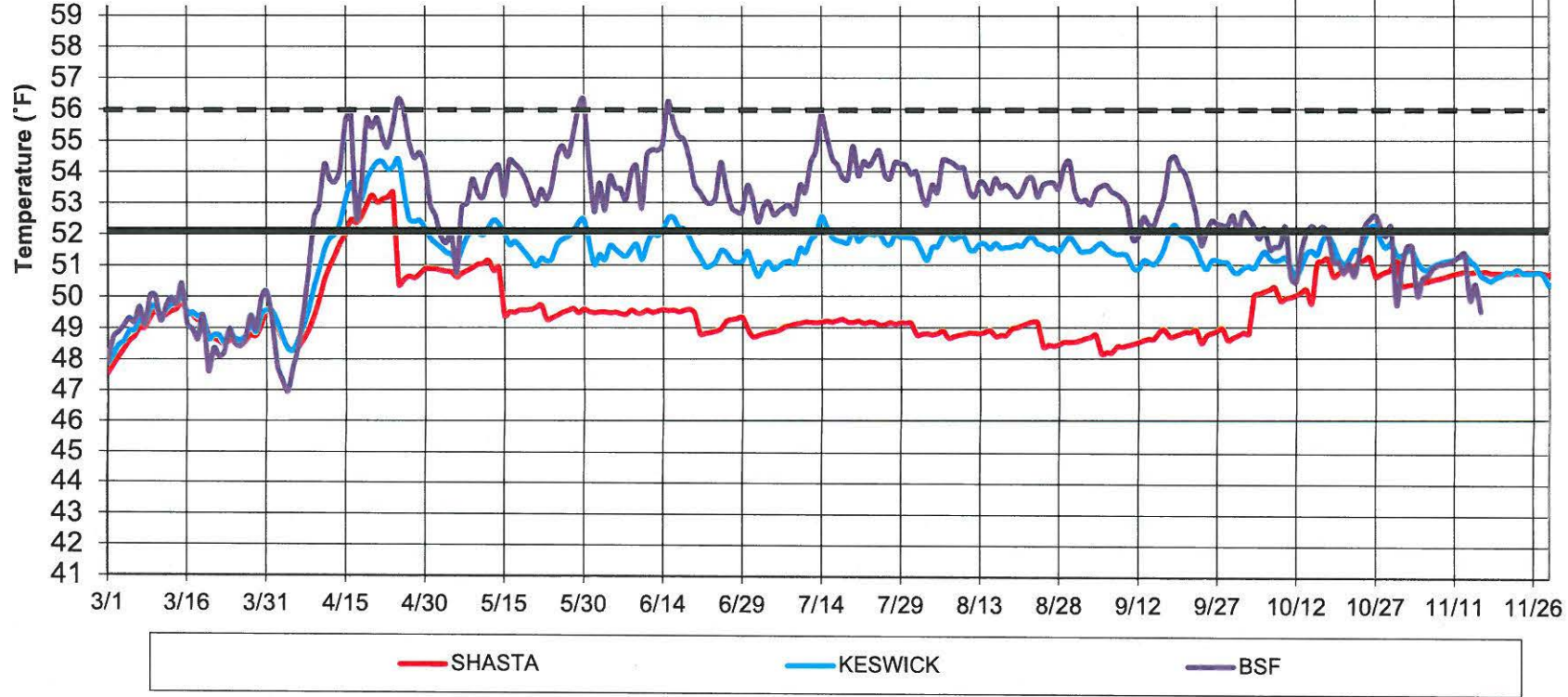
● 2017 (90%)    ● 2017 (50%)    ◆ 2006    ◆ 2011    ■ 2012    ■ 2016

Enclosure 4

**Sacramento River Modeled Temperature  
 2017 Mar 90%-Exceedance Water Outlook - Average Historical Meteorology  
 Approximately 52 degree at Keswick**

67 Kes Releases: April at 6,000, May at 8,500, June at 10,000, July at 12,000, Aug at 10,500, Sept at 8,500,  
 66 Oct at 7,000, and Nov at 4,500  
 65 **EOM April storage: 4.2 MAF & EOM Sept storage: 2.9 MAF**  
 64 Trinity profile date : 3/16/2017  
 63 Whiskeytown profile date: 3/9/2017  
 62 Shasta profile date: 3/8/2017  
 61 One Side gate: Sep 10, Full Side gates not used

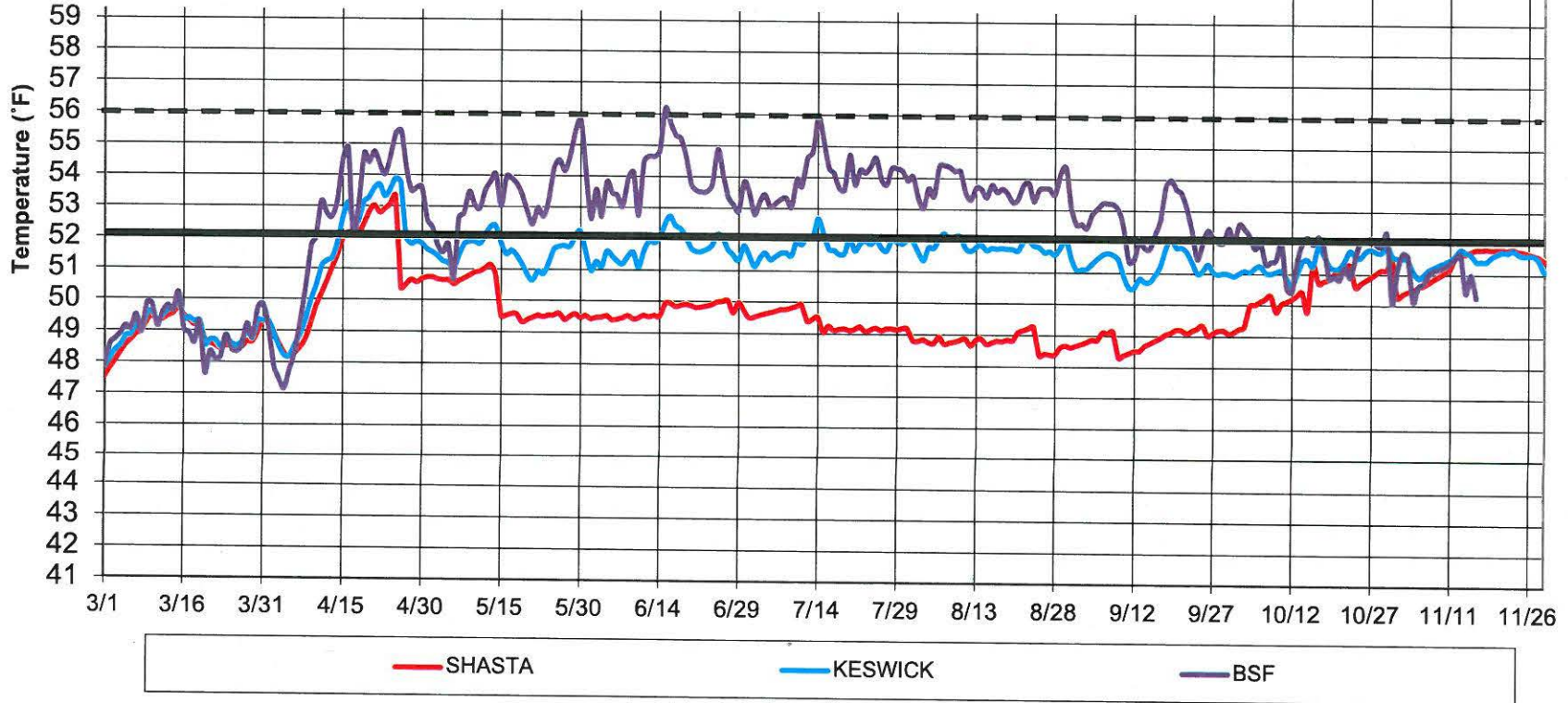
*Temp Run date: March 16, 2017*



**Sacramento River Modeled Temperature  
 2017 Mar 50%-Exceedance Water Outlook - Average Historical Meteorology  
 Approximately 52 degree at Keswick**

67 Kes Releases: April at 8,500, May at 9,500, June at 10,000, July at 12,000, Aug at 11,000, Sept at 10,000,  
 66 Oct at 8,000, and Nov at 5,500  
 65 **EOM April storage: 4.3 MAF & EOM Sept storage: 3.2 MAF**  
 64 Trinity profile date : 3/16/2017  
 63 Whiskeytown profile date: 3/9/2017  
 62 Shasta profile date: 3/8/2017  
 61 One Side gate: Sept 10, Full Side gates not engaged

*Temp Run date: March 16, 2017*



**Estimated CVP Operations Mar 2017 90% Exceedance**

**Storages**

**Federal End of the Month Storage/Elevation (TAF/Feet)**

		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Trinity		1922	2007	2111	2127	1992	1846	1722	1606	1574			
	Elev.	2341	2349	2350	2340	2330	2321	2312	2309				
Whiskeytown		224	206	238	238	238	238	230	206				
	Elev.	1199	1209	1209	1209	1209	1209	1207	1199				
Shasta		3779	3804	4225	4248	4026	3577	3169	2903	2716			
	Elev.	1040	1056	1057	1049	1032	1015	1003	995				
Folsom		404	580	759	966	944	784	647	539	415			
	Elev.	426	445	465	463	448	434	421	405				
New Melones		1578	1668	1712	1875	1990	1973	1919	1876	1846			
	Elev.	1021	1025	1041	1051	1050	1045	1041	1038				
San Luis		923	966	938	828	624	323	133	113	71			
	Elev.	543	534	510	480	446	424	417	404				
<b>Total</b>		9231	9984	10282	9814	8741	7827	7268	6829				

**State End of the Month Reservoir Storage (TAF)**

Oroville	Elev.	
San Luis		
Total San Luis (TAF)		

**Monthly River Releases (TAF/cfs)**

Trinity	TAF	18	32	260	150	68	28	27	23				
	cfs	300	540	4,225	2,526	1,102	450	450	373				
Clear Creek	TAF	11	13	13	9	7	5	9	14				
	cfs	175	218	216	150	120	85	150	225				
Sacramento	TAF	1045	357	523	595	738	645	506	430				
	cfs	17000	6000	8500	10000	12000	10500	8500	7000				
American	TAF	492	357	400	387	307	246	215	159				
	cfs	8000	6000	6500	6500	5000	4000	3618	2588				
Stanislaus	TAF	61	83	96	56	18	18	18	49				
	cfs	1000	1400	1555	940	300	300	300	797				
Feather	TAF												
	cfs												

**Trinity Diversions (TAF)**

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Carr PP	34	38	37	67	98	97	92	17				
Spring Crk. PP	60	8	30	60	90	90	90	30				

**Delta Summary (TAF)**

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Tracy	128	104	98	262	271	272	267	95				
USBR Banks	0	0	0	0	0	0	0	33				
Contra Costa	12.7	12.7	12.7	9.8	11.1	12.7	14.0	16.8				
<b>Total USBR</b>	141	117	111	272	282	285	281	145				
State Export												
<b>Total Export</b>												
COA Balance	0	0	0	0	0	0	-15	-16				
Old/Middle River Std.												
Old/Middle R. calc.	6,339	2,807	2,527	-3,388	-8,333	-8,358	-6,706	-4,244				
Computed DOI	72048	39233	33706	18558	8182	7109	11397	11403				
Excess Outflow	42848	16776	12184	4875	179	114	0	0				
% Export/Inflow	5%	8%	8%	28%	46%	49%	38%	30%				
% Export/Inflow std.	35%	35%	35%	35%	65%	65%	65%	65%				

**Hydrology**

Water Year Inflow (TAF)	Trinity	1850	Shasta	8,859	Folsom	6,865	New Melones	2417
Year to Date + Forecasted % of mean		153%		160%		252%		229%

**Estimated CVP Operations Mar 50% Exceedance**

**Storages**

**Federal End of the Month Storage/Elevation (TAF/Feet)**

		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Trinity		1922	2055	2223	2289	2197	2076	1928	1814	1785			
	Elev.	2345	2356	2360	2354	2346	2336	2328	2326				
Whiskeytown		224	206	238	238	238	238	238	230	206			
	Elev.	1199	1209	1209	1209	1209	1209	1207	1199				
Shasta		3779	3854	4308	4420	4213	3809	3468	3178	2949			
	Elev.	1042	1059	1063	1055	1041	1027	1015	1005				
Folsom		404	618	739	957	945	889	698	574	451			
	Elev.	430	443	464	463	458	439	425	410				
New Melones		1578	1711	1763	1939	2135	2166	2109	2062	1961			
	Elev.	1025	1030	1047	1064	1067	1062	1058	1049				
San Luis		923	966	1057	958	774	387	133	79	215			
	Elev.	543	536	518	502	463	436	420	417				
<b>Total</b>		9411	10327	10800	10502	9565	8574	7937	7567				

**State End of the Month Reservoir Storage (TAF)**

Oroville	
San Luis	
Total San Luis (TAF)	

**Monthly River Releases (TAF/cfs)**

Trinity	TAF	18	46	248	275	68	28	27	23				
	cfs	300	767	4,032	4,617	1,102	450	450	373				
Clear Creek	TAF	11	13	13	9	7	7	9	12				
	cfs	175	218	216	150	120	120	150	200				
Sacramento	TAF	1229	506	584	595	738	676	595	492				
	cfs	20000	8500	9500	10000	12000	11000	10000	8000				
American	TAF	492	506	523	565	307	307	238	198				
	cfs	8000	8500	8500	9500	5000	5000	4000	3219				
Stanislaus	TAF	74	97	120	65	26	25	24	123				
	cfs	1200	1633	1958	1100	429	400	400	2000				
Feather	TAF												
	cfs												

**Trinity Diversions (TAF)**

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Carr PP	66	51	9	13	97	128	91	16				
Spring Crk. PP	110	30	10	10	90	120	90	30				

**Delta Summary (TAF)**

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Tracy	132	253	154	262	270	273	265	270				
USBR Banks	0	0	0	0	0	0	0	44				
Contra Costa	12.7	12.7	12.7	9.8	11.1	12.7	14.0	16.8				
<b>Total USBR</b>	145	266	166	272	281	286	279	331				
State Export												
<b>Total Export</b>												
COA Balance	0	0	0	0	0	0	0	13				
Old/Middle River Std.												
Old/Middle R. calc.	6,379	6,044	4,608	-4,205	-7,227	-8,085	-5,723	-4,744				
Computed DOI	85029	72382	52755	30543	10509	10395	11800	11403				
Excess Outflow	55829	46142	26255	10220	2505	390	403	0				
% Export/Inflow	4%	6%	8%	24%	43%	44%	35%	35%				
% Export/Inflow std.	35%	35%	35%	35%	65%	65%	65%	65%				

**Hydrology**

Water Year Inflow (TAF)	Trinity	Shasta	Folsom	New Melones
Year to Date + Forecasted	2179	9,619	7,434	2687
% of mean	180%	174%	273%	254%

