



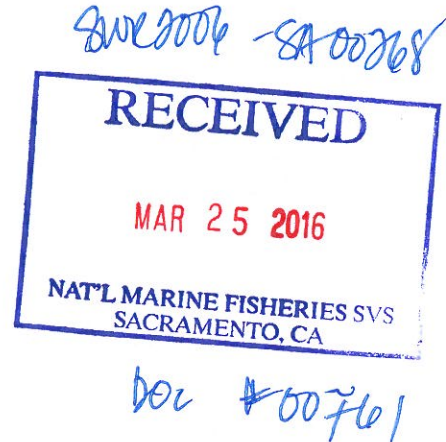
United States Department of the Interior

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

IN REPLY
REFER TO:

CVO-100
WTR-2.00

MAR 25 2016



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 2016 Reservoir Operations Forecasts Per RPA I.2.3

Dear Ms. Rea:

Consistent with your March 18, 2016, letter and the 2009 National Marine Fisheries Service Biological Opinion Reasonable and Prudent Actions (RPA) Action number I.2.3, please find attached our latest set of Sacramento River temperature model results for projected operations over the coming late spring and summer. These analyses are based on March 15, 2016, 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 through out the temperature management season.

The 90% exceedance hydrologic outlook forecasts Shasta Lake storage at 4.33 maf at the end of May 2016 and 3.03 maf at the end of September 2016. For the 50% exceedance hydrologic outlook, Shasta Lake storage is forecast to be 4.5 maf at the end of May and 3.18 maf at the end of September. For these temperature runs, we have used a data set to simulate warm meteorological conditions through the season at the 10% exceedance level.

Given this range of hydrology, projected system operations, and assumed meteorological conditions using a 10%, we were able to maintain the release temperatures from Keswick Dam at 52°F DAT through the entire management season. As outlined in your March 18 letter, this release temperature should be adequate to manage temperatures downstream to the Bonneyville Bridge (CCR CDEC gage location) within a 55°F 7-day average of the daily maximum

temperatures. This release temperature should also allow for a target 56°F DAT between Balls Ferry and Jellys Ferry this year.

These overall operations and hydrologic conditions described above support the following initial Central Valley Project allocations:

March 90% Exceedance Municipal & Industrial Water Service Contracts – Agricultural Water Service Contracts and Refuge Level 2 Contracts					
	North of Delta M&I	North of Delta Agricultural	South of Delta M&I	South of Delta Agricultural	Level 2 Refuge Supply
Allocation	100%	100%	55%	5%	100%

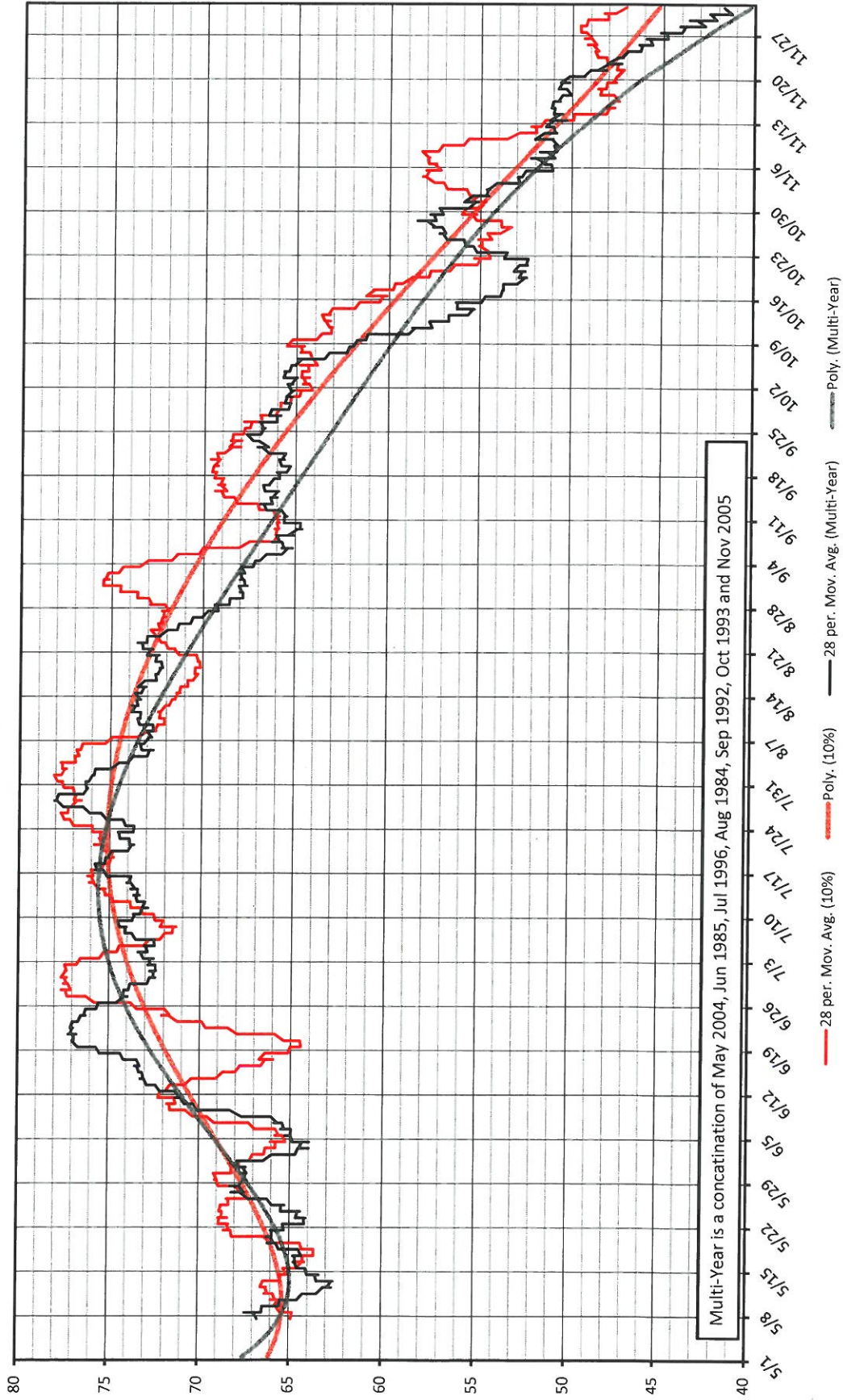
We believe these conditions are consistent with RPA I.2.3 A and the guidance provided in your 18 March letter, and we request your concurrence with our proposed operations and planning efforts. Please know that your staff has been very helpful in providing technical assistance as we prepare our temperature management plan for this critically important year ahead and we look forward to our continued close coordination of our operations plans. If you have any questions, please contact Ms. Elizabeth Kiteck at 916-979-2197 or Ms. Thuy Washburn at 916-979-2193.

Sincerely,

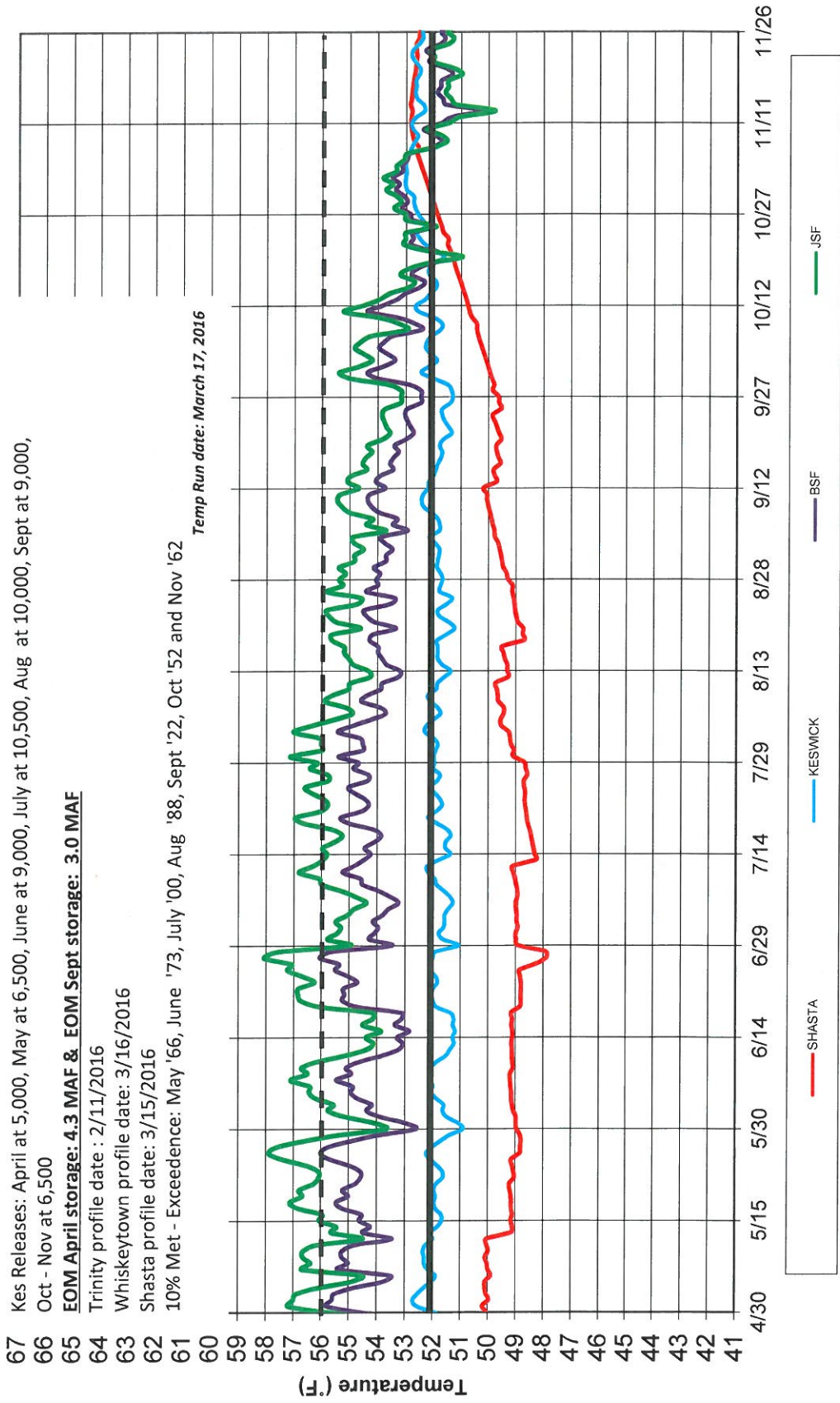


Ronald Milligan
Operations Manager

10% Historical Vs 2014 Simulation

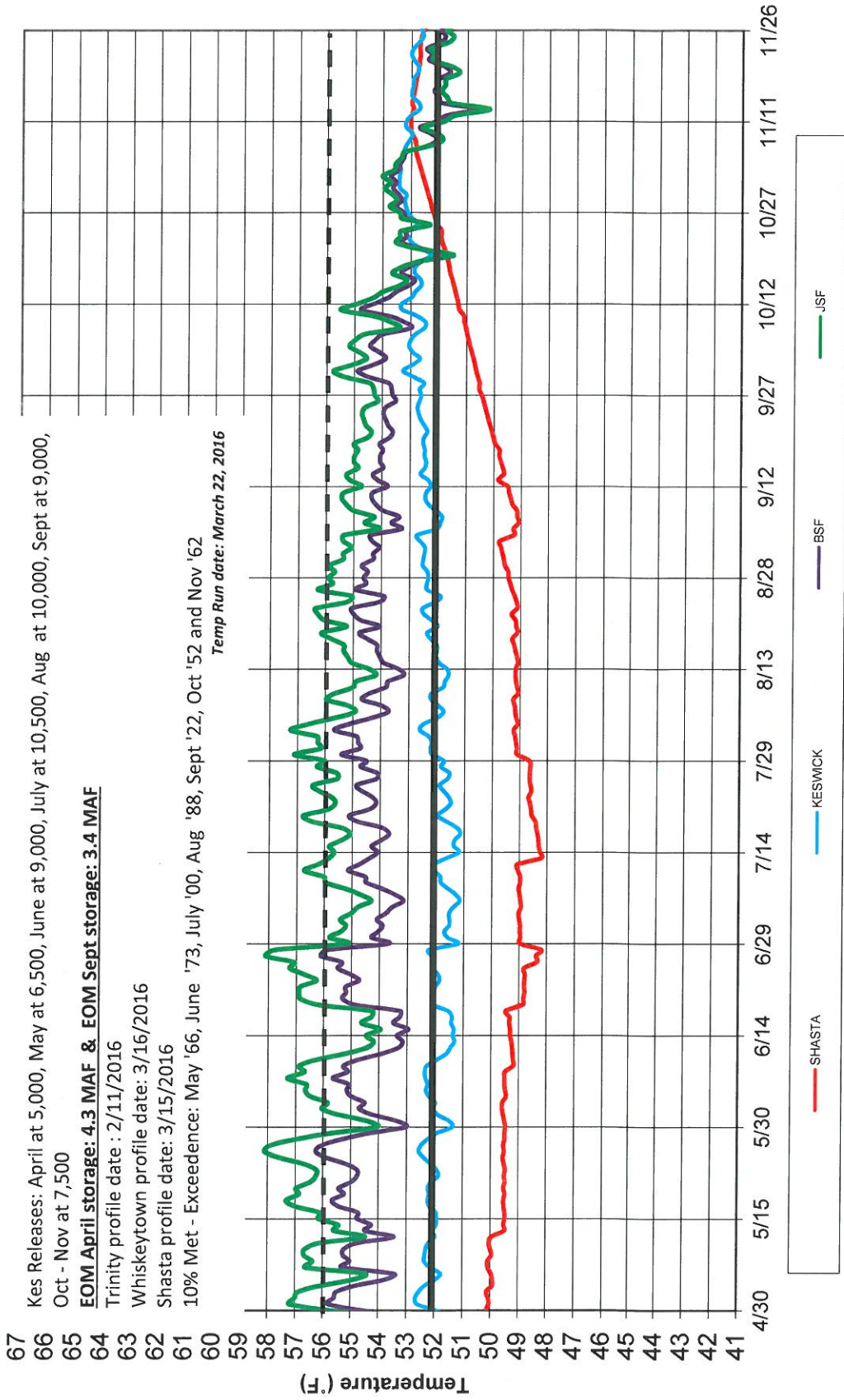


**Sacramento River Modeled Temperature
2016 Mar 90%-Exceedance Water Outlook - 10% L3MTO Historical
Approximately 52 degree at Kes**



**Sacramento River Modeled Temperature
 2016 Mar 50%-Exceedance Water Outlook - 10% L3MTO Historical
 Approximately 52 degree at Kes**

67 Kes Releases: April at 5,000, May at 6,500, June at 9,000, July at 10,500, Aug at 10,000, Sept at 9,000,
 66 Oct - Nov at 7,500
 65 **EOM April storage: 4.3 MAF & EOM Sept storage: 3.4 MAF**
 64 Trinity profile date : 2/11/2016
 63 Whiskeytown profile date: 3/16/2016
 62 Shasta profile date: 3/15/2016
 61 10% Met - Exceedance: May '66, June '73, July '00, Aug '88, Sept '22, Oct '52 and Nov '62
 60
 59 Temp Run date: March 22, 2016



Estimated CVP Operations BASE 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		854	1171	1350	1315	1242	1114	1035	964	950	939	942	971	1053
	Elev.	2273	2290	2287	2280	2267	2259	2251	2249	2248	2248	2248	2252	2261
Whiskeytown		207	206	238	238	238	238	230	206	206	206	206	206	206
	Elev.	1199	1209	1209	1209	1209	1209	1207	1199	1199	1199	1199	1199	1199
Shasta		2766	4044	4289	4330	4128	3756	3352	3032	2858	2723	2654	2788	3072
	Elev.	1049	1058	1059	1052	1039	1023	1009	1001	995	992	992	998	1011
Folsom		606	667	797	964	908	711	553	522	436	358	313	332	410
	Elev.	436	449	449	465	460	440	423	419	408	397	389	393	405
New Melones		459	567	568	572	548	494	445	402	392	410	427	444	462
	Elev.	871	872	872	868	856	846	835	833	837	841	841	845	849
San Luis		312	426	367	202	91	34	34	111	259	470	687	835	897
	Elev.	459	444	409	377	335	331	353	373	407	443	476	491	491
Total		7081	7609	7620	7155	6346	5659	5262	5102	5106	5228	5576	6099	

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	45	44	23	18	18	18	17
	cfs	300	540	4,225	2,526	1,102	734	744	373	300	300	300	300
Clear Creek	TAF	11	13	13	9	7	5	9	14	10	11	11	10
	cfs	175	218	216	150	120	85	150	225	175	175	175	175
Sacramento	TAF	246	297	400	535	645	615	535	400	387	400	255	230
	cfs	4000	5000	6500	9000	10500	10000	9000	6500	6500	6500	4150	4150
American	TAF	599	208	215	274	289	245	115	121	118	108	92	83
	cfs	9750	3500	3500	4602	4702	3989	1928	1971	1981	1750	1500	1500
Stanislaus	TAF	12	27	25	9	9	9	9	35	12	12	12	12
	cfs	200	460	400	150	150	150	150	577	200	200	200	213
Feather	TAF												
	cfs												

Trinity Diversions (TAF)

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Carr PP	13	38	37	77	83	37	32	0	14	19	6	5
Spring Crk. PP	28	8	30	70	75	30	30	12	5	12	3	7

Delta Summary (TAF)

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Tracy	210	71	50	184	282	282	272	282	272	258	195	145
USBR Banks	0	0	0	0	0	0	0	0	0	0	0	0
Contra Costa	12.7	12.7	12.7	9.8	11.1	12.7	14.0	16.8	18.4	18.3	14.0	14.0
Total USBR	223	84	63	194	293	295	286	299	290	276	209	159
State Export												
Total Export												
COA Balance	0	0	0	1	1	125	301	374	433	433	433	433
Old/Middle River Std.												
Old/Middle R. calc.	-5,102	-1,271	-1,285	-4,453	-5,267	-6,902	-7,591	-6,510	-7,388	-7,257	-5,099	-4,224
Computed DOI	47435	18171	12965	7816	4994	3497	3009	4002	4505	7109	11403	12499
Excess Outflow	36032	6774	2814	0	0	0	0	0	0	2603	5401	1099
% Export/Inflow	12%	7%	9%	32%	40%	52%	60%	59%	63%	56%	37%	30%
% Export/Inflow std.	35%	35%	35%	35%	65%	65%	65%	65%	65%	65%	65%	45%

Hydrology

Water Year Inflow (TAF)	Trinity	Shasta	Folsom	New Melones
Year to Date + Forecasted	1536	5,563	2,787	854
% of mean	127%	100%	102%	81%

CVP actual operations do not follow any forecasted operation or outlook; actual operations are based on real-time conditions.
 CVP operational forecasts or outlooks represent general system-wide dynamics and do not necessarily address specific watershed/tributary details.
 CVP releases or export values represent monthly averages.
 CVP Operations are updated monthly as new hydrology information is made available December through May.

Estimated CVP Operations BASE 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		854	1173	1376	1366	1379	1286	1169	1061	1009	1002	1040	1105	1212
	Elev.	2273	2293	2292	2293	2284	2273	2262	2256	2255	2260	2267	2277	
Whiskeytown		207	206	238	238	238	238	230	230	225	206	206	206	
	Elev.	1199	1209	1209	1209	1209	1209	1207	1207	1205	1199	1199	1199	
Shasta		2766	3875	4328	4508	4369	4006	3654	3381	3183	3052	2994	3297	3842
	Elev.	1043	1059	1066	1061	1048	1035	1024	1016	1010	1007	1020	1042	
Folsom		606	667	800	957	933	780	610	507	460	430	419	448	515
	Elev.	436	449	464	462	447	430	417	411	407	406	410	418	
New Melones		459	567	589	645	686	644	598	557	552	574	602	638	696
	Elev.	871	876	886	886	894	886	877	869	868	873	878	885	895
San Luis		312	441	376	201	154	83	73	149	294	501	657	807	929
	Elev.	463	447	411	391	393	410	434	449	481	494	523	547	
Total		6930	7707	7917	7758	7038	6342	5886	5727	5785	5918	6500	7399	

State End of the Month Reservoir Storage (TAF)

Oroville	
San Luis	
Total San Luis (TAF)	

Monthly River Releases (TAF/cfs)

Trinity	TAF	18	27	260	150	68	53	52	23	18	18	18	17
	cfs	300	460	4,225	2,526	1,102	855	870	373	300	300	300	300
Clear Creek	TAF	11	13	13	9	7	7	9	12	12	11	11	10
	cfs	175	218	216	150	120	120	150	200	200	175	175	175
Sacramento	TAF	473	297	400	535	645	615	535	461	446	461	307	222
	cfs	7700	5000	6500	9000	10500	10000	9000	7500	7500	7500	5000	4000
American	TAF	599	327	338	350	290	277	208	123	119	123	123	194
	cfs	9750	5500	5500	5881	4714	4500	3500	2000	2000	2000	2000	3500
Stanislaus	TAF	12	27	25	9	9	9	9	35	12	12	12	12
	cfs	200	460	400	150	150	150	150	577	200	200	200	213
Feather													

Trinity Diversions (TAF)

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Carr PP	0	21	24	71	67	68	61	40	19	1	0	5
Spring Crk. PP	28	0	25	68	60	60	60	30	19	25	24	40

Delta Summary (TAF)

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Tracy	230	71	50	272	282	282	272	282	272	200	200	210
USBR Banks	0	0	0	0	7	7	7	0	0	0	0	0
Contra Costa	12.7	12.7	12.7	9.8	11.1	12.7	14	16.8	18.4	18.3	14	14
Total USBR	243	84	63	282	300	302	293	299	290	218	214	224
State Export												
Total Export												
COA Balance	0	0	0	-27	-27	-27	-27	-27	-27	-27	-27	-27
Old/Middle R. std.												
Old/Middle R. calc.	-5,118	-705	-612	-5,890	-8,770	-9,130	-9,159	-7,073	-8,427	-5,242	-5,107	-5,151
Computed DOI	69852	27937	21522	10254	6507	4783	4404	4376	5514	14055	17048	22405
Excess Outflow	58448	16541	10265	0	0	781	1395	374	1009	9549	11045	11004
% Export/Inflow	10%	5%	6%	36%	51%	57%	62%	60%	62%	32%	29%	26%
% Export/Inflow std.	35%	35%	35%	35%	65%	65%	65%	65%	65%	65%	65%	35%

Hydrology

Water Year Inflow (TAF)	Trinity	Shasta	Folsom	New Melones
Year to Date + Forecasted	1642.6	6,112	3,216	1011
% of mean	136%	110%	118%	96%

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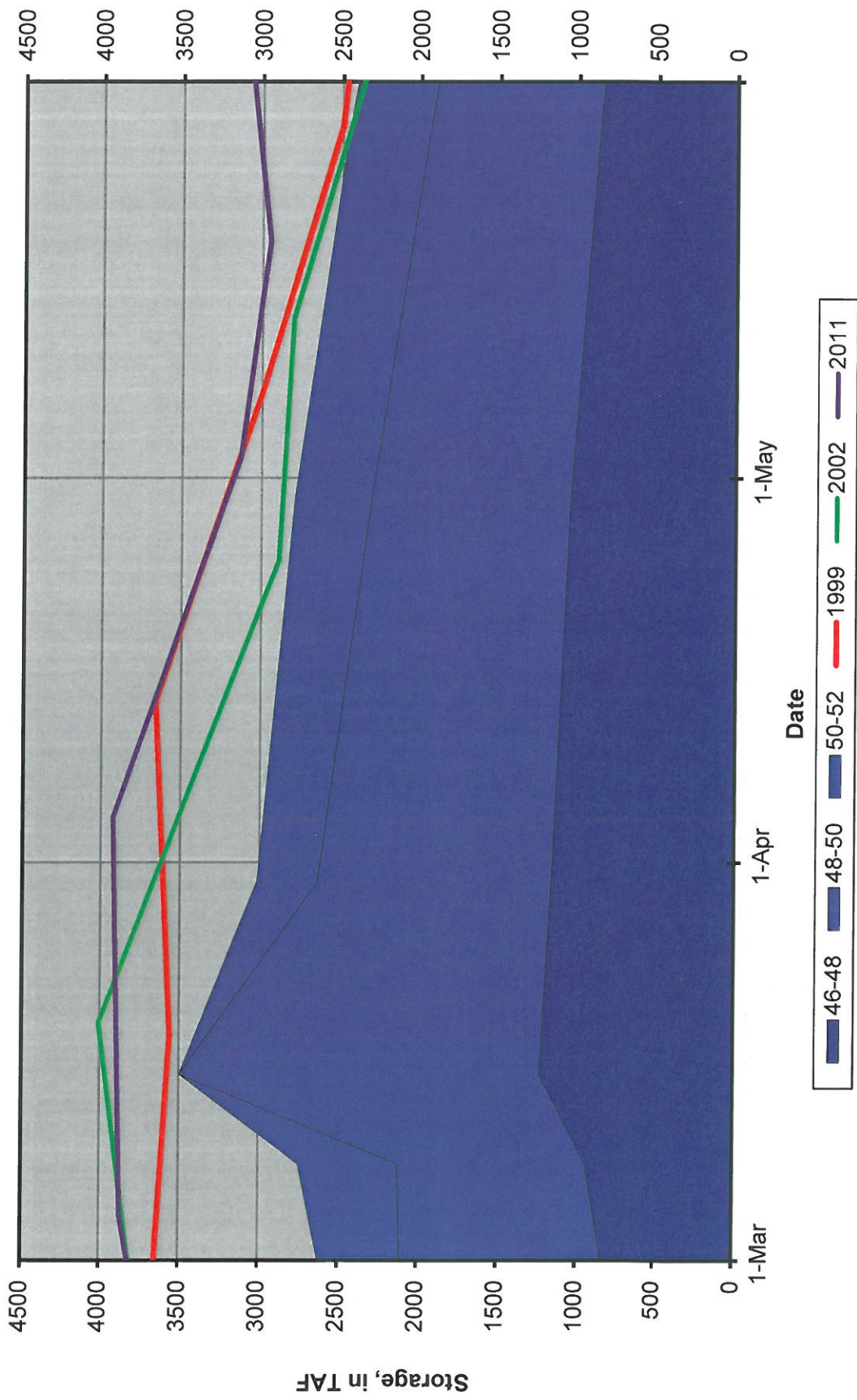
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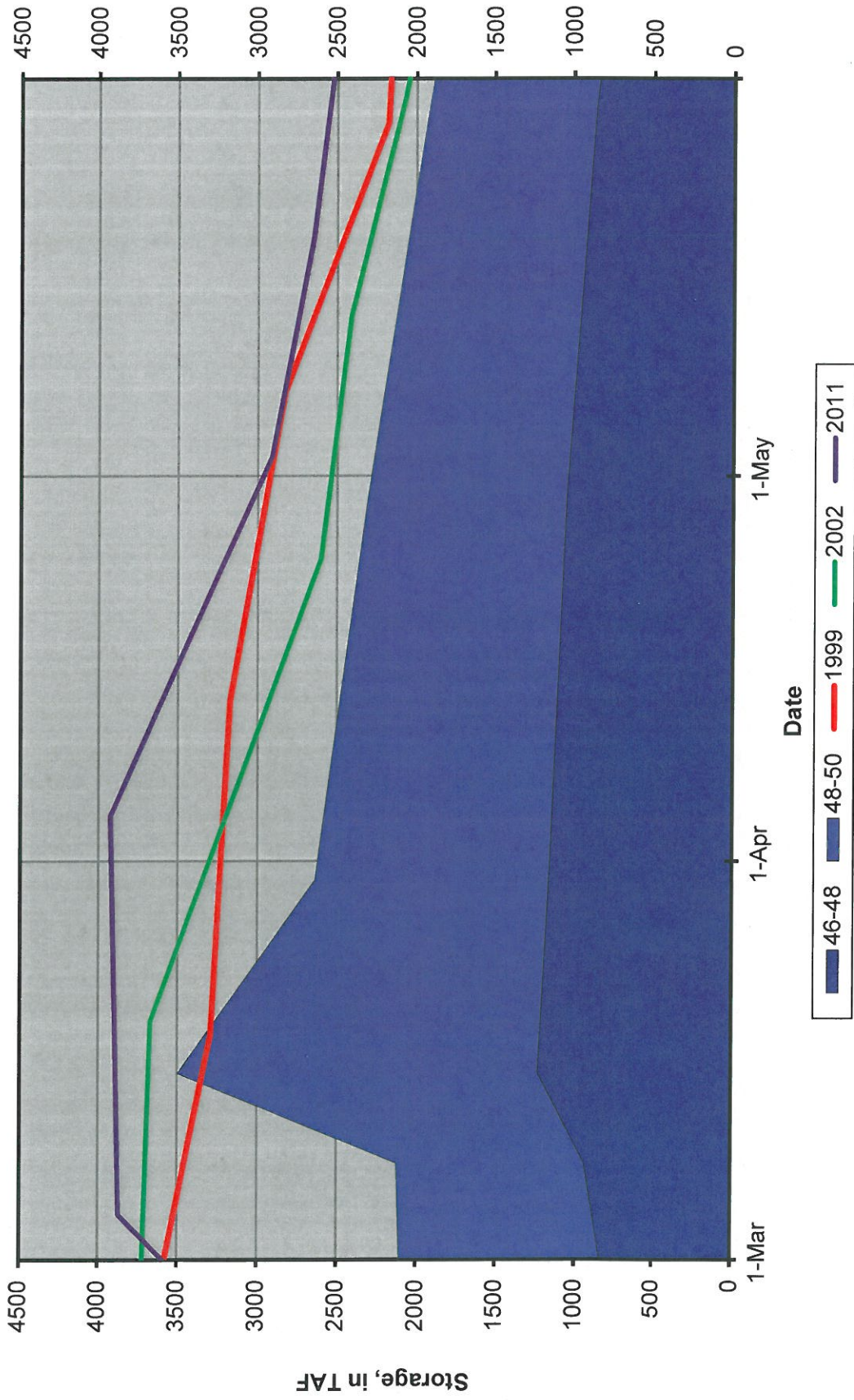
March 15th Model Run Vs Historic Data

Spring Cold Water Storage less than or equal to 52 °F



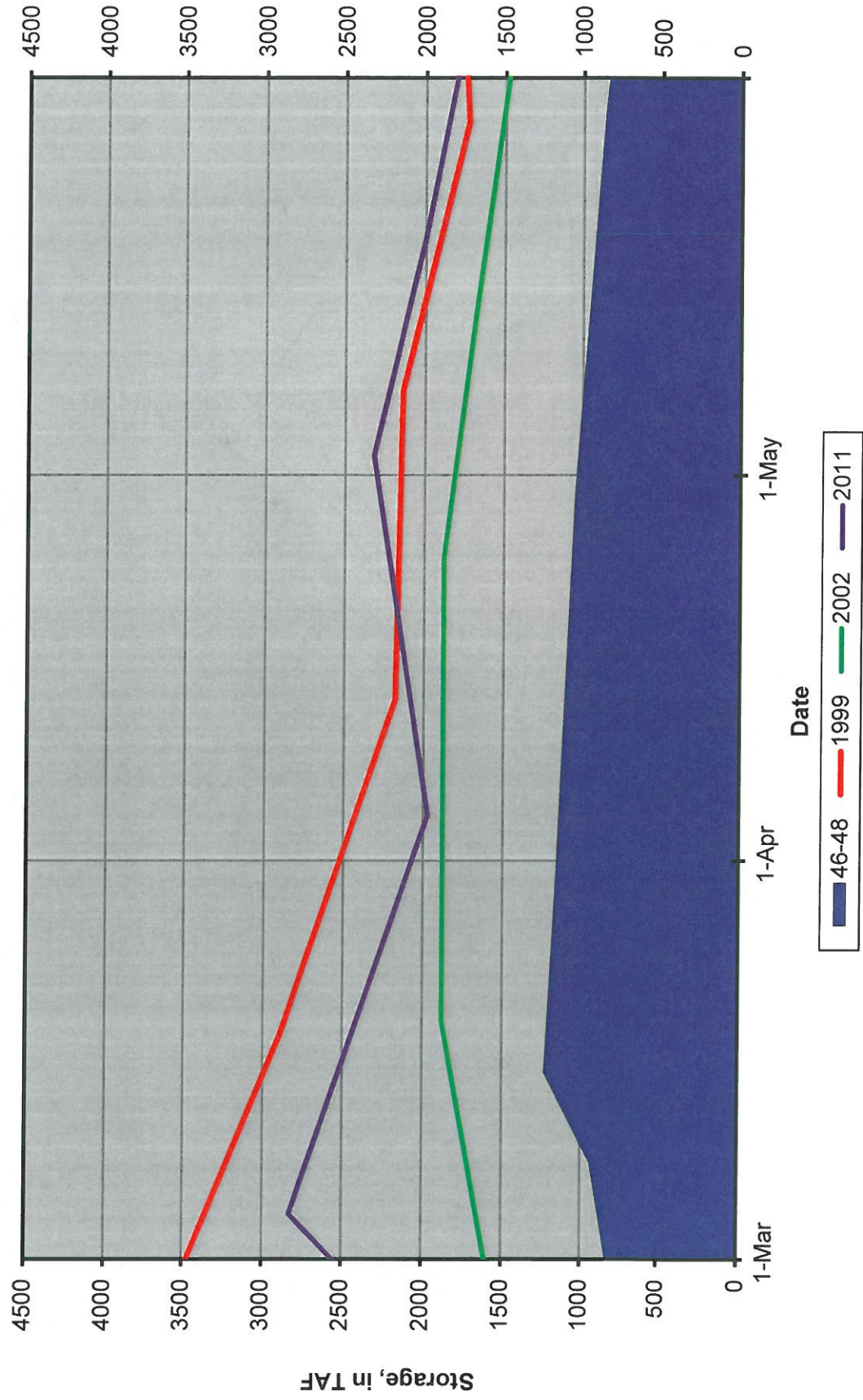
March 15th Model Run Vs Historic Data

Spring Cold Water Storage less than or equal to 50 °F

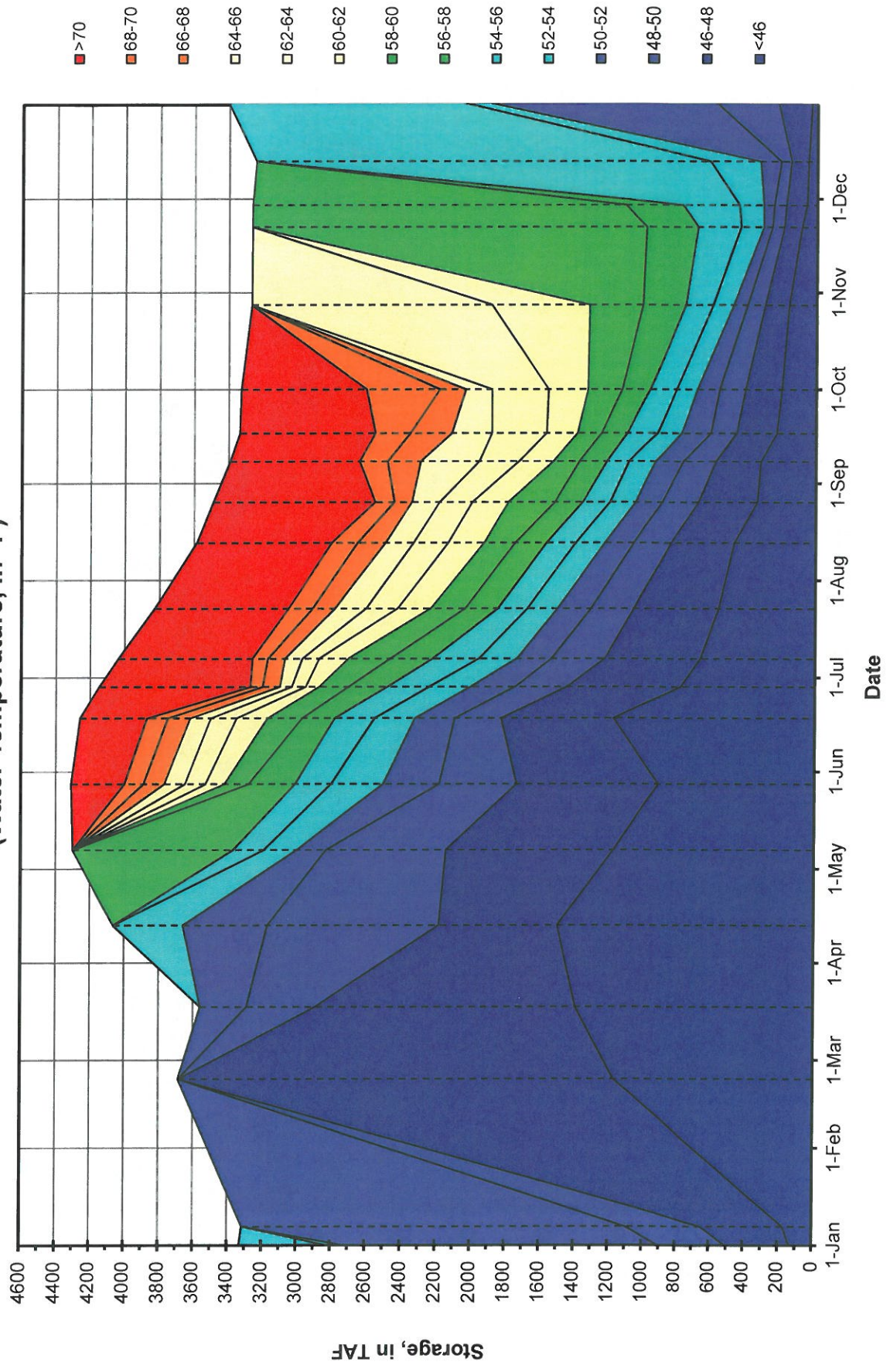


March 15th Model Run Vs Historic Data

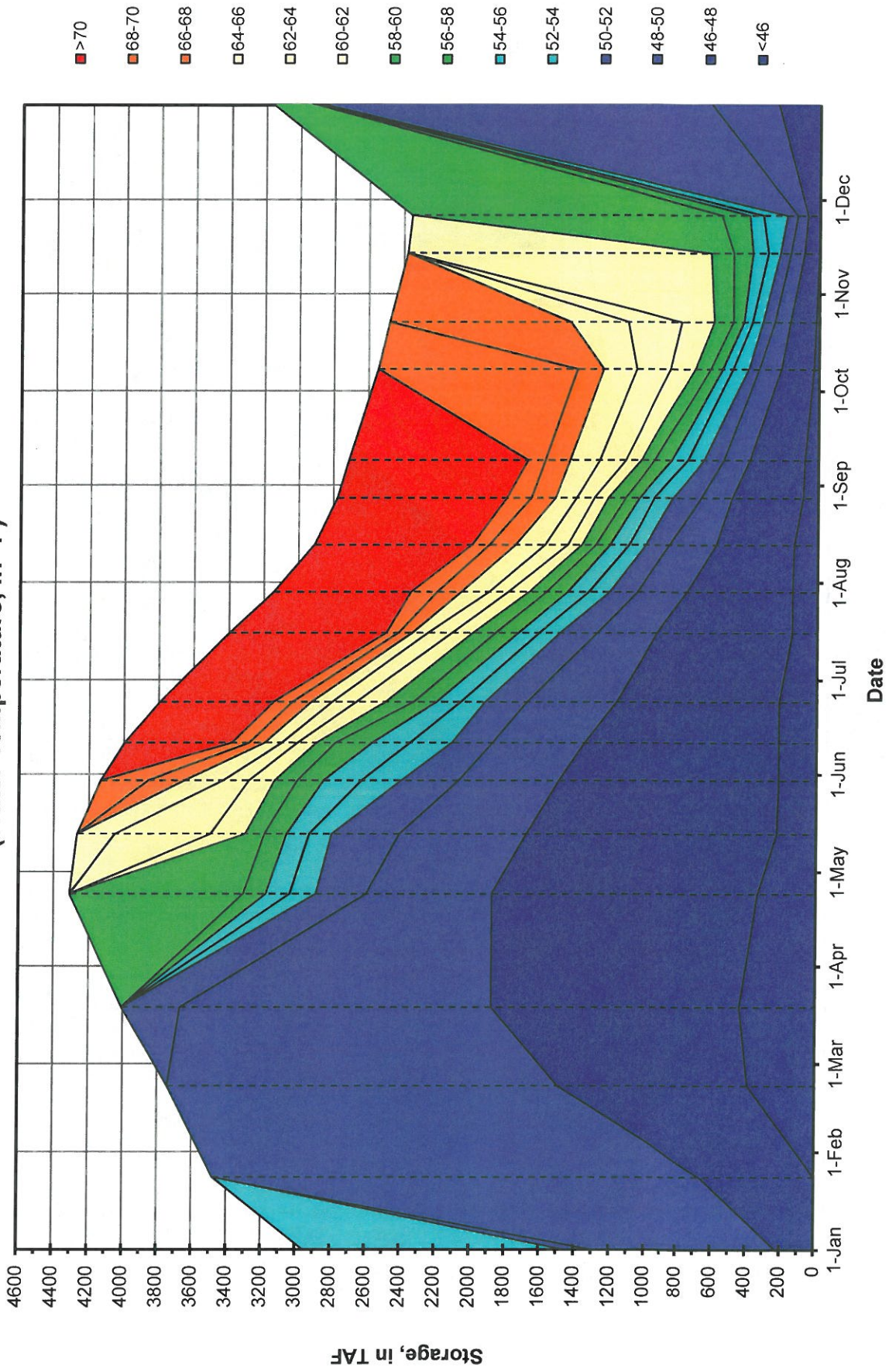
Spring Cold Water Storage less than or equal to 48 °F



**Lake Shasta Isothermobaths - 1999
(Water Temperature, in °F)**



Lake Shasta Isothermographs - 2002
(Water Temperature, in °F)



Lake Shasta Isothermographs - 2011
(Water Temperature, in °F)

