

Program Requirements Tab

Attachment A.1: Measurable Benefits

A.1 What measurable improvements to the Delta ecosystem or tributary to the Delta does the project provide? Where is the location of the improvement? If the project is not within the watershed of the Delta, what specific water rights or water contracts would be created or amended to ensure public benefits to the Delta ecosystem? Provide supporting documentation of the willingness of these water right or water contract holders to enter into such contracts or amendments. Explain how these changes would assure measurable improvements to the Delta ecosystem. See regulations section 6003(a)(1)(L).

WSIP Application Instructions, March, 2017

Response

Table A.1-1 provides some of the key benefits (public and non-public) from the modeling results for Sites Reservoir. Public benefits are highlighted in yellow.

The most significant measurable improvement to a tributary to the Delta is the improvement in Sacramento River water temperatures that result from Sites Reservoir. The modeled temperature improvements are shown at multiple locations in the river in Table A.1-1 (see under EEA-2).

Measurable improvements to the Delta ecosystem would be provided through releases to the Yolo Bypass for ecosystem enhancement (see EEA-5 on Table A.1-1). Benefits in the Sacramento, Feather, and American River watersheds (tributaries to the Delta) are also provided (see EEA-1 through EEA-4 and EEA-6 through EEA-8). The locations of the improvements are specified in the table.

The project is within the watershed contributing to the Delta and can make releases to the Delta for public benefits.

Table A1-1 Performance Measures Scorecard for Sites Reservoir Potential Beneficiaries (non-economic measures)

	DCR 2015 without Project	DCR 2015 with Project	DCR 2015 with Project Reservoir minus DCR 2015 without Project		WSIP 2030 without Project	WSIP 2030 with Project	WSIP 2030 with Project Reservoir minus WSIP 2030 without Project		WSIP 2070 without Project	WSIP 2070 with Project	WSIP 2070 with Project Reservoir minus WSIP 2070 without Project		
			Difference	Relative Difference			Difference	Relative Difference			Difference	Relative Difference	
Primary Objective - Ecosystem Enhancement Account (EEA) Actions													
EEA-1. Shasta Lake Cold Water Pool													
<i>Improve the reliability of coldwater pool storage in Shasta Reservoir to increase the U.S. Bureau of Reclamation's operational flexibility to provide suitable water temperatures in the Sacramento River. This action would operationally translate into the increase of Shasta Reservoir May storage levels, and increased coldwater pool in storage, with particular emphasis on Below Normal, Dry and Critical water year types.</i>													
Trinity Lake													
End-of-Month Storage (SW-01)													
May (TAF)													
	Full Simulation Period	1,835	1,845	10	0.6%	1,826	1,827	1	0.1%	1,689	1,693	5	0.3%
	Dry	1,646	1,649	3	0.2%	1,636	1,626	-11	-0.6%	1,453	1,471	17	1.2%
	Critical	1,119	1,135	16	1.4%	1,201	1,217	16	1.3%	1,016	1,024	9	0.9%
September (TAF)													
	Full Simulation Period	1,401	1,397	-4	-0.3%	1,320	1,312	-8	-0.6%	1,152	1,149	-3	-0.3%
	Dry	1,150	1,146	-4	-0.3%	1,104	1,093	-11	-1.0%	903	913	10	1.1%
	Critical	741	749	8	1.1%	800	807	7	0.9%	627	673	47	7.5%
Shasta Lake													
End-of-Month Storage (SW-07)													
May (TAF)													
	Full Simulation Period	3,952	4,023	71	1.8%	3,950	4,009	59	1.5%	3,681	3,761	80	2.2%
	Dry	3,730	3,822	92	2.5%	3,663	3,765	101	2.8%	3,386	3,478	92	2.7%
	Critical	2,486	2,744	258	10.4%	2,787	2,953	166	6.0%	2,157	2,428	271	12.6%
September (TAF)													
	Full Simulation Period	2,655	2,779	124	4.7%	2,544	2,627	83	3.3%	2,262	2,321	59	2.6%
	Dry	2,490	2,630	140	5.6%	2,457	2,514	57	2.3%	2,167	2,224	56	2.6%
	Critical	1,343	1,562	219	16.3%	1,515	1,696	181	12.0%	971	1,219	247	25.5%
EEA-2. Sacramento River Flows for Temperature Control													
<i>Provide releases from Shasta Dam of appropriate water temperatures, and subsequently from Keswick Dam, to maintain mean daily water temperatures year-round at levels suitable for all species and life stages of anadromous salmonids in the Sacramento River between Keswick Dam and Red Bluff Diversion Dam, with particular emphasis on the months of highest potential water temperature-related impacts (i.e., July through November) during Below Normal, Dry and Critical water year types.</i>													
Trinity River below Lewiston													
Monthly Temperature (SQ-33)													
Jul-Sep (Deg-F)													
	Full Simulation Period	51.3	51.2	-0.1	-0.2%	51.1	51.1	0.0	-0.1%	51.9	51.8	-0.2	-0.3%
	Dry	51.6	51.4	-0.1	-0.3%	51.5	51.7	0.2	0.3%	52.7	52.4	-0.2	-0.4%
	Critical	53.9	53.7	-0.1	-0.3%	53.8	53.5	-0.2	-0.4%	55.4	54.8	-0.5	-1.0%
Clear Creek at Igo													
Monthly Temperature (SQ-37)													
Jul-Sep (Deg-F)													
	Full Simulation Period	54.4	54.3	-0.1	-0.1%	54.8	54.7	-0.1	-0.2%	55.7	55.7	0.1	0.1%
	Dry	54.4	54.5	0.0	0.0%	55.0	54.9	-0.1	-0.2%	56.0	56.1	0.0	0.1%
	Critical	55.7	55.6	-0.1	-0.2%	56.6	56.5	-0.1	-0.2%	58.1	57.9	-0.3	-0.4%
Sacramento River at Bonnyview													
Monthly Temperature (SQ-03)													
Jul-Sep (Deg-F)													
	Full Simulation Period	53.0	52.5	-0.5	-0.9%	53.6	53.6	0.0	0.0%	54.8	54.3	-0.5	-0.8%
	Dry	53.5	52.9	-0.6	-1.1%	54.3	54.1	-0.1	-0.3%	55.1	54.6	-0.5	-0.9%
	Critical	56.5	55.1	-1.4	-2.5%	56.5	55.9	-0.6	-1.1%	60.5	58.6	-1.8	-3.0%
Sacramento River at Balls Ferry													
Monthly Temperature (SQ-04)													
Jul-Sep (Deg-F)													
	Full Simulation Period	54.6	54.1	-0.5	-0.9%	55.2	55.2	-0.1	-0.1%	56.5	56.0	-0.5	-0.9%
	Dry	55.1	54.5	-0.6	-1.1%	56.0	55.7	-0.2	-0.4%	56.9	56.3	-0.6	-1.0%

STATUS: FINAL

PREPARER: J HERRIN

PHASE: 1 VERSION: A

PURPOSE: PROGRAM REQUIREMENT A1

CHECKER: D RUARK

DATE: 2017 AUGUST

CAVEAT:

QA/QC:

REF/FILE #: WSIP APPLICATION

NOTES:

PAGE: 2 OF 4

Table A1-1 Performance Measures Scorecard for Sites Reservoir Potential Beneficiaries (non-economic measures)

				DCR 2015 without Project	DCR 2015 with Project	DCR 2015 with Project Reservoir minus DCR 2015 without Project		WSIP 2030 without Project	WSIP 2030 with Project	WSIP 2030 with Project Reservoir minus WSIP 2030 without Project		WSIP 2070 without Project	WSIP 2070 with Project	WSIP 2070 with Project Reservoir minus WSIP 2070 without Project	
						Difference	Relative Difference			Difference	Relative Difference				
														Difference	Relative Difference
			Critical	58.0	56.6	-1.4	-2.3%	58.1	57.5	-0.6	-1.1%	61.9	60.2	-1.7	-2.7%
Sacramento River at Jellys Ferry															
			Monthly Temperature (SQ-05)												
			Jul-Sep (Deg-F)												
			Full Simulation Period	55.9	55.4	-0.5	-0.8%	56.6	56.5	-0.1	-0.1%	57.9	57.4	-0.5	-0.9%
			Dry	56.4	55.8	-0.6	-1.1%	57.3	57.0	-0.3	-0.5%	58.4	57.7	-0.6	-1.1%
			Critical	59.2	57.9	-1.3	-2.2%	59.4	58.8	-0.6	-1.0%	63.0	61.5	-1.5	-2.5%
Sacramento River at Bend Bridge															
			Monthly Temperature (SQ-06)												
			Jul-Sep (Deg-F)												
			Full Simulation Period	56.9	56.5	-0.4	-0.8%	57.6	57.6	-0.1	-0.2%	59.0	58.5	-0.5	-0.9%
			Dry	57.5	56.9	-0.6	-1.1%	58.5	58.1	-0.3	-0.6%	59.5	58.8	-0.7	-1.1%
			Critical	60.1	58.9	-1.2	-2.1%	60.3	59.7	-0.6	-1.0%	63.8	62.4	-1.4	-2.3%
EEA-3. Folsom Lake Cold Water Pool															
<i>Increase the availability of coldwater pool storage in Folsom Reservoir, by increasing May storage and coldwater pool storage, to allow the U.S. Bureau of Reclamation additional operational flexibility to provide suitable water temperatures in the lower American River. This action would utilize additional coldwater pool storage by providing releases from Folsom Dam (and subsequently from Nimbus Dam) to maintain mean daily water temperatures at levels suitable for juvenile steelhead over-summer rearing and fall-run Chinook salmon spawning in the lower American River from May through November during all water year types.</i>															
Folsom Lake															
			End-of-Month Storage (SW-24)												
			May (TAF)												
			Full Simulation Period	838	841	3	0.4%	769	764	-4	-0.5%	679	677	-2	-0.3%
			Dry	765	775	10	1.3%	699	692	-8	-1.1%	601	607	6	1.0%
			Critical	480	489	9	1.9%	476	473	-3	-0.6%	407	401	-5	-1.3%
			September (TAF)												
			Full Simulation Period	505	532	27	5.3%	428	447	19	4.5%	377	396	19	5.2%
			Dry	426	465	39	9.1%	371	410	38	10.4%	349	373	24	6.7%
			Critical	265	278	13	4.7%	293	289	-4	-1.4%	235	246	11	4.8%
American River at Watt Ave															
			Monthly Temperature (SQ-19)												
			Jul-Sep (Deg-F)												
			Full Simulation Period	66.7	65.8	-0.9	-1.3%	70.6	69.9	-0.6	-0.9%	71.9	71.2	-0.7	-0.9%
			Dry	68.0	67.2	-0.8	-1.2%	70.7	70.5	-0.2	-0.4%	72.2	71.9	-0.3	-0.4%
			Critical	71.6	70.2	-1.4	-2.0%	73.6	73.1	-0.5	-0.7%	75.6	74.7	-0.9	-1.2%
EEA-4. Stabilize American River Flows															
<i>Stabilize flows in the lower American River to minimize dewatering of fall-run Chinook salmon redds (i.e., October through March) and steelhead redds (i.e., January through May), and reduce isolation events (specifically, flow increases to 4,000 cfs with subsequent reduction to < 4,000 cfs) of juvenile anadromous salmonids, particularly from October through June. Reduce the reliance upon Folsom Reservoir as a "real-time, first response facility" to meet Delta objectives and demands, particularly from January through August, to reduce flow fluctuation and water temperature-related impacts to fall-run Chinook salmon and steelhead in the lower American River.</i>															
<i>N/A - Reporting Metrics require daily timestep modeling of flow operations to demonstrate how flexibility in storage operations supports stabilization of flows throughout late Fall through Spring.</i>															
EEA-5. Yolo Bypass Flow Improvement															
<i>Increase flows in the Yolo Bypass by 400 cfs in August, September, and October to promote food production for Delta Smelt</i>															
Yolo Bypass Flow															
			Increase in Volume (SW-31)												
			Aug-Oct (TAF)												
			Full Simulation Period	15	58	42	273.7%	24	64	40	163.2%	20	58	38	188.3%
			Dry	14	47	33	241.6%	60	100	40	66.4%	37	59	22	58.4%
			Critical	14	23	9	64.2%	13	18	5	33.5%	9	22	13	150.4%
EEA-6. Lake Oroville Cold Water Pool															
<i>Improve the reliability of coldwater pool storage in Oroville Reservoir to improve water temperature suitability for juvenile steelhead and spring-run Chinook salmon over-summer rearing, and fall-run Chinook salmon spawning in the lower Feather River from May through November during all water year types. (Improve storage conditions for:) Provide releases from Oroville Dam to maintain mean daily water temperatures at levels suitable for juvenile steelhead and spring-run Chinook salmon over-summer rearing, and fall-run Chinook salmon spawning in the lower Feather River. Stabilize flows in the lower Feather River to minimize redd dewatering, juvenile stranding and isolation of anadromous salmonids.</i>															

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			DCR 2015 without Project	DCR 2015 with Project	DCR 2015 with Project Reservoir minus DCR 2015 without Project		WSIP 2030 without Project	WSIP 2030 with Project	WSIP 2030 with Project Reservoir minus WSIP 2030 without Project		WSIP 2070 without Project	WSIP 2070 with Project	WSIP 2070 with Project Reservoir minus WSIP 2070 without Project	
					Difference	Relative Difference			Difference	Relative Difference			Difference	Relative Difference
Lake Oroville														
		End-of-Month Storage (SW-18)												
		May (TAF)												
		Full Simulation Period	2,814	2,849	35	1.2%	2,760	2,786	26	0.9%	2,620	2,651	31	1.2%
		Dry	2,204	2,304	100	4.5%	2,294	2,332	38	1.7%	2,167	2,206	39	1.8%
		Critical	1,444	1,502	58	4.0%	1,527	1,611	83	5.5%	1,507	1,618	111	7.4%
		September (TAF)												
		Full Simulation Period	1,677	1,763	86	5.1%	1,469	1,528	59	4.0%	1,287	1,383	96	7.4%
		Dry	1,153	1,258	104	9.0%	1,146	1,195	49	4.3%	1,140	1,147	7	0.6%
		Critical	898	967	69	7.7%	901	924	23	2.6%	903	979	76	8.4%
EEA-7. Stabilize Sacramento River Fall Flows														
<i>Stabilize flows in the Sacramento River between Keswick Dam and the Red Bluff Diversion Dam to minimize dewatering of fall-run Chinook salmon redds (for the spawning and embryo incubation lifestage periods extending from October through March), particularly during fall months. (avoid abrupt changes; operation limited to not greatly impact cold water pool operations in D and C years)</i>														
		Sacramento River below Keswick												
		Monthly Flow (SW-10)												
		Dec-Feb (cfs)												
		Full Simulation Period	8,349	8,720	372	4.4%	9,028	9,256	228	2.5%	9,459	9,617	157	1.7%
		Below Normal	5,071	5,448	376	7.4%	4,711	4,889	177	3.8%	5,479	5,693	214	3.9%
		Dry	3,829	4,173	343	9.0%	3,969	4,442	474	11.9%	3,736	3,964	228	6.1%
		Critical	3,763	3,666	-97	-2.6%	3,532	3,679	147	4.2%	3,531	3,810	279	7.9%