APPENDIX E-1

SUPPORTING DOCUMENTATION FOR DEVELOPMENTAL ANALYSIS, PREFERRED PLAN AND ALTERNATIVES PROPOSED BY OTHERS

ATTACHMENT H

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE ALTERNATIVE FLOW SCENARIOS

H-1 - SWB'S REQUEST TO MODEL THE 20% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

H-2 – SED 30% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

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APPENDIX E-1
ATTACHMENT H–1

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE SWB'S REQUEST TO MODEL THE 20% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED20_WSF is the designation for a simulation of an alternative Don Pedro Project operations scenario requested by the SWB during a March 2014 meeting with the FERC staff. The "WSF" in the simulation name indicates that the Districts' normal reservoir operation rules are modeled which represent general Don Pedro operational rules consistent with those implemented historically over the period of record. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced to conserve water. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375 TAF, the amount of "buffer" storage retained in the reservoir historically and under the Base Case. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED20_WSF are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 20% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from

[1]This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 20% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

SED20_WSF

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED20_WSF	% of Base Case
January	1,063,873	973,824	92%
February	1,722,819	1,751,806	102%
March	3,042,430	2,957,551	97%
April	3,481,703	3,411,323	98%
May	3,491,340	3,976,555	114%
June	3,434,821	3,862,933	112%
July	3,521,988	3,400,068	97%
August	2,710,847	2,629,365	97%
September	1,340,662	1,281,777	96%
October	918,413	891,006	97%
November	402,483	395,261	98%
December	613,223	550,347	90%
Total	25,744,602	26,081,816	101%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED20_WSF		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	1,487	91%	81%
87-92	Drought	5,198	4,590	88%	4,259	93%	82%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	808	88%	88%
1977	C	921	713	77%	678	95%	74%
1978	W	767	752	98%	750	100%	98%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	784	88%	88%
1988	C	855	759	89%	731	96%	85%
1989	C	846	744	88%	723	97%	85%
1990	C	876	771	88%	749	97%	85%
1991	C	881	774	88%	658	85%	75%
1992	C	844	647	77%	614	95%	73%
1993	W	823	807	98%	805	100%	98%
1994	C	835	835	100%	724	87%	87%
1995	W	774	774	100%	765	99%	99%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	885	100%	100%
2004	D	940	940	100%	940	100%	100%
2005	W	874	874	100%	874	100%	100%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	763	86%	86%
2009	BN	903	903	100%	894	99%	99%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	824	98%	96%
Total		36,190	35,343	98%	34,617	98%	96%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED20_WSF	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	457	86%
87-92	C	1,600	1,502	94%	1,158	72%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	270	100%
1973	AN	267	219	100%	219	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	251	80%
1977	C	267	269	90%	206	65%
1978	W	267	205	100%	163	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	252	80%
1988	C	267	267	90%	209	65%
1989	C	267	250	90%	182	65%
1990	C	267	240	90%	174	65%
1991	C	267	243	90%	175	65%
1992	C	267	235	90%	164	65%
1993	W	267	211	100%	169	100%
1994	C	267	264	100%	264	100%
1995	W	267	189	100%	189	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	253	100%
2003	BN	267	234	100%	234	100%
2004	D	267	249	100%	249	100%
2005	W	267	193	100%	193	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	265	100%
2008	C	267	247	100%	229	80%
2009	BN	267	240	100%	205	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	217	81%
Total		11,197	9,676	86%	9,116	81%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

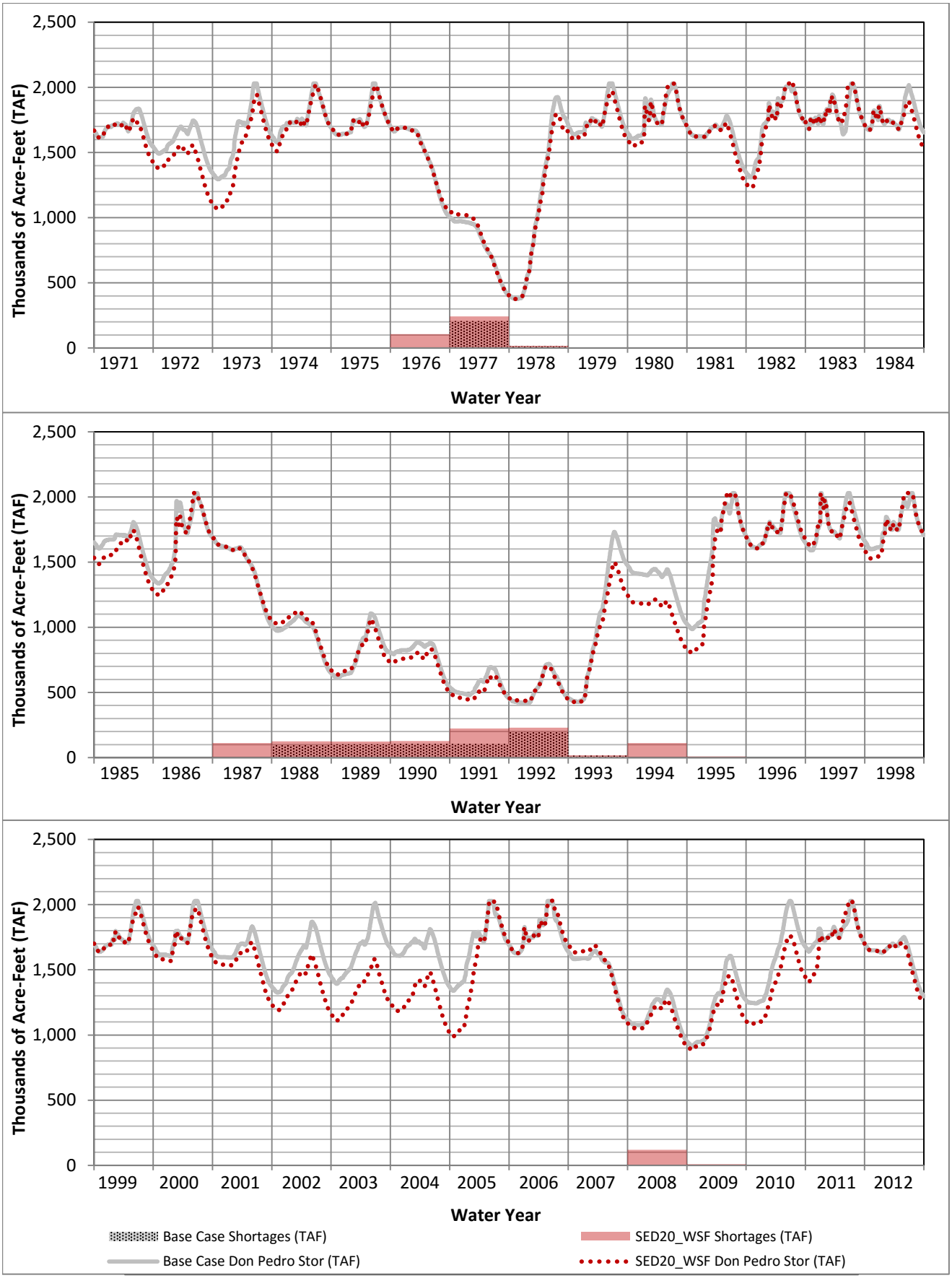


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

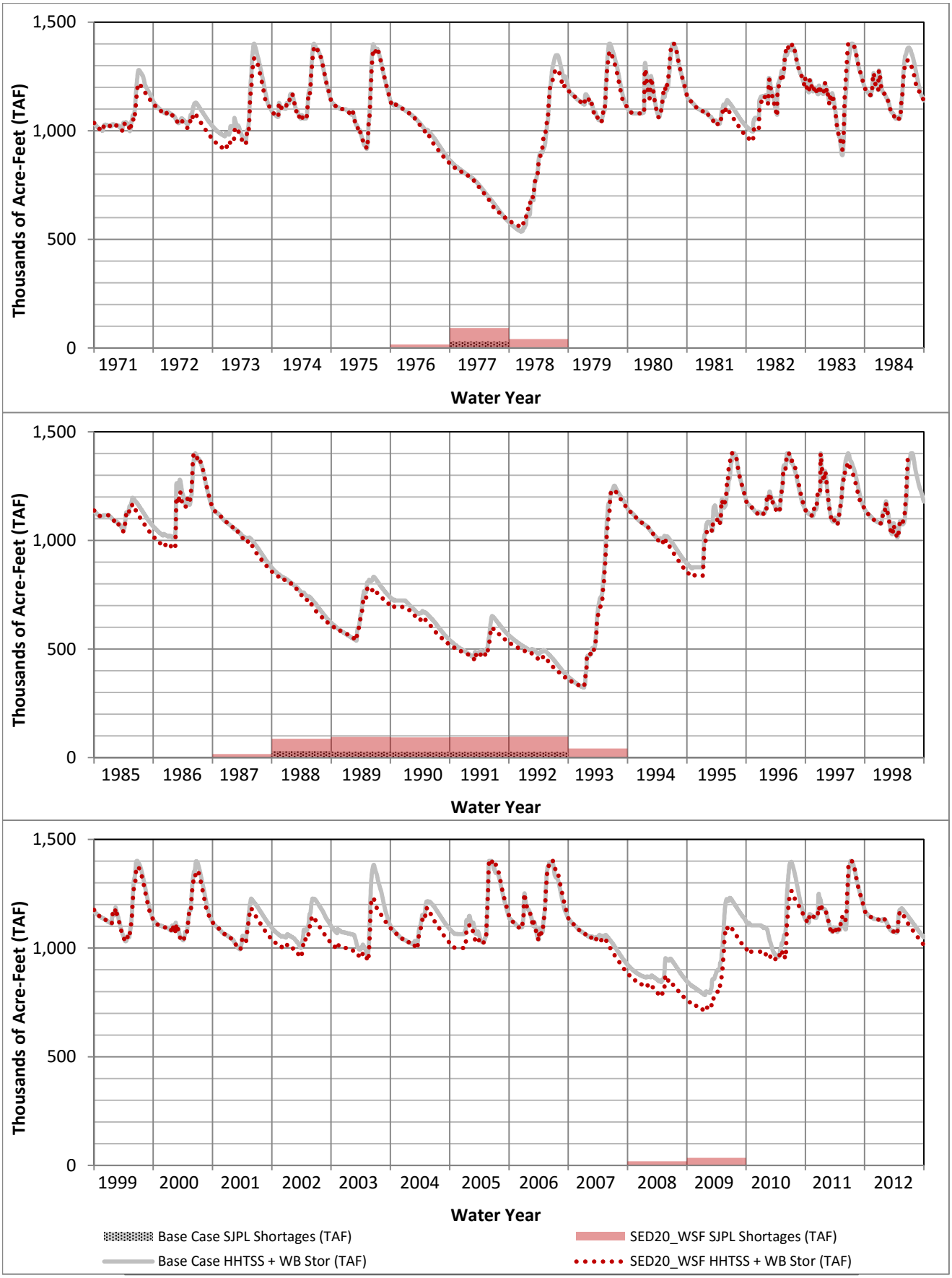


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED20_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	407	421	154%	151%
87-92	Drought	713	713	1,416	1,419	199%	199%
1971	BN	266	539	409	657	154%	122%
1972	D	138	151	271	271	196%	180%
1973	AN	237	613	450	450	190%	74%
1974	W	301	1,050	481	982	160%	93%
1975	W	301	887	528	888	175%	100%
1976	C	171	185	233	247	136%	134%
1977	C	94	94	174	174	186%	186%
1978	W	235	349	525	525	223%	150%
1979	AN	301	876	481	881	160%	100%
1980	W	302	1,818	529	1,762	175%	97%
1981	D	194	252	301	337	155%	134%
1982	W	250	2,275	614	2,191	246%	96%
1983	W	301	3,689	738	3,688	245%	100%
1984	AN	302	1,463	464	1,584	154%	108%
1985	D	205	340	311	311	152%	91%
1986	W	237	1,496	617	1,403	261%	94%
1987	C	179	179	248	252	139%	141%
1988	C	94	94	196	196	208%	208%
1989	C	116	116	295	295	255%	255%
1990	C	103	103	205	205	199%	199%
1991	C	116	116	268	268	232%	232%
1992	C	105	105	202	202	193%	193%
1993	W	235	235	489	489	208%	208%
1994	C	182	182	262	262	145%	145%
1995	W	237	2,098	604	1,916	255%	91%
1996	W	302	1,281	535	1,250	177%	98%
1997	W	301	1,954	463	2,057	154%	105%
1998	W	301	2,226	608	2,155	202%	97%
1999	AN	301	974	494	1,012	164%	104%
2000	AN	302	916	490	937	163%	102%
2001	D	193	233	314	314	163%	135%
2002	D	137	137	291	291	213%	213%
2003	BN	180	233	379	379	210%	163%
2004	D	141	355	290	290	206%	82%
2005	W	237	1,488	555	1,128	234%	76%
2006	W	301	2,270	629	2,225	209%	98%
2007	C	182	182	260	261	143%	143%
2008	C	119	119	251	251	211%	211%
2009	BN	156	156	342	342	219%	219%
2010	AN	249	349	428	428	172%	123%
2011	W	301	2,376	582	2,144	194%	90%
2012	D	192	213	261	276	136%	130%
Average (1971-2012)		216	828	406	861	188%	104%
Average (1980-2009)		210	903	408	942	194%	104%
Total (1971-2012)		9,092	34,765	17,071	36,177	188%	104%
Total (1980-2009)		6,306	27,083	12,247	28,255	194%	104%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED20_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	275	275	207%	207%
87-92	Drought	403	403	1,107	1,107	274%	274%
1971	BN	173	399	316	516	182%	130%
1972	D	84	96	217	217	258%	225%
1973	AN	154	515	368	368	238%	71%
1974	W	176	760	356	767	202%	101%
1975	W	176	728	403	741	229%	102%
1976	C	83	83	145	145	175%	175%
1977	C	50	50	130	130	262%	262%
1978	W	154	193	444	444	288%	230%
1979	AN	176	683	356	740	202%	108%
1980	W	177	1,205	404	1,131	229%	94%
1981	D	101	151	208	236	206%	157%
1982	W	159	1,862	523	1,815	330%	97%
1983	W	176	2,287	613	2,191	348%	96%
1984	AN	177	552	340	673	192%	122%
1985	D	112	247	218	218	195%	88%
1986	W	154	1,388	535	1,301	347%	94%
1987	C	91	91	160	160	177%	177%
1988	C	50	50	152	152	304%	304%
1989	C	72	72	251	251	350%	350%
1990	C	59	59	161	161	274%	274%
1991	C	72	72	224	224	313%	313%
1992	C	60	60	158	158	262%	262%
1993	W	154	154	408	408	264%	264%
1994	C	93	93	174	174	187%	187%
1995	W	154	1,482	522	1,203	338%	81%
1996	W	177	1,126	410	1,113	232%	99%
1997	W	176	859	338	931	192%	108%
1998	W	176	1,667	484	1,566	274%	94%
1999	AN	176	774	369	822	209%	106%
2000	AN	177	791	366	813	207%	103%
2001	D	100	140	221	221	221%	158%
2002	D	86	86	241	241	279%	279%
2003	BN	130	182	329	329	253%	180%
2004	D	82	295	232	232	281%	79%
2005	W	154	1,289	473	901	306%	70%
2006	W	176	1,759	504	1,732	286%	98%
2007	C	94	94	172	172	184%	184%
2008	C	75	75	207	207	277%	277%
2009	BN	106	106	291	291	276%	276%
2010	AN	158	218	338	338	214%	155%
2011	W	176	1,489	458	1,443	260%	97%
2012	D	104	118	173	181	167%	154%
Average (1971-2012)		129	581	319	620	247%	107%
Average (1980-2009)		125	636	323	668	259%	105%
Total (1971-2012)		5,411	24,398	13,391	26,055	247%	107%
Total (1980-2009)		3,746	19,067	9,687	20,026	259%	105%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	105	23	9	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	62	27	9	0	0	0	0	0	0	0	0
1974	148	121	91	36	24	17	4	0	0	0	0
1975	131	105	83	53	15	7	0	0	0	0	0
1976	2	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	80	33	13	0	0	0	0	0	0	0	0
1979	126	100	69	51	31	14	6	0	0	0	0
1980	205	172	147	118	96	60	58	55	40	38	37
1981	11	0	0	0	0	0	0	0	0	0	0
1982	192	177	168	161	137	128	114	109	92	81	69
1983	346	308	278	263	229	221	212	189	156	151	111
1984	211	159	123	96	70	49	49	41	34	27	27
1985	2	0	0	0	0	0	0	0	0	0	0
1986	142	108	105	97	95	75	64	51	47	43	31
1987	2	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	2	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	9	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	81	17	0	0	0	0	0	0	0	0	0
1994	2	0	0	0	0	0	0	0	0	0	0
1995	164	148	144	138	130	126	119	80	61	53	51
1996	148	130	106	103	77	61	40	28	17	8	6
1997	169	128	112	105	83	83	69	61	61	54	47
1998	192	189	172	167	163	141	127	104	67	54	47
1999	150	103	75	45	29	21	21	10	7	7	5
2000	108	84	77	54	47	31	24	21	16	7	3
2001	14	0	0	0	0	0	0	0	0	0	0
2002	8	0	0	0	0	0	0	0	0	0	0
2003	56	18	10	7	0	0	0	0	0	0	0
2004	3	0	0	0	0	0	0	0	0	0	0
2005	116	90	89	79	62	45	37	29	22	17	13
2006	195	186	185	170	166	139	127	100	67	65	61
2007	2	0	0	0	0	0	0	0	0	0	0
2008	8	1	0	0	0	0	0	0	0	0	0
2009	27	9	0	0	0	0	0	0	0	0	0
2010	61	11	7	4	0	0	0	0	0	0	0
2011	226	224	210	189	167	103	70	65	44	42	34
2012	10	0	0	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	3,516	2,671	2,282	1,936	1,621	1,321	1,141	943	731	647	542
Number of years flows NOT achieved for threshold period	5	17	20	23	25	25	26	28	28	28	28

Table 7. February through June La Grange 1 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	103	23	9	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	62	27	9	0	0	0	0	0	0	0	0
1974	131	113	84	36	24	17	4	0	0	0	0
1975	129	105	83	53	15	7	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	80	33	13	0	0	0	0	0	0	0	0
1979	124	100	69	51	31	14	6	0	0	0	0
1980	151	120	103	81	67	39	38	36	22	21	21
1981	9	0	0	0	0	0	0	0	0	0	0
1982	147	146	138	138	130	121	114	109	92	81	69
1983	150	149	149	148	148	148	148	147	136	134	97
1984	128	83	53	33	14	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0
1986	135	108	105	97	95	75	64	51	47	43	31
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	2	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	9	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	81	17	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	110	101	97	91	90	86	79	55	46	39	38
1996	146	130	106	103	77	61	40	28	17	8	6
1997	116	77	61	54	33	33	26	26	26	26	19
1998	147	146	136	131	127	112	100	80	52	43	37
1999	137	92	71	45	29	21	21	10	7	7	5
2000	106	84	77	54	47	31	24	21	16	7	3
2001	12	0	0	0	0	0	0	0	0	0	0
2002	8	0	0	0	0	0	0	0	0	0	0
2003	56	18	10	7	0	0	0	0	0	0	0
2004	3	0	0	0	0	0	0	0	0	0	0
2005	97	81	80	71	54	38	30	29	22	17	13
2006	149	149	149	141	137	118	106	86	60	58	54
2007	0	0	0	0	0	0	0	0	0	0	0
2008	8	1	0	0	0	0	0	0	0	0	0
2009	27	9	0	0	0	0	0	0	0	0	0
2010	61	11	7	4	0	0	0	0	0	0	0
2011	150	150	148	141	134	78	60	55	35	33	26
2012	8	0	0	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	2,782	2,073	1,757	1,479	1,252	999	860	733	578	517	419
Number of years flows NOT achieved for threshold period	10	17	20	23	25	26	27	29	29	29	29

Table 8. La Grange Consecutive 7 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	3	3	1	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	1	1	1	0	0	0	0	0	0	0	0
1974	2	3	4	2	3	2	0	0	0	0	0
1975	1	3	3	3	2	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	2	1	0	0	0	0	0	0	0	0
1979	1	2	3	2	2	1	0	0	0	0	0
1980	1	3	4	5	5	3	2	2	2	2	2
1981	1	0	0	0	0	0	0	0	0	0	0
1982	3	3	3	3	4	3	3	3	3	3	3
1983	2	3	5	7	6	7	6	5	5	5	4
1984	2	2	2	3	2	2	2	2	2	2	2
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	2	2	2	2	3	2	1	1	1	3
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	3	1	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	1	1	1	1	1	4	2	2	2
1996	1	2	3	3	4	2	2	1	2	0	0
1997	3	3	1	1	2	2	1	2	2	2	2
1998	1	1	2	2	2	4	4	5	3	3	3
1999	2	3	2	2	1	1	1	1	1	1	0
2000	2	2	1	2	1	1	1	1	1	0	0
2001	1	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	2	1	1	1	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0
2005	2	2	2	2	2	1	1	1	2	2	1
2006	2	2	2	3	4	4	5	4	4	4	4
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	0	0	0	0	0	0	0	0	0	0
2009	1	1	0	0	0	0	0	0	0	0	0
2010	2	1	1	0	0	0	0	0	0	0	0
2011	1	1	2	2	3	3	2	4	2	2	3
2012	1	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	46	49	47	46	46	41	33	36	32	29	29
Number of years flows NOT achieved for threshold period	14	18	20	24	25	25	28	28	28	30	31

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	3	3	1	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	1	1	1	0	0	0	0	0	0	0	0
1974	2	3	3	2	3	2	0	0	0	0	0
1975	1	3	3	3	2	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	2	1	0	0	0	0	0	0	0	0
1979	1	2	3	2	2	1	0	0	0	0	0
1980	1	3	2	3	3	1	1	1	1	1	1
1981	1	0	0	0	0	0	0	0	0	0	0
1982	1	2	2	2	4	3	3	3	3	3	3
1983	1	2	2	3	3	3	3	2	4	4	4
1984	2	2	1	2	1	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	2	2	2	2	3	2	1	1	1	3
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	3	1	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	1	1	1	1	1	3	2	2	2
1996	1	2	3	3	4	2	2	1	2	0	0
1997	3	3	1	1	1	1	1	1	1	1	1
1998	1	1	2	2	2	4	3	4	3	3	3
1999	2	3	2	2	1	1	1	1	1	1	0
2000	2	2	1	2	1	1	1	1	1	0	0
2001	1	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	2	1	1	1	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0
2005	1	2	2	2	2	1	1	1	2	2	1
2006	2	2	2	2	3	3	4	3	3	3	3
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	0	0	0	0	0	0	0	0	0	0
2009	1	1	0	0	0	0	0	0	0	0	0
2010	2	1	1	0	0	0	0	0	0	0	0
2011	1	1	1	1	1	2	2	4	2	2	2
2012	1	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	42	47	38	36	36	30	25	26	26	23	23
Number of years flows NOT achieved for threshold period	14	18	20	24	25	26	29	29	29	31	32

Table 10. La Grange Consecutive 14 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	3	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	1	1	0	0	0	0	0	0	0	0	0
1974	2	2	3	2	0	0	0	0	0	0	0
1975	1	3	2	1	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	1	2	1	1	1	1	0	0	0	0	0
1980	1	2	2	3	2	2	2	2	2	2	1
1981	0	0	0	0	0	0	0	0	0	0	0
1982	2	3	3	3	3	3	3	3	3	2	2
1983	1	2	3	5	3	4	4	3	3	3	3
1984	2	1	2	2	2	2	2	2	2	1	1
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	2	2	2	2	2	1	1	1	1	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	1	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	1	1	1	1	1	1	2	1	1	1
1996	1	2	1	1	1	1	1	1	0	0	0
1997	2	1	1	1	1	1	1	2	2	2	2
1998	1	1	2	2	2	3	3	3	2	2	1
1999	1	2	2	1	1	1	1	0	0	0	0
2000	2	1	1	1	1	1	1	1	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	2	1	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0
2005	1	2	2	2	1	1	1	1	0	0	0
2006	2	2	2	3	4	4	4	4	2	1	1
2007	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0
2009	1	0	0	0	0	0	0	0	0	0	0
2010	2	0	0	0	0	0	0	0	0	0	0
2011	1	1	2	2	2	3	2	2	2	2	1
2012	0	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	36	34	32	33	27	30	27	27	20	17	13
Number of years flows NOT achieved for threshold period	18	21	25	25	27	27	28	29	32	32	33

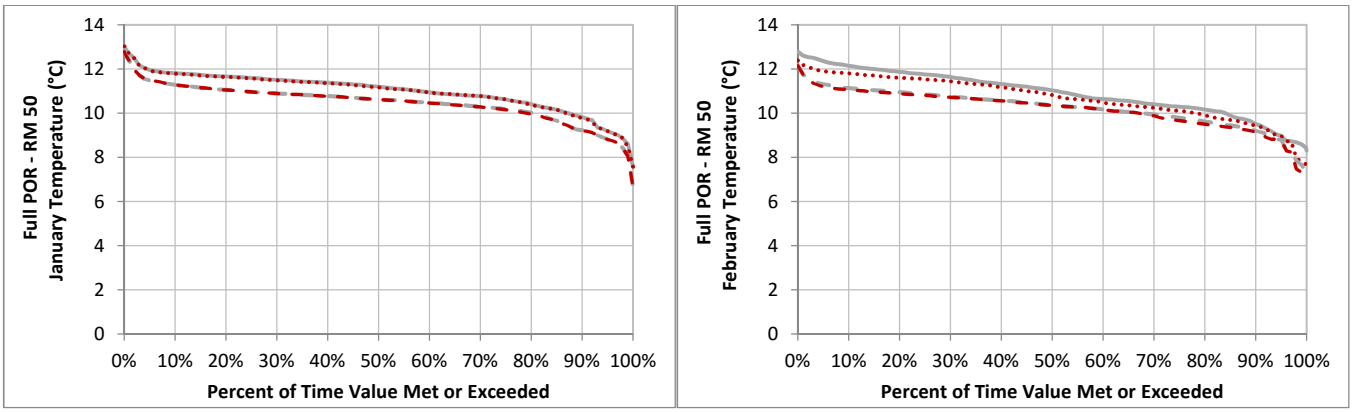
Table 11. February through June La Grange Consecutive 14 Day Flow Count

	SED20_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	3	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0
1973	1	1	0	0	0	0	0	0	0	0	0
1974	2	2	3	2	0	0	0	0	0	0	0
1975	1	3	2	1	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	1	2	1	1	1	1	0	0	0	0	0
1980	1	2	1	2	1	1	1	1	1	1	1
1981	0	0	0	0	0	0	0	0	0	0	0
1982	1	2	2	2	3	3	3	3	3	2	2
1983	1	1	1	2	2	2	2	2	3	3	3
1984	2	1	1	1	1	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	2	2	2	2	2	1	1	1	1	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	1	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	1	1	1	1	1	1	2	1	1	1
1996	1	2	1	1	1	1	1	1	0	0	0
1997	2	1	1	1	1	1	1	1	1	1	1
1998	1	1	2	2	2	3	3	3	2	1	0
1999	1	2	2	1	1	1	1	0	0	0	0
2000	2	1	1	1	1	1	1	1	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	2	1	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0
2005	1	2	2	2	1	1	1	1	0	0	0
2006	2	2	2	2	3	3	3	3	2	1	1
2007	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0
2009	1	0	0	0	0	0	0	0	0	0	0
2010	2	0	0	0	0	0	0	0	0	0	0
2011	1	1	1	1	1	1	1	1	1	1	1
2012	0	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	35	32	26	25	22	22	20	20	15	12	10
Number of years flows NOT achieved for threshold period	18	21	25	25	27	28	29	30	33	33	35

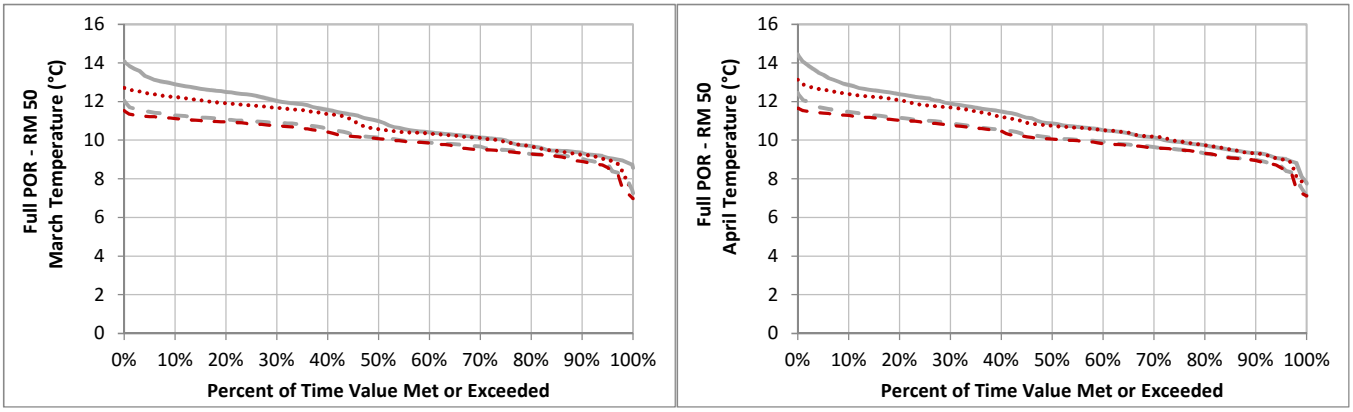
SED20_WSF

Dynamic Routing

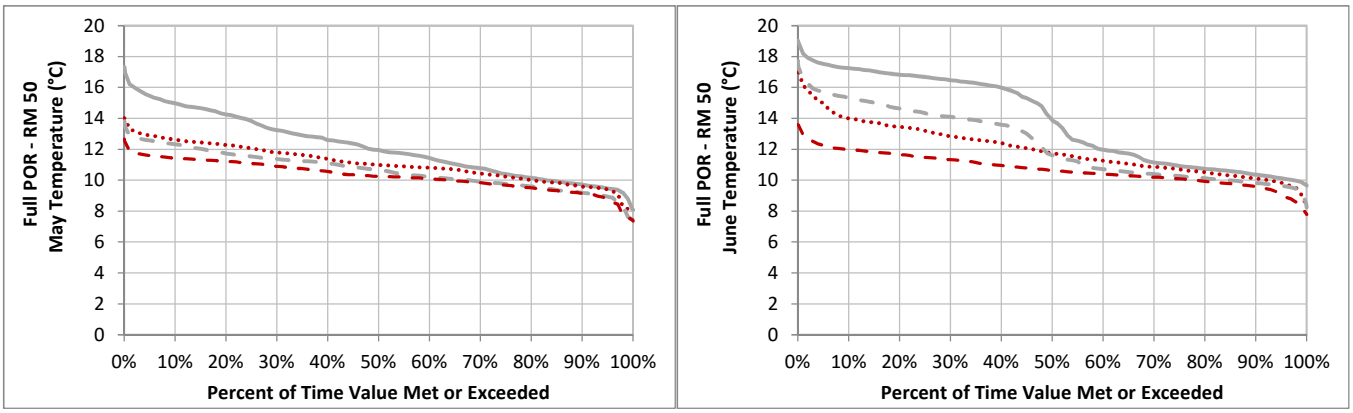
Results Summary


Full POR - RM 50
January Temperature (°C)
Percent of Time Value Met or Exceeded

Full POR - RM 50
February Temperature (°C)
Percent of Time Value Met or Exceeded

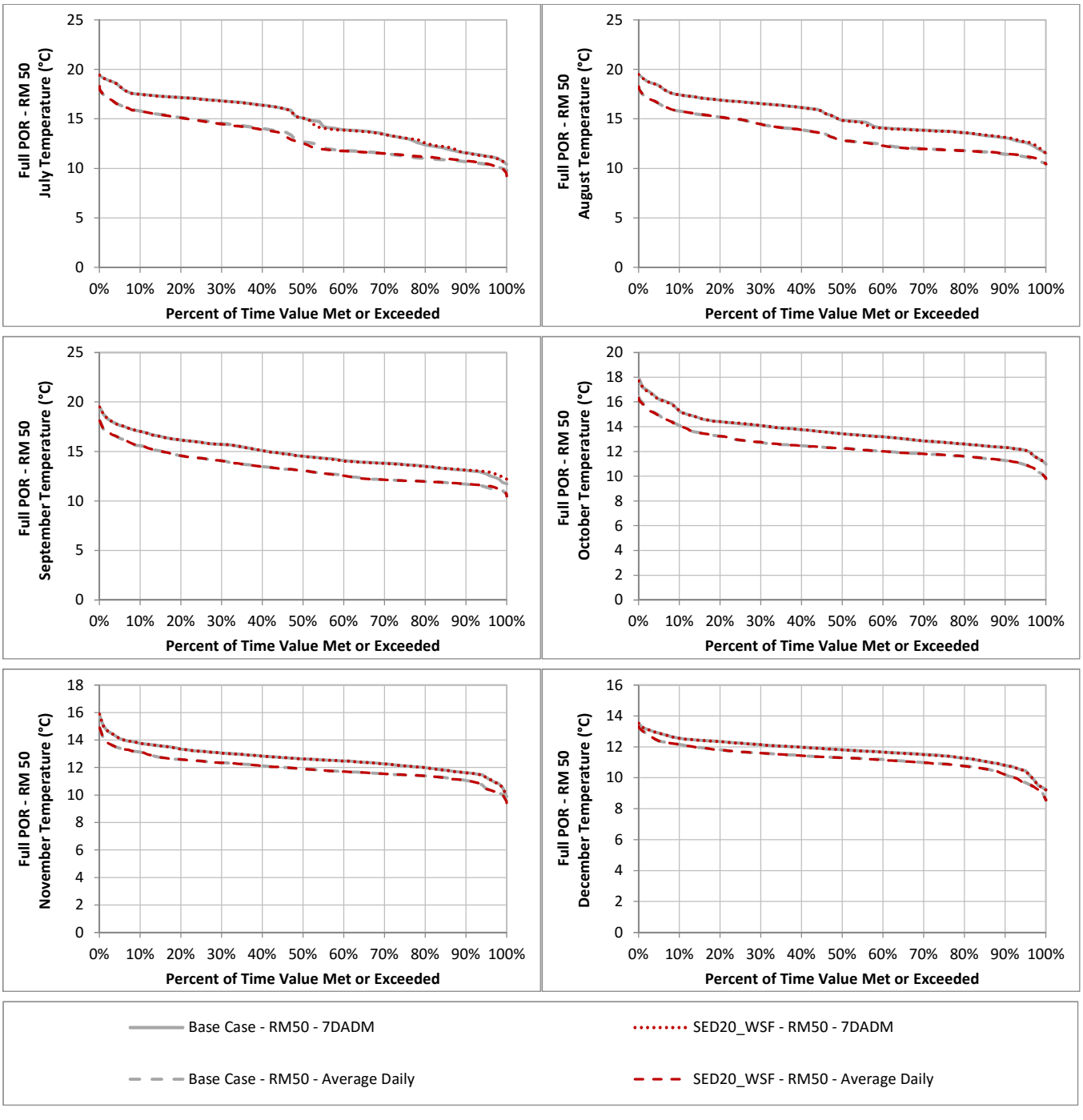

Full POR - RM 50
March Temperature (°C)
Percent of Time Value Met or Exceeded

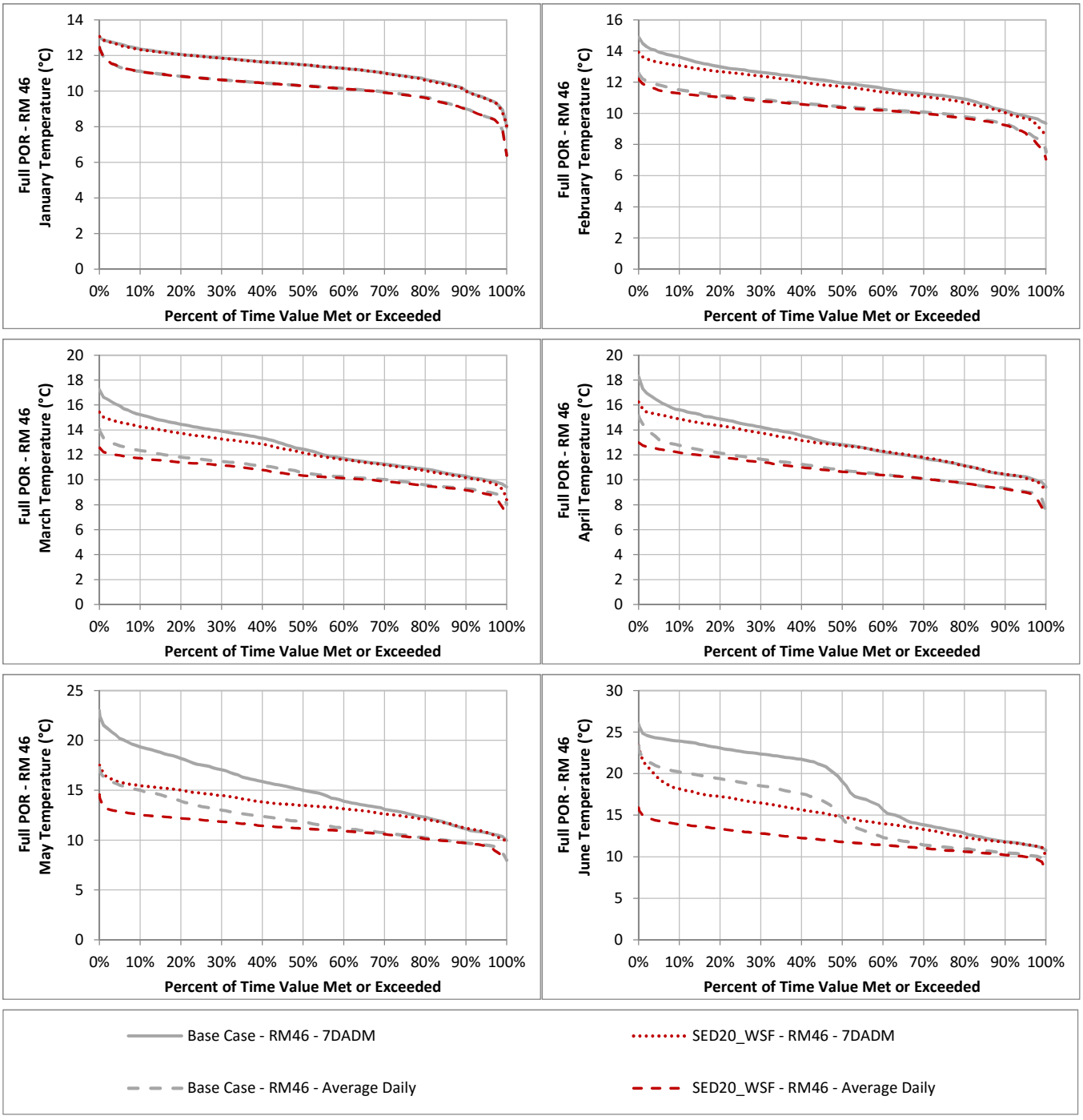
Full POR - RM 50
April Temperature (°C)
Percent of Time Value Met or Exceeded

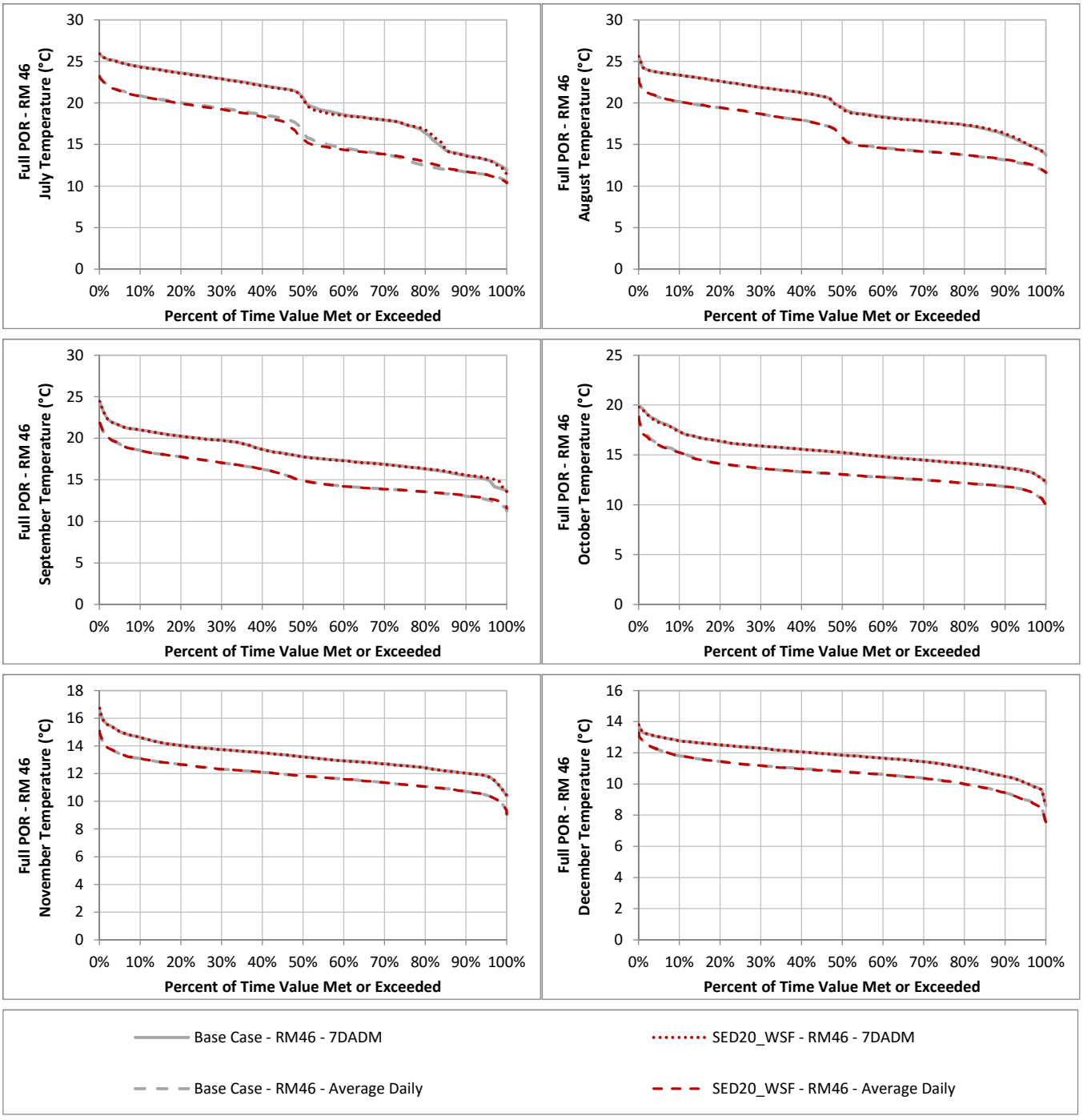

Full POR - RM 50
May Temperature (°C)
Percent of Time Value Met or Exceeded

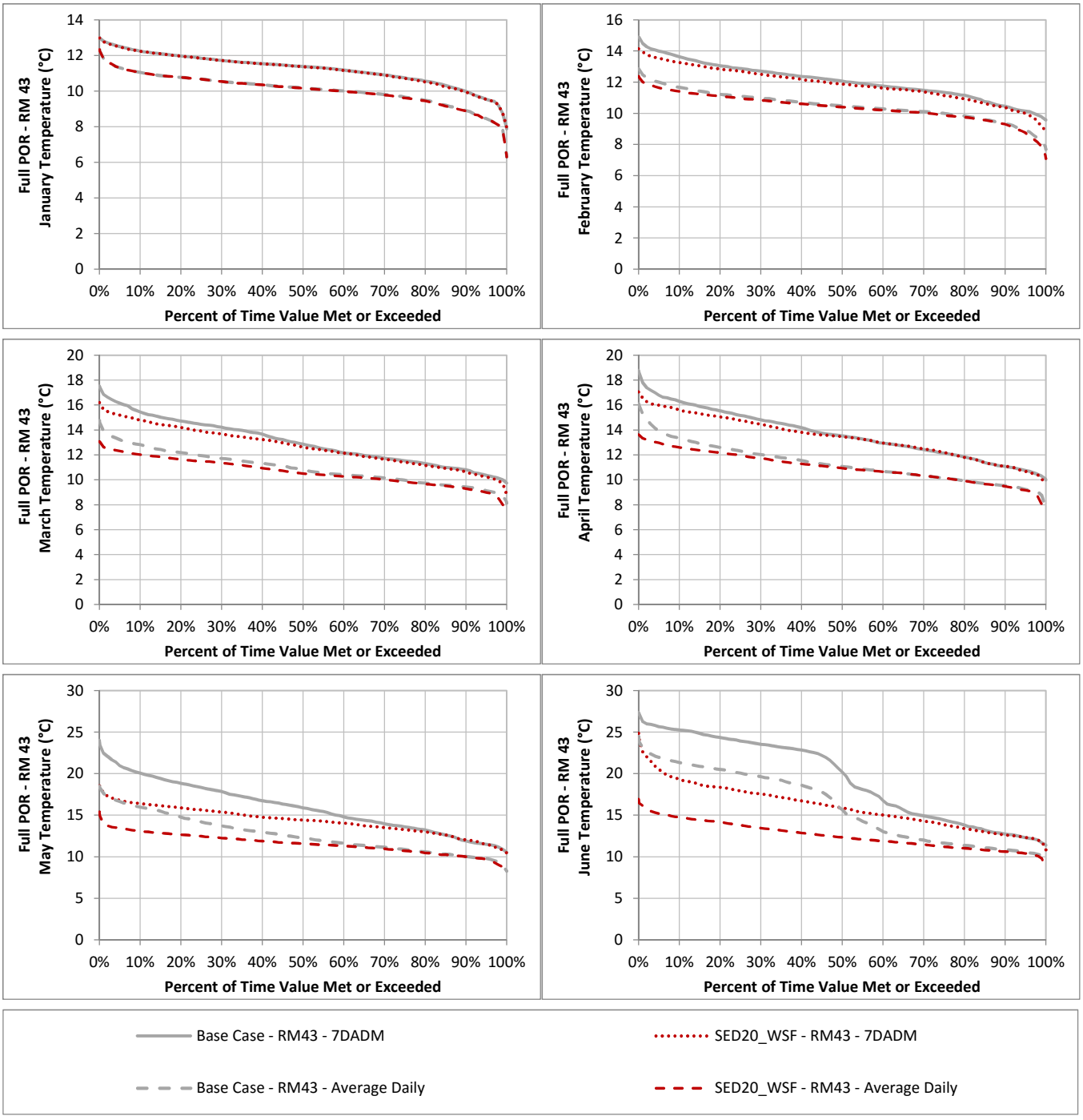
Full POR - RM 50
June Temperature (°C)
Percent of Time Value Met or Exceeded

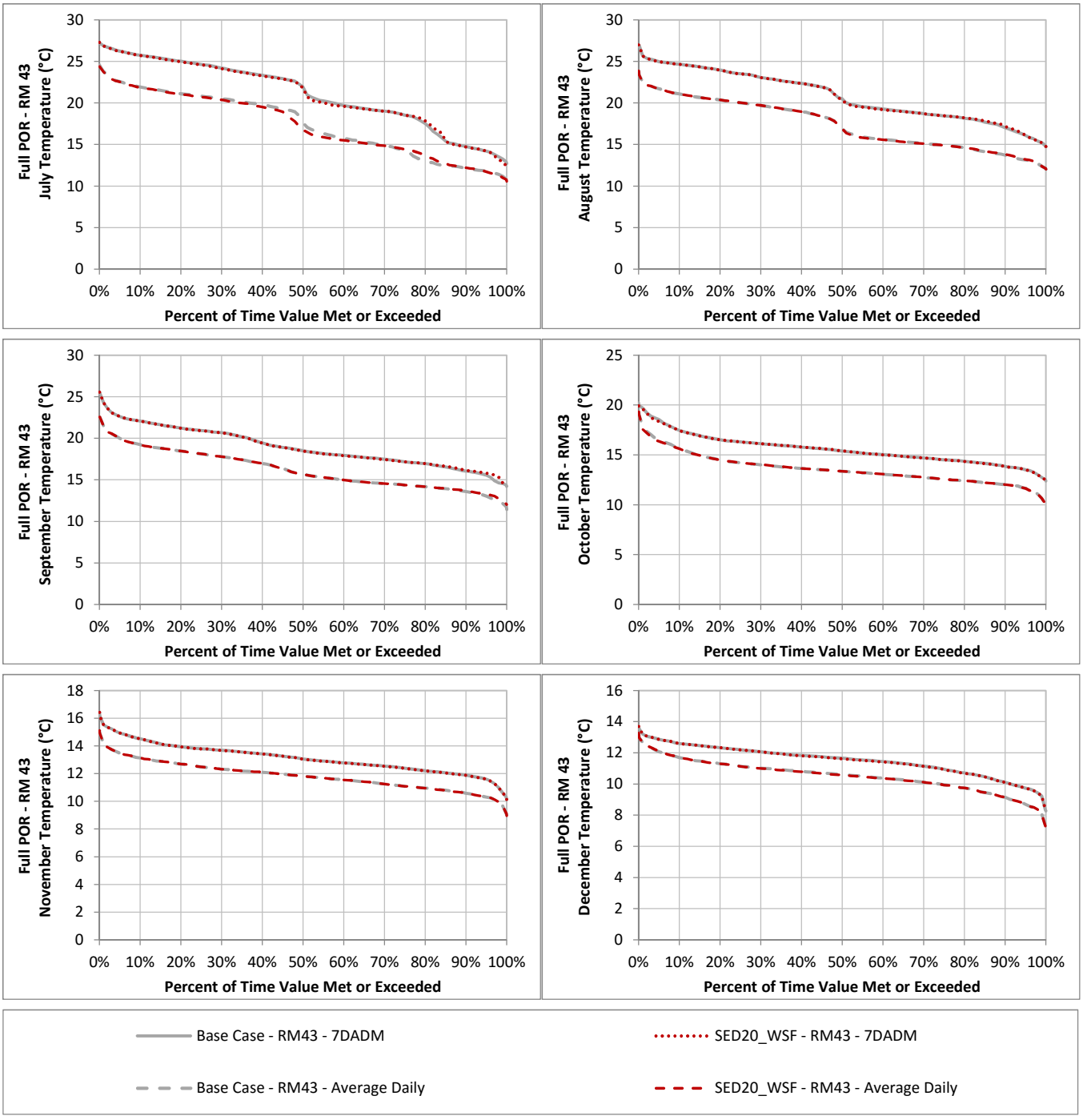

Base Case - RM50 - 7DADM
SED20_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED20_WSF - RM50 - Average Daily

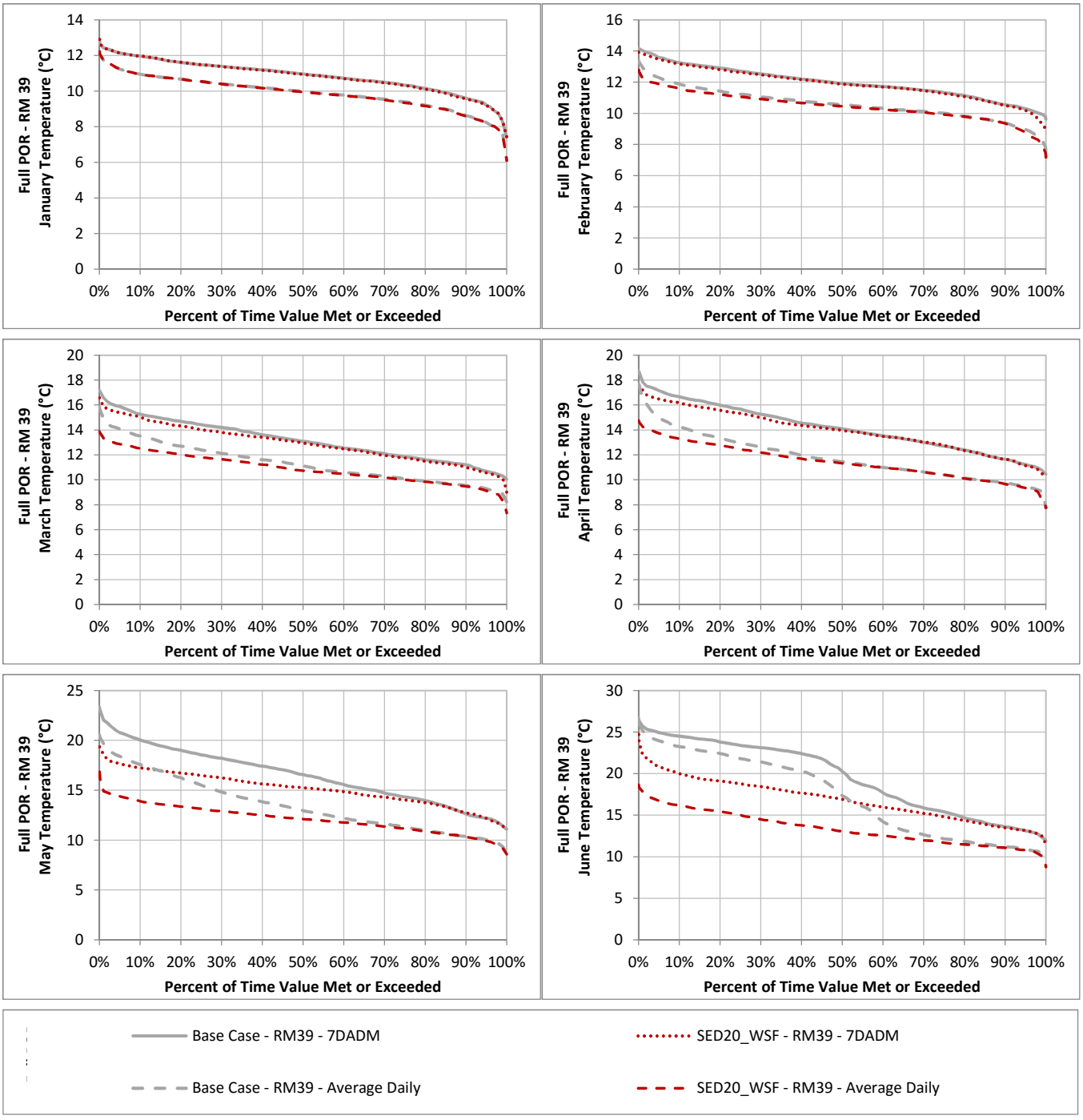

Full POR - RM 50 July Temperature (°C)
Full POR - RM 50 August Temperature (°C)
Full POR - RM 50 September Temperature (°C)
Full POR - RM 50 October Temperature (°C)
Full POR - RM 50 November Temperature (°C)
Full POR - RM 50 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
SED20_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED20_WSF - RM50 - Average Daily

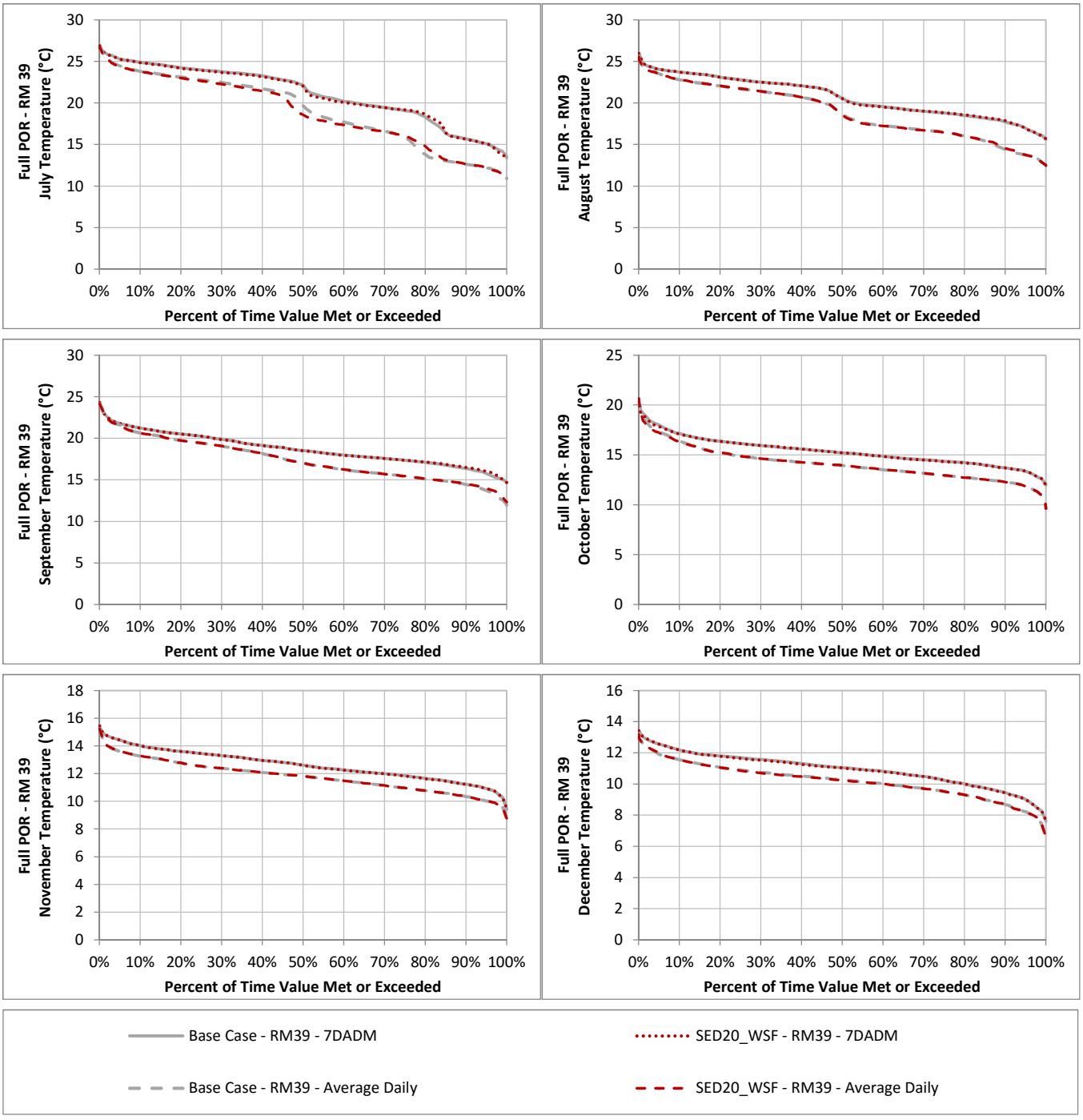

Full POR - RM 46 January Temperature (°C)
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED20_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED20_WSF - RM46 - Average Daily

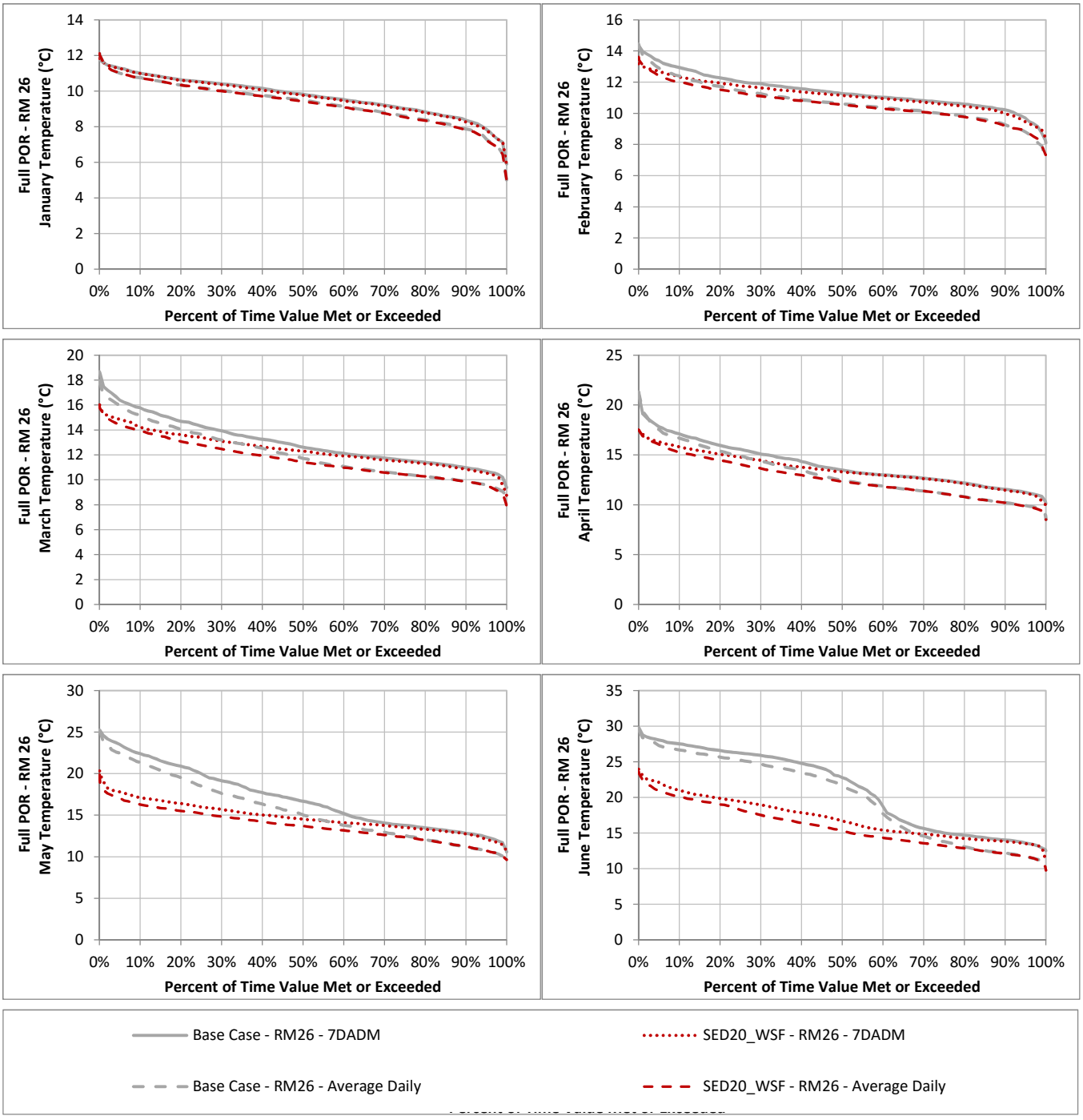

Full POR - RM 46
July Temperature (°C)
Full POR - RM 46
August Temperature (°C)
Full POR - RM 46
September Temperature (°C)
Full POR - RM 46
October Temperature (°C)
Full POR - RM 46
November Temperature (°C)
Full POR - RM 46
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED20_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED20_WSF - RM46 - Average Daily


Full POR - RM 43 January Temperature (°C)
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
SED20_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED20_WSF - RM43 - Average Daily


Full POR - RM 43
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
SED20_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED20_WSF - RM43 - Average Daily


Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
SED20_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED20_WSF - RM39 - Average Daily


Full POR - RM 39
July Temperature (°C)
Full POR - RM 39
August Temperature (°C)
Full POR - RM 39
September Temperature (°C)
Full POR - RM 39
October Temperature (°C)
Full POR - RM 39
November Temperature (°C)
Full POR - RM 39
December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
SED20_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED20_WSF - RM39 - Average Daily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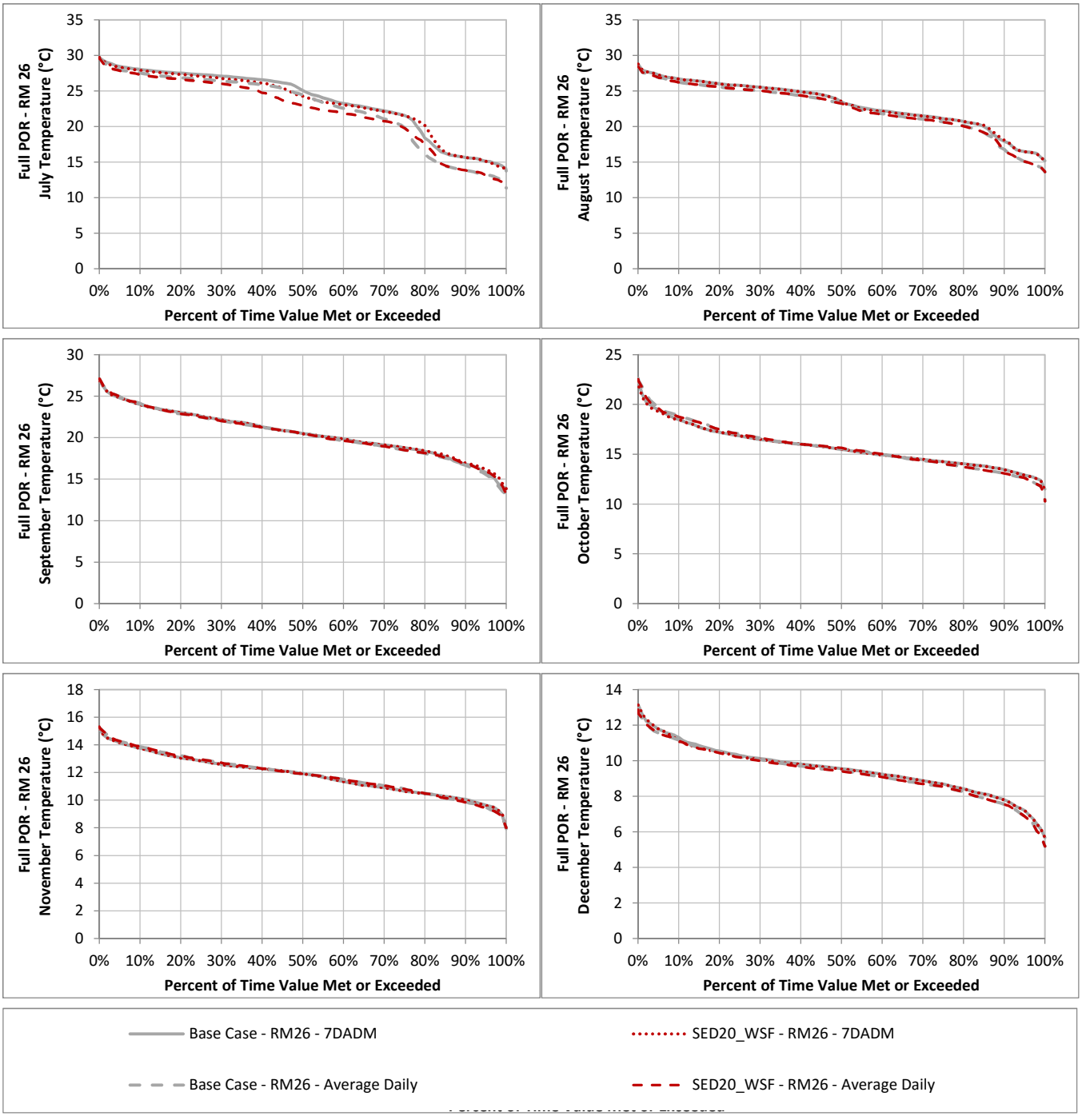
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED20_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED20_WSF - RM26 - Average Daily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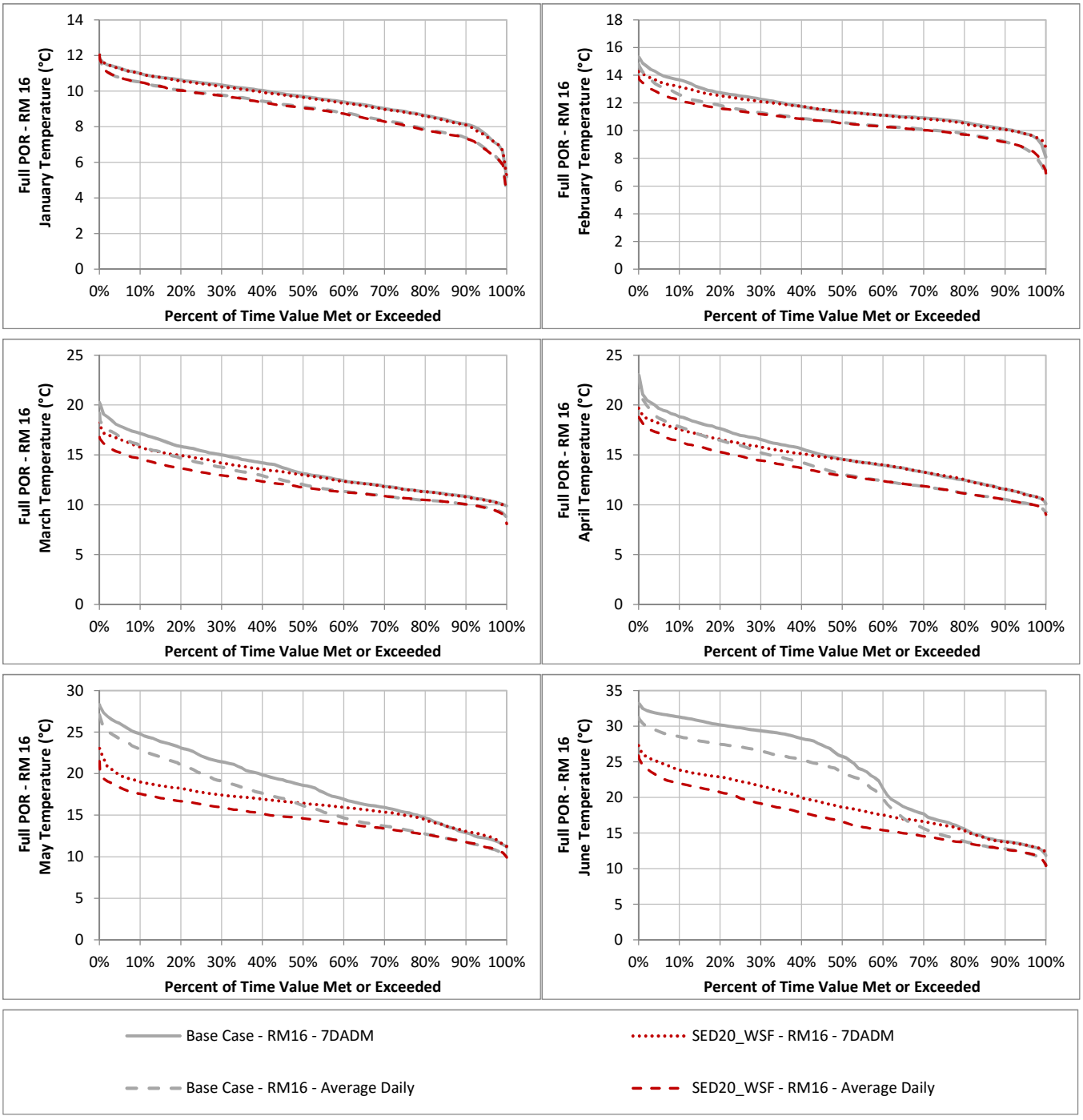
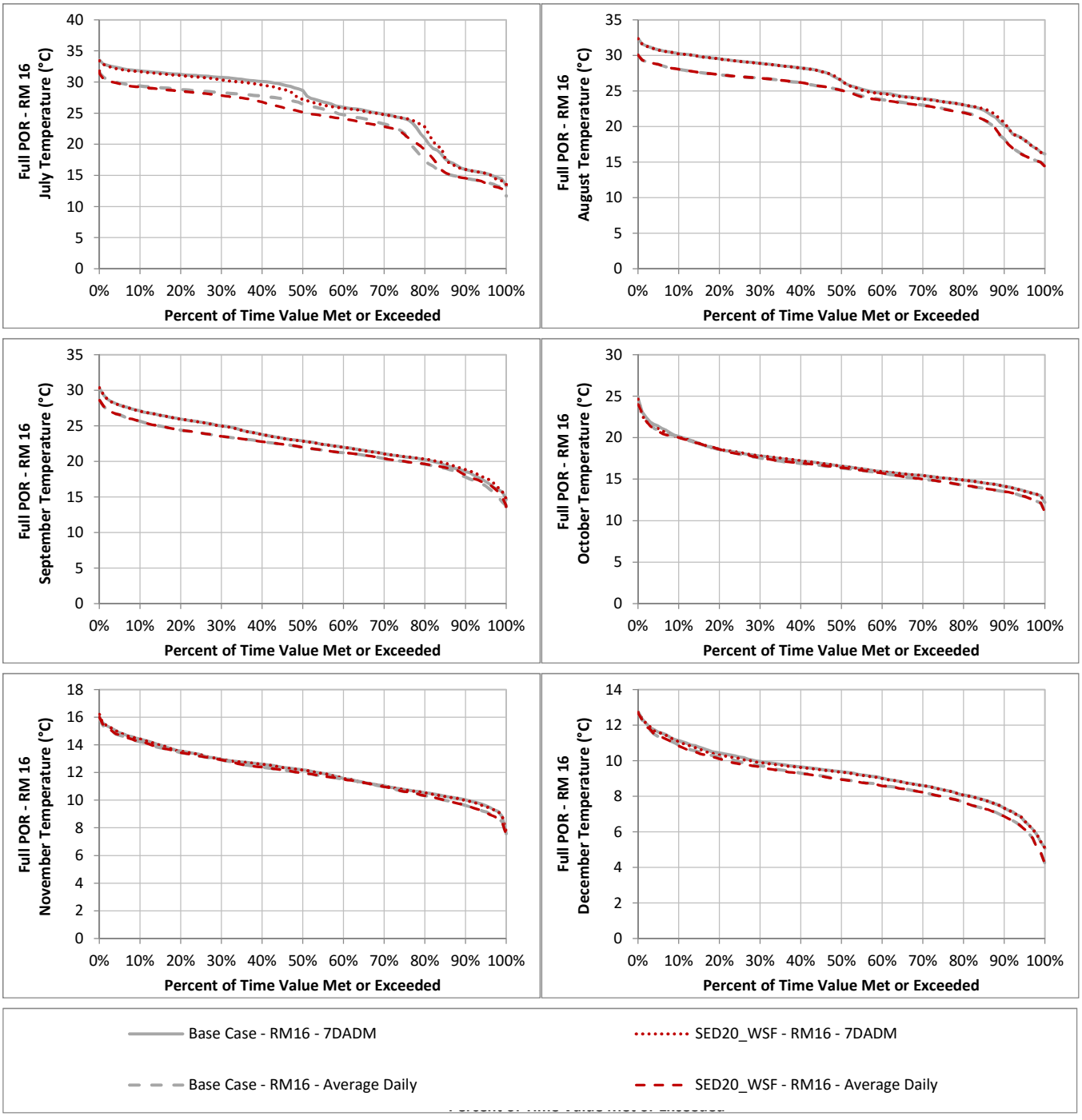
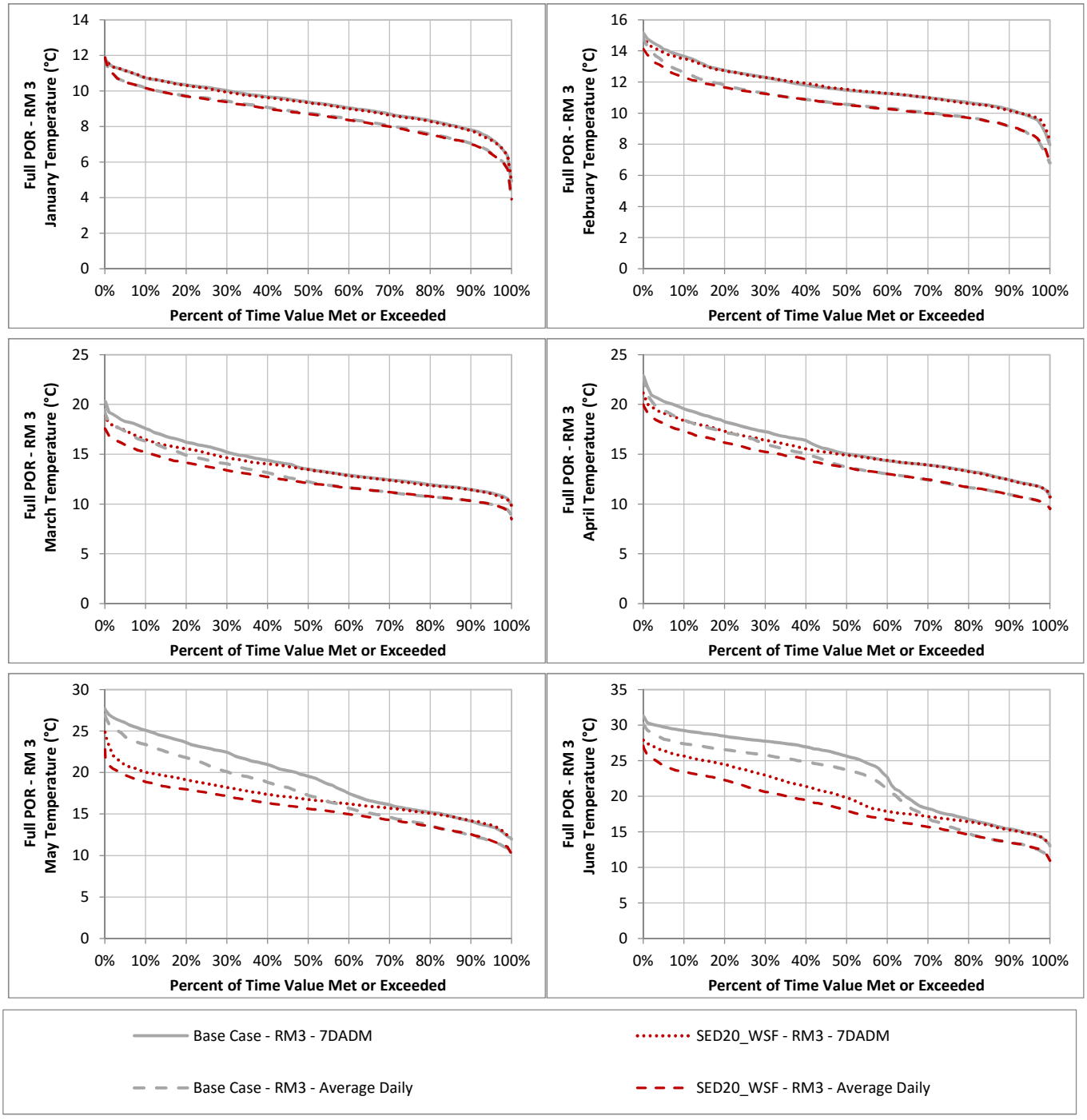
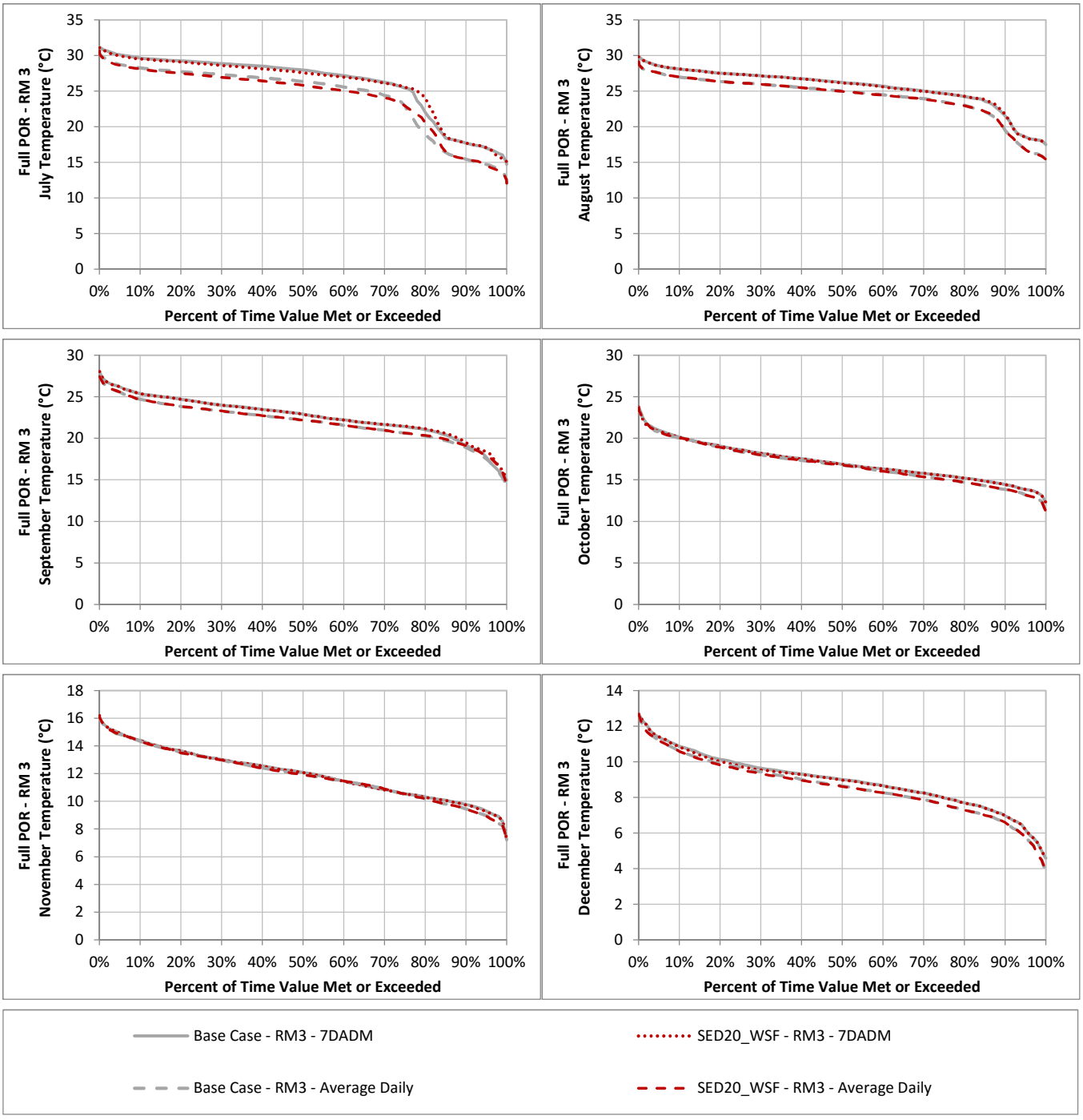
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED20_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED20_WSF - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED20_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED20_WSF - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED20_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED20_WSF - RM16 - Average Daily


Full POR - RM 3
January Temperature (°C)
Full POR - RM 3
February Temperature (°C)
Full POR - RM 3
March Temperature (°C)
Full POR - RM 3
April Temperature (°C)
Full POR - RM 3
May Temperature (°C)
Full POR - RM 3
June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED20_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED20_WSF - RM3 - Average Daily


Full POR - RM 3
July Temperature (°C)
Full POR - RM 3
August Temperature (°C)
Full POR - RM 3
September Temperature (°C)
Full POR - RM 3
October Temperature (°C)
Full POR - RM 3
November Temperature (°C)
Full POR - RM 3
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED20_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED20_WSF - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–2

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE SWB'S REQUEST TO MODEL THE 30% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED30_WSF is the designation for a simulation of an alternative Don Pedro Project operations scenario identified by the SWB in the 2016 SED. The "WSF" in the simulation name indicates that the Districts' normal reservoir operation rules are modeled which represent Don Pedro operational rules consistent with those implemented historically. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced to conserve water. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375 TAF, the amount of "buffer" storage retained in the reservoir historically and under the Base Case. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED30_WSF are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 30% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from

[1] This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 30% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

SED30_WSF

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED30_WSF	% of Base Case
January	1,063,873	847,836	80%
February	1,722,819	1,582,379	92%
March	3,042,430	3,008,928	99%
April	3,481,703	3,385,902	97%
May	3,491,340	4,360,886	125%
June	3,434,821	4,106,325	120%
July	3,521,988	3,308,923	94%
August	2,710,847	2,556,757	94%
September	1,340,662	1,240,057	92%
October	918,413	862,988	94%
November	402,483	390,043	97%
December	613,223	538,074	88%
Total	25,744,602	26,189,098	102%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED30_WSF		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	1,380	85%	75%
87-92	Drought	5,198	4,590	88%	4,082	89%	79%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	731	80%	80%
1977	C	921	713	77%	649	91%	70%
1978	W	767	752	98%	748	100%	97%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	726	81%	81%
1988	C	855	759	89%	667	88%	78%
1989	C	846	744	88%	660	89%	78%
1990	C	876	771	88%	684	89%	78%
1991	C	881	774	88%	687	89%	78%
1992	C	844	647	77%	658	102%	78%
1993	W	823	807	98%	808	100%	98%
1994	C	835	835	100%	667	80%	80%
1995	W	774	774	100%	761	98%	98%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	885	100%	100%
2004	D	940	940	100%	758	81%	81%
2005	W	874	874	100%	861	98%	98%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	702	80%	80%
2009	BN	903	903	100%	889	98%	98%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	810	96%	94%
Total		36,190	35,343	98%	34,012	96%	94%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED30_WSF	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	394	74%
87-92	C	1,600	1,502	94%	988	62%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	270	100%
1973	AN	267	219	100%	219	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	235	60%
1977	C	267	269	90%	159	55%
1978	W	267	205	100%	147	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	235	60%
1988	C	267	267	90%	164	55%
1989	C	267	250	90%	155	55%
1990	C	267	240	90%	148	55%
1991	C	267	243	90%	149	55%
1992	C	267	235	90%	136	55%
1993	W	267	211	100%	153	100%
1994	C	267	264	100%	216	60%
1995	W	267	189	100%	130	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	253	100%
2003	BN	267	234	100%	234	100%
2004	D	267	249	100%	249	100%
2005	W	267	193	100%	193	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	265	100%
2008	C	267	247	100%	205	55%
2009	BN	267	240	100%	162	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	207	77%
Total		11,197	9,676	86%	8,676	77%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

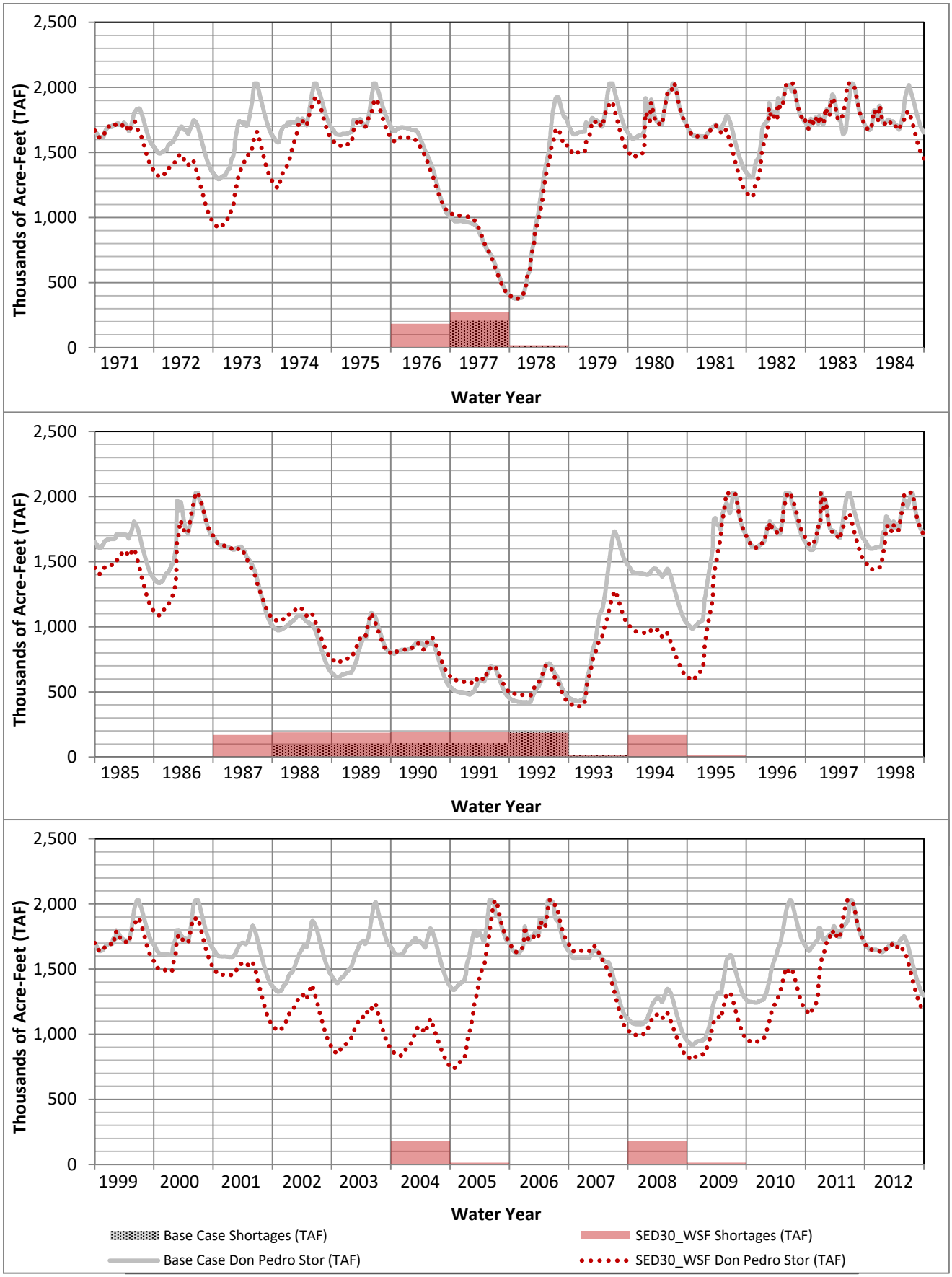


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

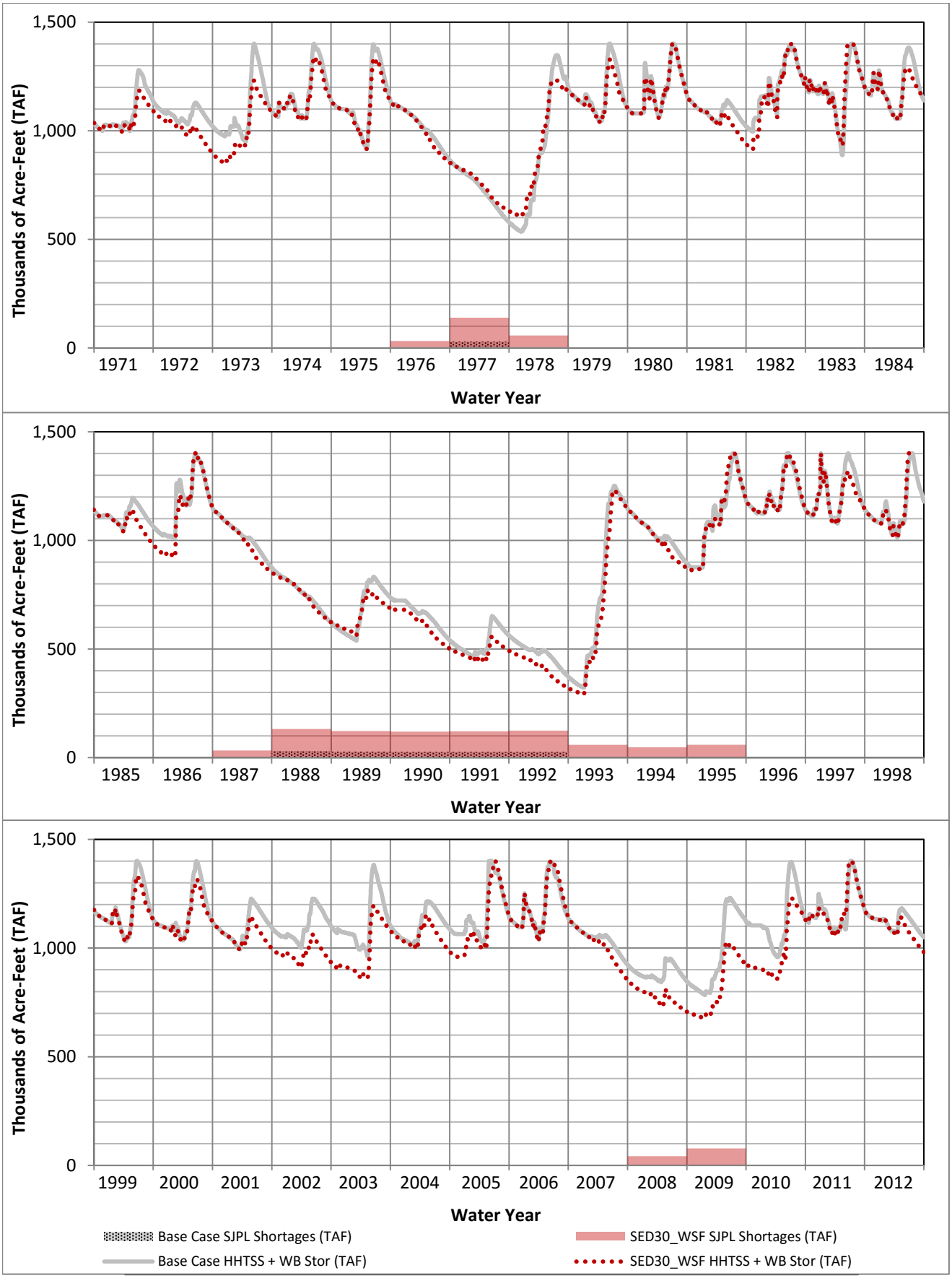


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED30_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	447	447	169%	160%
87-92	Drought	713	713	1,825	1,830	256%	257%
1971	BN	266	539	500	721	188%	134%
1972	D	138	151	353	353	255%	234%
1973	AN	237	613	595	595	252%	97%
1974	W	301	1,050	612	788	203%	75%
1975	W	301	887	674	887	224%	100%
1976	C	171	185	257	257	151%	139%
1977	C	94	94	190	190	202%	202%
1978	W	235	349	719	719	306%	206%
1979	AN	301	876	613	856	204%	98%
1980	W	302	1,818	702	1,676	233%	92%
1981	D	194	252	378	407	195%	162%
1982	W	250	2,275	873	2,123	349%	93%
1983	W	301	3,689	992	3,688	330%	100%
1984	AN	302	1,463	589	1,666	195%	114%
1985	D	205	340	394	394	192%	116%
1986	W	237	1,496	835	1,241	353%	83%
1987	C	179	179	292	296	163%	166%
1988	C	94	94	245	245	259%	259%
1989	C	116	116	406	406	350%	350%
1990	C	103	103	263	263	255%	255%
1991	C	116	116	360	360	311%	311%
1992	C	105	105	261	261	249%	249%
1993	W	235	235	662	662	282%	282%
1994	C	182	182	320	320	176%	176%
1995	W	237	2,098	841	1,809	355%	86%
1996	W	302	1,281	714	1,246	237%	97%
1997	W	301	1,954	601	2,150	200%	110%
1998	W	301	2,226	826	2,067	275%	93%
1999	AN	301	974	634	1,103	211%	113%
2000	AN	302	916	637	932	211%	102%
2001	D	193	233	397	397	206%	171%
2002	D	137	137	394	394	289%	289%
2003	BN	180	233	478	478	265%	206%
2004	D	141	355	392	392	278%	110%
2005	W	237	1,488	750	880	317%	59%
2006	W	301	2,270	878	2,225	292%	98%
2007	C	182	182	321	321	176%	177%
2008	C	119	119	345	345	289%	289%
2009	BN	156	156	471	471	302%	302%
2010	AN	249	349	546	546	219%	156%
2011	W	301	2,376	788	1,888	262%	79%
2012	D	192	213	326	337	170%	159%
Average (1971-2012)		216	828	534	889	247%	107%
Average (1980-2009)		210	903	542	974	258%	108%
Total (1971-2012)		9,092	34,765	22,422	37,353	247%	107%
Total (1980-2009)		6,306	27,083	16,249	29,216	258%	108%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED30_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	315	315	237%	237%
87-92	Drought	403	403	1,516	1,516	376%	376%
1971	BN	173	399	407	581	235%	146%
1972	D	84	96	298	298	355%	309%
1973	AN	154	515	513	513	332%	100%
1974	W	176	760	487	663	276%	87%
1975	W	176	728	549	762	312%	105%
1976	C	83	83	169	169	205%	205%
1977	C	50	50	145	145	292%	292%
1978	W	154	193	639	639	414%	331%
1979	AN	176	683	488	731	277%	107%
1980	W	177	1,205	578	1,159	327%	96%
1981	D	101	151	285	306	283%	203%
1982	W	159	1,862	782	1,747	493%	94%
1983	W	176	2,287	868	2,191	492%	96%
1984	AN	177	552	464	755	262%	137%
1985	D	112	247	301	301	269%	122%
1986	W	154	1,388	753	1,140	487%	82%
1987	C	91	91	203	203	225%	225%
1988	C	50	50	200	200	400%	400%
1989	C	72	72	362	362	504%	504%
1990	C	59	59	218	218	371%	371%
1991	C	72	72	315	315	441%	441%
1992	C	60	60	216	216	358%	358%
1993	W	154	154	582	582	377%	377%
1994	C	93	93	231	231	248%	248%
1995	W	154	1,482	758	1,097	491%	74%
1996	W	177	1,126	590	1,113	334%	99%
1997	W	176	859	476	1,020	270%	119%
1998	W	176	1,667	702	1,478	398%	89%
1999	AN	176	774	509	912	289%	118%
2000	AN	177	791	512	807	290%	102%
2001	D	100	140	304	304	304%	217%
2002	D	86	86	344	344	398%	398%
2003	BN	130	182	428	428	329%	235%
2004	D	82	295	333	333	404%	113%
2005	W	154	1,289	668	668	432%	52%
2006	W	176	1,759	754	1,730	428%	98%
2007	C	94	94	232	232	248%	248%
2008	C	75	75	300	300	401%	401%
2009	BN	106	106	421	421	399%	399%
2010	AN	158	218	455	455	288%	209%
2011	W	176	1,489	663	1,377	376%	92%
2012	D	104	118	238	242	230%	206%
Average (1971-2012)		129	581	446	659	346%	113%
Average (1980-2009)		125	636	456	704	365%	111%
Total (1971-2012)		5,411	24,398	18,742	27,690	346%	113%
Total (1980-2009)		3,746	19,067	13,689	21,114	365%	111%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	140	55	11	0	0	0	0	0	0	0	0
1972	34	4	0	0	0	0	0	0	0	0	0
1973	72	46	34	27	15	5	0	0	0	0	0
1974	108	91	76	46	10	7	4	0	0	0	0
1975	125	91	76	55	33	21	12	0	0	0	0
1976	2	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	100	75	53	33	15	10	0	0	0	0	0
1979	119	108	76	53	28	6	0	0	0	0	0
1980	203	187	166	118	83	56	53	39	30	28	27
1981	45	7	0	0	0	0	0	0	0	0	0
1982	186	170	167	158	126	116	108	106	89	79	62
1983	346	308	278	263	229	221	212	168	130	111	101
1984	227	176	146	113	70	49	49	41	34	27	27
1985	38	8	0	0	0	0	0	0	0	0	0
1986	136	121	111	95	86	57	42	35	29	21	17
1987	2	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	45	10	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	32	18	0	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	12	0	0	0	0	0	0	0	0	0	0
1995	164	132	126	117	107	99	83	67	56	50	29
1996	148	135	122	105	65	54	40	24	18	11	6
1997	186	158	132	117	85	83	69	61	61	54	47
1998	193	190	177	166	155	133	114	90	67	44	29
1999	162	133	106	56	37	23	21	7	7	7	6
2000	131	105	92	56	35	19	8	7	3	0	0
2001	42	26	4	0	0	0	0	0	0	0	0
2002	49	19	0	0	0	0	0	0	0	0	0
2003	68	28	22	18	13	9	7	0	0	0	0
2004	34	12	0	0	0	0	0	0	0	0	0
2005	123	83	48	32	23	20	16	14	8	2	0
2006	201	184	184	169	160	128	118	101	70	63	59
2007	5	0	0	0	0	0	0	0	0	0	0
2008	19	10	6	1	0	0	0	0	0	0	0
2009	51	35	21	9	0	0	0	0	0	0	0
2010	75	38	23	11	8	6	4	0	0	0	0
2011	184	175	175	147	110	97	77	65	49	44	37
2012	22	10	5	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	3,928	3,022	2,488	1,982	1,499	1,219	1,037	825	651	541	447
Number of years flows NOT achieved for threshold period	3	8	15	18	20	21	24	28	28	29	30

Table 7. February through June La Grange 1 Day Flow Count

	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	138	55	11	0	0	0	0	0	0	0	0
1972	34	4	0	0	0	0	0	0	0	0	0
1973	72	46	34	27	15	5	0	0	0	0	0
1974	106	91	76	46	10	7	4	0	0	0	0
1975	123	91	76	55	33	21	12	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	100	75	53	33	15	10	0	0	0	0	0
1979	117	108	76	53	28	6	0	0	0	0	0
1980	151	137	124	84	57	38	37	31	22	21	20
1981	43	7	0	0	0	0	0	0	0	0	0
1982	136	134	133	133	126	116	108	106	89	79	62
1983	150	149	149	148	148	148	148	126	110	94	87
1984	144	100	76	50	14	0	0	0	0	0	0
1985	36	8	0	0	0	0	0	0	0	0	0
1986	136	121	111	95	86	57	42	35	29	21	17
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	45	10	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	32	18	0	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	10	0	0	0	0	0	0	0	0	0	0
1995	110	85	79	70	67	59	43	42	41	36	16
1996	146	135	122	105	65	54	40	24	18	11	6
1997	133	107	81	66	35	33	26	26	26	26	19
1998	148	147	141	130	119	104	87	66	52	33	19
1999	149	122	102	56	37	23	21	7	7	7	6
2000	129	105	92	56	35	19	8	7	3	0	0
2001	40	26	4	0	0	0	0	0	0	0	0
2002	49	19	0	0	0	0	0	0	0	0	0
2003	68	28	22	18	13	9	7	0	0	0	0
2004	34	12	0	0	0	0	0	0	0	0	0
2005	94	64	41	30	22	20	16	14	8	2	0
2006	149	149	149	141	132	114	104	87	63	56	52
2007	3	0	0	0	0	0	0	0	0	0	0
2008	19	10	6	1	0	0	0	0	0	0	0
2009	51	35	21	9	0	0	0	0	0	0	0
2010	75	38	23	11	8	6	4	0	0	0	0
2011	141	134	134	113	91	86	67	55	40	35	29
2012	20	10	5	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	3,230	2,454	1,992	1,547	1,162	935	774	626	508	421	333
Number of years flows NOT achieved for threshold period	5	8	15	18	20	22	25	29	29	30	31

Table 8. La Grange Consecutive 7 Day Flow Count

	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	3	4	1	0	0	0	0	0	0	0	0
1972	2	0	0	0	0	0	0	0	0	0	0
1973	1	2	1	1	1	0	0	0	0	0	0
1974	1	3	4	3	1	1	0	0	0	0	0
1975	1	3	3	3	2	2	1	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	4	1	1	2	1	1	0	0	0	0	0
1979	1	2	3	3	3	0	0	0	0	0	0
1980	2	4	6	3	3	2	2	2	2	2	2
1981	3	1	0	0	0	0	0	0	0	0	0
1982	2	2	3	3	4	3	3	3	3	3	3
1983	2	3	5	7	6	7	6	6	5	5	4
1984	2	2	3	4	2	2	2	2	2	2	2
1985	3	0	0	0	0	0	0	0	0	0	0
1986	1	3	3	4	4	4	2	2	1	1	1
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	3	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	1	1	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	2	2	1	2	2	3	2	1	1
1996	1	2	2	2	2	2	2	2	2	0	0
1997	2	3	2	2	2	2	1	2	2	2	2
1998	1	1	2	2	3	3	4	4	3	2	2
1999	1	4	4	2	2	1	1	1	1	1	0
2000	2	2	3	3	1	1	1	1	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	3	1	0	0	0	0	0	0	0	0	0
2005	3	2	1	1	1	1	1	1	1	0	0
2006	3	2	2	3	5	4	5	4	4	4	4
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	0	0	0	0	0	0	0
2010	2	1	1	1	1	0	0	0	0	0	0
2011	1	1	1	2	3	2	2	4	2	2	3
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	62	61	58	56	49	41	36	37	30	25	24
Number of years flows NOT achieved for threshold period	8	11	18	19	21	24	26	28	29	31	32

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	3	4	1	0	0	0	0	0	0	0	0
1972	2	0	0	0	0	0	0	0	0	0	0
1973	1	2	1	1	1	0	0	0	0	0	0
1974	1	3	4	3	1	1	0	0	0	0	0
1975	1	3	3	3	2	2	1	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	4	1	1	2	1	1	0	0	0	0	0
1979	1	2	3	3	3	0	0	0	0	0	0
1980	1	3	5	2	2	1	1	1	1	1	1
1981	3	1	0	0	0	0	0	0	0	0	0
1982	1	2	2	2	4	3	3	3	3	3	3
1983	1	2	2	3	3	3	3	3	4	4	4
1984	2	2	2	3	1	0	0	0	0	0	0
1985	3	0	0	0	0	0	0	0	0	0	0
1986	1	3	3	4	4	4	2	2	1	1	1
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	3	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	1	1	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	2	2	1	2	2	2	2	1	1
1996	1	2	2	2	2	2	2	2	2	0	0
1997	2	3	2	2	1	1	1	1	1	1	1
1998	1	1	2	2	3	3	3	3	3	2	2
1999	1	4	4	2	2	1	1	1	1	1	0
2000	2	2	3	3	1	1	1	1	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	3	1	0	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	1	0	0
2006	2	2	2	2	4	3	4	3	3	3	3
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	0	0	0	0	0	0	0
2010	2	1	1	1	1	0	0	0	0	0	0
2011	1	1	1	2	2	2	2	4	2	2	2
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	57	58	52	48	41	32	28	27	24	19	18
Number of years flows NOT achieved for threshold period	8	11	18	19	21	25	27	29	30	32	33

Table 10. La Grange Consecutive 14 Day Flow Count

	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	3	1	0	0	0	0	0	0	0	0	0
1972	2	0	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	0	0	0	0	0	0	0
1974	1	3	2	2	0	0	0	0	0	0	0
1975	1	2	2	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	0	0	0	0	0	0
1979	1	2	2	2	0	0	0	0	0	0	0
1980	2	3	4	3	2	2	2	1	1	1	1
1981	1	0	0	0	0	0	0	0	0	0	0
1982	1	2	3	3	3	3	3	3	3	2	2
1983	1	2	3	5	3	4	4	4	3	3	3
1984	2	2	3	3	2	2	2	2	2	1	1
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	3	1	1	1	1	1	1	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	1	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	1	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	2	1	1	2	1	1	1	1	1
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	2	2	2	2
1998	1	1	2	2	3	3	3	3	2	1	1
1999	1	4	3	1	1	1	1	0	0	0	0
2000	2	2	1	1	1	1	0	0	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	2	0	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	0	0	0	0	0	0	0
2004	1	0	0	0	0	0	0	0	0	0	0
2005	2	2	1	1	1	1	1	1	0	0	0
2006	2	2	2	3	4	4	4	4	2	1	1
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	0	0	0	0	0	0	0	0	0	0
2009	1	1	1	0	0	0	0	0	0	0	0
2010	2	1	1	0	0	0	0	0	0	0	0
2011	1	1	1	2	2	2	2	2	2	2	0
2012	1	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	46	45	42	39	28	29	26	24	19	15	12
Number of years flows NOT achieved for threshold period	9	17	19	21	26	27	29	31	32	32	34

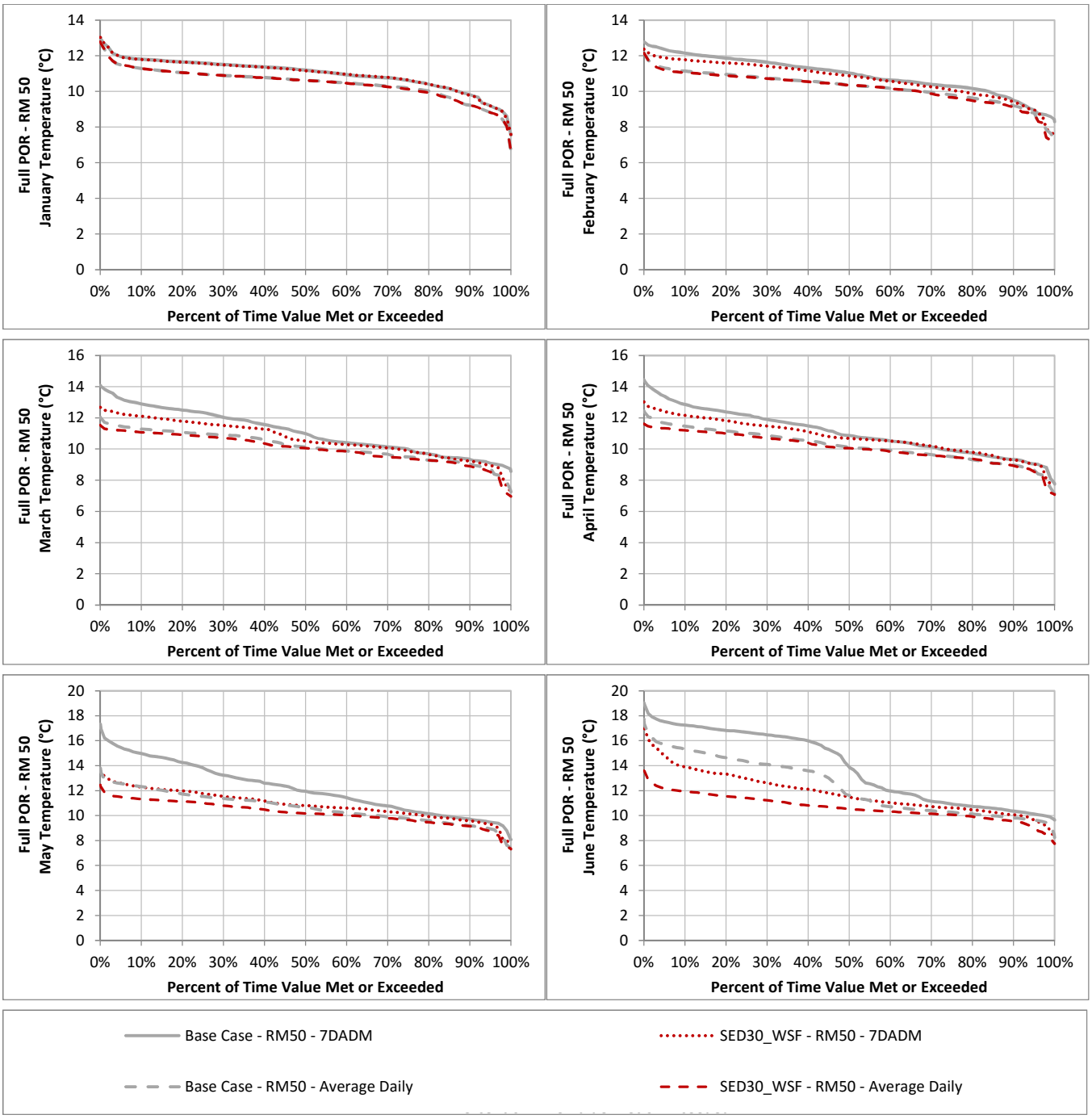
Table 11. February through June La Grange Consecutive 14 Day Flow Count

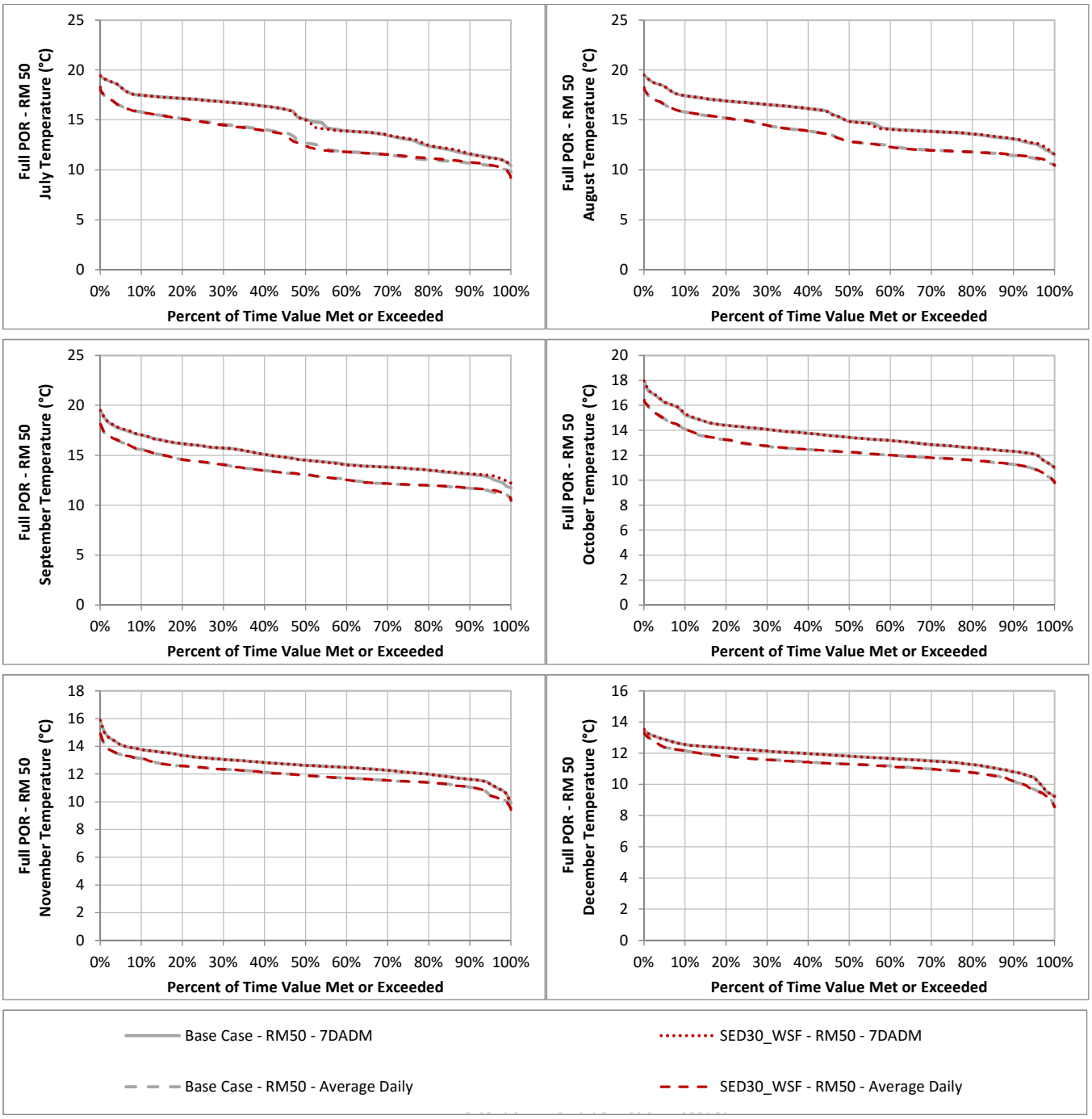
	SED30_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	3	1	0	0	0	0	0	0	0	0	0
1972	2	0	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	0	0	0	0	0	0	0
1974	1	3	2	2	0	0	0	0	0	0	0
1975	1	2	2	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	0	0	0	0	0	0
1979	1	2	2	2	0	0	0	0	0	0	0
1980	1	2	3	2	1	1	1	1	1	1	1
1981	1	0	0	0	0	0	0	0	0	0	0
1982	1	2	2	2	3	3	3	3	3	2	2
1983	1	1	1	2	2	2	2	3	3	3	3
1984	2	2	2	2	1	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	3	1	1	1	1	1	1	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	1	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	1	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0
1995	2	2	2	1	1	2	1	1	1	1	0
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	1	1	1	1
1998	1	1	2	2	3	3	3	3	2	0	0
1999	1	4	3	1	1	1	1	0	0	0	0
2000	2	2	1	1	1	1	0	0	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	2	0	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	0	0	0	0	0	0	0
2004	1	0	0	0	0	0	0	0	0	0	0
2005	1	1	1	1	1	1	1	1	0	0	0
2006	2	2	2	2	3	3	3	3	2	1	1
2007	0	0	0	0	0	0	0	0	0	0	0
2008	1	0	0	0	0	0	0	0	0	0	0
2009	1	1	1	0	0	0	0	0	0	0	0
2010	2	1	1	0	0	0	0	0	0	0	0
2011	1	1	1	2	2	2	2	1	1	1	0
2012	1	0	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	44	42	37	32	24	23	20	18	15	11	8
Number of years flows NOT achieved for threshold period	9	17	19	21	26	28	30	32	33	34	37

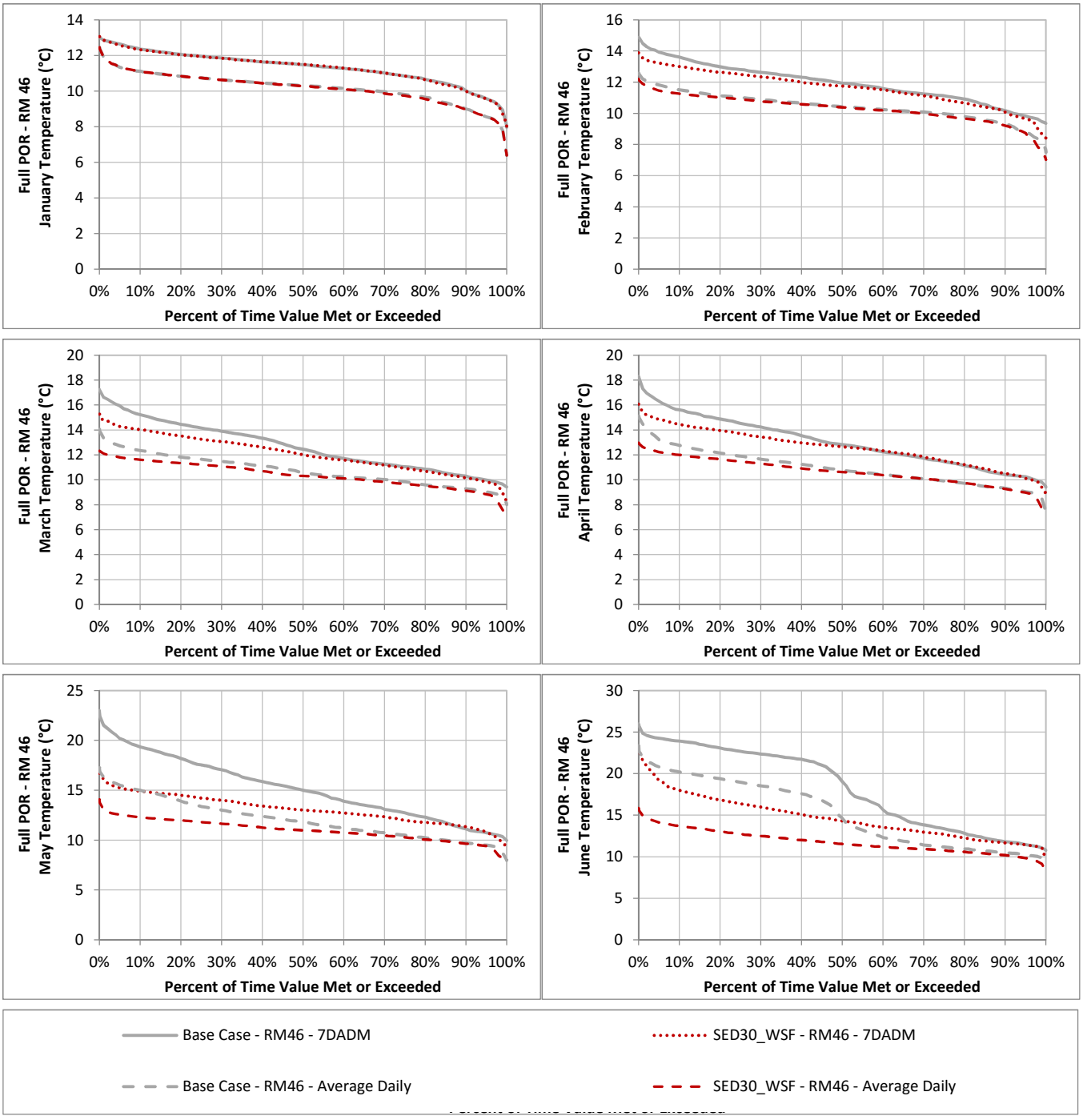
SED30_WSF

Dynamic Routing

Results Summary


Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
SED30_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED30_WSF - RM50 - Average Daily


Full POR - RM 50 July Temperature (°C)
Full POR - RM 50 August Temperature (°C)
Full POR - RM 50 September Temperature (°C)
Full POR - RM 50 October Temperature (°C)
Full POR - RM 50 November Temperature (°C)
Full POR - RM 50 December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM50 - 7DADM
SED30_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED30_WSF - RM50 - Average Daily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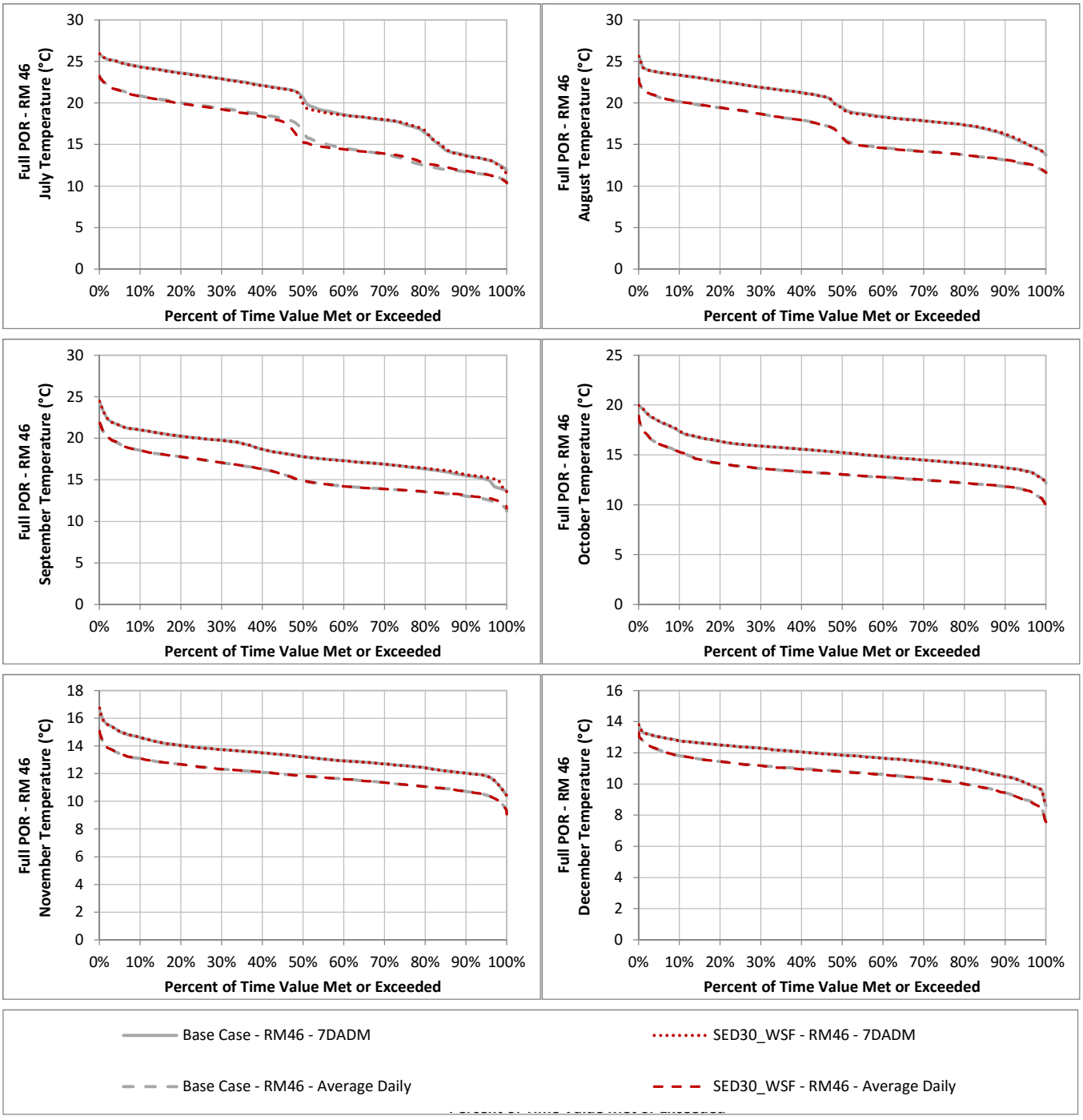
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED30_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED30_WSF - RM46 - Average Daily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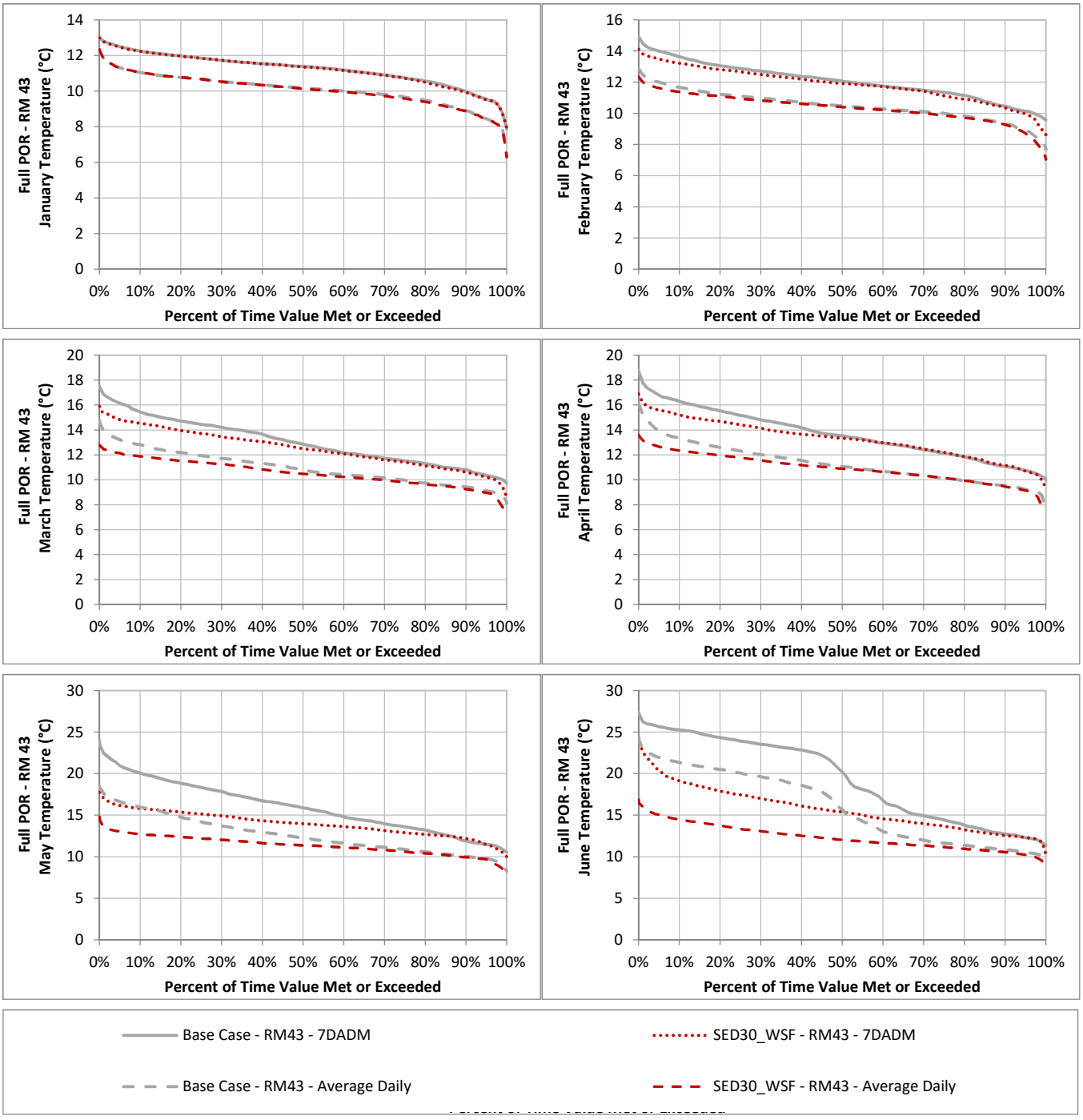
Full POR - RM 46 August Temperature (°C)
Full POR - RM 46 September Temperature (°C)
Full POR - RM 46 October Temperature (°C)
Full POR - RM 46 November Temperature (°C)
Full POR - RM 46 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED30_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED30_WSF - RM46 - Average Daily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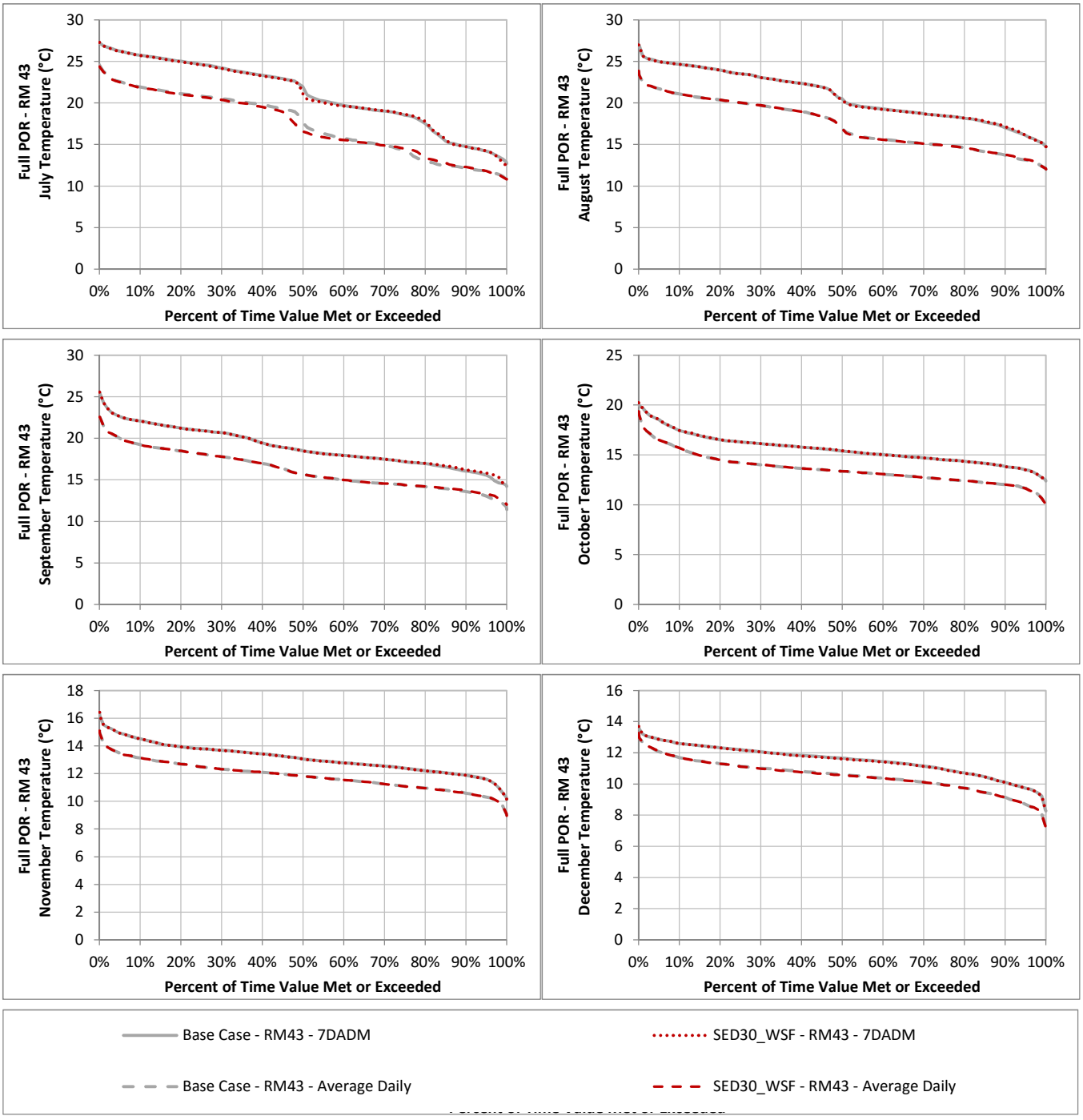
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED30_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED30_WSF - RM43 - Average Daily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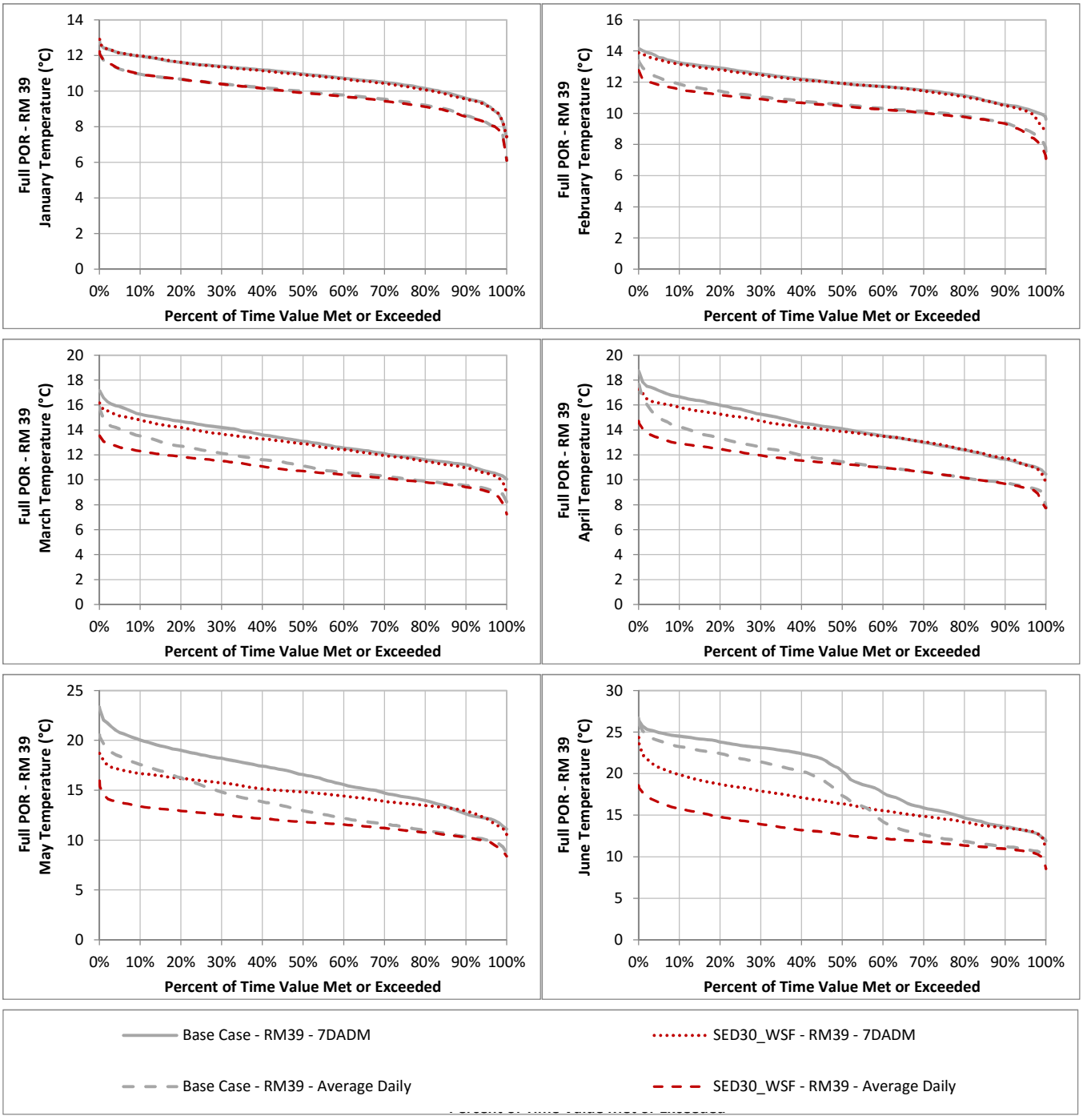
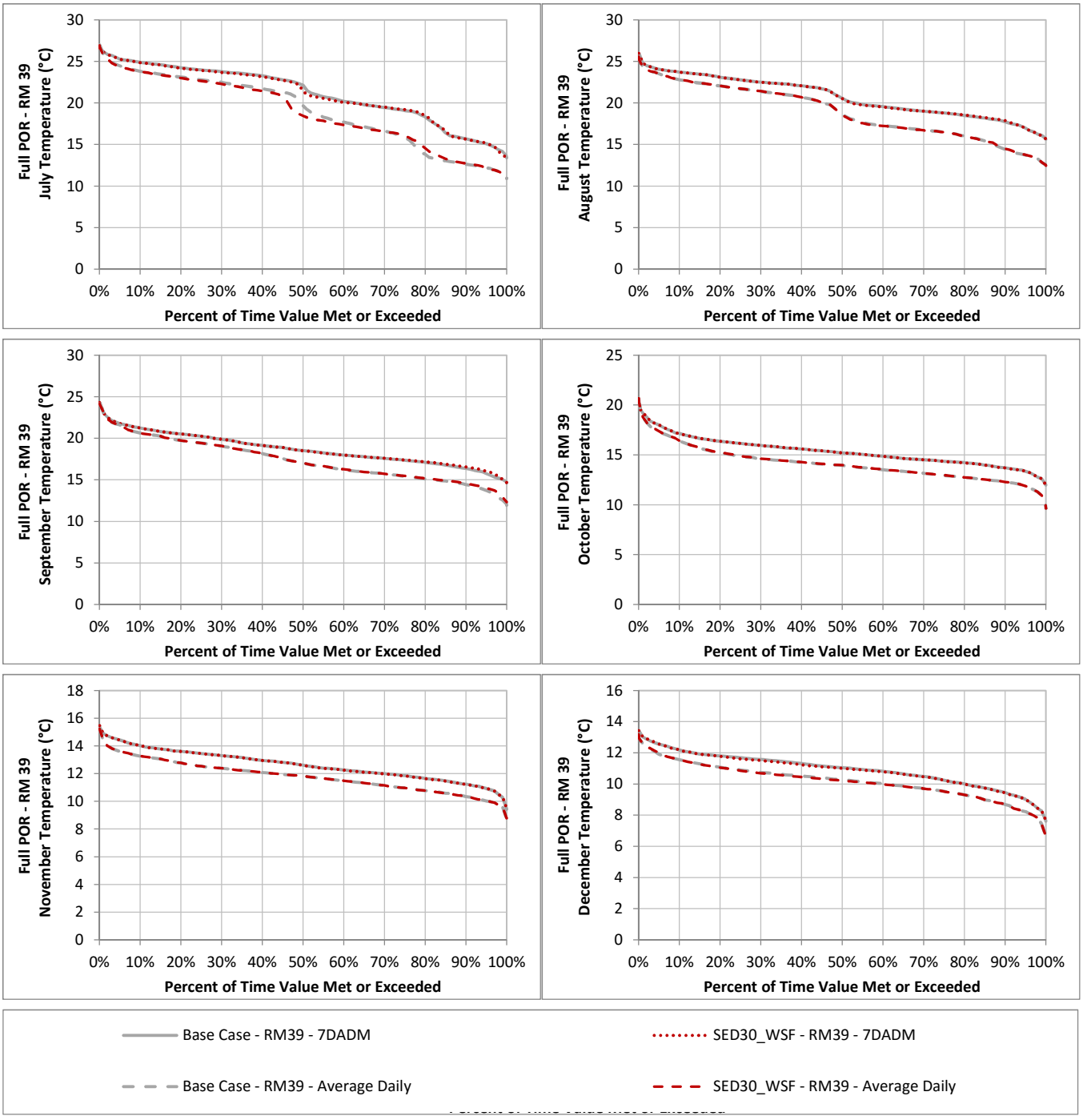
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED30_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED30_WSF - RM43 - Average Daily


Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED30_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED30_WSF - RM39 - Average Daily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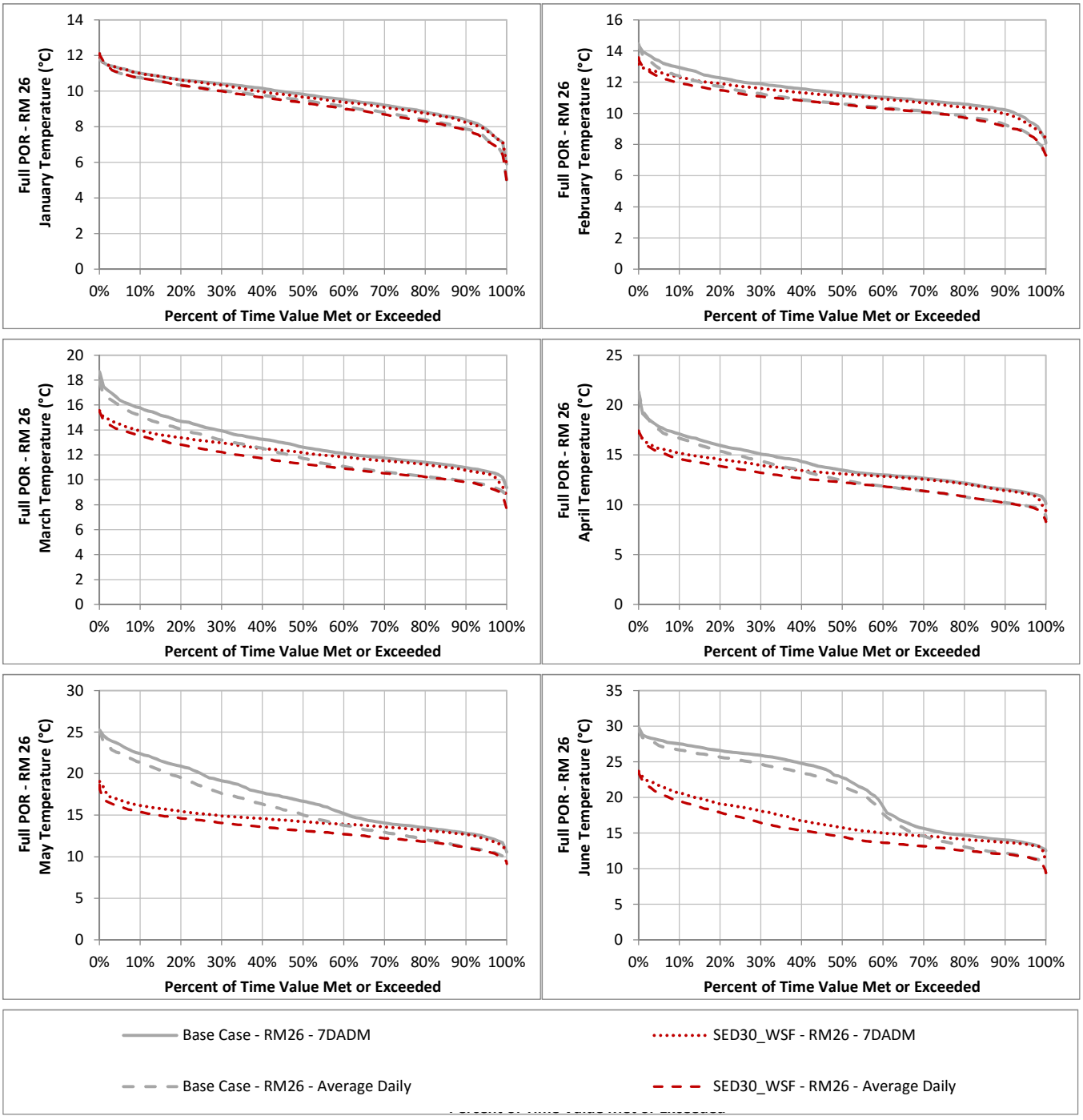
Full POR - RM 39 August Temperature (°C)
Full POR - RM 39 September Temperature (°C)
Full POR - RM 39 October Temperature (°C)
Full POR - RM 39 November Temperature (°C)
Full POR - RM 39 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED30_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED30_WSF - RM39 - Average Daily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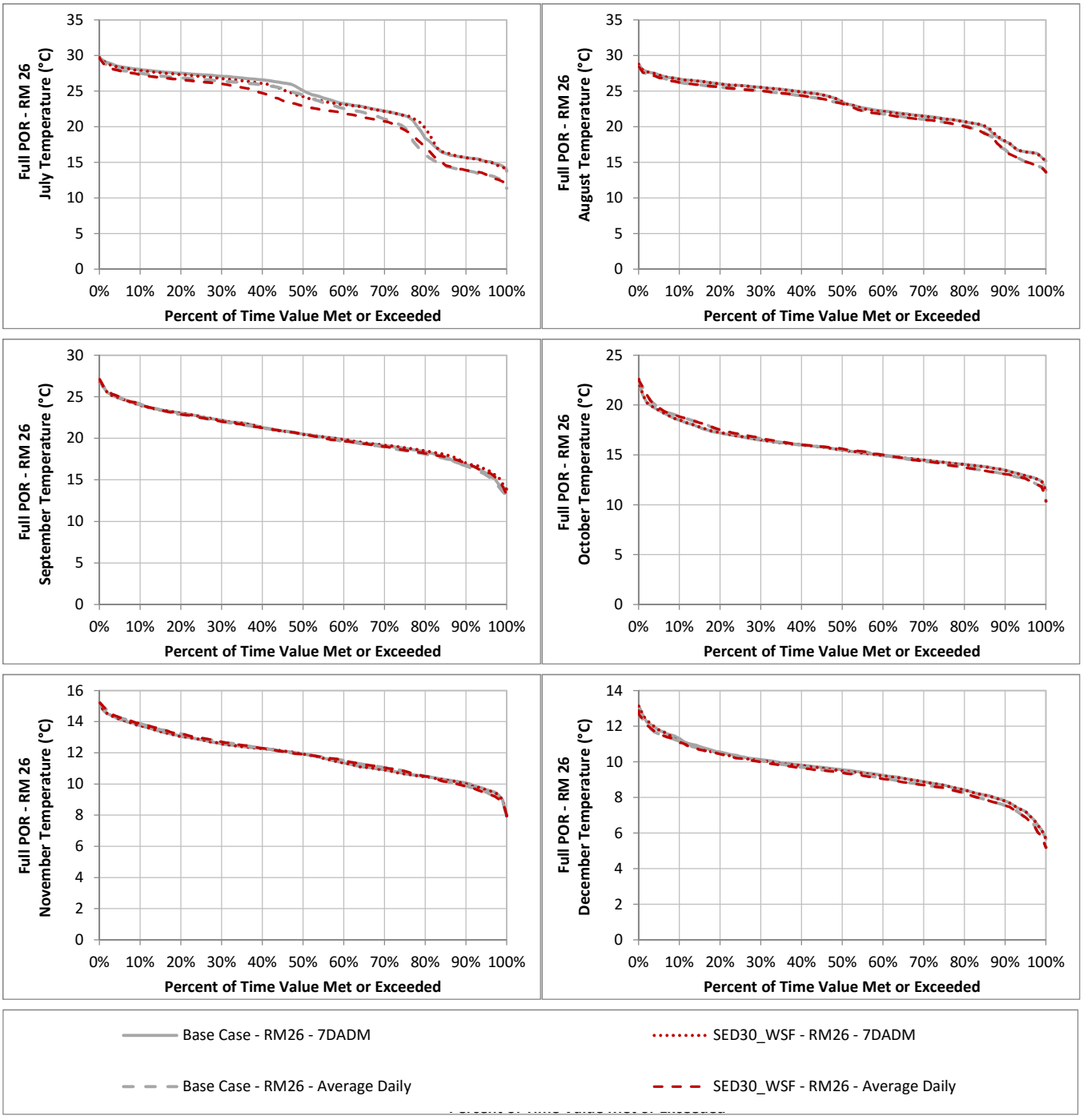
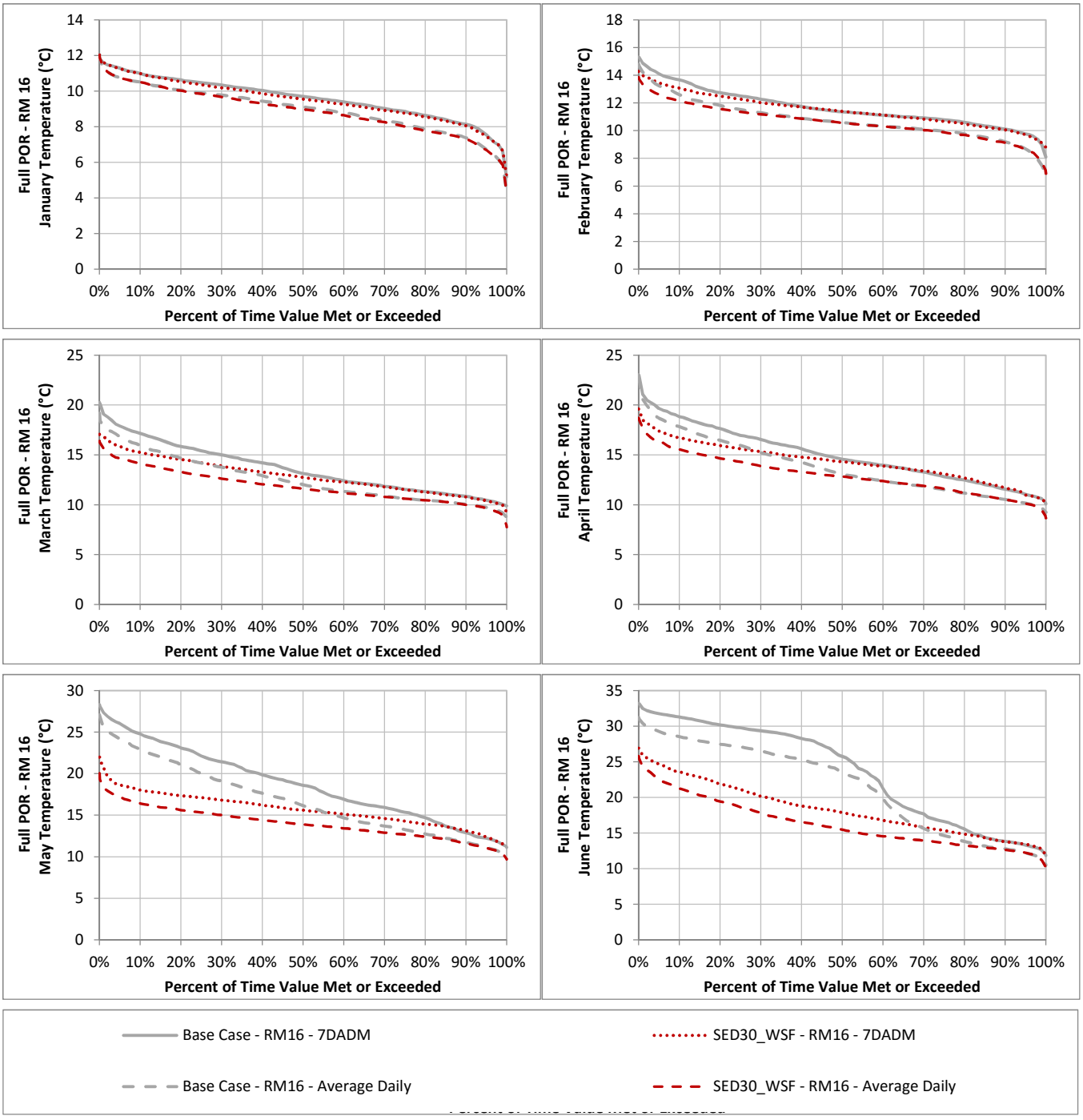
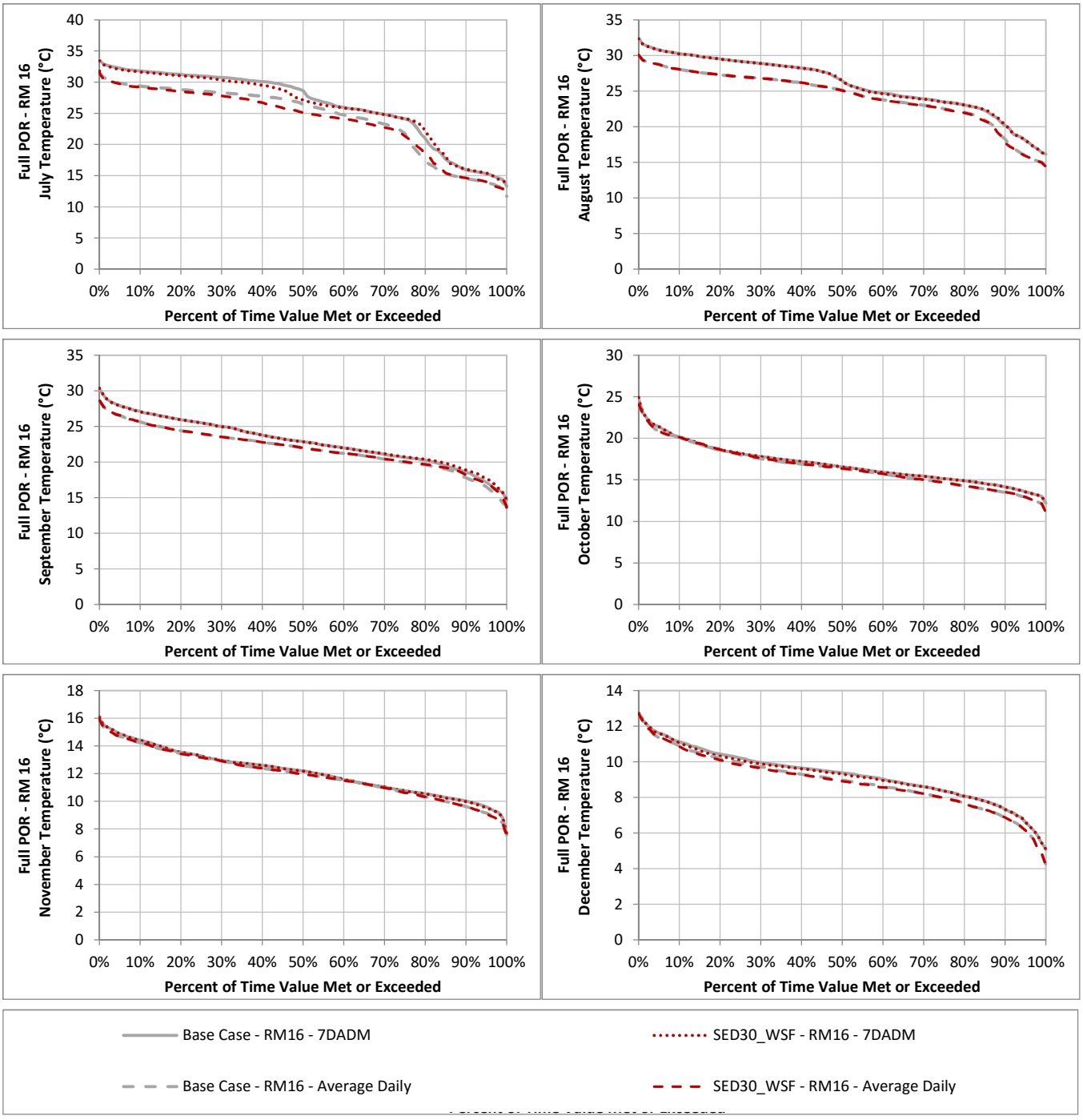
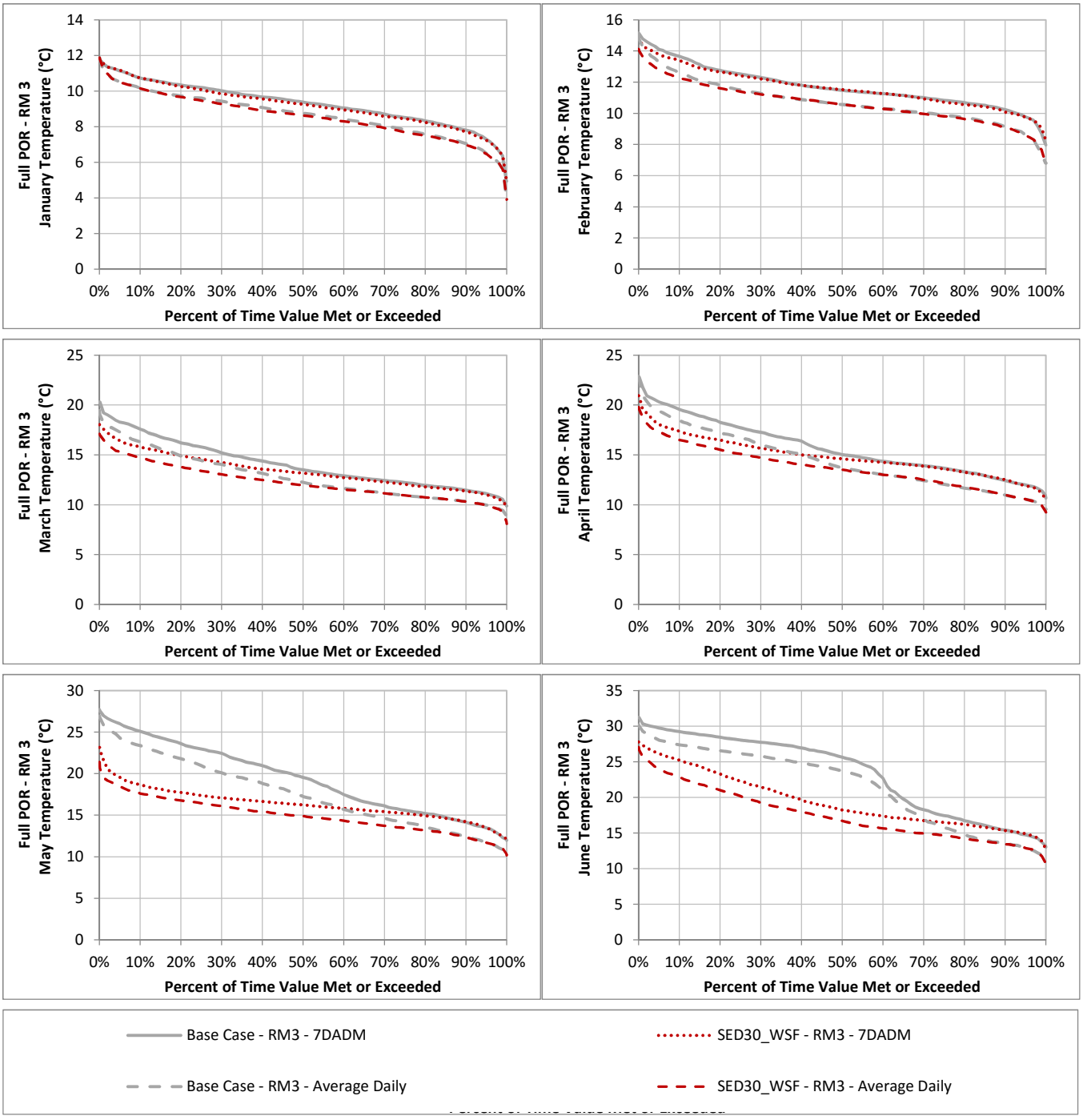
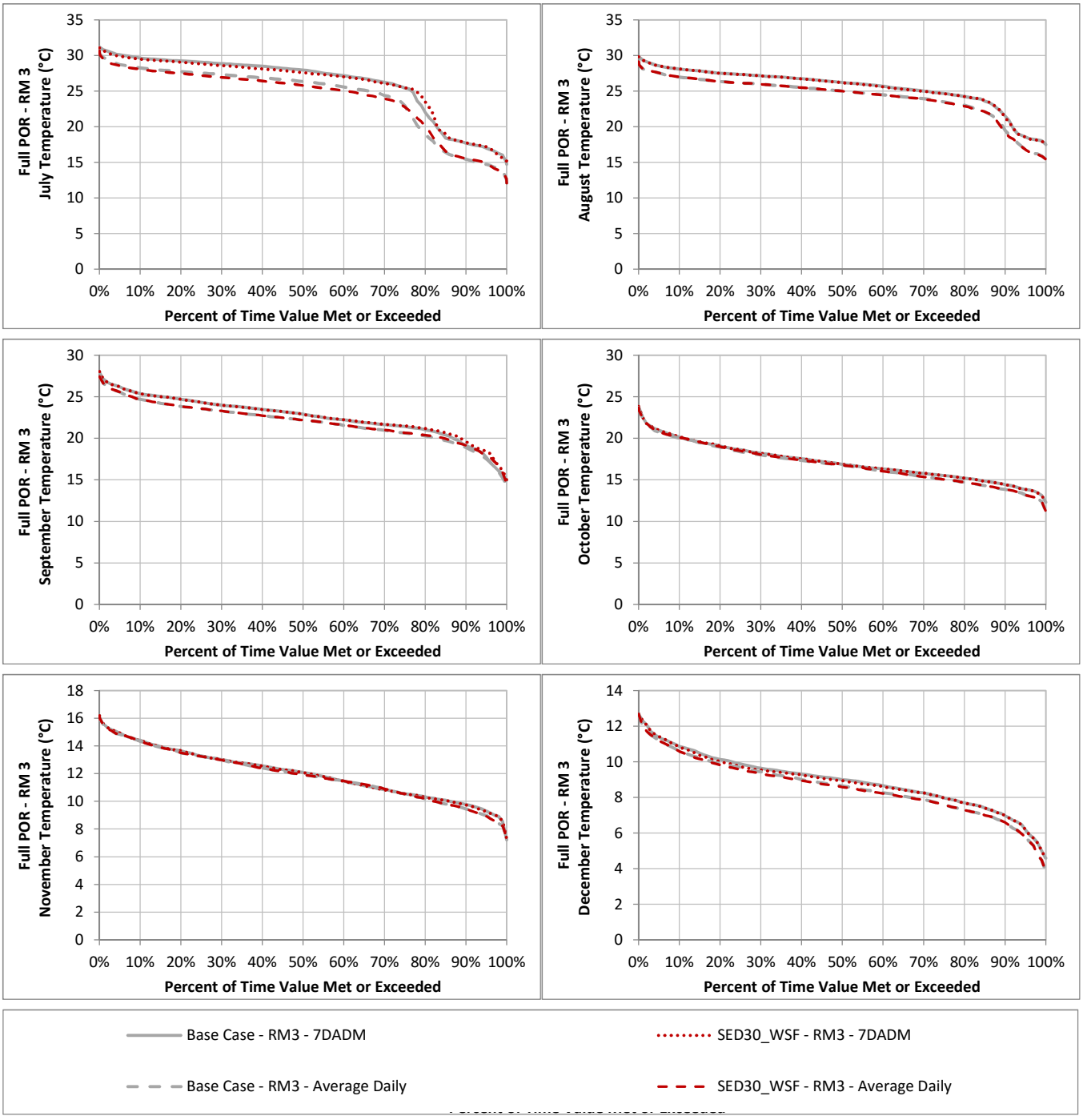
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED30_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED30_WSF - RM26 - Average Daily


Full POR - RM 26
July Temperature (°C)
Full POR - RM 26
August Temperature (°C)
Full POR - RM 26
September Temperature (°C)
Full POR - RM 26
October Temperature (°C)
Full POR - RM 26
November Temperature (°C)
Full POR - RM 26
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED30_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED30_WSF - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED30_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED30_WSF - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED30_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED30_WSF - RM16 - Average Daily


Full POR - RM 3
January Temperature (°C)
Full POR - RM 3
February Temperature (°C)
Full POR - RM 3
March Temperature (°C)
Full POR - RM 3
April Temperature (°C)
Full POR - RM 3
May Temperature (°C)
Full POR - RM 3
June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED30_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED30_WSF - RM3 - Average Daily


Full POR - RM 3
July Temperature (°C)
Full POR - RM 3
August Temperature (°C)
Full POR - RM 3
September Temperature (°C)
Full POR - RM 3
October Temperature (°C)
Full POR - RM 3
November Temperature (°C)
Full POR - RM 3
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED30_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED30_WSF - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–3

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE SWB'S REQUEST TO MODEL THE 40% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED40_WSF is the designation for a simulation of an alternative Don Pedro Project operations scenario identified by the SWB in the 2016 SED as its preferred alternative. The "WSF" in the simulation name indicates that the Districts' normal reservoir operation rules are modeled which represent Don Pedro operational rules consistent with those implemented historically. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced to conserve water. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375 TAF, the amount of "buffer" storage retained in the reservoir historically and under the Base Case. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED40_WSF are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 40% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from

[1]This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 40% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

SED40_WSF

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED40_WSF	% of Base Case
January	1,063,873	686,586	65%
February	1,722,819	1,397,349	81%
March	3,042,430	2,770,707	91%
April	3,481,703	3,342,989	96%
May	3,491,340	4,475,282	128%
June	3,434,821	4,153,433	121%
July	3,521,988	3,322,763	94%
August	2,710,847	2,495,119	92%
September	1,340,662	1,404,955	105%
October	918,413	1,016,221	111%
November	402,483	530,422	132%
December	613,223	445,118	73%
Total	25,744,602	26,040,944	101%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED40_WSF		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	1,111	68%	61%
87-92	Drought	5,198	4,590	88%	3,684	80%	71%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	668	73%	73%
1977	C	921	713	77%	444	62%	48%
1978	W	767	752	98%	734	98%	96%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	654	73%	73%
1988	C	855	759	89%	602	79%	70%
1989	C	846	744	88%	596	80%	70%
1990	C	876	771	88%	618	80%	70%
1991	C	881	774	88%	621	80%	70%
1992	C	844	647	77%	594	92%	70%
1993	W	823	807	98%	803	100%	98%
1994	C	835	835	100%	609	73%	73%
1995	W	774	774	100%	756	98%	98%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	668	76%	76%
2004	D	940	940	100%	674	72%	72%
2005	W	874	874	100%	856	98%	98%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	640	73%	73%
2009	BN	903	903	100%	884	98%	98%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	783	93%	91%
Total		36,190	35,343	98%	32,891	93%	91%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED40_WSF	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	333	63%
87-92	C	1,600	1,502	94%	715	45%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	270	100%
1973	AN	267	219	100%	219	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	223	45%
1977	C	267	269	90%	111	35%
1978	W	267	205	100%	114	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	223	45%
1988	C	267	267	90%	121	35%
1989	C	267	250	90%	102	35%
1990	C	267	240	90%	94	35%
1991	C	267	243	90%	95	35%
1992	C	267	235	90%	80	35%
1993	W	267	211	100%	119	100%
1994	C	267	264	100%	198	45%
1995	W	267	189	100%	108	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	253	100%
2003	BN	267	234	100%	234	100%
2004	D	267	249	100%	249	100%
2005	W	267	193	100%	193	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	265	100%
2008	C	267	247	100%	186	35%
2009	BN	267	240	100%	127	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	195	73%
Total		11,197	9,676	86%	8,183	73%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

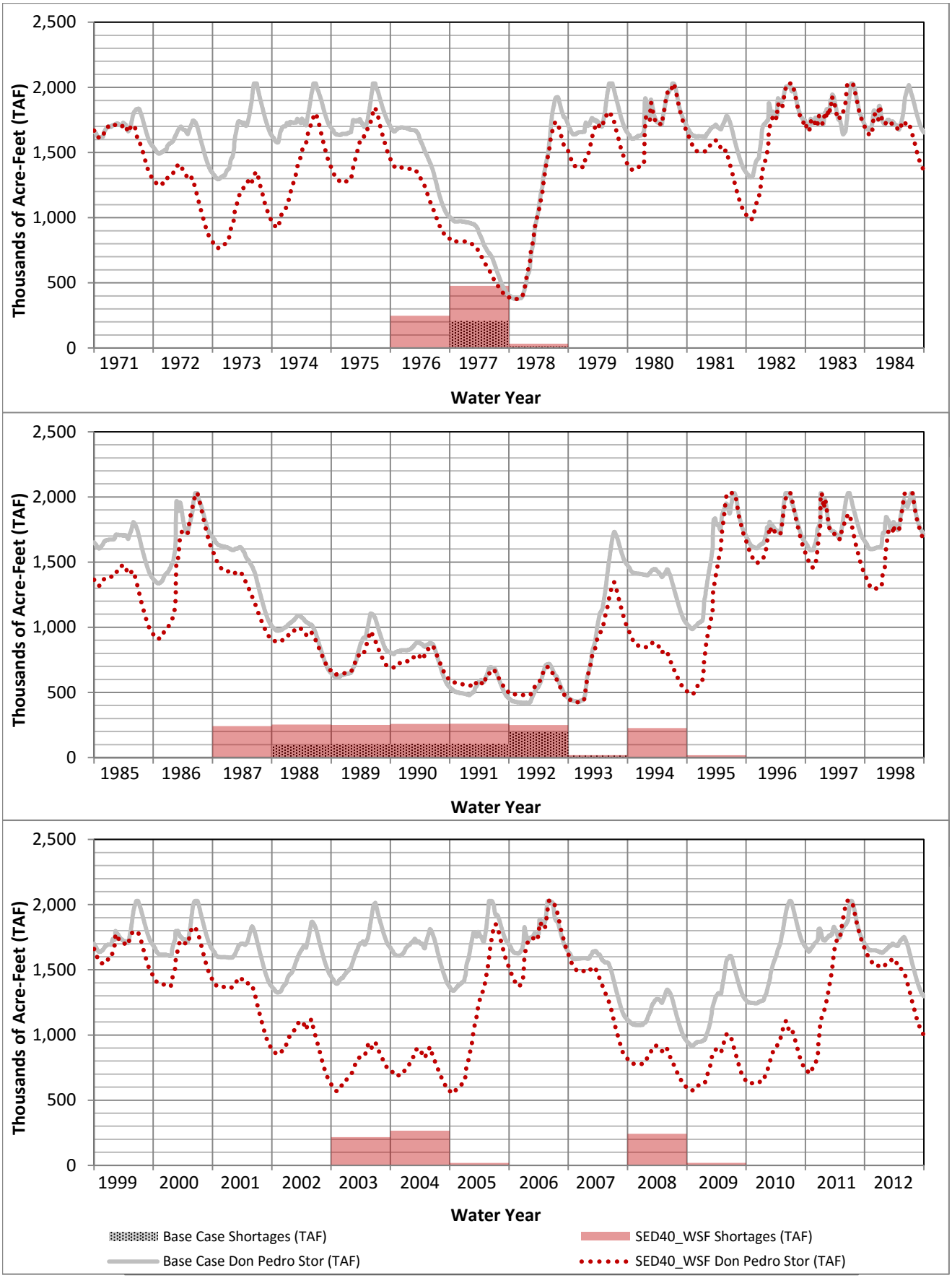


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

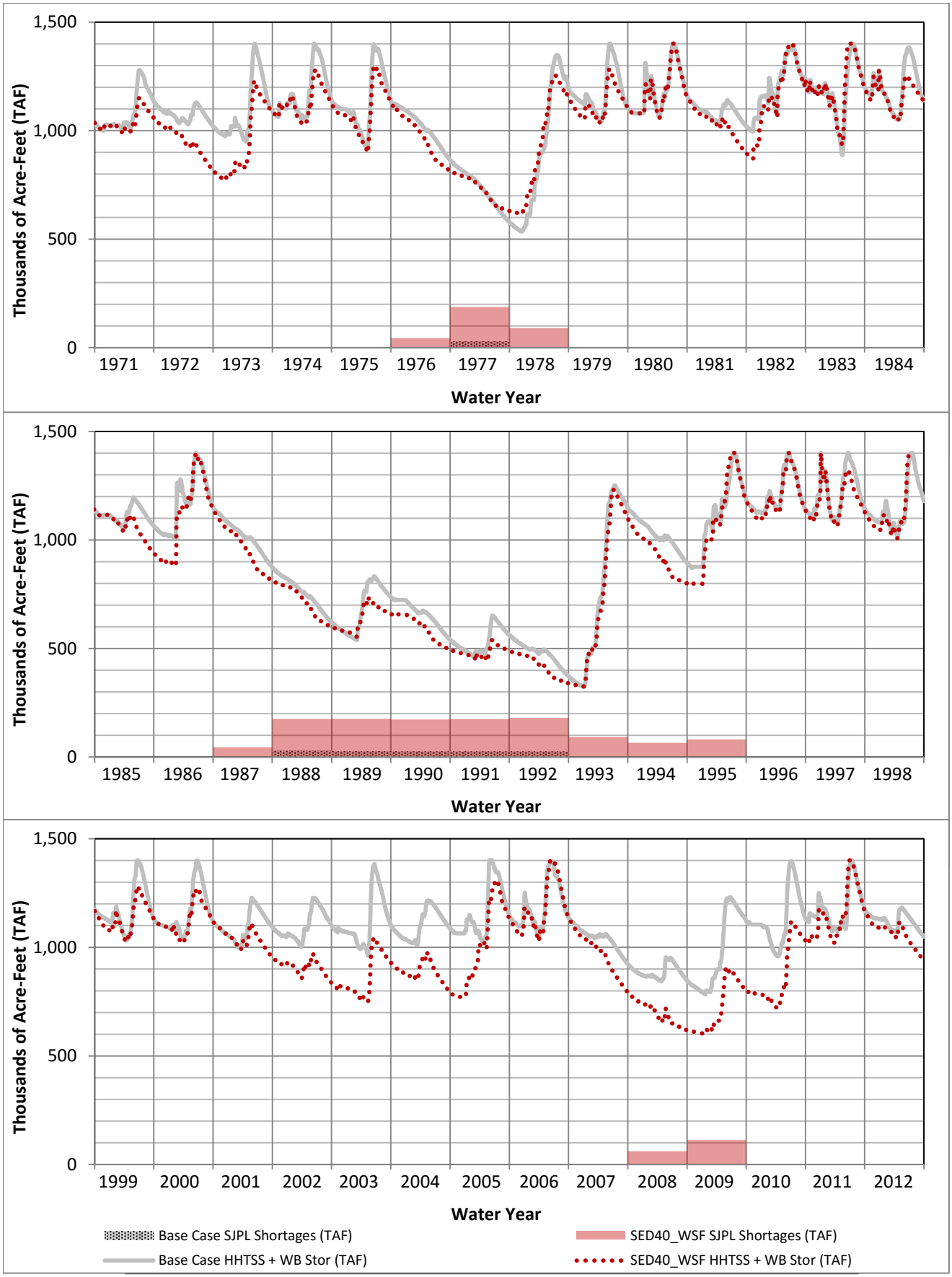


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED40_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	570	570	215%	205%
87-92	Drought	713	713	2,355	2,355	330%	330%
1971	BN	266	539	598	788	225%	146%
1972	D	138	151	445	445	322%	295%
1973	AN	237	613	753	752	318%	123%
1974	W	301	1,050	704	704	234%	67%
1975	W	301	887	839	839	279%	95%
1976	C	171	185	357	357	209%	193%
1977	C	94	94	213	213	227%	227%
1978	W	235	349	848	848	361%	243%
1979	AN	301	876	842	919	280%	105%
1980	W	302	1,818	818	1,622	271%	89%
1981	D	194	252	539	539	279%	214%
1982	W	250	2,275	1,052	1,965	421%	86%
1983	W	301	3,689	1,271	3,687	422%	100%
1984	AN	302	1,463	800	1,742	265%	119%
1985	D	205	340	486	486	238%	143%
1986	W	237	1,496	997	1,172	421%	78%
1987	C	179	179	426	426	238%	238%
1988	C	94	94	302	302	320%	320%
1989	C	116	116	520	520	448%	448%
1990	C	103	103	326	326	316%	316%
1991	C	116	116	456	456	394%	394%
1992	C	105	105	324	324	310%	310%
1993	W	235	235	778	778	331%	331%
1994	C	182	182	462	462	255%	255%
1995	W	237	2,098	1,008	1,781	426%	85%
1996	W	302	1,281	914	1,325	303%	103%
1997	W	301	1,954	772	2,131	257%	109%
1998	W	301	2,226	1,037	2,015	345%	91%
1999	AN	301	974	874	1,167	290%	120%
2000	AN	302	916	801	920	266%	100%
2001	D	193	233	487	487	253%	209%
2002	D	137	137	504	504	369%	369%
2003	BN	180	233	584	584	324%	251%
2004	D	141	355	498	498	353%	140%
2005	W	237	1,488	887	887	375%	60%
2006	W	301	2,270	1,129	2,114	375%	93%
2007	C	182	182	471	471	259%	259%
2008	C	119	119	442	442	371%	371%
2009	BN	156	156	607	607	390%	390%
2010	AN	249	349	686	686	276%	197%
2011	W	301	2,376	926	1,479	308%	62%
2012	D	192	213	476	476	248%	223%
Average (1971-2012)		216	828	673	934	311%	113%
Average (1980-2009)		210	903	686	1,025	326%	114%
Total (1971-2012)		9,092	34,765	28,262	39,247	311%	113%
Total (1980-2009)		6,306	27,083	20,576	30,742	326%	114%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED40_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	370	370	279%	279%
87-92	Drought	403	403	1,963	1,963	487%	487%
1971	BN	173	399	505	648	291%	162%
1972	D	84	96	391	391	465%	405%
1973	AN	154	515	670	669	434%	130%
1974	W	176	760	485	485	275%	64%
1975	W	176	728	549	549	312%	75%
1976	C	83	83	201	201	243%	243%
1977	C	50	50	169	169	340%	340%
1978	W	154	193	643	643	416%	334%
1979	AN	176	683	635	712	361%	104%
1980	W	177	1,205	578	1,150	327%	95%
1981	D	101	151	370	370	368%	246%
1982	W	159	1,862	836	1,575	527%	85%
1983	W	176	2,287	940	2,190	533%	96%
1984	AN	177	552	594	843	336%	153%
1985	D	112	247	394	394	352%	159%
1986	W	154	1,388	791	964	512%	69%
1987	C	91	91	256	256	283%	283%
1988	C	50	50	258	258	515%	515%
1989	C	72	72	475	475	663%	663%
1990	C	59	59	282	282	478%	478%
1991	C	72	72	412	412	576%	576%
1992	C	60	60	280	280	464%	464%
1993	W	154	154	582	582	377%	377%
1994	C	93	93	298	298	319%	319%
1995	W	154	1,482	801	1,033	519%	70%
1996	W	177	1,126	590	1,001	334%	89%
1997	W	176	859	476	1,020	270%	119%
1998	W	176	1,667	726	1,323	412%	79%
1999	AN	176	774	667	961	379%	124%
2000	AN	177	791	676	795	382%	100%
2001	D	100	140	394	394	395%	282%
2002	D	86	86	454	454	526%	526%
2003	BN	130	182	534	534	410%	293%
2004	D	82	295	439	439	533%	149%
2005	W	154	1,289	681	681	441%	53%
2006	W	176	1,759	798	1,723	453%	98%
2007	C	94	94	301	301	322%	322%
2008	C	75	75	397	397	530%	530%
2009	BN	106	106	557	557	527%	527%
2010	AN	158	218	595	595	376%	273%
2011	W	176	1,489	677	930	384%	62%
2012	D	104	118	306	306	295%	260%
Average (1971-2012)		129	581	516	672	400%	116%
Average (1980-2009)		125	636	528	731	423%	115%
Total (1971-2012)		5,411	24,398	21,664	28,240	400%	116%
Total (1980-2009)		3,746	19,067	15,837	21,942	423%	115%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	145	67	41	15	6	0	0	0	0	0	0
1972	48	34	9	0	0	0	0	0	0	0	0
1973	87	60	50	41	33	27	17	9	5	0	0
1974	80	42	33	23	0	0	0	0	0	0	0
1975	84	40	37	33	24	14	7	0	0	0	0
1976	14	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	102	75	55	34	16	11	0	0	0	0	0
1979	113	95	58	40	22	16	13	9	3	0	0
1980	196	179	159	118	74	48	40	30	22	21	20
1981	53	36	10	2	0	0	0	0	0	0	0
1982	179	170	161	148	131	114	96	89	70	54	42
1983	346	306	277	262	229	208	207	166	134	119	105
1984	220	184	151	127	95	64	53	41	21	21	14
1985	58	36	13	0	0	0	0	0	0	0	0
1986	136	122	109	96	71	36	15	8	5	5	4
1987	25	0	0	0	0	0	0	0	0	0	0
1988	14	0	0	0	0	0	0	0	0	0	0
1989	86	45	22	2	0	0	0	0	0	0	0
1990	24	0	0	0	0	0	0	0	0	0	0
1991	53	32	22	9	0	0	0	0	0	0	0
1992	28	1	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	37	10	0	0	0	0	0	0	0	0	0
1995	167	137	127	105	86	83	81	69	59	33	29
1996	138	121	106	90	51	44	31	15	14	8	5
1997	172	144	111	96	65	63	56	54	54	54	47
1998	191	171	162	148	138	114	100	69	53	39	28
1999	145	127	112	82	53	33	24	9	7	5	5
2000	135	120	94	62	17	7	1	0	0	0	0
2001	54	40	28	12	2	0	0	0	0	0	0
2002	67	49	24	8	0	0	0	0	0	0	0
2003	73	37	31	25	20	18	14	10	8	7	3
2004	72	34	16	3	0	0	0	0	0	0	0
2005	97	64	44	31	23	20	17	14	9	3	0
2006	174	157	155	147	126	113	103	89	67	56	52
2007	23	3	0	0	0	0	0	0	0	0	0
2008	51	19	10	8	5	1	0	0	0	0	0
2009	73	51	38	27	18	9	0	0	0	0	0
2010	80	66	43	30	18	11	9	7	6	4	0
2011	157	147	130	86	73	53	32	28	23	19	18
2012	36	20	12	8	4	0	0	0	0	0	0
Total number of days greater than threshold flow	4,131	3,115	2,501	1,935	1,406	1,107	916	716	560	448	372
Number of years flows NOT achieved for threshold period	1	5	8	10	16	20	23	25	25	27	29

Table 7. February through June La Grange 1 Day Flow Count

	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	143	67	41	15	6	0	0	0	0	0	0
1972	48	34	9	0	0	0	0	0	0	0	0
1973	87	60	50	41	33	27	17	9	5	0	0
1974	78	42	33	23	0	0	0	0	0	0	0
1975	82	40	37	33	24	14	7	0	0	0	0
1976	12	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	102	75	55	34	16	11	0	0	0	0	0
1979	111	95	58	40	22	16	13	9	3	0	0
1980	151	137	124	84	55	38	31	30	22	21	20
1981	51	36	10	2	0	0	0	0	0	0	0
1982	136	134	129	124	117	107	96	89	70	54	42
1983	150	149	149	148	148	148	148	127	114	102	91
1984	144	115	88	64	39	15	4	0	0	0	0
1985	56	36	13	0	0	0	0	0	0	0	0
1986	136	122	109	96	71	36	15	8	5	5	4
1987	23	0	0	0	0	0	0	0	0	0	0
1988	14	0	0	0	0	0	0	0	0	0	0
1989	86	45	22	2	0	0	0	0	0	0	0
1990	24	0	0	0	0	0	0	0	0	0	0
1991	53	32	22	9	0	0	0	0	0	0	0
1992	28	1	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	35	10	0	0	0	0	0	0	0	0	0
1995	113	90	80	58	46	43	41	39	37	19	16
1996	136	121	106	90	51	44	31	15	14	8	5
1997	133	107	81	66	35	33	26	26	26	26	19
1998	146	135	126	112	102	83	72	46	31	21	18
1999	143	127	112	82	53	33	24	9	7	5	5
2000	133	120	94	62	17	7	1	0	0	0	0
2001	52	40	28	12	2	0	0	0	0	0	0
2002	67	49	24	8	0	0	0	0	0	0	0
2003	73	37	31	25	20	18	14	10	8	7	3
2004	72	34	16	3	0	0	0	0	0	0	0
2005	97	64	44	31	23	20	17	14	9	3	0
2006	149	149	148	140	126	113	103	89	67	56	52
2007	21	3	0	0	0	0	0	0	0	0	0
2008	51	19	10	8	5	1	0	0	0	0	0
2009	73	51	38	27	18	9	0	0	0	0	0
2010	80	66	43	30	18	11	9	7	6	4	0
2011	114	106	96	55	47	35	22	18	14	10	10
2012	34	20	12	8	4	0	0	0	0	0	0
Total number of days greater than threshold flow	3,535	2,642	2,089	1,549	1,104	862	691	545	438	341	285
Number of years flows NOT achieved for threshold period	1	5	8	10	16	20	23	26	26	28	30

Table 8. La Grange Consecutive 7 Day Flow Count

	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	4	2	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	2	1	2	1	1	1	1	1	0	0	0
1974	2	2	2	2	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	1	0	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	4	1	1	2	1	1	0	0	0	0	0
1979	2	1	3	1	1	1	1	1	0	0	0
1980	2	4	6	3	3	2	2	1	1	1	1
1981	2	2	1	0	0	0	0	0	0	0	0
1982	2	2	3	5	5	5	3	3	3	3	1
1983	2	3	6	7	6	4	4	6	6	6	5
1984	2	2	3	4	3	3	2	2	2	2	1
1985	2	3	1	0	0	0	0	0	0	0	0
1986	1	3	4	5	5	3	1	1	0	0	0
1987	2	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	4	3	2	0	0	0	0	0	0	0	0
1990	2	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	3	0	0	0	0	0	0	0	0	0	0
1995	1	3	2	3	2	2	2	2	2	1	1
1996	2	2	2	2	2	1	1	2	2	0	0
1997	2	3	2	2	1	1	1	2	2	2	2
1998	2	2	2	2	3	3	3	3	3	3	2
1999	1	3	3	4	2	2	2	1	1	0	0
2000	1	4	2	4	1	1	0	0	0	0	0
2001	2	1	1	1	0	0	0	0	0	0	0
2002	3	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	0
2004	3	3	1	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	1	0	0
2006	2	2	2	3	4	3	4	4	3	3	3
2007	2	0	0	0	0	0	0	0	0	0	0
2008	2	1	1	1	0	0	0	0	0	0	0
2009	2	1	1	1	1	1	0	0	0	0	0
2010	1	2	2	1	1	1	1	1	0	0	0
2011	1	1	2	3	3	3	2	1	1	1	2
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	75	70	69	63	48	41	33	33	28	23	18
Number of years flows NOT achieved for threshold period	1	8	9	15	21	21	24	25	29	32	33

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	4	2	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	2	1	2	1	1	1	1	1	0	0	0
1974	2	2	2	2	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	1	0	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	4	1	1	2	1	1	0	0	0	0	0
1979	2	1	3	1	1	1	1	1	0	0	0
1980	1	3	5	2	2	1	1	1	1	1	1
1981	2	2	1	0	0	0	0	0	0	0	0
1982	1	2	3	4	4	4	3	3	3	3	1
1983	1	2	2	3	3	3	3	3	5	5	5
1984	2	2	2	3	2	1	0	0	0	0	0
1985	2	3	1	0	0	0	0	0	0	0	0
1986	1	3	4	5	5	3	1	1	0	0	0
1987	2	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	4	3	2	0	0	0	0	0	0	0	0
1990	2	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	3	0	0	0	0	0	0	0	0	0	0
1995	1	3	2	3	2	2	2	1	1	1	1
1996	2	2	2	2	2	1	1	2	2	0	0
1997	2	3	2	2	1	1	1	1	1	1	1
1998	2	2	2	2	3	3	2	2	2	2	2
1999	1	3	3	4	2	2	2	1	1	0	0
2000	1	4	2	4	1	1	0	0	0	0	0
2001	2	1	1	1	0	0	0	0	0	0	0
2002	3	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	0
2004	3	3	1	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	1	0	0
2006	2	2	2	3	4	3	4	4	3	3	3
2007	2	0	0	0	0	0	0	0	0	0	0
2008	2	1	1	1	0	0	0	0	0	0	0
2009	2	1	1	1	1	1	0	0	0	0	0
2010	1	2	2	1	1	1	1	1	0	0	0
2011	1	1	2	3	2	2	2	1	1	1	1
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	72	68	63	56	41	35	28	25	22	18	15
Number of years flows NOT achieved for threshold period	1	8	9	15	21	21	25	26	30	33	34

Table 10. La Grange Consecutive 14 Day Flow Count

	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	2	1	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	0	0	0	0	0
1974	1	2	1	1	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	0	0	0	0	0	0
1979	1	1	1	1	1	1	0	0	0	0	0
1980	2	3	4	3	2	1	1	1	1	1	1
1981	2	1	0	0	0	0	0	0	0	0	0
1982	1	2	2	4	4	3	3	3	3	1	1
1983	1	2	4	5	3	3	3	3	3	3	3
1984	2	2	3	4	3	2	2	2	1	1	1
1985	2	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	2	1	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	3	1	0	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	2	2	1	1	1	1	2	1	1	1
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	2	2	2	2
1998	2	1	2	2	3	2	3	2	1	1	1
1999	1	3	3	2	2	1	1	0	0	0	0
2000	1	2	2	3	0	0	0	0	0	0	0
2001	1	1	1	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	2	1	0	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	0	0	0
2006	2	2	2	3	3	3	3	3	2	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	2	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	1	0	0	0	0	0	0
2010	1	2	1	1	1	0	0	0	0	0	0
2011	1	1	1	2	3	2	1	1	1	1	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	54	52	43	44	35	25	22	20	15	12	11
Number of years flows NOT achieved for threshold period	3	9	16	18	22	26	29	32	33	33	34

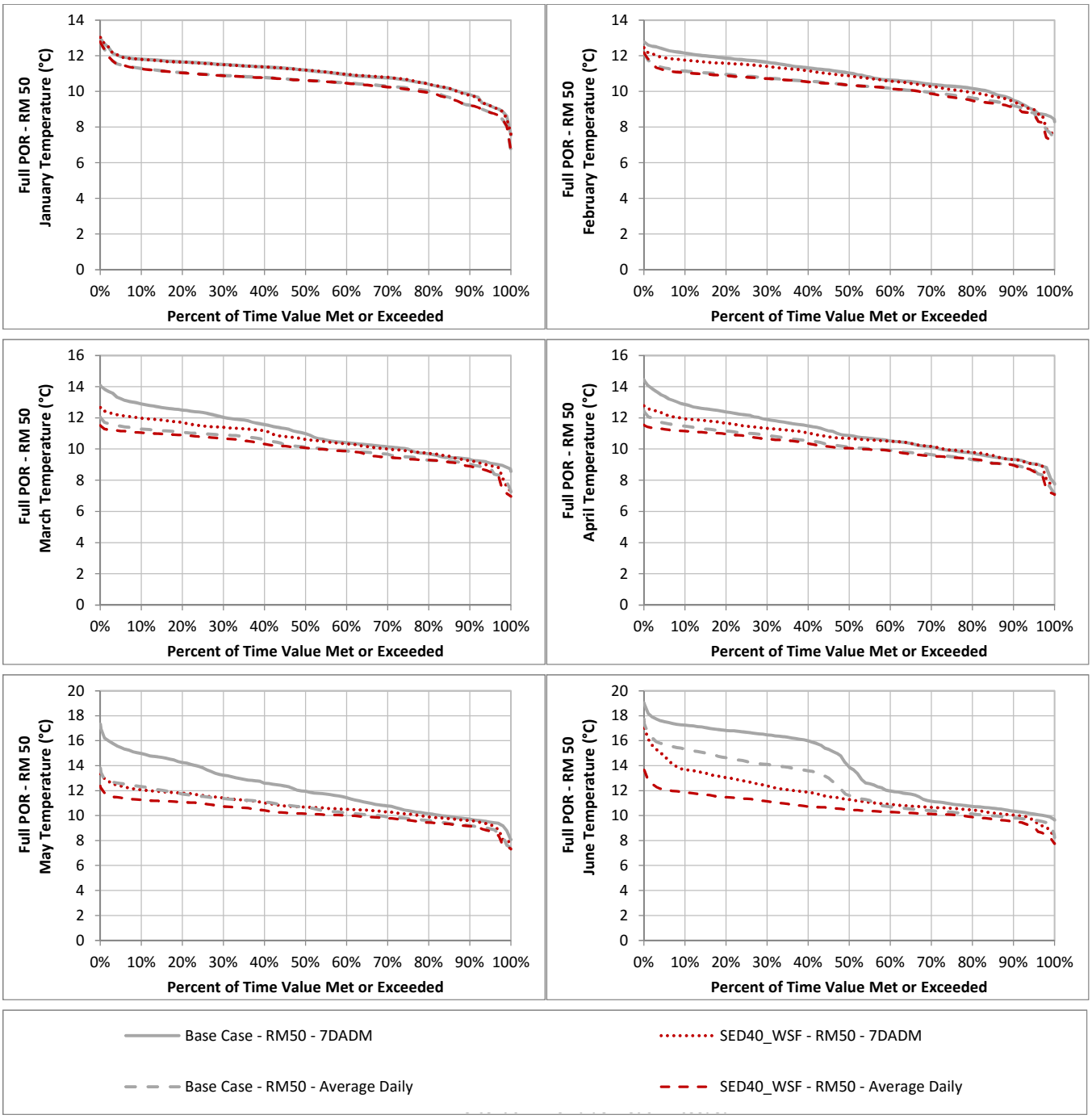
Table 11. February through June La Grange Consecutive 14 Day Flow Count

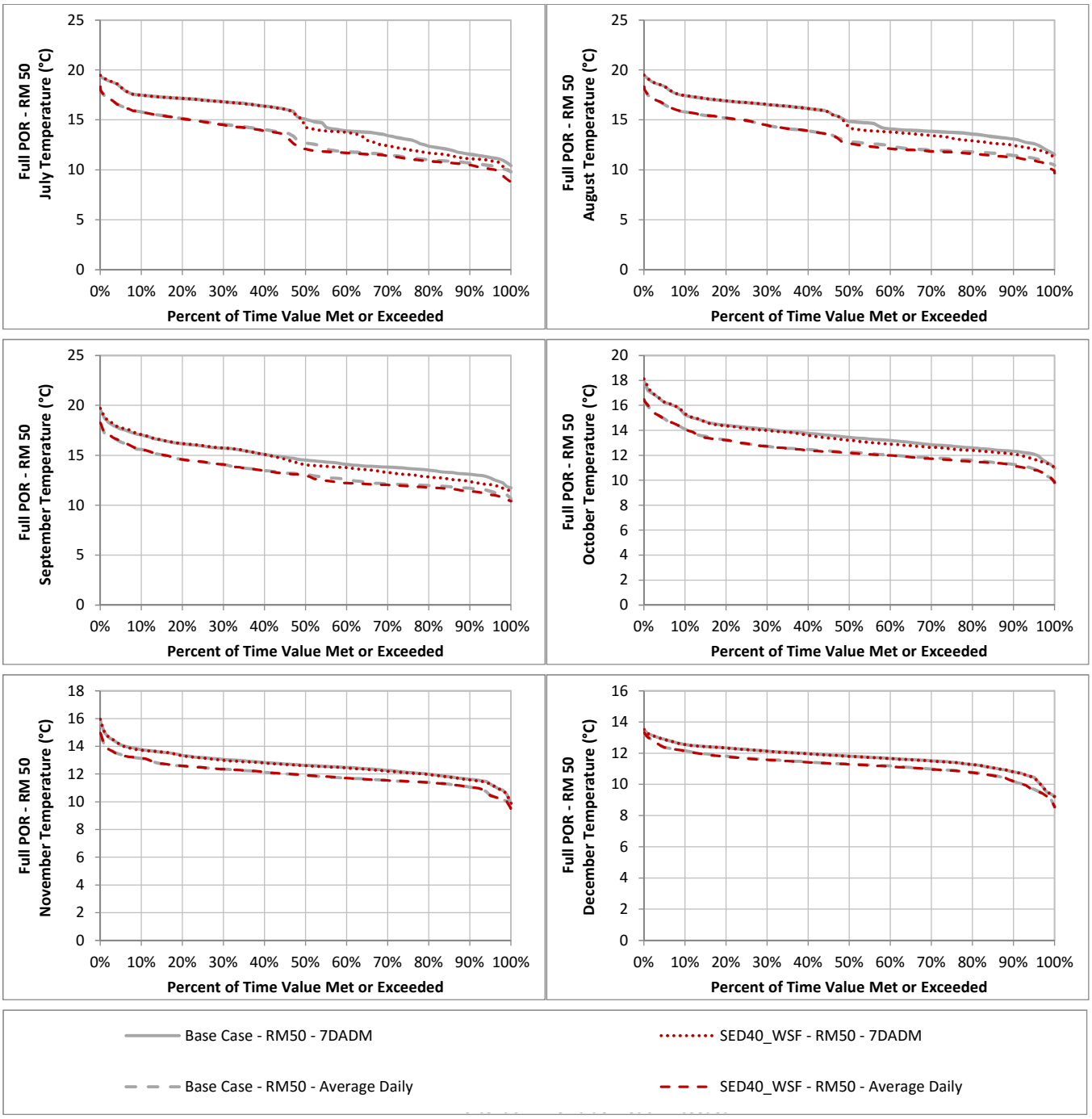
	SED40_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	2	1	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	0	0	0	0	0
1974	1	2	1	1	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	0	0	0	0	0	0
1979	1	1	1	1	1	1	0	0	0	0	0
1980	1	2	3	2	1	1	1	1	1	1	1
1981	2	1	0	0	0	0	0	0	0	0	0
1982	1	2	2	3	3	3	3	3	3	1	1
1983	1	1	1	2	2	2	2	3	3	3	3
1984	2	2	2	3	2	0	0	0	0	0	0
1985	2	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	2	1	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	3	1	0	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	2	2	1	1	1	1	1	1	0	0
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	1	1	1	1
1998	2	1	2	2	3	2	2	2	1	0	0
1999	1	3	3	2	2	1	1	0	0	0	0
2000	1	2	2	3	0	0	0	0	0	0	0
2001	1	1	1	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	2	1	0	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	0	0	0
2006	2	2	2	3	3	3	3	3	2	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	2	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	1	0	0	0	0	0	0
2010	1	2	1	1	1	0	0	0	0	0	0
2011	1	1	1	2	2	2	1	1	0	0	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	53	50	38	38	30	22	18	16	12	7	7
Number of years flows NOT achieved for threshold period	3	9	16	18	22	27	30	33	35	37	37

SED40_WSF

Dynamic Routing

Results Summary


Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
SED40_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED40_WSF - RM50 - Average Daily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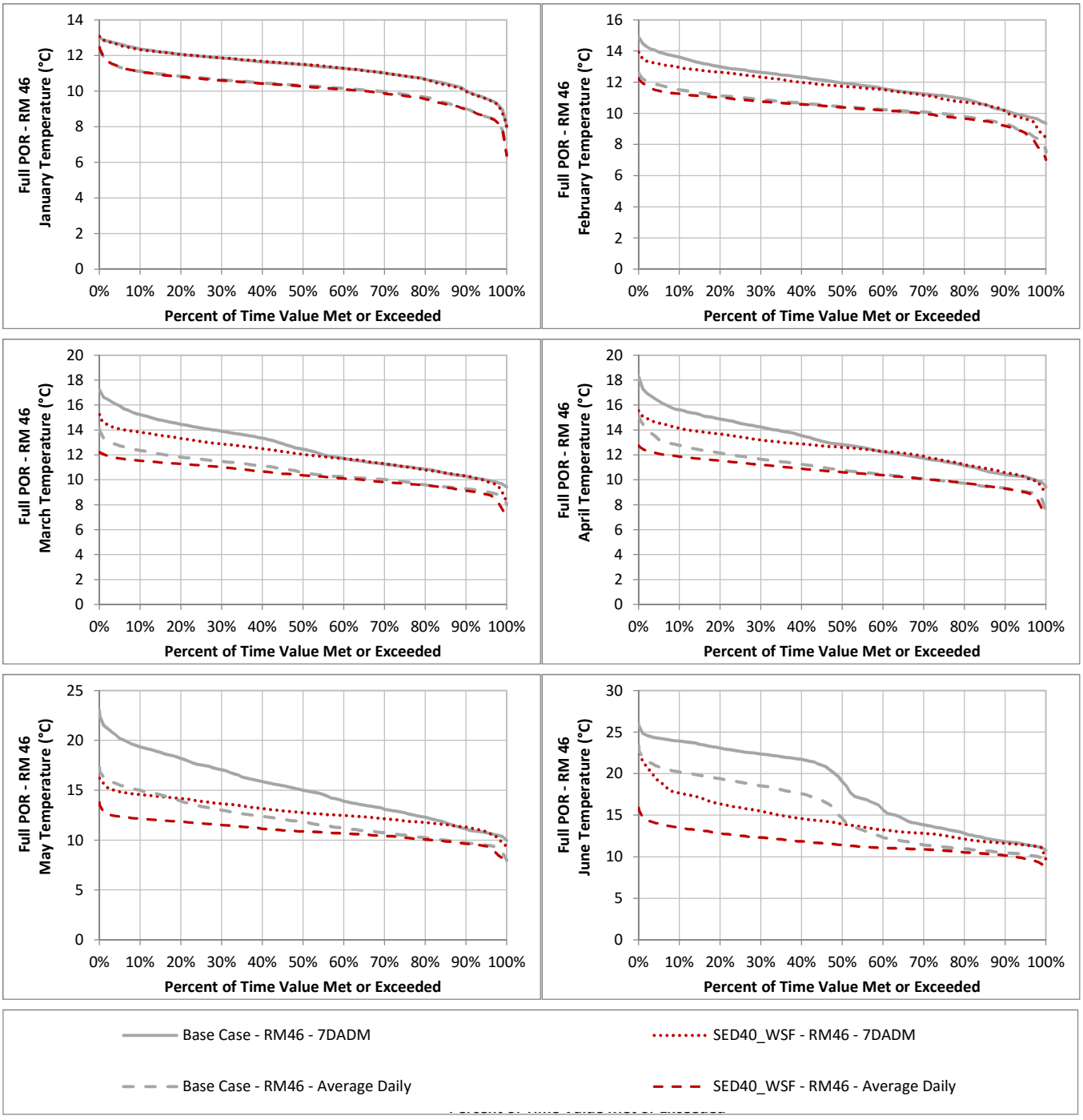
Full POR - RM 50 August Temperature (°C)
Full POR - RM 50 September Temperature (°C)
Full POR - RM 50 October Temperature (°C)
Full POR - RM 50 November Temperature (°C)
Full POR - RM 50 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
SED40_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED40_WSF - RM50 - Average Daily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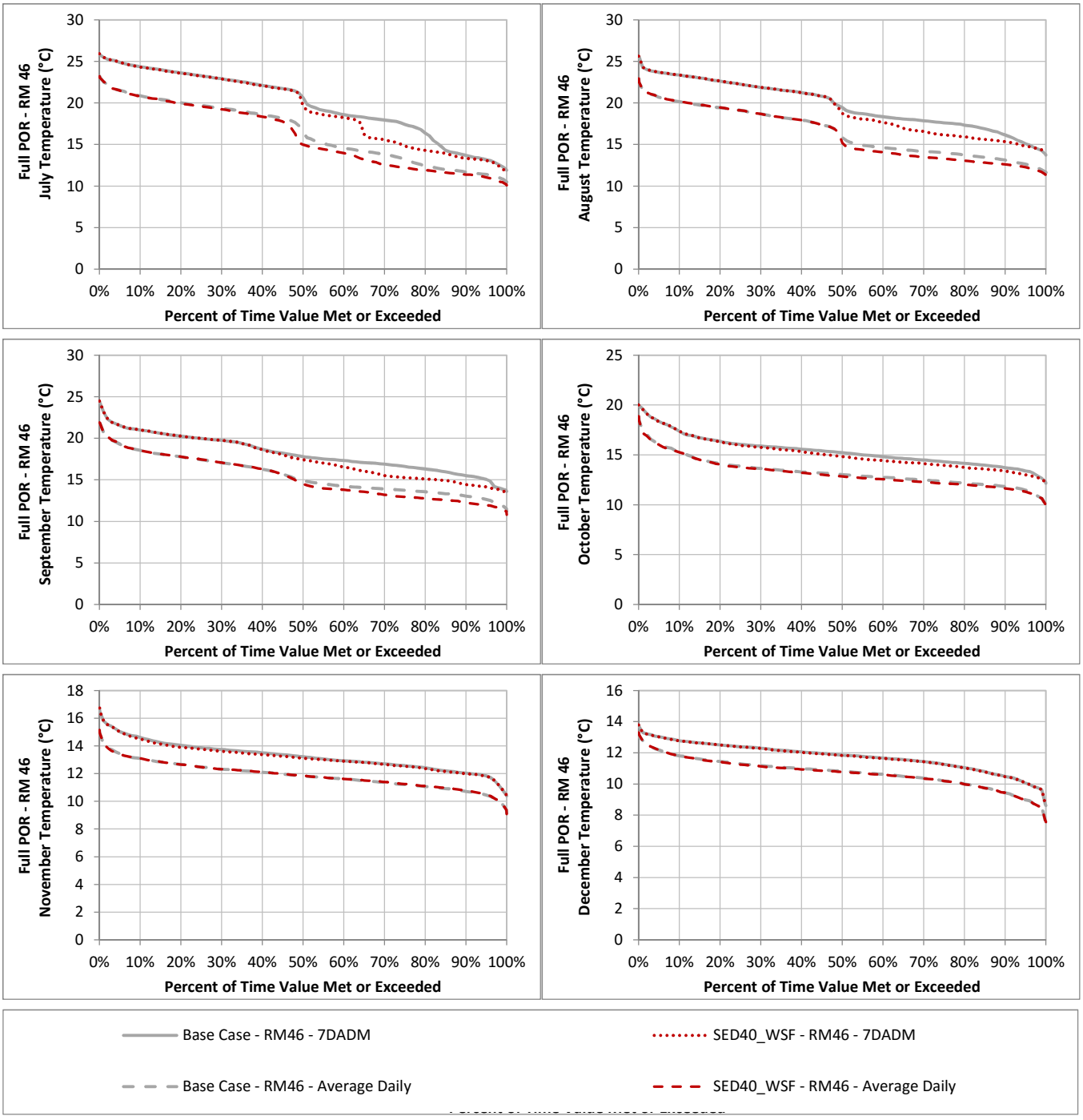
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED40_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED40_WSF - RM46 - Average Daily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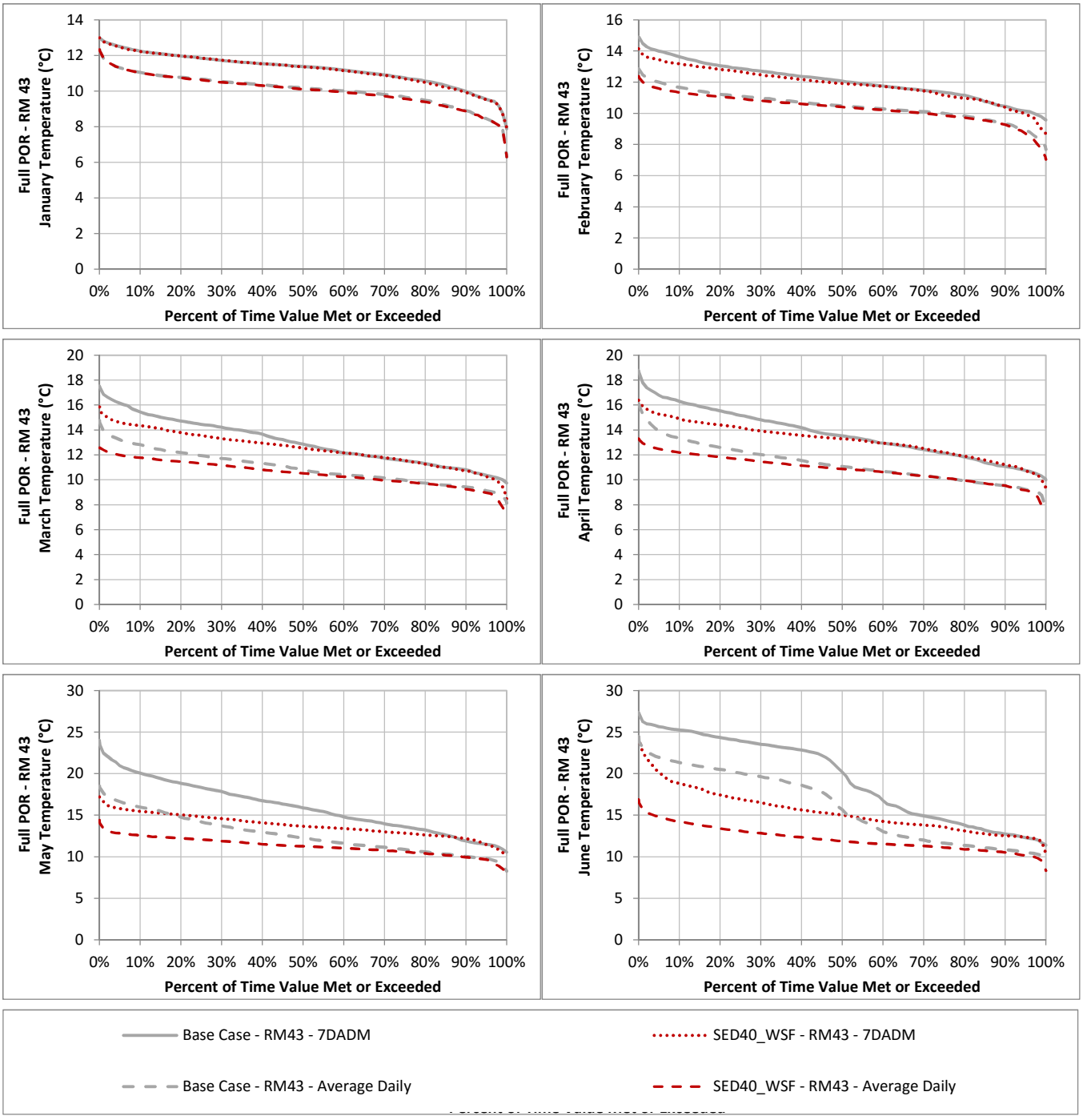
July Temperature (°C)
Full POR - RM 46
August Temperature (°C)
Full POR - RM 46
September Temperature (°C)
Full POR - RM 46
October Temperature (°C)
Full POR - RM 46
November Temperature (°C)
Full POR - RM 46
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED40_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED40_WSF - RM46 - Average Daily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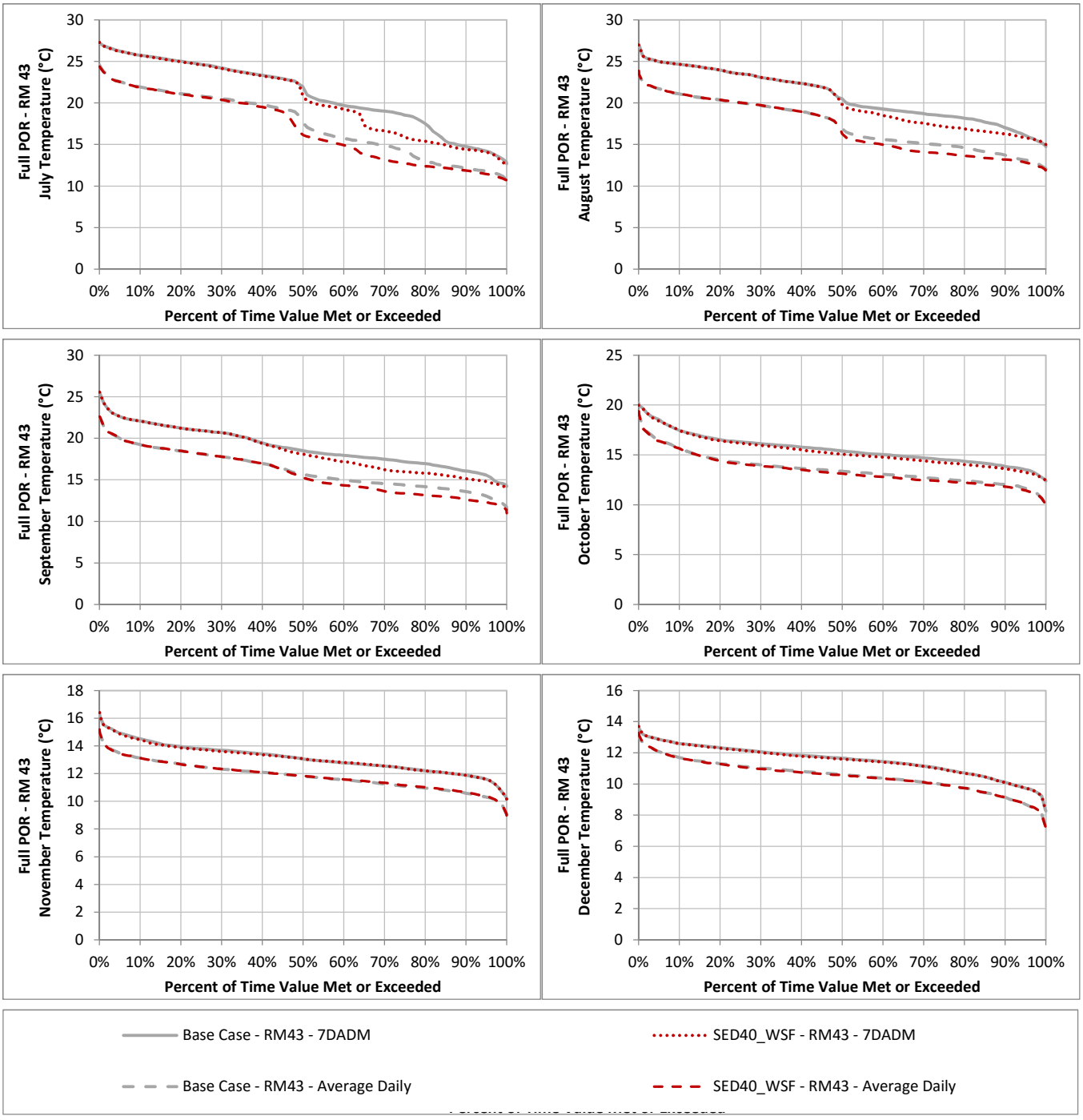
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED40_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED40_WSF - RM43 - Average Daily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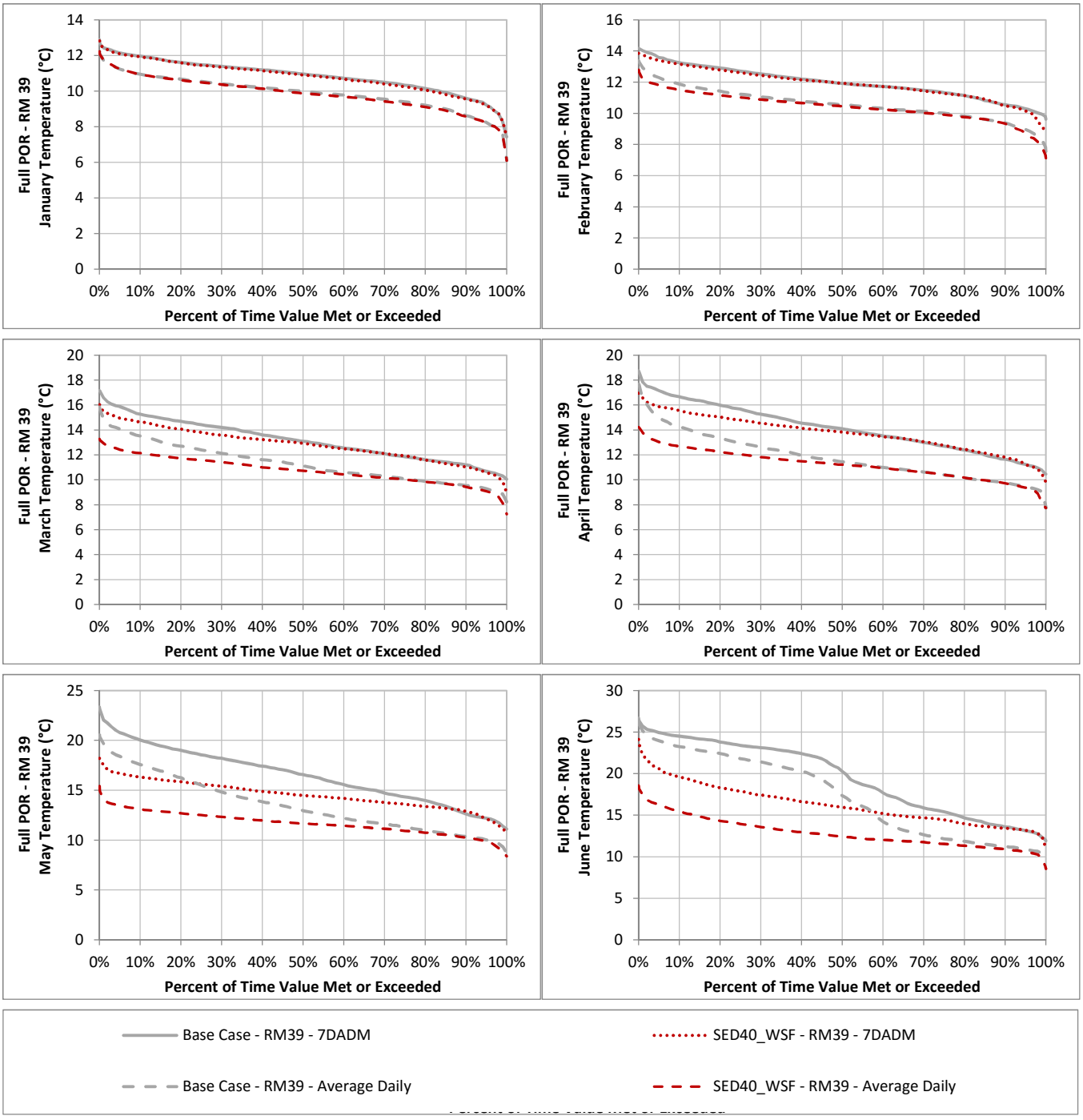
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED40_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED40_WSF - RM43 - Average Daily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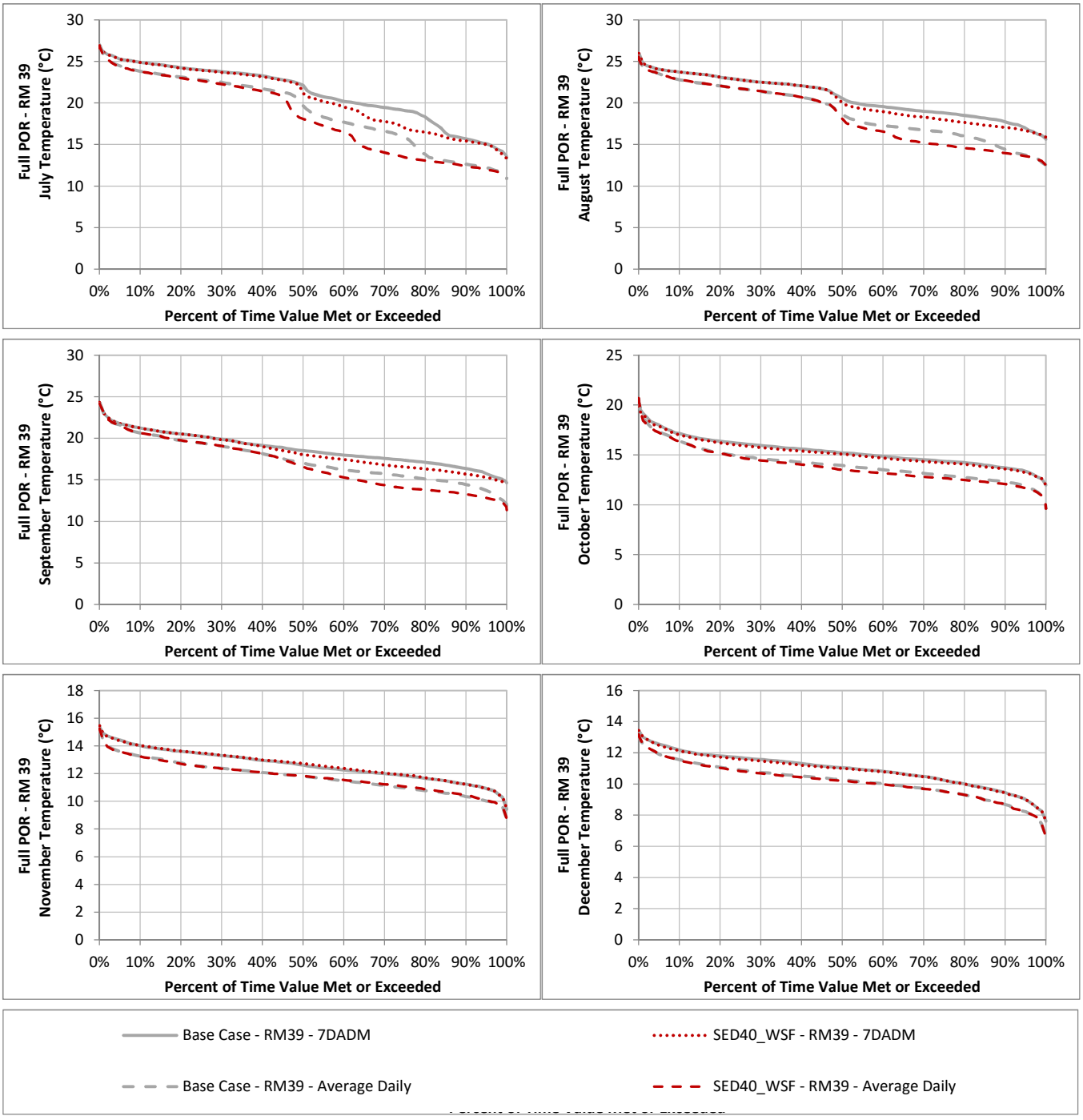
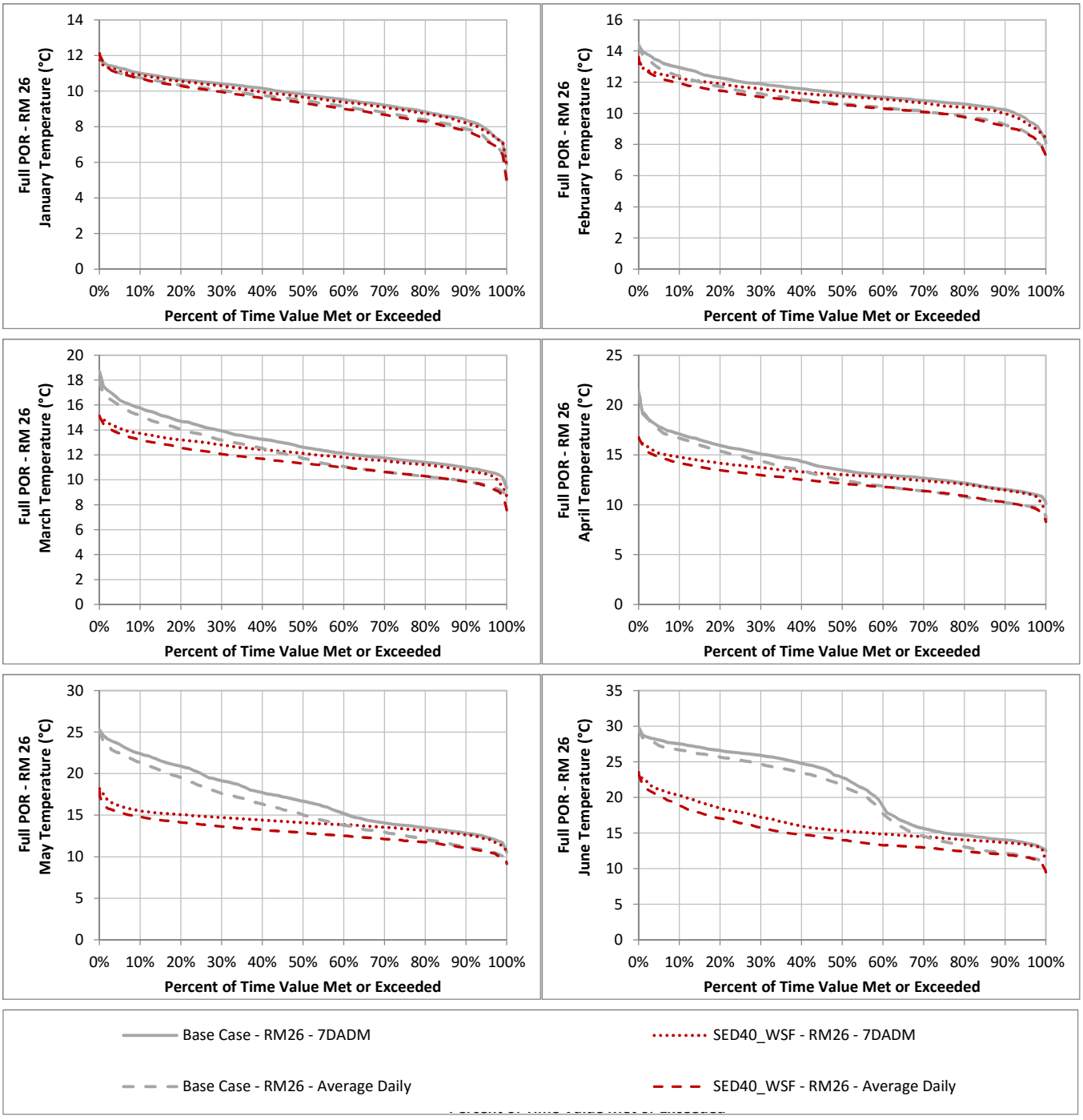
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED40_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED40_WSF - RM39 - Average Daily


Full POR - RM 39 July Temperature (°C)
Full POR - RM 39 August Temperature (°C)
Full POR - RM 39 September Temperature (°C)
Full POR - RM 39 October Temperature (°C)
Full POR - RM 39 November Temperature (°C)
Full POR - RM 39 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED40_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED40_WSF - RM39 - Average Daily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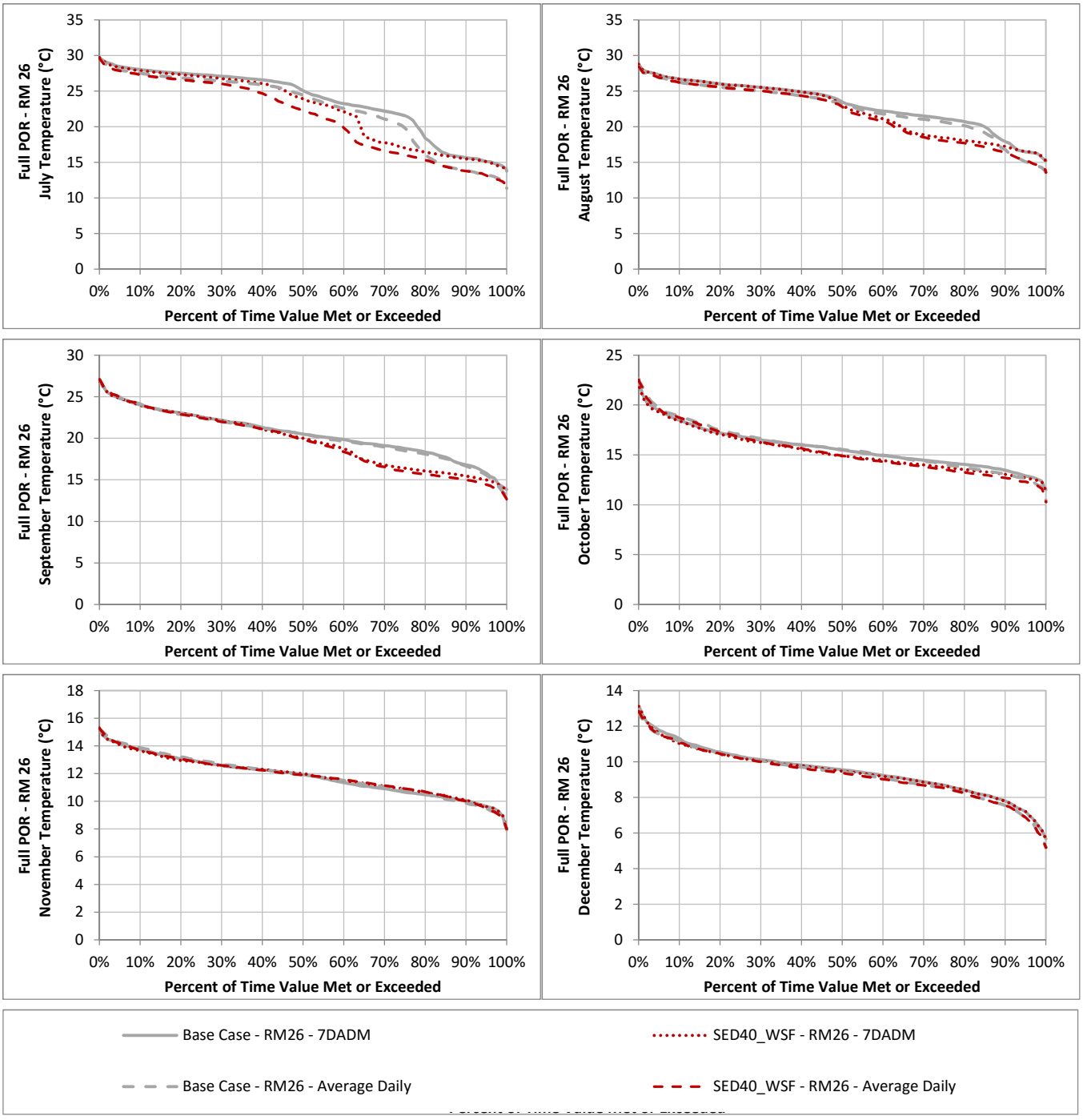
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED40_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED40_WSF - RM26 - Average Daily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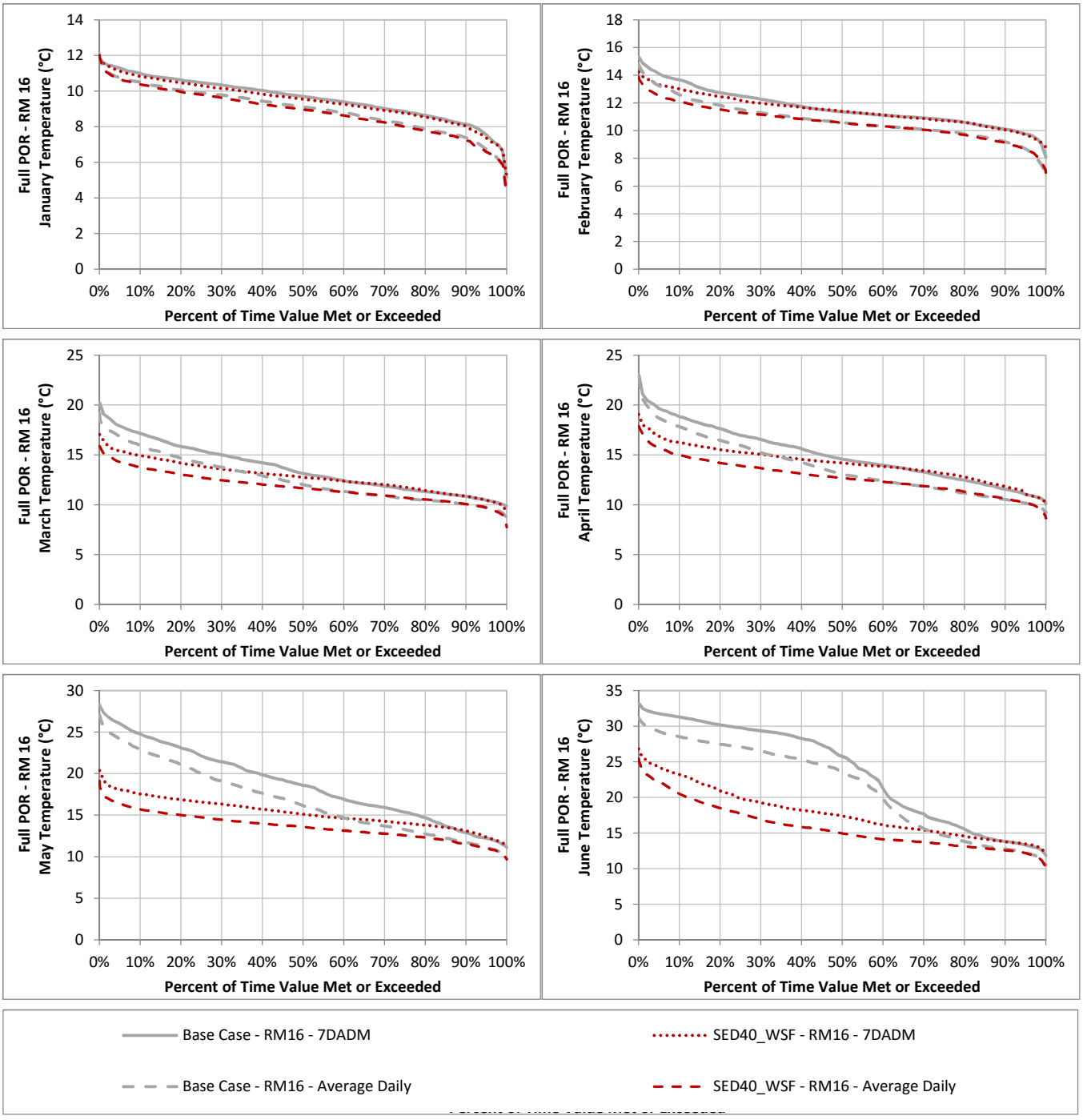
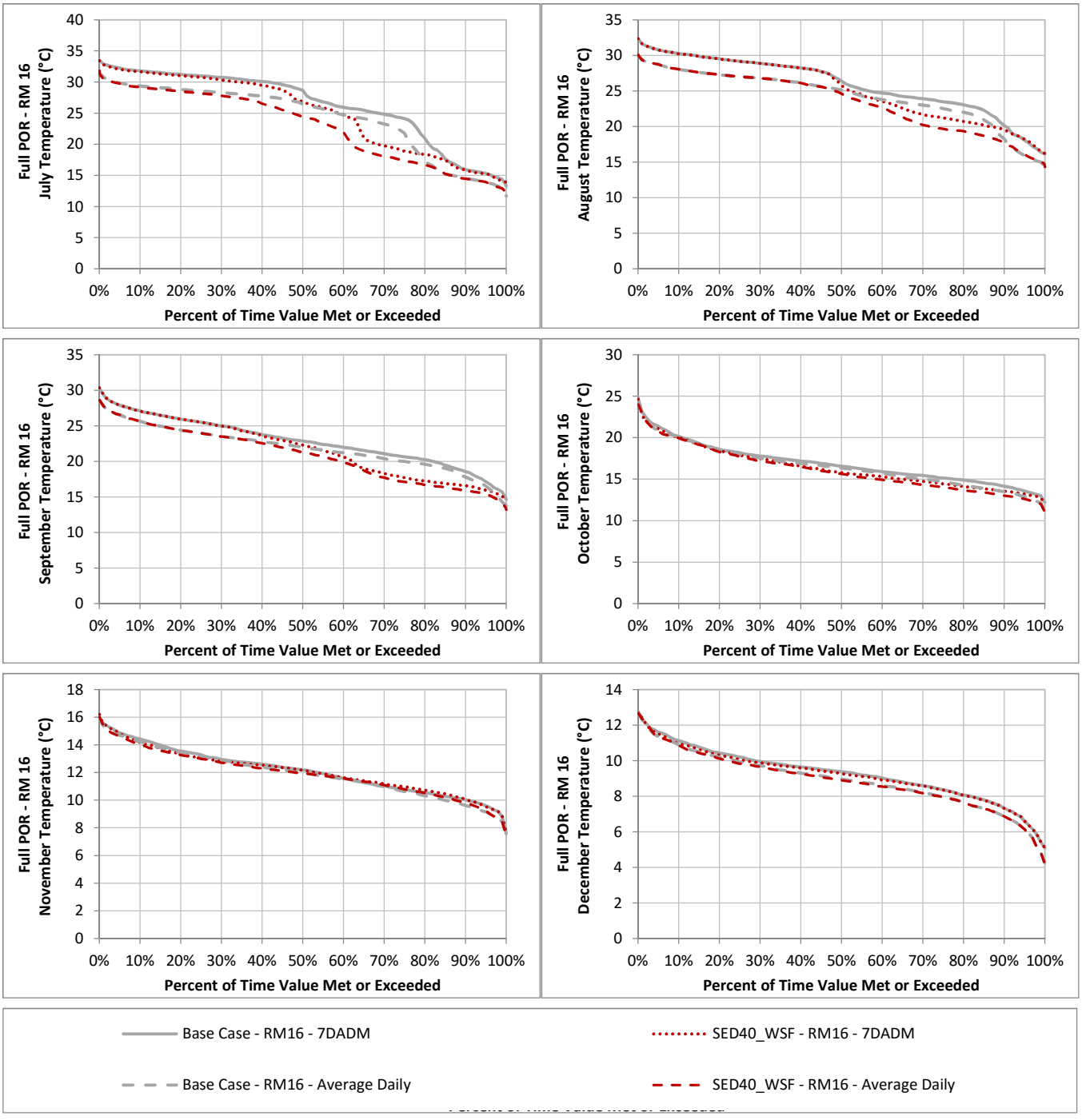
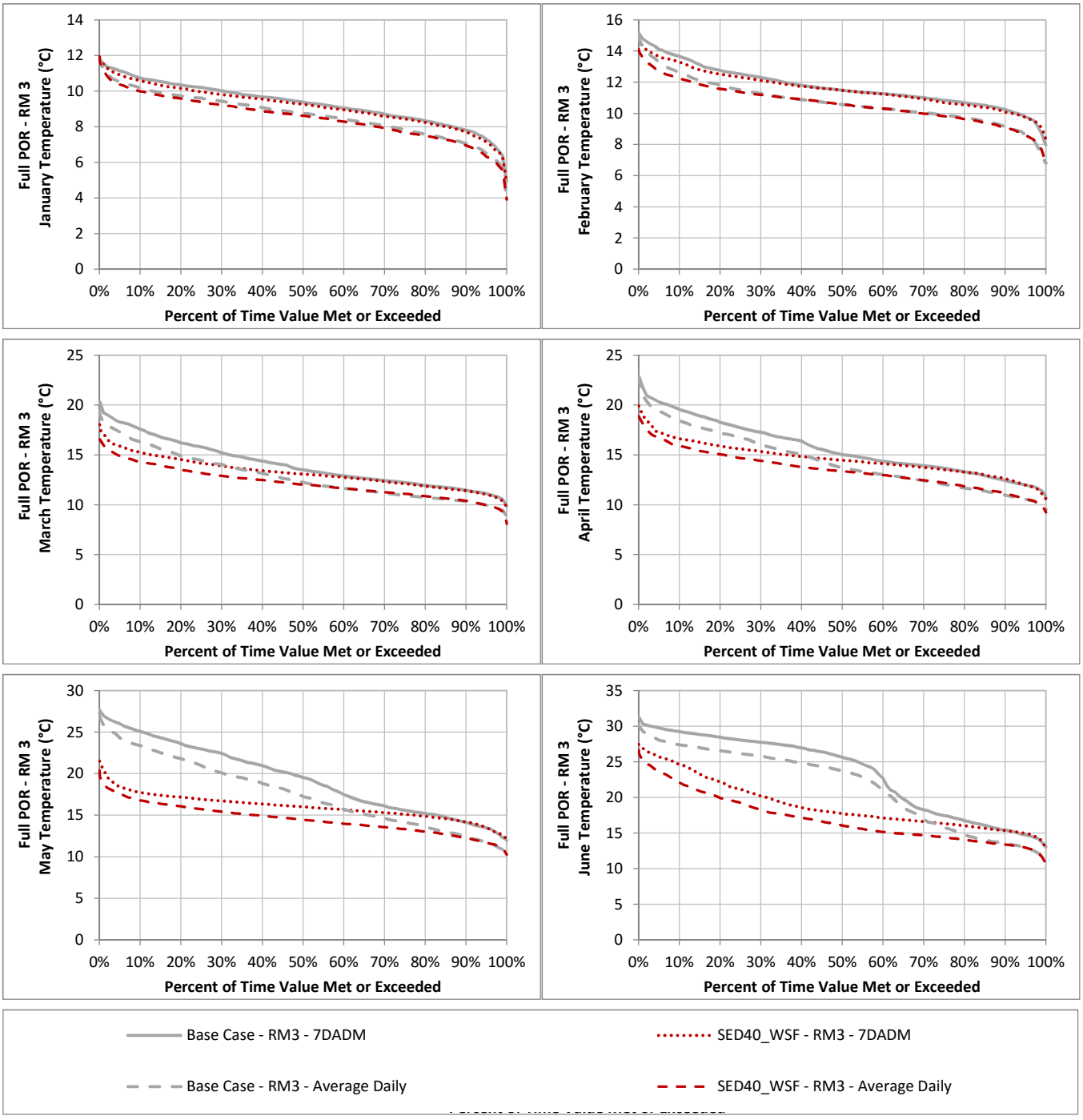
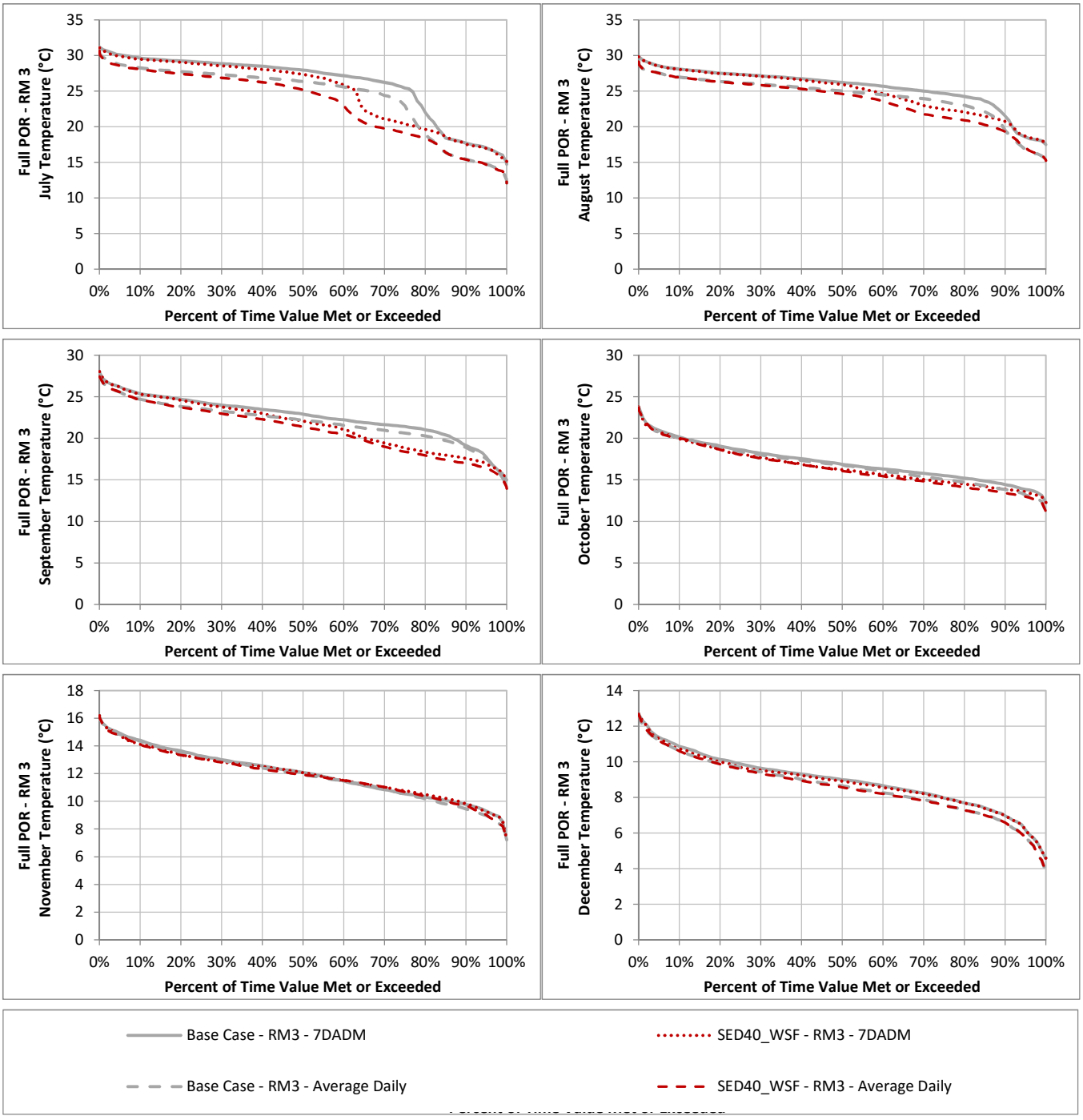
July Temperature (°C)
Full POR - RM 26
August Temperature (°C)
Full POR - RM 26
September Temperature (°C)
Full POR - RM 26
October Temperature (°C)
Full POR - RM 26
November Temperature (°C)
Full POR - RM 26
December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM26 - 7DADM
SED40_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED40_WSF - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED40_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED40_WSF - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED40_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED40_WSF - RM16 - Average Daily


Full POR - RM 3 January Temperature (°C)
Full POR - RM 3 February Temperature (°C)
Full POR - RM 3 March Temperature (°C)
Full POR - RM 3 April Temperature (°C)
Full POR - RM 3 May Temperature (°C)
Full POR - RM 3 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED40_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED40_WSF - RM3 - Average Daily


Full POR - RM 3 July Temperature (°C)
Full POR - RM 3 August Temperature (°C)
Full POR - RM 3 September Temperature (°C)
Full POR - RM 3 October Temperature (°C)
Full POR - RM 3 November Temperature (°C)
Full POR - RM 3 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED40_WSF - RM3 - 7DADM
SED40_WSF - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–4

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE SWB'S 40% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF) WITH ADDITIONAL DON PEDRO RESERVOIR RESTRICTIONS

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED40 is the designation for a simulation of an alternative Don Pedro Project operations scenario identified by the SWB in the 2016 SED as its preferred alternative **with additional restrictions** placed on the operation of Don Pedro Reservoir. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED40 are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 40% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 40% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

[1]This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

- Flow shifting part of the 40% unimpaired flow volume to the fall in Wet years (up to 10% of the unimpaired flow volume can be shifted). In Wet years, the flow target is 1200 cfs for July, 600 cfs for August, and 1000 cfs for September, October, and November. The February through June unimpaired flow requirement is reduced below 40% to meet these flow targets (assuming perfect hydrologic foresight). February through June flow requirement in Wet years is 30% of unimpaired flow or greater, if less water is needed to meet the fall flow requirements.

In addition to the minimum flows above, the Don Pedro Reservoir is operated by restricting the percentage of annual deliveries so that the following conditions are met:

- 363 TAF minimum annual diversion for water supply purposes.
- Annual deliveries must be balanced so that the reservoir maintains 800 TAF minimum Don Pedro storage on September 30. The end of September storage only allowed to drop below 800 TAF if needed to meet 363 TAF minimum diversion for water supplies.
- Annual water supply deliveries may not exceed 50% of the forecasted September storage (accounting for February 1 storage, February-June forecasted inflow, February-June forecasted evaporation, and February-June forecasted instream/environmental releases) minus the end of September carryover storage requirement of 800 TAF. More than 50% of stored water can only be diverted if needed to meet 363 TAF minimum diversion.

SED40

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED40	% of Base Case
January	1,063,873	852,604	80%
February	1,722,819	1,548,910	90%
March	3,042,430	2,887,337	95%
April	3,481,703	3,501,285	101%
May	3,491,340	4,515,561	129%
June	3,434,821	4,170,753	121%
July	3,521,988	3,259,942	93%
August	2,710,847	2,445,052	90%
September	1,340,662	1,392,376	104%
October	918,413	1,003,114	109%
November	402,483	532,303	132%
December	613,223	457,809	75%
Total	25,744,602	26,567,047	103%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED40		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	1,166	72%	64%
87-92	Drought	5,198	4,590	88%	3,337	73%	64%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	664	77%	77%
1974	W	825	825	100%	805	98%	98%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	768	84%	84%
1977	C	921	713	77%	399	56%	43%
1978	W	767	752	98%	354	47%	46%
1979	AN	878	878	100%	834	95%	95%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	739	96%	96%
1983	W	753	753	100%	749	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	717	85%	85%
1987	C	895	895	100%	824	92%	92%
1988	C	855	759	89%	397	52%	46%
1989	C	846	744	88%	361	49%	43%
1990	C	876	771	88%	559	73%	64%
1991	C	881	774	88%	588	76%	67%
1992	C	844	647	77%	607	94%	72%
1993	W	823	807	98%	572	71%	70%
1994	C	835	835	100%	811	97%	97%
1995	W	774	774	100%	566	73%	73%
1996	W	841	841	100%	813	97%	97%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	644	72%	72%
2003	BN	885	885	100%	562	64%	64%
2004	D	940	940	100%	711	76%	76%
2005	W	874	874	100%	561	64%	64%
2006	W	830	830	100%	798	96%	96%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	422	48%	48%
2009	BN	903	903	100%	360	40%	40%
2010	AN	826	826	100%	773	94%	94%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	717	85%	83%
Total		36,190	35,343	98%	30,108	85%	83%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED40	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	333	63%
87-92	C	1,600	1,502	94%	715	45%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	270	100%
1973	AN	267	219	100%	219	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	223	45%
1977	C	267	269	90%	111	35%
1978	W	267	205	100%	114	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	223	45%
1988	C	267	267	90%	121	35%
1989	C	267	250	90%	102	35%
1990	C	267	240	90%	94	35%
1991	C	267	243	90%	95	35%
1992	C	267	235	90%	80	35%
1993	W	267	211	100%	119	100%
1994	C	267	264	100%	198	45%
1995	W	267	189	100%	108	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	253	100%
2003	BN	267	234	100%	234	100%
2004	D	267	249	100%	249	100%
2005	W	267	193	100%	193	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	265	100%
2008	C	267	247	100%	186	35%
2009	BN	267	240	100%	127	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	195	73%
Total		11,197	9,676	86%	8,183	73%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

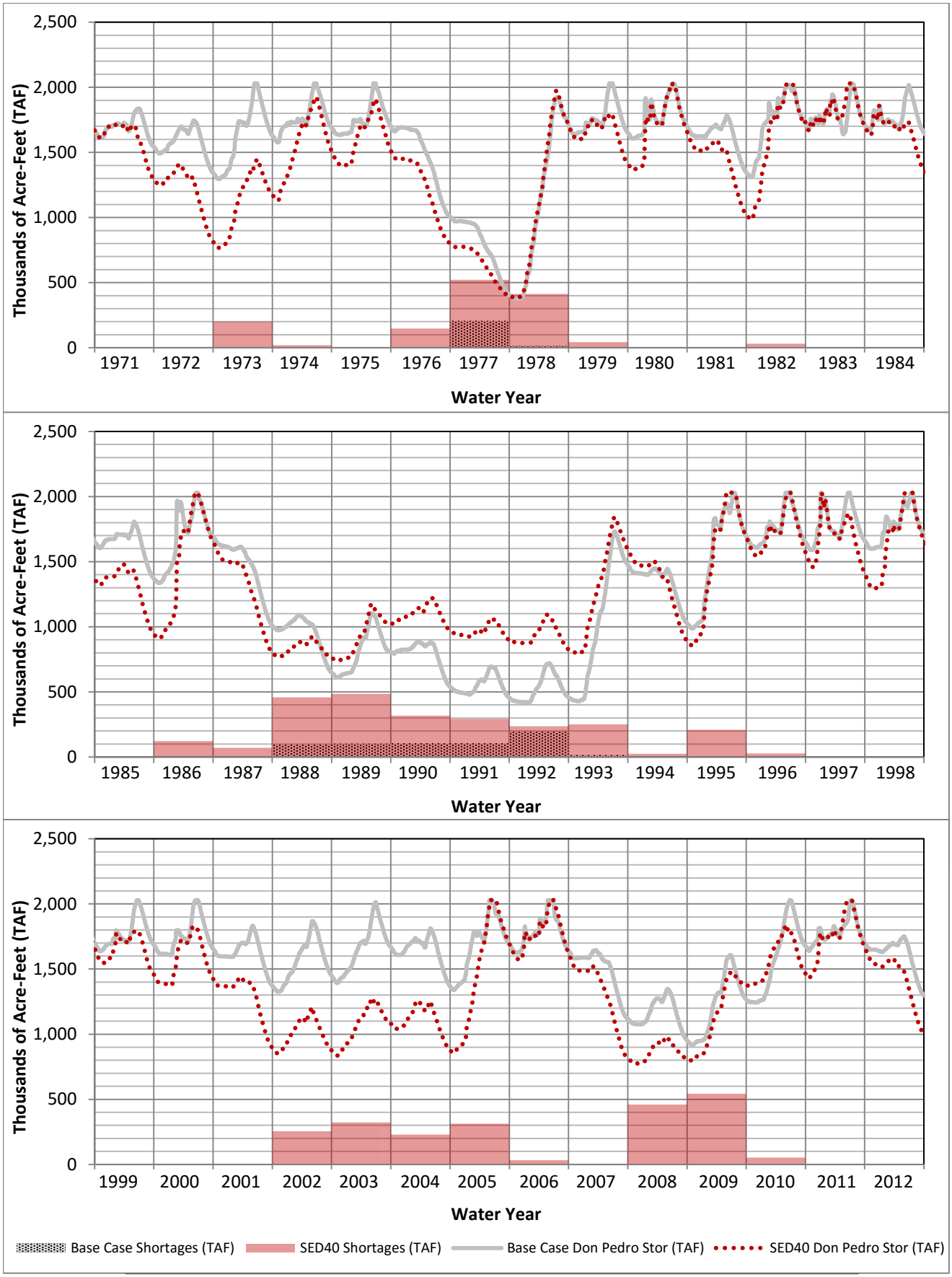


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

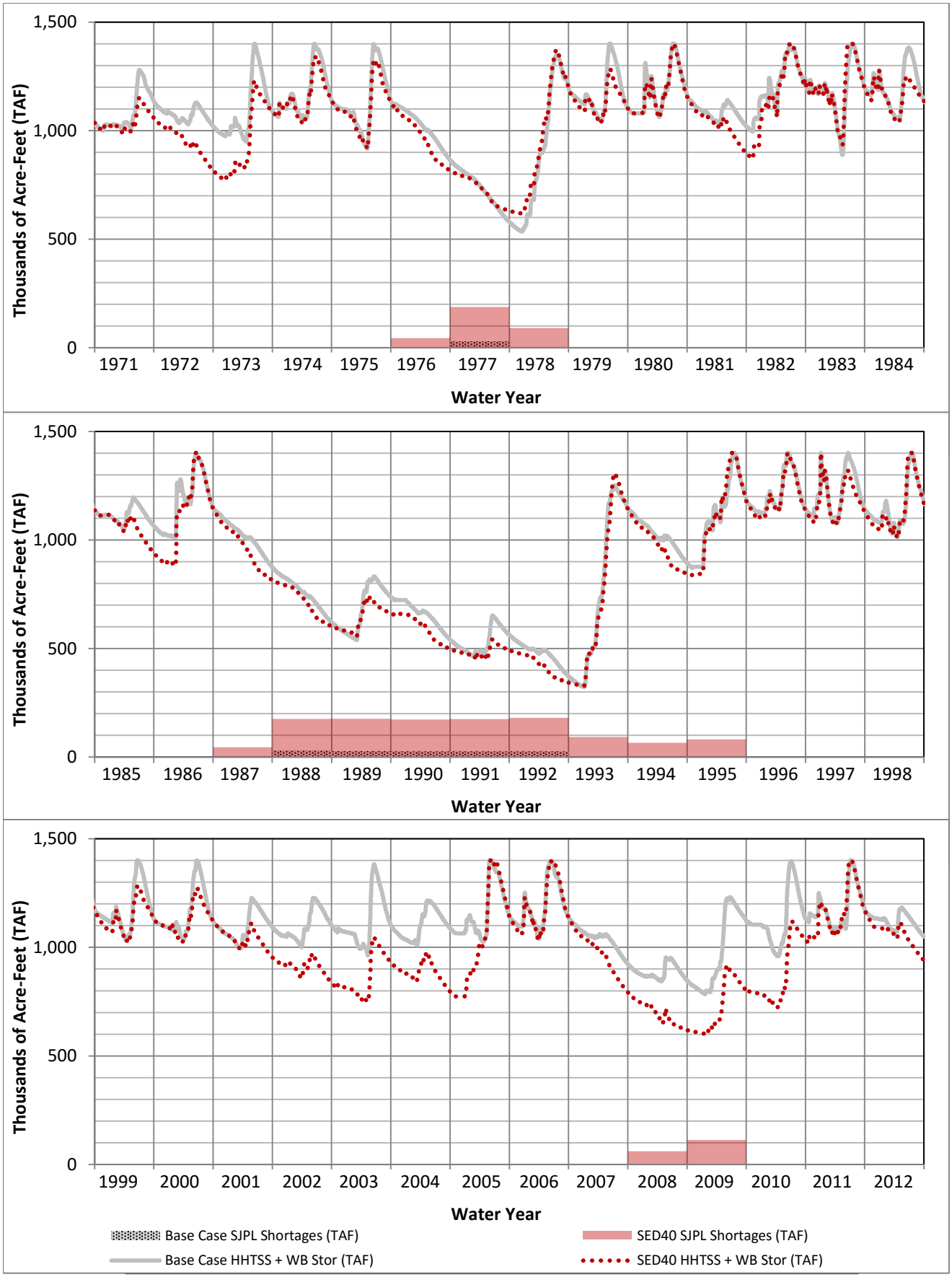


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED40			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	570	570	215%	205%
87-92	Drought	713	713	2,355	2,355	330%	330%
1971	BN	266	539	598	788	225%	146%
1972	D	138	151	445	445	322%	295%
1973	AN	237	613	753	752	318%	123%
1974	W	301	1,050	704	796	234%	76%
1975	W	301	887	839	896	279%	101%
1976	C	171	185	357	357	209%	193%
1977	C	94	94	213	213	227%	227%
1978	W	235	349	848	1,038	361%	297%
1979	AN	301	876	842	1,158	280%	132%
1980	W	302	1,818	818	1,622	271%	89%
1981	D	194	252	539	539	279%	214%
1982	W	250	2,275	1,052	1,995	421%	88%
1983	W	301	3,689	1,271	3,692	422%	100%
1984	AN	302	1,463	800	1,742	265%	119%
1985	D	205	340	486	486	238%	143%
1986	W	237	1,496	997	1,231	421%	82%
1987	C	179	179	426	426	238%	238%
1988	C	94	94	302	302	320%	320%
1989	C	116	116	520	520	448%	448%
1990	C	103	103	326	326	316%	316%
1991	C	116	116	456	456	394%	394%
1992	C	105	105	324	324	310%	310%
1993	W	235	235	778	778	331%	331%
1994	C	182	182	462	462	255%	255%
1995	W	237	2,098	1,008	2,327	426%	111%
1996	W	302	1,281	914	1,380	303%	108%
1997	W	301	1,954	772	2,131	257%	109%
1998	W	301	2,226	1,037	2,015	345%	91%
1999	AN	301	974	874	1,167	290%	120%
2000	AN	302	916	801	920	266%	100%
2001	D	193	233	487	487	253%	209%
2002	D	137	137	504	504	369%	369%
2003	BN	180	233	584	584	324%	251%
2004	D	141	355	498	498	353%	140%
2005	W	237	1,488	887	1,307	375%	88%
2006	W	301	2,270	1,129	2,322	375%	102%
2007	C	182	182	471	471	259%	259%
2008	C	119	119	442	442	371%	371%
2009	BN	156	156	607	607	390%	390%
2010	AN	249	349	686	725	276%	208%
2011	W	301	2,376	926	2,201	308%	93%
2012	D	192	213	476	476	248%	223%
Average (1971-2012)		216	828	673	998	311%	121%
Average (1980-2009)		210	903	686	1,069	326%	118%
Total (1971-2012)		9,092	34,765	28,262	41,908	311%	121%
Total (1980-2009)		6,306	27,083	20,576	32,064	326%	118%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED40			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	370	370	279%	279%
87-92	Drought	403	403	1,963	1,963	487%	487%
1971	BN	173	399	505	648	291%	162%
1972	D	84	96	391	391	465%	405%
1973	AN	154	515	670	669	434%	130%
1974	W	176	760	485	577	275%	76%
1975	W	176	728	549	606	312%	83%
1976	C	83	83	201	201	243%	243%
1977	C	50	50	169	169	340%	340%
1978	W	154	193	643	643	416%	334%
1979	AN	176	683	635	933	361%	137%
1980	W	177	1,205	578	1,150	327%	95%
1981	D	101	151	370	370	368%	246%
1982	W	159	1,862	836	1,590	527%	85%
1983	W	176	2,287	940	2,191	533%	96%
1984	AN	177	552	594	843	336%	153%
1985	D	112	247	394	394	352%	159%
1986	W	154	1,388	791	1,023	512%	74%
1987	C	91	91	256	256	283%	283%
1988	C	50	50	258	258	515%	515%
1989	C	72	72	475	475	663%	663%
1990	C	59	59	282	282	478%	478%
1991	C	72	72	412	412	576%	576%
1992	C	60	60	280	280	464%	464%
1993	W	154	154	582	582	377%	377%
1994	C	93	93	298	298	319%	319%
1995	W	154	1,482	801	1,489	519%	101%
1996	W	177	1,126	590	1,055	334%	94%
1997	W	176	859	476	1,020	270%	119%
1998	W	176	1,667	726	1,323	412%	79%
1999	AN	176	774	667	961	379%	124%
2000	AN	177	791	676	795	382%	100%
2001	D	100	140	394	394	395%	282%
2002	D	86	86	454	454	526%	526%
2003	BN	130	182	534	534	410%	293%
2004	D	82	295	439	439	533%	149%
2005	W	154	1,289	681	929	441%	72%
2006	W	176	1,759	798	1,735	453%	99%
2007	C	94	94	301	301	322%	322%
2008	C	75	75	397	397	530%	530%
2009	BN	106	106	557	557	527%	527%
2010	AN	158	218	595	634	376%	291%
2011	W	176	1,489	677	1,443	384%	97%
2012	D	104	118	306	306	295%	260%
Average (1971-2012)		129	581	516	714	400%	123%
Average (1980-2009)		125	636	528	760	423%	120%
Total (1971-2012)		5,411	24,398	21,664	30,008	400%	123%
Total (1980-2009)		3,746	19,067	15,837	22,788	423%	120%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	145	67	41	15	6	0	0	0	0	0	0
1972	48	34	9	0	0	0	0	0	0	0	0
1973	87	60	50	41	33	27	17	9	5	0	0
1974	87	70	61	40	8	3	0	0	0	0	0
1975	98	57	51	33	24	14	7	0	0	0	0
1976	14	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	167	120	76	39	16	11	0	0	0	0	0
1979	139	135	100	78	58	39	20	9	3	0	0
1980	196	179	159	118	74	48	40	30	22	21	20
1981	53	36	10	2	0	0	0	0	0	0	0
1982	186	170	161	153	133	118	99	90	72	58	43
1983	346	306	277	262	229	208	207	166	134	119	105
1984	220	184	151	127	95	64	53	41	21	21	14
1985	58	36	13	0	0	0	0	0	0	0	0
1986	136	122	109	101	81	50	29	13	9	8	5
1987	25	0	0	0	0	0	0	0	0	0	0
1988	14	0	0	0	0	0	0	0	0	0	0
1989	86	45	22	2	0	0	0	0	0	0	0
1990	24	0	0	0	0	0	0	0	0	0	0
1991	53	32	22	9	0	0	0	0	0	0	0
1992	28	1	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	37	10	0	0	0	0	0	0	0	0	0
1995	181	173	166	155	154	146	140	115	91	63	57
1996	143	129	119	101	55	46	31	18	14	10	6
1997	172	144	111	96	65	63	56	54	54	54	47
1998	191	171	162	148	138	114	100	69	53	39	28
1999	145	127	112	82	53	33	24	9	7	5	5
2000	135	120	94	62	17	7	1	0	0	0	0
2001	54	40	28	12	2	0	0	0	0	0	0
2002	67	49	24	8	0	0	0	0	0	0	0
2003	73	37	31	25	20	18	14	10	8	7	3
2004	72	34	16	3	0	0	0	0	0	0	0
2005	131	97	74	67	52	44	43	42	37	31	18
2006	195	184	183	169	150	127	117	96	74	56	52
2007	23	3	0	0	0	0	0	0	0	0	0
2008	51	19	10	8	5	1	0	0	0	0	0
2009	73	51	38	27	18	9	0	0	0	0	0
2010	80	75	64	37	20	11	9	7	6	4	0
2011	226	224	205	155	138	118	91	73	51	45	38
2012	36	20	12	8	4	0	0	0	0	0	0
Total number of days greater than threshold flow	4,393	3,435	2,812	2,200	1,654	1,319	1,098	851	661	541	441
Number of years flows NOT achieved for threshold period	1	5	8	10	15	19	23	25	25	27	28

Table 7. February through June La Grange 1 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	143	67	41	15	6	0	0	0	0	0	0
1972	48	34	9	0	0	0	0	0	0	0	0
1973	87	60	50	41	33	27	17	9	5	0	0
1974	85	70	61	40	8	3	0	0	0	0	0
1975	96	57	51	33	24	14	7	0	0	0	0
1976	12	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	102	75	55	34	16	11	0	0	0	0	0
1979	133	131	100	78	58	39	20	9	3	0	0
1980	151	137	124	84	55	38	31	30	22	21	20
1981	51	36	10	2	0	0	0	0	0	0	0
1982	136	134	129	124	119	111	99	90	72	58	43
1983	150	149	149	148	148	148	148	127	114	102	91
1984	144	115	88	64	39	15	4	0	0	0	0
1985	56	36	13	0	0	0	0	0	0	0	0
1986	136	122	109	101	81	50	29	13	9	8	5
1987	23	0	0	0	0	0	0	0	0	0	0
1988	14	0	0	0	0	0	0	0	0	0	0
1989	86	45	22	2	0	0	0	0	0	0	0
1990	24	0	0	0	0	0	0	0	0	0	0
1991	53	32	22	9	0	0	0	0	0	0	0
1992	28	1	0	0	0	0	0	0	0	0	0
1993	98	74	51	17	6	0	0	0	0	0	0
1994	35	10	0	0	0	0	0	0	0	0	0
1995	113	112	112	108	107	106	100	75	60	46	42
1996	141	129	119	101	55	46	31	18	14	10	6
1997	133	107	81	66	35	33	26	26	26	26	19
1998	146	135	126	112	102	83	72	46	31	21	18
1999	143	127	112	82	53	33	24	9	7	5	5
2000	133	120	94	62	17	7	1	0	0	0	0
2001	52	40	28	12	2	0	0	0	0	0	0
2002	67	49	24	8	0	0	0	0	0	0	0
2003	73	37	31	25	20	18	14	10	8	7	3
2004	72	34	16	3	0	0	0	0	0	0	0
2005	97	66	47	46	45	44	43	42	37	31	18
2006	149	149	149	141	129	113	103	89	67	56	52
2007	21	3	0	0	0	0	0	0	0	0	0
2008	51	19	10	8	5	1	0	0	0	0	0
2009	73	51	38	27	18	9	0	0	0	0	0
2010	80	75	64	37	20	11	9	7	6	4	0
2011	150	150	150	110	98	86	67	57	42	36	30
2012	34	20	12	8	4	0	0	0	0	0	0
Total number of days greater than threshold flow	3,619	2,808	2,297	1,748	1,303	1,046	845	657	523	431	352
Number of years flows NOT achieved for threshold period	1	5	8	10	15	19	23	26	26	28	29

Table 8. La Grange Consecutive 7 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	4	2	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	2	1	2	1	1	1	1	1	0	0	0
1974	1	3	3	4	0	0	0	0	0	0	0
1975	1	3	2	1	1	1	1	0	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	6	3	2	2	1	1	0	0	0	0	0
1979	1	1	3	3	3	2	2	1	0	0	0
1980	2	4	6	3	3	2	2	1	1	1	1
1981	2	2	1	0	0	0	0	0	0	0	0
1982	2	2	3	5	4	5	3	3	3	3	1
1983	2	3	6	7	6	4	4	6	6	6	5
1984	2	2	3	4	3	3	2	2	2	2	1
1985	2	3	1	0	0	0	0	0	0	0	0
1986	1	3	4	5	4	4	2	1	0	0	0
1987	2	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	4	3	2	0	0	0	0	0	0	0	0
1990	2	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	3	0	0	0	0	0	0	0	0	0	0
1995	1	1	1	2	1	1	2	3	3	2	2
1996	1	2	2	2	2	1	1	2	2	0	0
1997	2	3	2	2	1	1	1	2	2	2	2
1998	2	2	2	2	3	3	3	3	3	3	2
1999	1	3	3	4	2	2	2	1	1	0	0
2000	1	4	2	4	1	1	0	0	0	0	0
2001	2	1	1	1	0	0	0	0	0	0	0
2002	3	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	0
2004	3	3	1	0	0	0	0	0	0	0	0
2005	2	1	1	2	1	1	1	1	2	1	1
2006	2	2	2	4	5	4	5	5	4	3	3
2007	2	0	0	0	0	0	0	0	0	0	0
2008	2	1	1	1	0	0	0	0	0	0	0
2009	2	1	1	1	1	1	0	0	0	0	0
2010	1	2	3	2	1	1	1	1	0	0	0
2011	1	1	2	4	4	4	3	4	2	2	3
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	74	73	72	70	49	44	37	38	32	26	21
Number of years flows NOT achieved for threshold period	1	8	9	15	21	21	24	25	29	31	32

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	4	2	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	2	1	2	1	1	1	1	1	0	0	0
1974	1	3	3	4	0	0	0	0	0	0	0
1975	1	3	2	1	1	1	1	0	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	4	1	1	2	1	1	0	0	0	0	0
1979	1	1	3	3	3	2	2	1	0	0	0
1980	1	3	5	2	2	1	1	1	1	1	1
1981	2	2	1	0	0	0	0	0	0	0	0
1982	1	2	3	4	3	4	3	3	3	3	1
1983	1	2	2	3	3	3	3	3	5	5	5
1984	2	2	2	3	2	1	0	0	0	0	0
1985	2	3	1	0	0	0	0	0	0	0	0
1986	1	3	4	5	4	4	2	1	0	0	0
1987	2	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	4	3	2	0	0	0	0	0	0	0	0
1990	2	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	2	3	1	0	0	0	0	0	0	0
1994	3	0	0	0	0	0	0	0	0	0	0
1995	1	1	1	2	1	1	2	3	3	2	2
1996	1	2	2	2	2	1	1	2	2	0	0
1997	2	3	2	2	1	1	1	1	1	1	1
1998	2	2	2	2	3	3	2	2	2	2	2
1999	1	3	3	4	2	2	2	1	1	0	0
2000	1	4	2	4	1	1	0	0	0	0	0
2001	2	1	1	1	0	0	0	0	0	0	0
2002	3	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	0
2004	3	3	1	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	2	1	1
2006	2	2	2	3	4	3	4	4	3	3	3
2007	2	0	0	0	0	0	0	0	0	0	0
2008	2	1	1	1	0	0	0	0	0	0	0
2009	2	1	1	1	1	1	0	0	0	0	0
2010	1	2	3	2	1	1	1	1	0	0	0
2011	1	1	1	3	2	2	2	4	2	2	2
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	69	69	64	60	40	36	30	30	26	21	18
Number of years flows NOT achieved for threshold period	1	8	9	15	21	21	25	26	30	32	33

Table 10. La Grange Consecutive 14 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	2	1	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	0	0	0	0	0
1974	1	3	2	1	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	3	3	2	1	1	0	0	0	0	0	0
1979	1	1	2	2	2	2	0	0	0	0	0
1980	2	3	4	3	2	1	1	1	1	1	1
1981	2	1	0	0	0	0	0	0	0	0	0
1982	1	2	2	4	4	3	3	3	3	1	1
1983	1	2	4	5	3	3	3	3	3	3	3
1984	2	2	3	4	3	2	2	2	1	1	1
1985	2	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	3	2	2	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	3	1	0	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	2	3	1	1	1
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	2	2	2	2
1998	2	1	2	2	3	2	3	2	1	1	1
1999	1	3	3	2	2	1	1	0	0	0	0
2000	1	2	2	3	0	0	0	0	0	0	0
2001	1	1	1	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	2	1	0	0	0	0	0	0	0	0	0
2005	2	1	1	2	1	1	1	1	1	1	0
2006	2	2	2	4	5	4	4	3	2	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	2	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	1	0	0	0	0	0	0
2010	1	2	2	1	1	0	0	0	0	0	0
2011	1	1	2	3	4	3	3	2	2	2	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	56	54	47	49	40	30	26	22	17	14	11
Number of years flows NOT achieved for threshold period	3	9	16	18	22	25	29	32	32	32	34

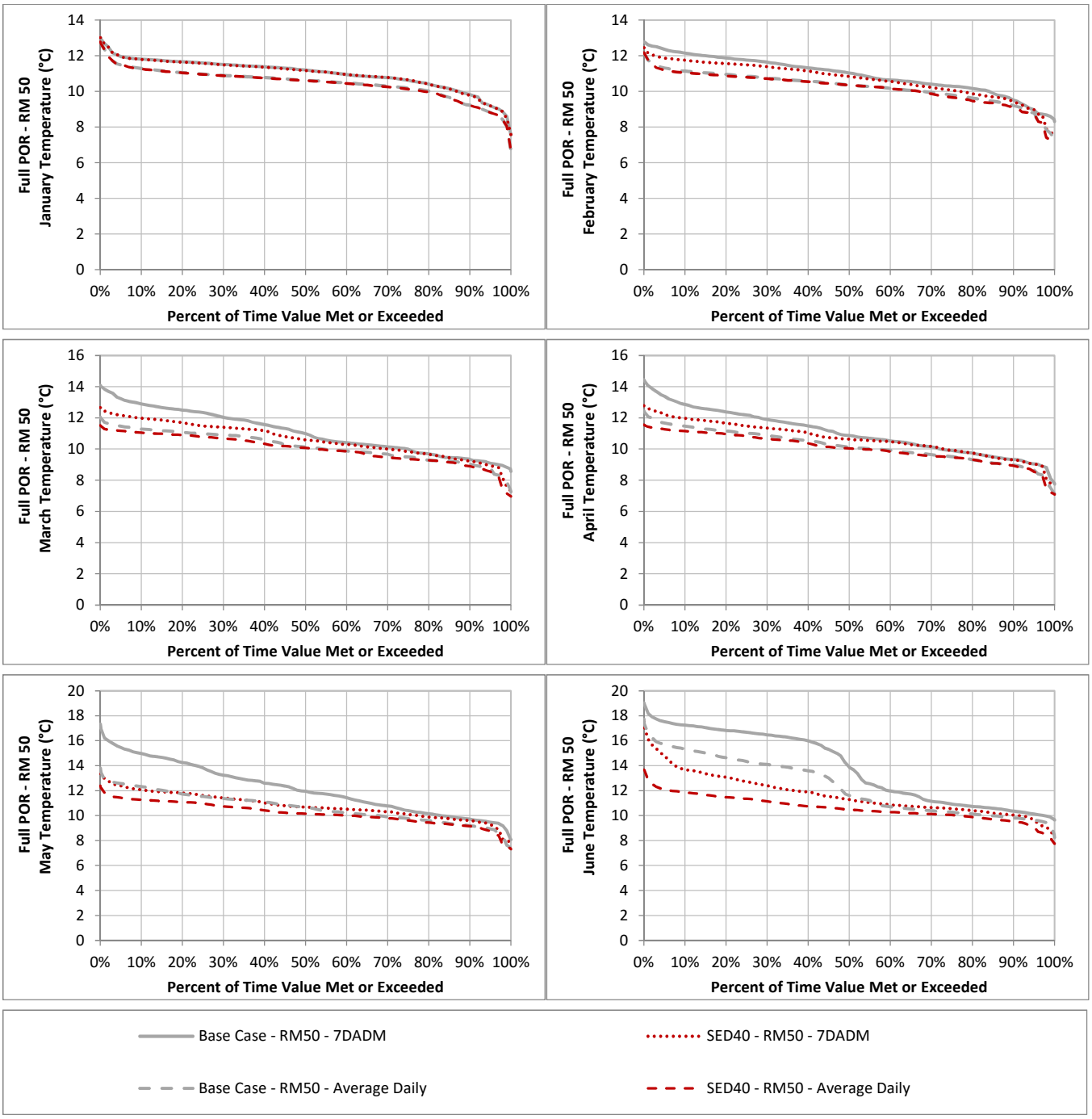
Table 11. February through June La Grange Consecutive 14 Day Flow Count

	SED40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	2	1	1	0	0	0	0	0	0	0
1972	1	2	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	0	0	0	0	0
1974	1	3	2	1	0	0	0	0	0	0	0
1975	1	1	1	1	1	1	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	0	0	0	0	0	0
1979	1	1	2	2	2	2	0	0	0	0	0
1980	1	2	3	2	1	1	1	1	1	1	1
1981	2	1	0	0	0	0	0	0	0	0	0
1982	1	2	2	3	3	3	3	3	3	1	1
1983	1	1	1	2	2	2	2	3	3	3	3
1984	2	2	2	3	2	0	0	0	0	0	0
1985	2	0	0	0	0	0	0	0	0	0	0
1986	1	3	2	3	2	2	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	3	1	0	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0
1993	2	1	1	1	0	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	2	3	1	1	1
1996	1	2	1	1	1	1	1	0	0	0	0
1997	2	2	2	1	1	1	1	1	1	1	1
1998	2	1	2	2	3	2	2	2	1	0	0
1999	1	3	3	2	2	1	1	0	0	0	0
2000	1	2	2	3	0	0	0	0	0	0	0
2001	1	1	1	0	0	0	0	0	0	0	0
2002	2	2	0	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	0	0	0	0
2004	2	1	0	0	0	0	0	0	0	0	0
2005	2	1	1	1	1	1	1	1	1	1	0
2006	2	2	2	3	4	3	3	3	2	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	2	1	0	0	0	0	0	0	0	0	0
2009	1	1	1	1	1	0	0	0	0	0	0
2010	1	2	2	1	1	0	0	0	0	0	0
2011	1	1	1	2	2	2	2	2	1	1	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	53	50	40	40	33	25	20	19	14	10	8
Number of years flows NOT achieved for threshold period	3	9	16	18	22	26	30	33	33	34	36

SED40

Dynamic Routing

Results Summary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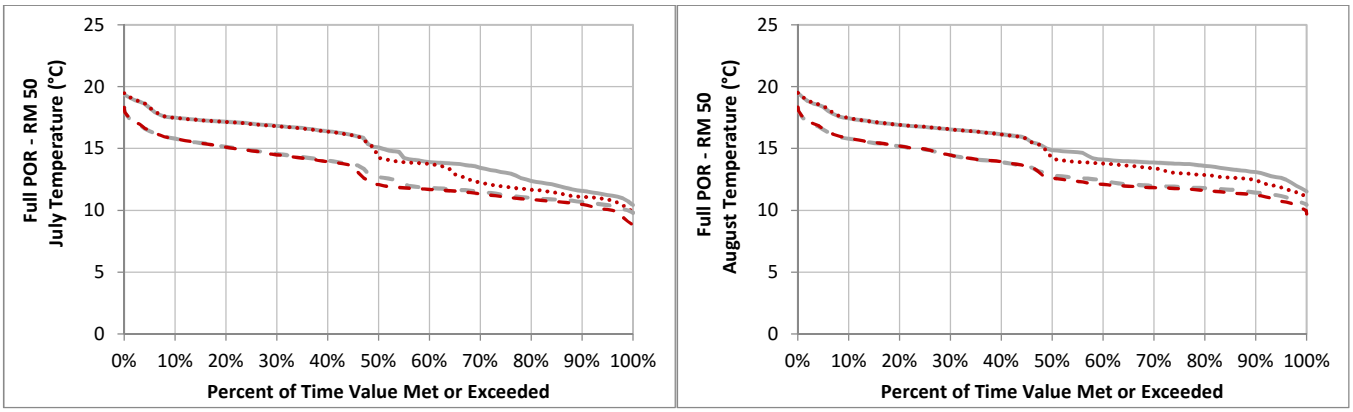
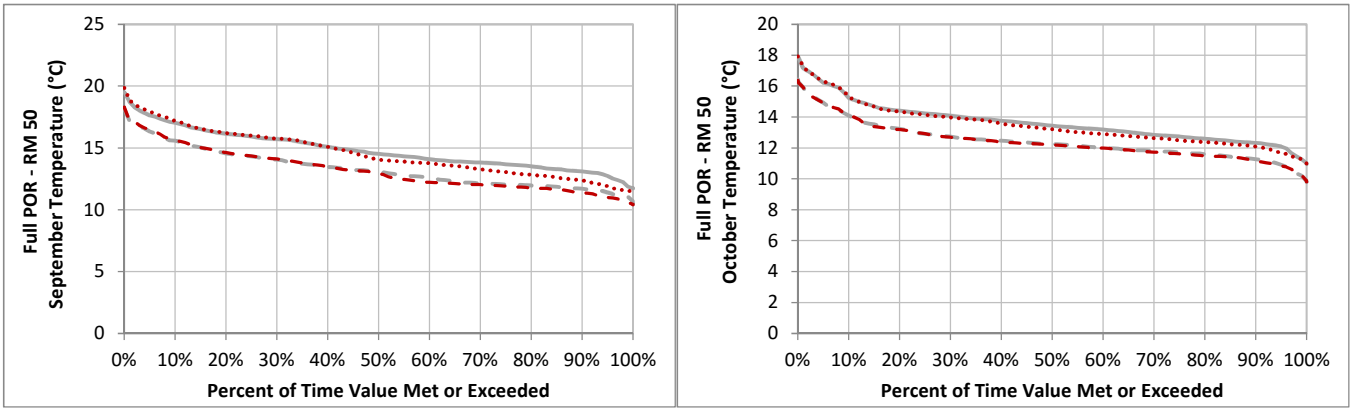
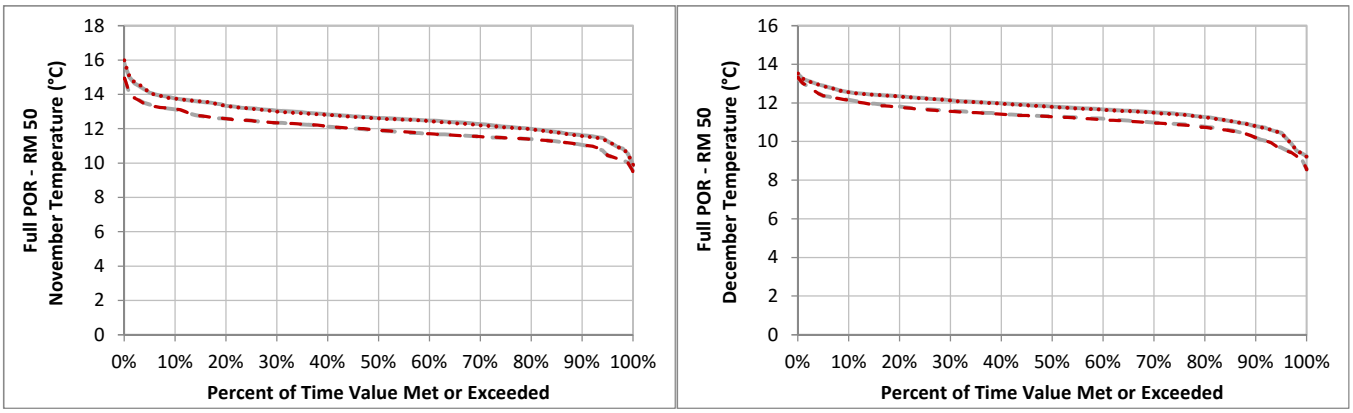
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM50 - 7DADM
SED40 - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED40 - RM50 - Average Daily


Full POR - RM 50
July Temperature (°C)
Percent of Time Value Met or Exceeded

Full POR - RM 50
August Temperature (°C)
Percent of Time Value Met or Exceeded

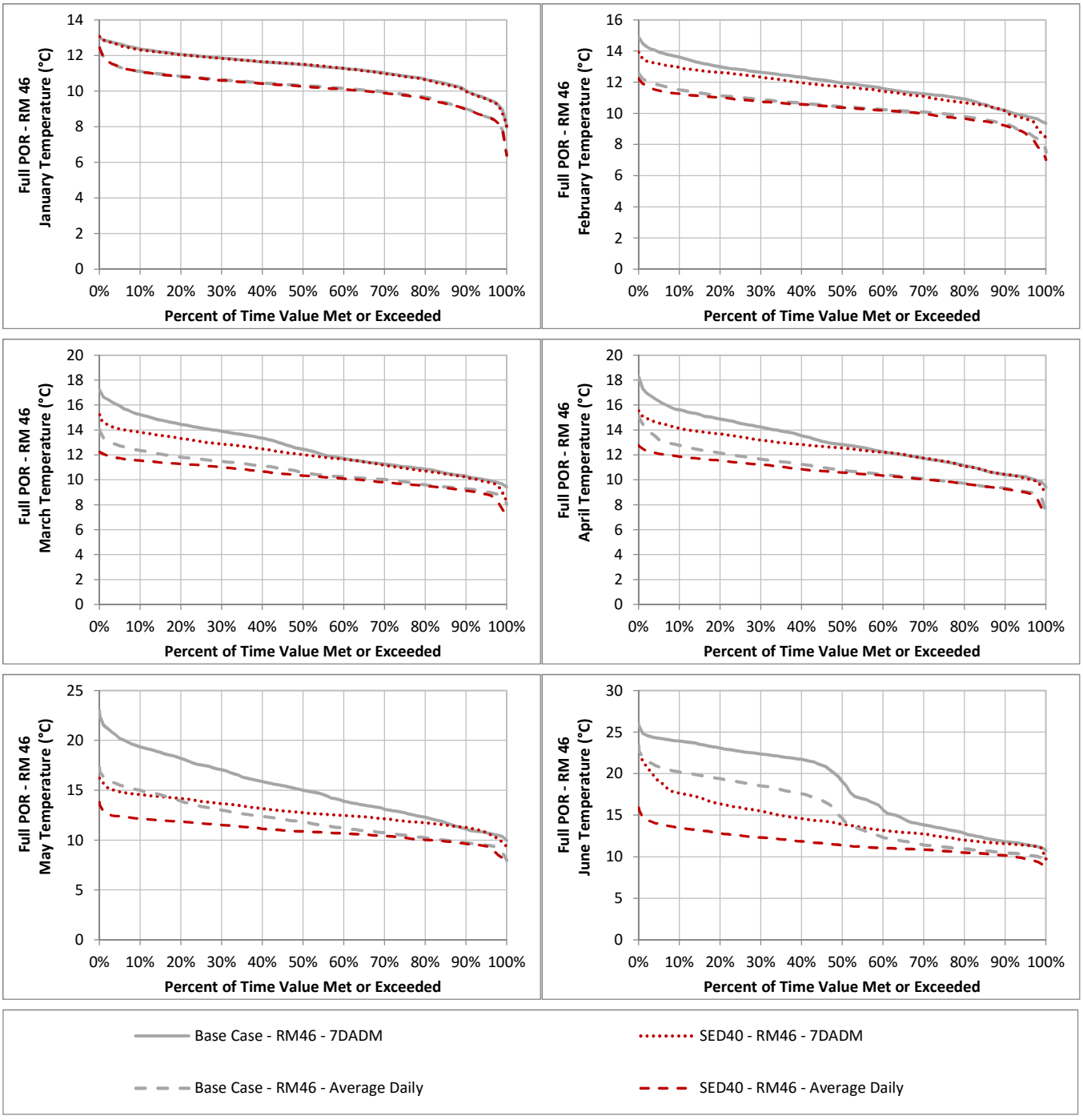

Full POR - RM 50
September Temperature (°C)
Percent of Time Value Met or Exceeded

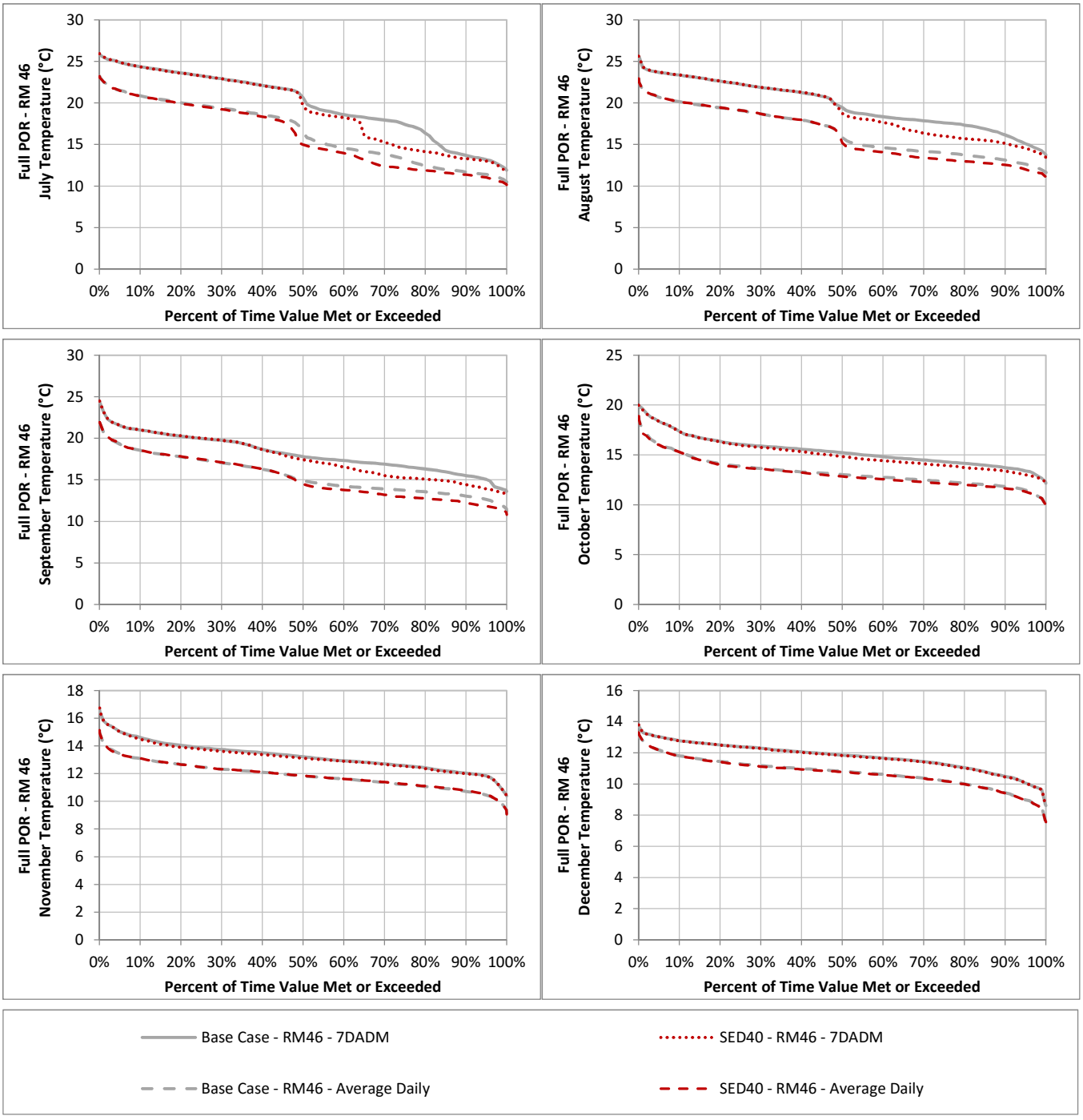
Full POR - RM 50
October Temperature (°C)
Percent of Time Value Met or Exceeded

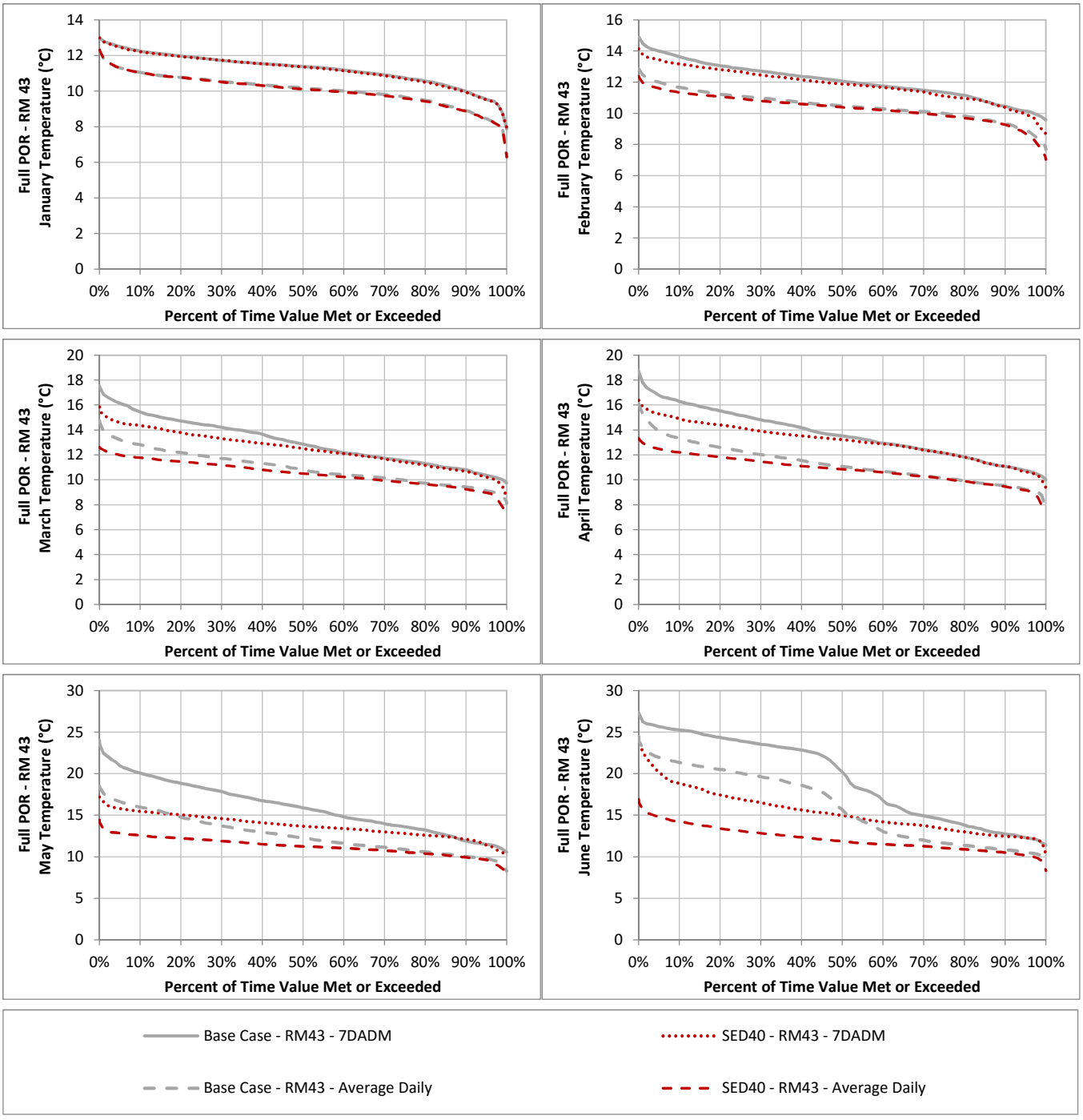

Full POR - RM 50
November Temperature (°C)
Percent of Time Value Met or Exceeded

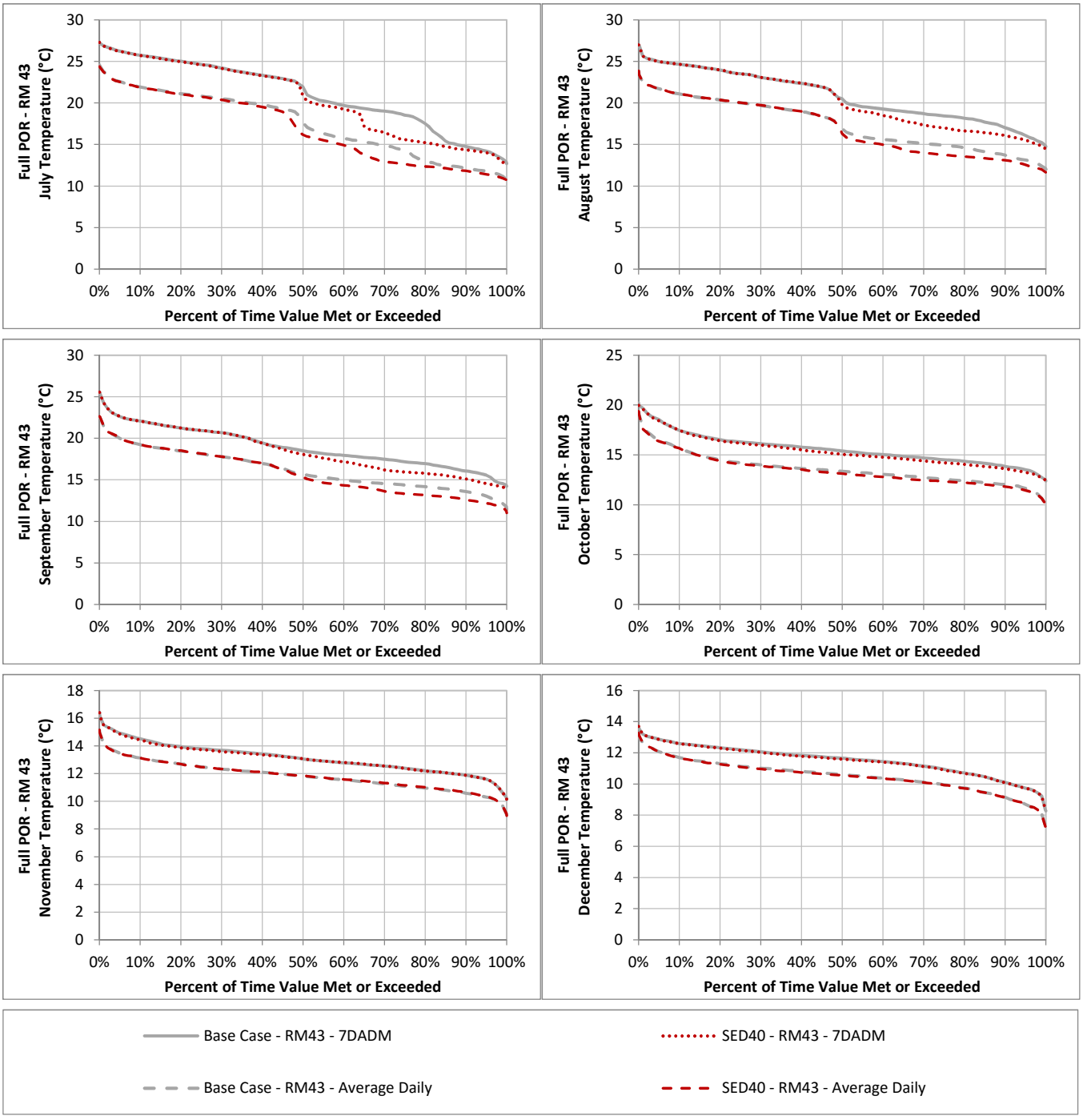
Full POR - RM 50
December Temperature (°C)
Percent of Time Value Met or Exceeded

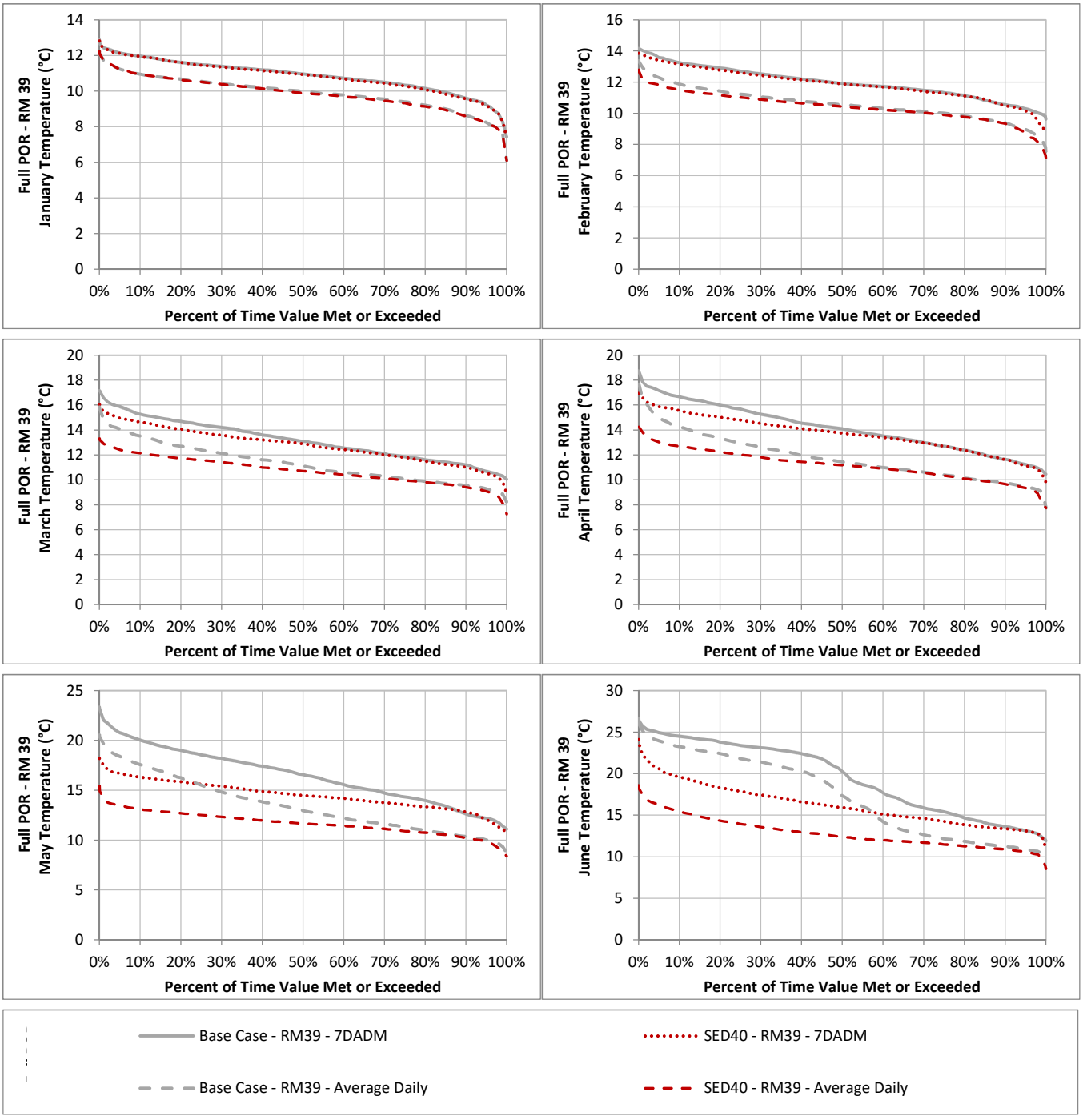

Base Case - RM50 - 7DADM
SED40 - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED40 - RM50 - Average Daily

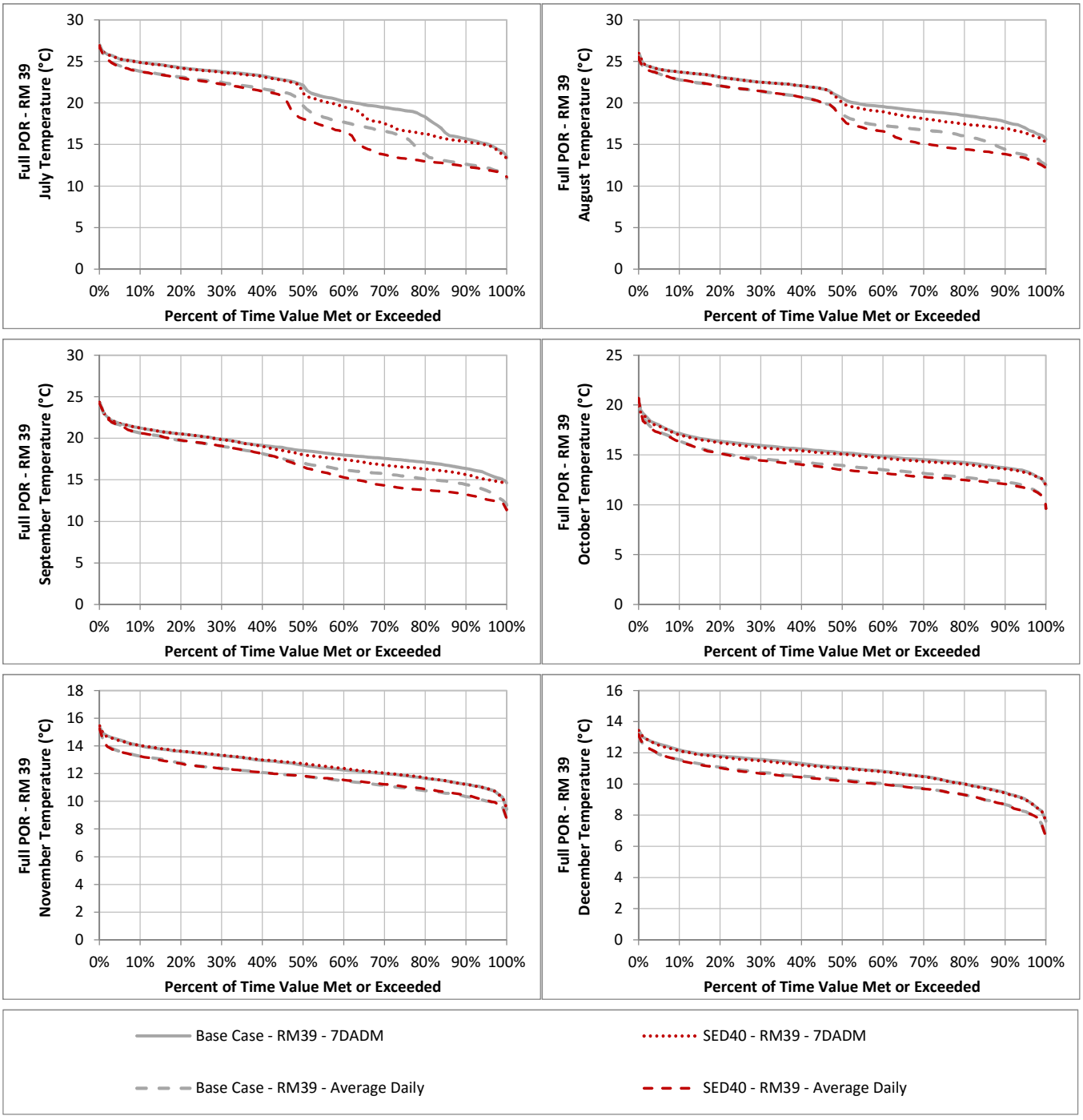

Full POR - RM 46 January Temperature (°C)
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM46 - 7DADM
SED40 - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED40 - RM46 - Average Daily

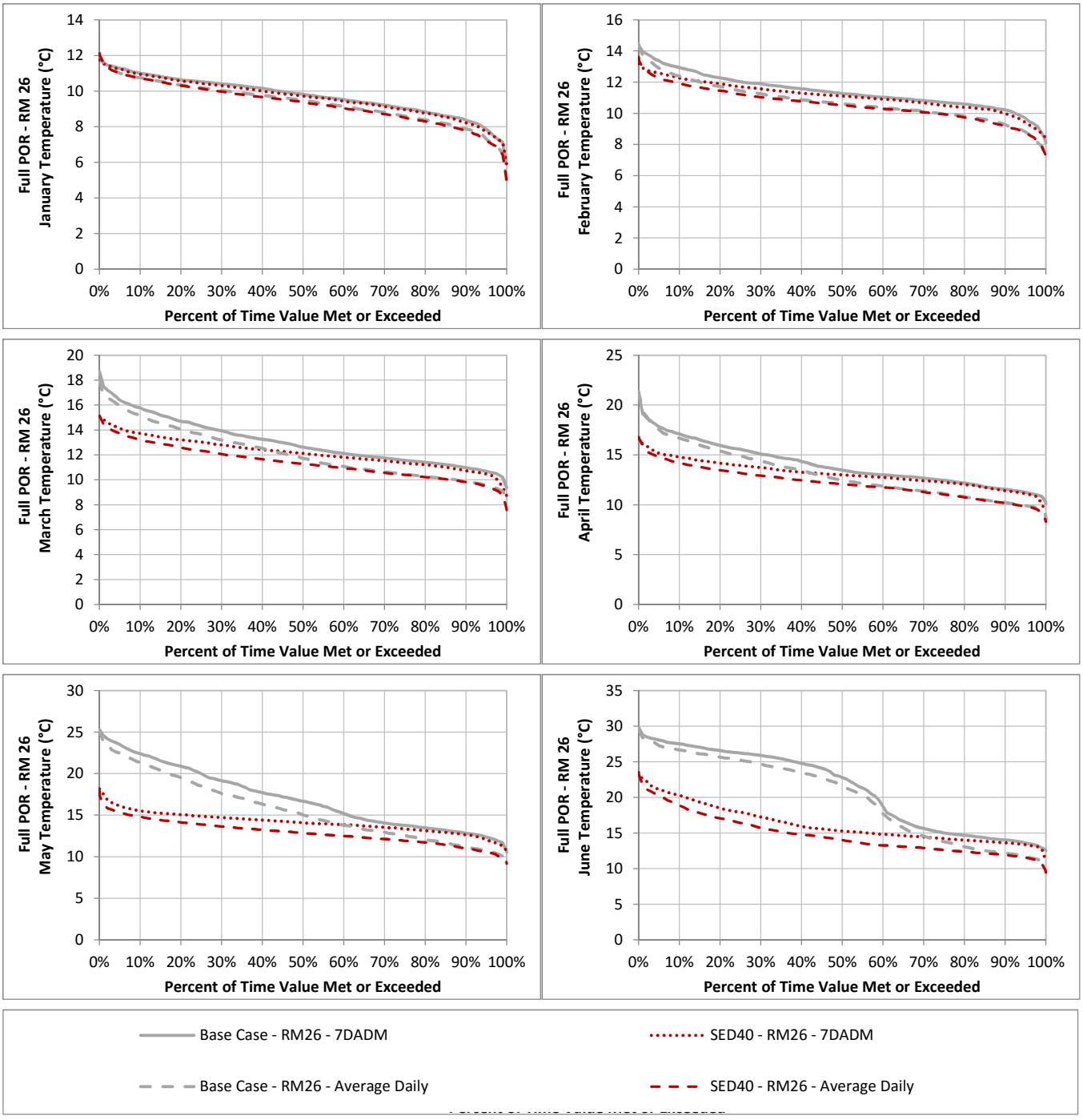

Full POR - RM 46 July Temperature (°C)
Full POR - RM 46 August Temperature (°C)
Full POR - RM 46 September Temperature (°C)
Full POR - RM 46 October Temperature (°C)
Full POR - RM 46 November Temperature (°C)
Full POR - RM 46 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED40 - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED40 - RM46 - Average Daily

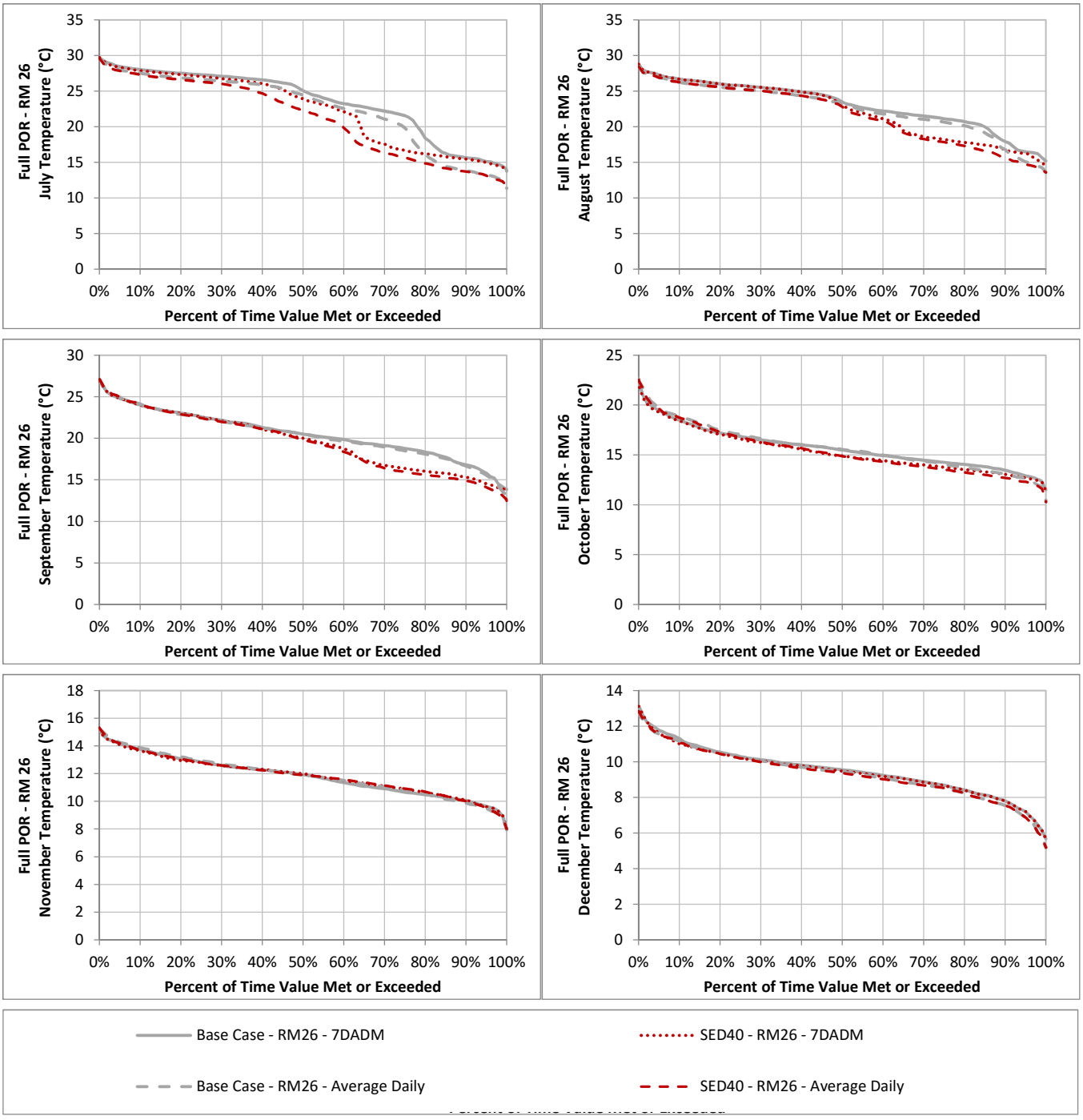

Full POR - RM 43
January Temperature (°C)
Full POR - RM 43
February Temperature (°C)
Full POR - RM 43
March Temperature (°C)
Full POR - RM 43
April Temperature (°C)
Full POR - RM 43
May Temperature (°C)
Full POR - RM 43
June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
SED40 - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED40 - RM43 - Average Daily

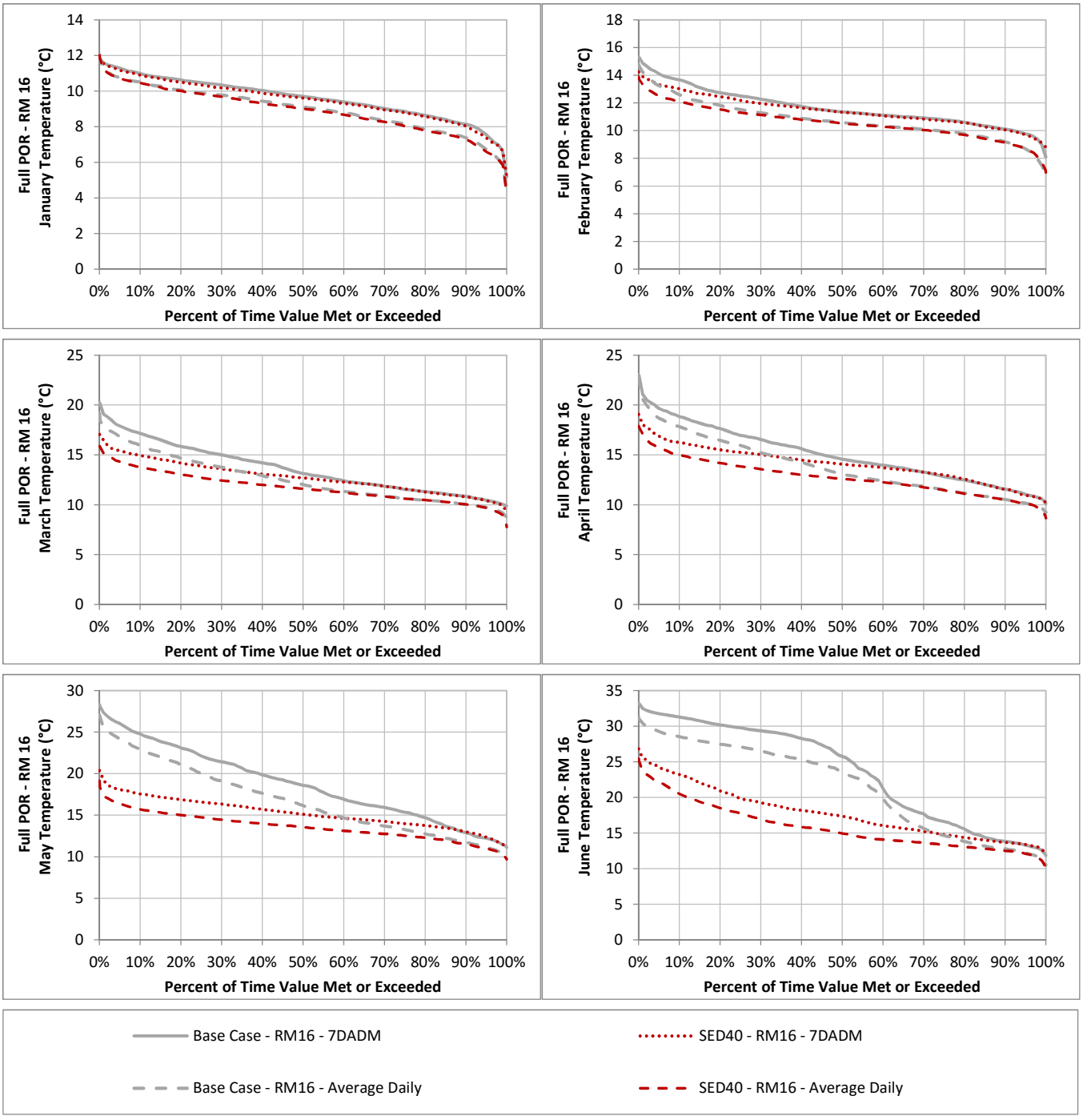

Full POR - RM 43
July Temperature (°C)
August Temperature (°C)
September Temperature (°C)
October Temperature (°C)
November Temperature (°C)
December Temperature (°C)
Percent of Time Value Met or Exceeded
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Base Case - RM43 - 7DADM
SED40 - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED40 - RM43 - Average Daily

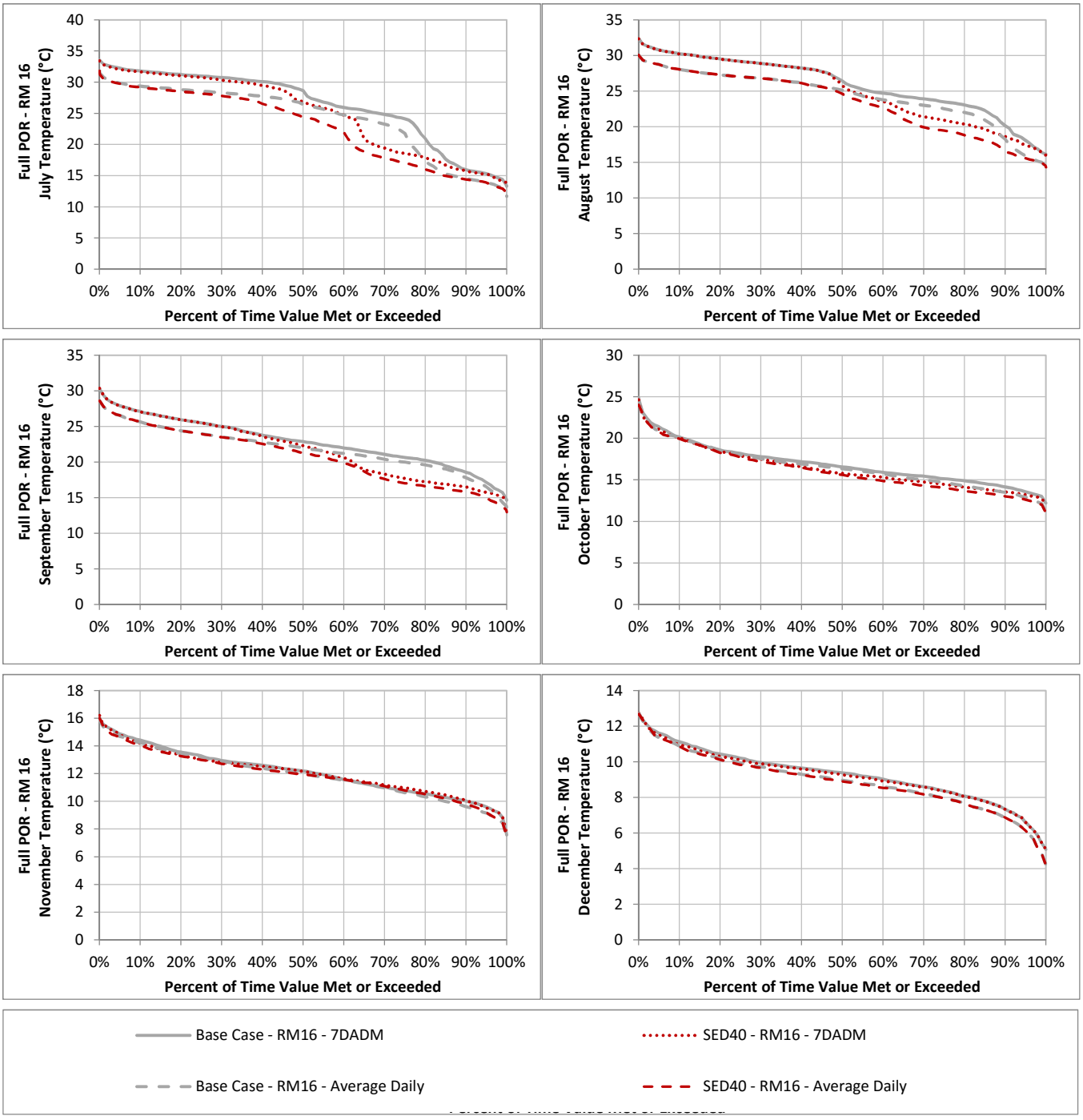

Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
SED40 - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED40 - RM39 - Average Daily


Full POR - RM 39
July Temperature (°C)
August Temperature (°C)
September Temperature (°C)
October Temperature (°C)
November Temperature (°C)
December Temperature (°C)
Percent of Time Value Met or Exceeded
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Base Case - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED40 - RM39 - 7DADM
SED40 - RM39 - Average Daily


Full POR - RM 26 January Temperature (°C)
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED40 - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED40 - RM26 - Average Daily


Full POR - RM 26 July Temperature (°C)
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED40 - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED40 - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED40 - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED40 - RM16 - Average Daily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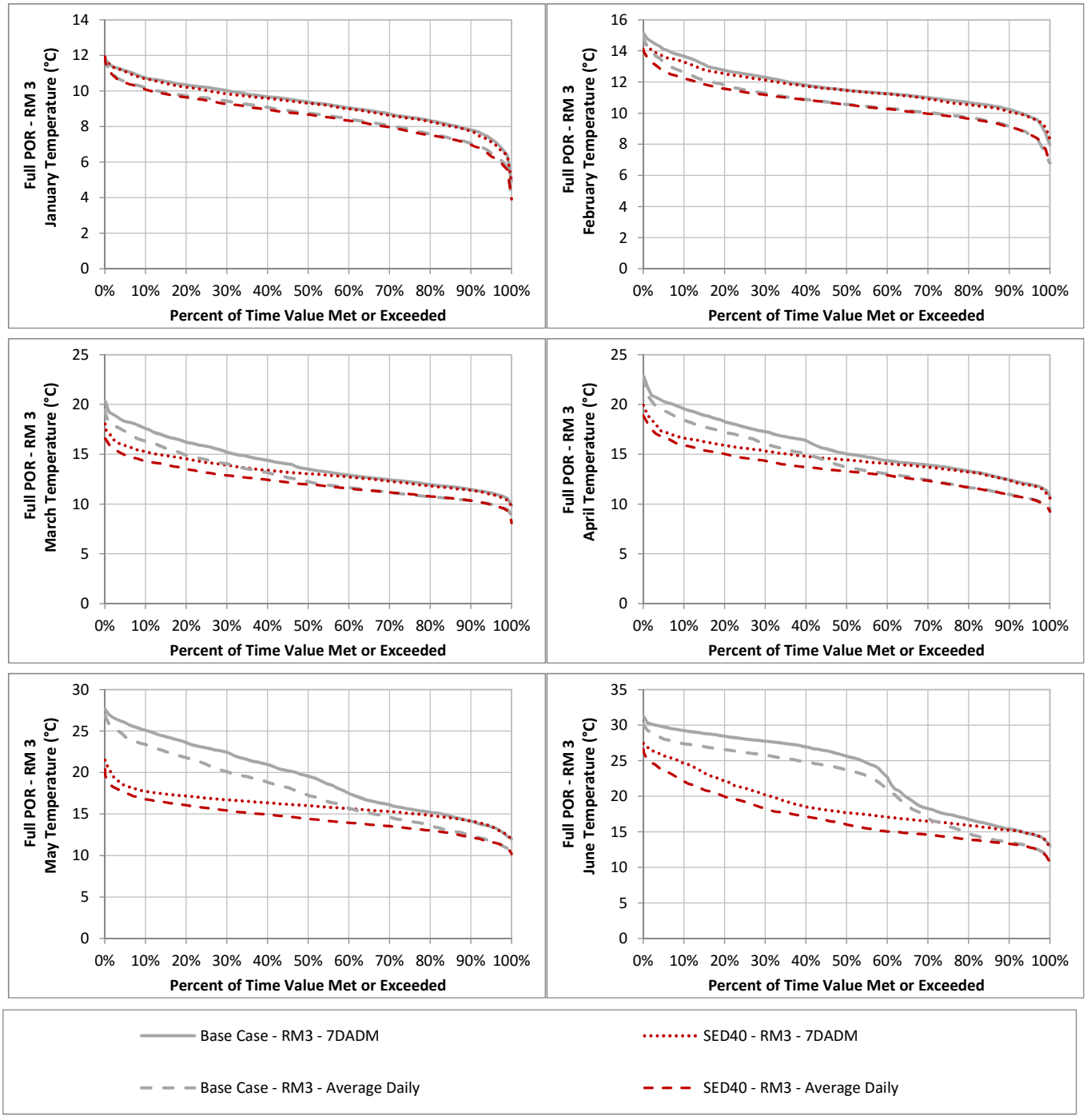
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED40 - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED40 - RM16 - Average Daily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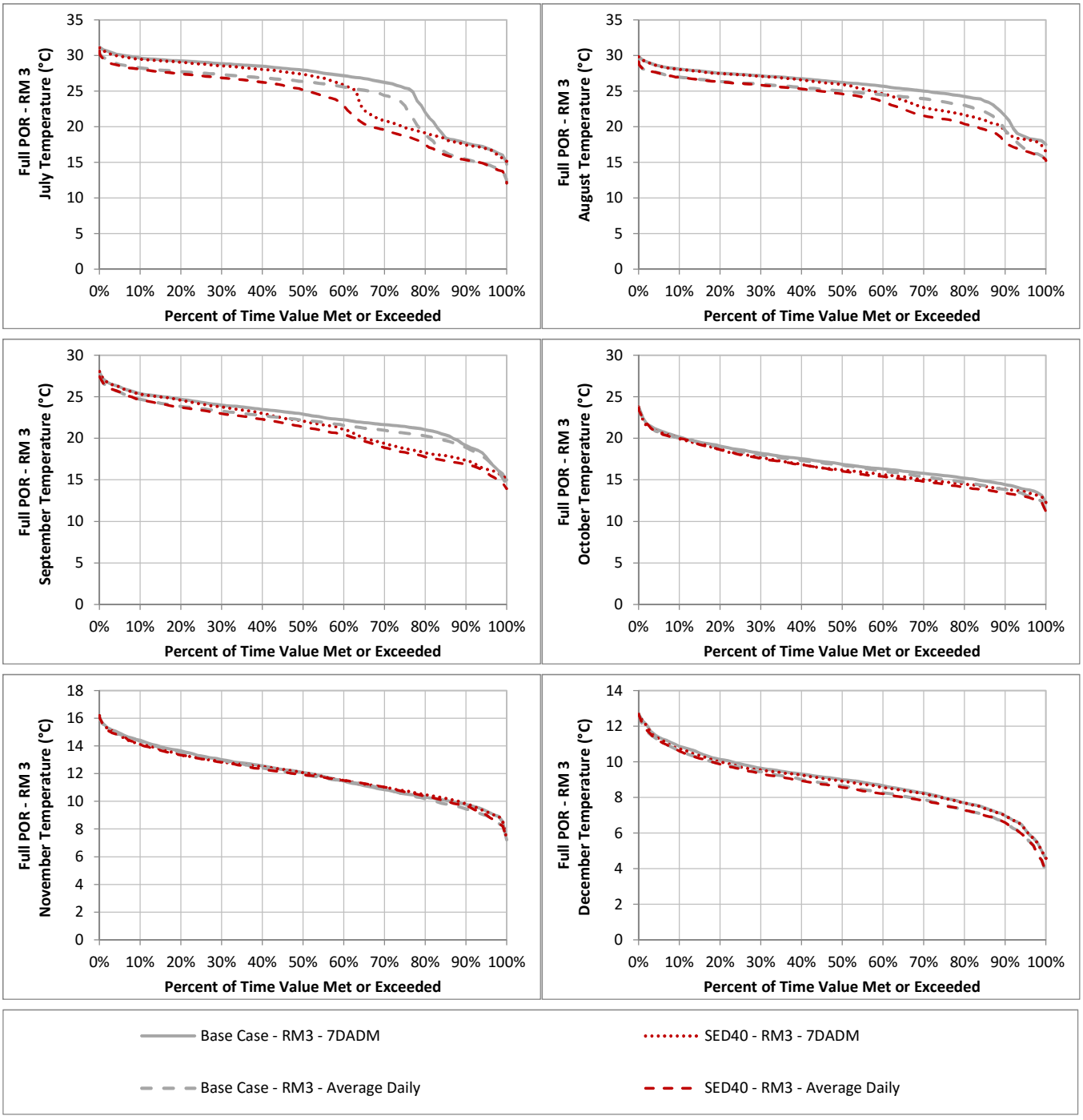
January Temperature (°C)
Full POR - RM 3
February Temperature (°C)
Full POR - RM 3
March Temperature (°C)
Full POR - RM 3
April Temperature (°C)
Full POR - RM 3
May Temperature (°C)
Full POR - RM 3
June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED40 - RM3 - 7DADM
SED40 - RM3 - Average Daily


Full POR - RM 3
July Temperature (°C)
Full POR - RM 3
August Temperature (°C)
Full POR - RM 3
September Temperature (°C)
Full POR - RM 3
October Temperature (°C)
Full POR - RM 3
November Temperature (°C)
Full POR - RM 3
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED40 - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED40 - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–5

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE SED'S 50% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED50_WSF is the designation for a simulation of an alternative Don Pedro Project operations scenario identified by the SWB in the 2016 SED as the maximum unimpaired flow requirement. The "WSF" in the simulation name indicates that the Districts' normal reservoir operation rules are modeled which represent Don Pedro operational rules consistent with those implemented historically. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced to conserve water. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375 TAF, the amount of "buffer" storage retained in the reservoir historically and under the Base Case. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED50_WSF are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 50% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from

[1]This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 50% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

SED50_WSF

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED50_WSF	% of Base Case
January	1,063,873	639,212	60%
February	1,722,819	1,438,335	83%
March	3,042,430	2,821,467	93%
April	3,481,703	3,389,096	97%
May	3,491,340	4,661,333	134%
June	3,434,821	4,192,643	122%
July	3,521,988	3,130,250	89%
August	2,710,847	2,372,852	88%
September	1,340,662	1,357,055	101%
October	918,413	987,375	108%
November	402,483	529,191	131%
December	613,223	429,505	70%
Total	25,744,602	25,948,314	101%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED50_WSF		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	733	45%	40%
87-92	Drought	5,198	4,590	88%	3,153	69%	61%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	405	44%	44%
1977	C	921	713	77%	329	46%	36%
1978	W	767	752	98%	729	97%	95%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	602	67%	67%
1988	C	855	759	89%	548	72%	64%
1989	C	846	744	88%	542	73%	64%
1990	C	876	771	88%	563	73%	64%
1991	C	881	774	88%	566	73%	64%
1992	C	844	647	77%	332	51%	39%
1993	W	823	807	98%	784	97%	95%
1994	C	835	835	100%	560	67%	67%
1995	W	774	774	100%	752	97%	97%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	610	71%	71%
2002	D	898	898	100%	606	68%	68%
2003	BN	885	885	100%	860	97%	97%
2004	D	940	940	100%	643	68%	68%
2005	W	874	874	100%	852	97%	97%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	646	70%	70%
2008	C	882	882	100%	859	97%	97%
2009	BN	903	903	100%	903	100%	100%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	750	89%	87%
Total		36,190	35,343	98%	31,481	89%	87%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED50_WSF	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	251	47%
87-92	C	1,600	1,502	94%	500	31%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	199	30%
1973	AN	267	219	100%	104	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	203	20%
1977	C	267	269	90%	49	20%
1978	W	267	205	100%	89	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	211	30%
1988	C	267	267	90%	81	20%
1989	C	267	250	90%	61	20%
1990	C	267	240	90%	55	20%
1991	C	267	243	90%	55	20%
1992	C	267	235	90%	38	20%
1993	W	267	211	100%	94	100%
1994	C	267	264	100%	179	20%
1995	W	267	189	100%	85	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	186	30%
2003	BN	267	234	100%	115	100%
2004	D	267	249	100%	168	30%
2005	W	267	193	100%	87	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	201	30%
2008	C	267	247	100%	50	20%
2009	BN	267	240	100%	101	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	167	63%
Total		11,197	9,676	86%	7,008	63%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

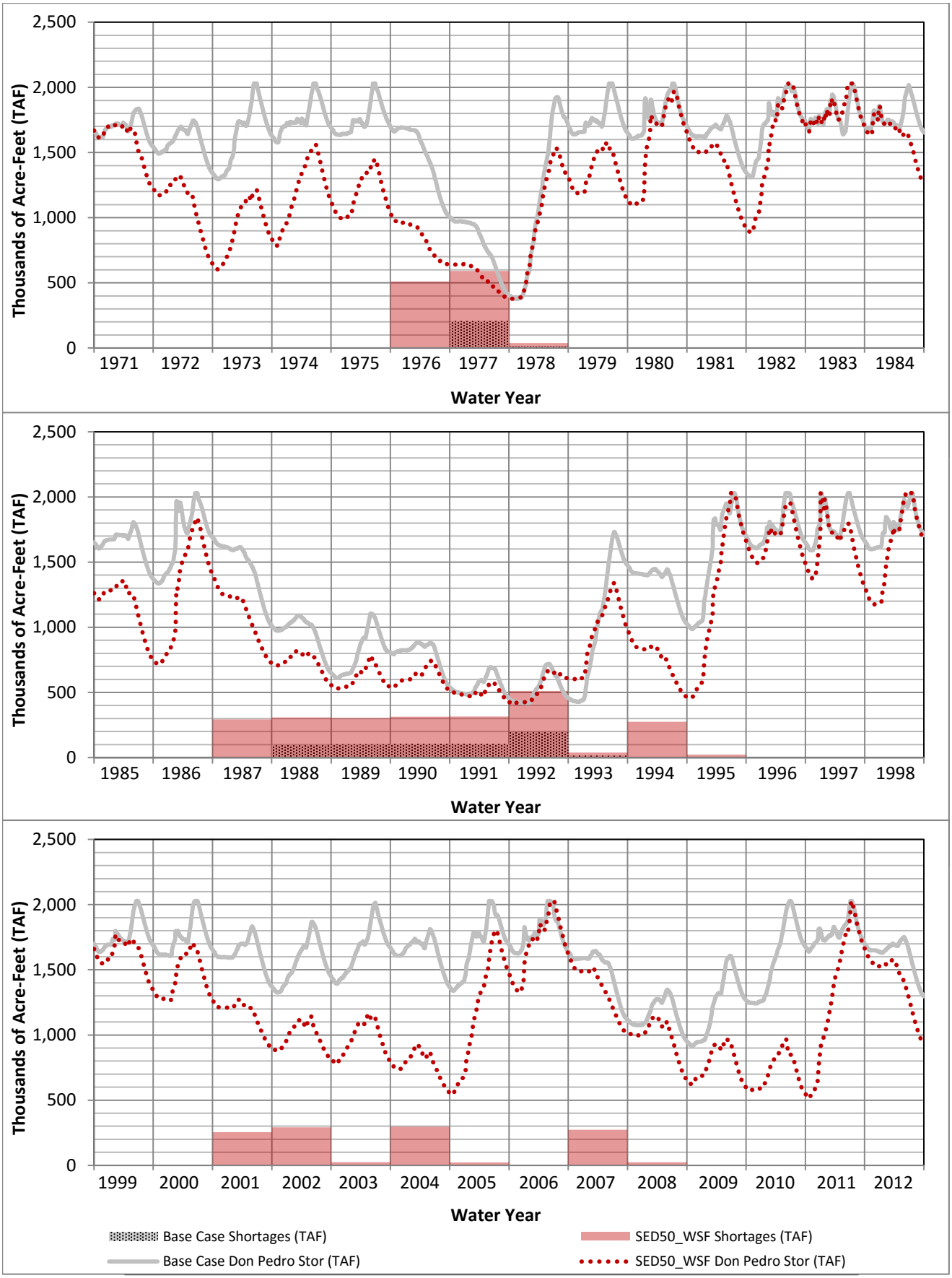


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

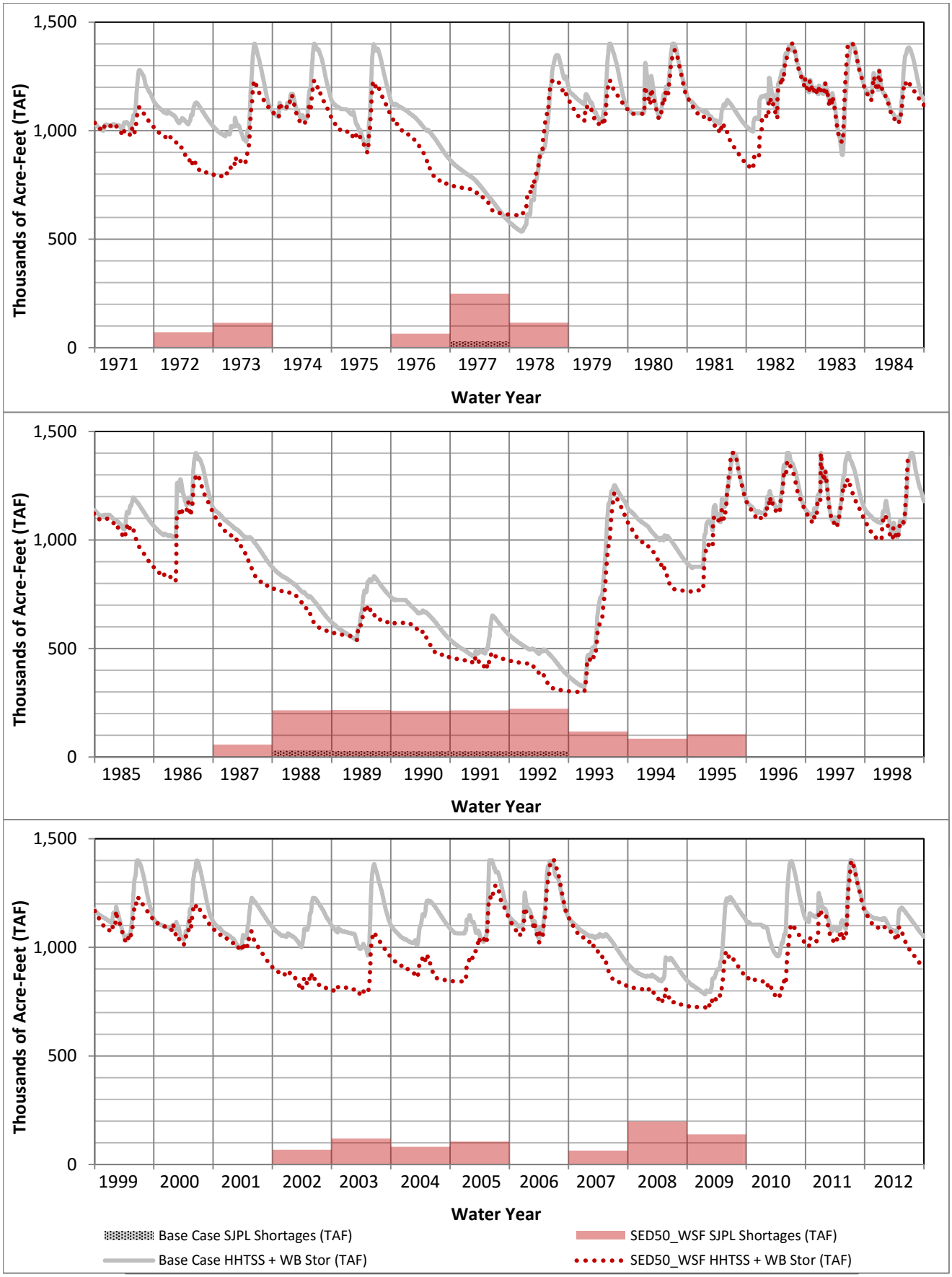


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED50_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	650	650	245%	233%
87-92	Drought	713	713	2,812	2,812	395%	395%
1971	BN	266	539	699	864	263%	160%
1972	D	138	151	542	542	392%	360%
1973	AN	237	613	913	911	386%	149%
1974	W	301	1,050	833	833	277%	79%
1975	W	301	887	995	995	331%	112%
1976	C	171	185	410	410	240%	222%
1977	C	94	94	240	240	255%	255%
1978	W	235	349	1,056	1,056	449%	302%
1979	AN	301	876	998	998	332%	114%
1980	W	302	1,818	1,001	1,357	332%	75%
1981	D	194	252	635	635	328%	253%
1982	W	250	2,275	1,313	1,866	525%	82%
1983	W	301	3,689	1,547	3,687	514%	100%
1984	AN	302	1,463	944	1,847	313%	126%
1985	D	205	340	583	583	285%	171%
1986	W	237	1,496	1,237	1,165	523%	78%
1987	C	179	179	482	482	270%	270%
1988	C	94	94	362	362	384%	384%
1989	C	116	116	634	634	547%	547%
1990	C	103	103	391	391	379%	379%
1991	C	116	116	553	553	478%	478%
1992	C	105	105	389	389	372%	372%
1993	W	235	235	955	955	406%	406%
1994	C	182	182	538	538	297%	297%
1995	W	237	2,098	1,255	1,787	530%	85%
1996	W	302	1,281	1,097	1,408	364%	110%
1997	W	301	1,954	915	2,152	304%	110%
1998	W	301	2,226	1,279	1,915	425%	86%
1999	AN	301	974	1,039	1,279	345%	131%
2000	AN	302	916	970	970	322%	106%
2001	D	193	233	581	581	302%	250%
2002	D	137	137	615	615	451%	451%
2003	BN	180	233	704	704	390%	303%
2004	D	141	355	606	606	429%	171%
2005	W	237	1,488	1,104	1,104	466%	74%
2006	W	301	2,270	1,381	2,069	459%	91%
2007	C	182	182	543	543	298%	298%
2008	C	119	119	540	540	454%	454%
2009	BN	156	156	746	746	479%	479%
2010	AN	249	349	831	831	334%	238%
2011	W	301	2,376	1,147	1,288	381%	54%
2012	D	192	213	547	547	285%	257%
Average (1971-2012)		216	828	813	1,000	376%	121%
Average (1980-2009)		210	903	831	1,082	395%	120%
Total (1971-2012)		9,092	34,765	34,150	41,980	376%	121%
Total (1980-2009)		6,306	27,083	24,939	32,465	395%	120%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED50_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	435	435	329%	329%
87-92	Drought	403	403	2,421	2,421	600%	600%
1971	BN	173	399	606	724	350%	182%
1972	D	84	96	488	488	581%	506%
1973	AN	154	515	831	829	538%	161%
1974	W	176	760	591	591	335%	78%
1975	W	176	728	668	668	379%	92%
1976	C	83	83	240	240	290%	290%
1977	C	50	50	196	196	393%	393%
1978	W	154	193	851	851	551%	442%
1979	AN	176	683	791	791	449%	116%
1980	W	177	1,205	752	1,055	425%	88%
1981	D	101	151	461	461	457%	306%
1982	W	159	1,862	1,097	1,476	691%	79%
1983	W	176	2,287	1,216	2,191	690%	96%
1984	AN	177	552	737	949	417%	172%
1985	D	112	247	490	490	438%	198%
1986	W	154	1,388	1,030	958	667%	69%
1987	C	91	91	312	312	345%	345%
1988	C	50	50	318	318	634%	634%
1989	C	72	72	590	590	823%	823%
1990	C	59	59	347	347	589%	589%
1991	C	72	72	509	509	712%	712%
1992	C	60	60	345	345	571%	571%
1993	W	154	154	750	750	486%	486%
1994	C	93	93	368	368	395%	395%
1995	W	154	1,482	1,048	1,040	679%	70%
1996	W	177	1,126	765	1,077	433%	96%
1997	W	176	859	590	1,099	335%	128%
1998	W	176	1,667	952	1,207	540%	72%
1999	AN	176	774	832	1,072	472%	138%
2000	AN	177	791	845	845	478%	107%
2001	D	100	140	489	489	489%	349%
2002	D	86	86	565	565	655%	655%
2003	BN	130	182	653	653	502%	358%
2004	D	82	295	547	547	663%	186%
2005	W	154	1,289	897	897	581%	70%
2006	W	176	1,759	1,049	1,696	596%	96%
2007	C	94	94	373	373	398%	398%
2008	C	75	75	496	496	662%	662%
2009	BN	106	106	696	696	659%	659%
2010	AN	158	218	740	740	468%	339%
2011	W	176	1,489	898	898	509%	60%
2012	D	104	118	377	377	364%	320%
Average (1971-2012)		129	581	652	744	506%	128%
Average (1980-2009)		125	636	671	796	537%	125%
Total (1971-2012)		5,411	24,398	27,395	31,260	506%	128%
Total (1980-2009)		3,746	19,067	20,119	23,869	537%	125%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	144	82	52	41	21	11	0	0	0	0	0
1972	74	43	34	12	2	0	0	0	0	0	0
1973	103	73	60	55	44	36	32	27	18	12	7
1974	92	57	42	35	27	10	0	0	0	0	0
1975	90	51	41	37	35	32	23	15	9	2	0
1976	21	8	0	0	0	0	0	0	0	0	0
1977	2	0	0	0	0	0	0	0	0	0	0
1978	122	99	82	68	49	34	19	13	7	0	0
1979	131	84	51	47	37	28	19	16	13	10	8
1980	158	142	125	94	72	41	23	21	20	13	9
1981	70	45	36	13	6	0	0	0	0	0	0
1982	179	169	151	139	121	104	82	68	51	42	41
1983	346	306	277	262	213	191	190	168	143	128	114
1984	223	205	170	134	102	81	73	56	28	21	14
1985	76	50	36	22	2	0	0	0	0	0	0
1986	136	122	96	63	53	39	25	21	16	10	5
1987	41	19	0	0	0	0	0	0	0	0	0
1988	25	12	0	0	0	0	0	0	0	0	0
1989	104	82	45	23	4	0	0	0	0	0	0
1990	38	16	0	0	0	0	0	0	0	0	0
1991	73	49	32	22	16	2	0	0	0	0	0
1992	43	26	1	0	0	0	0	0	0	0	0
1993	111	89	76	62	37	12	7	0	0	0	0
1994	48	30	10	2	0	0	0	0	0	0	0
1995	174	155	140	128	113	98	81	60	44	30	25
1996	145	132	121	107	67	48	33	20	17	7	4
1997	170	149	135	112	77	67	56	54	54	54	54
1998	177	162	142	129	120	105	92	65	53	40	30
1999	145	132	120	94	75	55	29	19	17	12	5
2000	141	121	84	55	37	27	13	7	3	0	0
2001	62	50	40	30	24	8	0	0	0	0	0
2002	81	62	49	28	13	3	0	0	0	0	0
2003	83	46	37	32	28	23	20	18	14	12	10
2004	88	68	34	17	7	0	0	0	0	0	0
2005	122	94	68	60	39	30	26	22	19	16	15
2006	170	156	141	141	122	116	105	87	76	60	52
2007	52	18	3	0	0	0	0	0	0	0	0
2008	70	43	19	11	8	7	5	1	0	0	0
2009	114	59	51	39	30	23	15	9	2	0	0
2010	87	72	66	51	34	27	13	11	9	8	6
2011	147	141	120	89	58	31	18	17	16	14	12
2012	42	32	20	13	9	7	4	0	0	0	0
Total number of days greater than threshold flow	4,520	3,551	2,807	2,267	1,702	1,296	1,003	795	629	491	411
Number of years flows NOT achieved for threshold period	0	1	5	7	8	13	18	20	21	24	25

Table 7. February through June La Grange 1 Day Flow Count

	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	142	82	52	41	21	11	0	0	0	0	0
1972	74	43	34	12	2	0	0	0	0	0	0
1973	103	73	60	55	44	36	32	27	18	12	7
1974	90	57	42	35	27	10	0	0	0	0	0
1975	88	51	41	37	35	32	23	15	9	2	0
1976	19	8	0	0	0	0	0	0	0	0	0
1977	2	0	0	0	0	0	0	0	0	0	0
1978	122	99	82	68	49	34	19	13	7	0	0
1979	129	84	51	47	37	28	19	16	13	10	8
1980	135	134	118	94	72	41	23	21	20	13	9
1981	68	45	36	13	6	0	0	0	0	0	0
1982	136	133	119	115	107	97	82	68	51	42	41
1983	150	149	149	148	132	131	131	129	123	111	100
1984	147	136	107	71	46	32	24	15	7	0	0
1985	74	50	36	22	2	0	0	0	0	0	0
1986	136	122	96	63	53	39	25	21	16	10	5
1987	39	19	0	0	0	0	0	0	0	0	0
1988	25	12	0	0	0	0	0	0	0	0	0
1989	104	82	45	23	4	0	0	0	0	0	0
1990	38	16	0	0	0	0	0	0	0	0	0
1991	73	49	32	22	16	2	0	0	0	0	0
1992	43	26	1	0	0	0	0	0	0	0	0
1993	111	89	76	62	37	12	7	0	0	0	0
1994	46	30	10	2	0	0	0	0	0	0	0
1995	120	108	93	81	73	58	41	30	22	16	12
1996	143	132	121	107	67	48	33	20	17	7	4
1997	138	119	105	82	47	37	26	26	26	26	26
1998	132	126	106	93	84	74	64	42	31	22	20
1999	143	132	120	94	75	55	29	19	17	12	5
2000	139	121	84	55	37	27	13	7	3	0	0
2001	60	50	40	30	24	8	0	0	0	0	0
2002	81	62	49	28	13	3	0	0	0	0	0
2003	83	46	37	32	28	23	20	18	14	12	10
2004	88	68	34	17	7	0	0	0	0	0	0
2005	122	94	68	60	39	30	26	22	19	16	15
2006	147	141	141	141	122	116	105	87	76	60	52
2007	50	18	3	0	0	0	0	0	0	0	0
2008	70	43	19	11	8	7	5	1	0	0	0
2009	114	59	51	39	30	23	15	9	2	0	0
2010	87	72	66	51	34	27	13	11	9	8	6
2011	116	113	99	71	44	24	18	17	16	14	12
2012	40	32	20	13	9	7	4	0	0	0	0
Total number of days greater than threshold flow	3,967	3,125	2,443	1,935	1,431	1,072	797	634	516	393	332
Number of years flows NOT achieved for threshold period	0	1	5	7	8	13	18	20	21	25	26

Table 8. La Grange Consecutive 7 Day Flow Count

	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	3	3	2	1	1	0	0	0	0	0
1972	2	2	2	1	0	0	0	0	0	0	0
1973	3	1	1	1	2	1	1	1	2	1	1
1974	2	2	2	2	2	0	0	0	0	0	0
1975	2	1	1	1	1	2	1	1	1	0	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	3	5	2	1	1	2	1	1	1	0	0
1979	3	3	1	1	2	1	1	1	1	1	1
1980	2	2	5	5	3	1	1	1	1	1	1
1981	2	2	2	1	0	0	0	0	0	0	0
1982	2	3	3	4	5	6	3	2	1	1	1
1983	2	3	6	7	7	5	5	6	6	5	4
1984	2	3	3	4	3	3	3	3	3	2	1
1985	2	2	3	2	0	0	0	0	0	0	0
1986	1	3	4	3	3	3	2	2	1	0	0
1987	1	2	0	0	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	2	4	3	2	0	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	3	1	1	1	1	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	2	2	2	2	1	1	0	0	0	0
1994	2	3	0	0	0	0	0	0	0	0	0
1995	1	2	3	2	3	3	4	4	3	2	1
1996	1	2	2	2	4	2	3	2	2	0	0
1997	2	2	3	2	2	1	1	2	2	2	2
1998	2	2	3	3	2	2	5	4	3	3	2
1999	1	2	3	3	3	3	2	2	2	0	0
2000	1	2	5	3	2	2	1	1	0	0	0
2001	2	2	1	1	1	1	0	0	0	0	0
2002	1	2	2	2	1	0	0	0	0	0	0
2003	2	1	1	1	1	1	1	1	1	1	1
2004	2	3	3	2	1	0	0	0	0	0	0
2005	2	3	2	1	1	1	1	1	1	1	1
2006	3	3	2	2	2	4	5	4	3	3	3
2007	4	1	0	0	0	0	0	0	0	0	0
2008	1	2	1	1	1	1	0	0	0	0	0
2009	3	2	1	1	1	1	1	1	0	0	0
2010	2	1	2	3	1	1	1	1	1	1	0
2011	2	2	4	4	4	2	1	1	1	1	1
2012	1	1	1	1	1	1	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	76	86	83	74	64	52	45	42	36	25	20
Number of years flows NOT achieved for threshold period	1	1	8	8	12	16	20	21	23	28	29

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	3	3	2	1	1	0	0	0	0	0
1972	2	2	2	1	0	0	0	0	0	0	0
1973	3	1	1	1	2	1	1	1	2	1	1
1974	2	2	2	2	2	0	0	0	0	0	0
1975	2	1	1	1	1	2	1	1	1	0	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	3	5	2	1	1	2	1	1	1	0	0
1979	3	3	1	1	2	1	1	1	1	1	1
1980	1	1	4	5	3	1	1	1	1	1	1
1981	2	2	2	1	0	0	0	0	0	0	0
1982	1	3	3	3	4	5	3	2	1	1	1
1983	1	2	2	3	4	4	4	3	5	4	4
1984	2	3	2	3	2	1	1	1	1	0	0
1985	2	2	3	2	0	0	0	0	0	0	0
1986	1	3	4	3	3	3	2	2	1	0	0
1987	1	2	0	0	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	2	4	3	2	0	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	3	1	1	1	1	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	2	2	2	2	1	1	0	0	0	0
1994	2	3	0	0	0	0	0	0	0	0	0
1995	1	2	3	2	3	3	4	3	1	1	0
1996	1	2	2	2	4	2	3	2	2	0	0
1997	2	2	3	2	2	1	1	1	1	1	1
1998	2	2	3	3	2	2	4	3	2	2	2
1999	1	2	3	3	3	3	2	2	2	0	0
2000	1	2	5	3	2	2	1	1	0	0	0
2001	2	2	1	1	1	1	0	0	0	0	0
2002	1	2	2	2	1	0	0	0	0	0	0
2003	2	1	1	1	1	1	1	1	1	1	1
2004	2	3	3	2	1	0	0	0	0	0	0
2005	2	3	2	1	1	1	1	1	1	1	1
2006	2	2	2	2	2	4	5	4	3	3	3
2007	4	1	0	0	0	0	0	0	0	0	0
2008	1	2	1	1	1	1	0	0	0	0	0
2009	3	2	1	1	1	1	1	1	0	0	0
2010	2	1	2	3	1	1	1	1	1	1	0
2011	1	1	3	3	3	1	1	1	1	1	1
2012	1	1	1	1	1	1	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	71	82	76	67	58	47	41	34	29	19	17
Number of years flows NOT achieved for threshold period	1	1	8	8	12	16	20	21	23	29	31

Table 10. La Grange Consecutive 14 Day Flow Count

	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	1	2	2	1	0	0	0	0	0	0
1972	2	2	2	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	1	1	0	0	0
1974	1	2	2	1	1	0	0	0	0	0	0
1975	1	1	1	1	1	1	1	1	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	1	1	0	0	0	0
1979	3	1	1	1	1	1	1	1	0	0	0
1980	2	1	3	3	2	1	1	1	1	0	0
1981	1	2	1	0	0	0	0	0	0	0	0
1982	1	3	2	3	4	4	1	1	1	1	1
1983	1	2	4	5	4	4	4	3	3	3	3
1984	2	3	3	4	3	3	3	2	1	1	1
1985	1	2	0	0	0	0	0	0	0	0	0
1986	1	3	3	1	1	1	0	0	0	0	0
1987	1	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	2	2	1	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	1	0	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	2	1	2	1	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	2	2	2	3	1	1	2	1	1	1
1996	1	1	2	1	1	1	1	0	0	0	0
1997	2	2	2	2	1	1	1	2	2	2	2
1998	2	2	2	2	2	2	3	1	1	1	1
1999	1	2	3	2	2	2	1	0	0	0	0
2000	1	2	2	2	2	0	0	0	0	0	0
2001	2	1	1	1	1	0	0	0	0	0	0
2002	1	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	0	0
2004	2	2	1	0	0	0	0	0	0	0	0
2005	1	2	1	1	1	1	1	1	1	1	1
2006	3	3	2	2	2	3	2	1	1	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	1	1	1	0	0	0	0	0	0	0	0
2009	3	1	1	1	1	1	1	0	0	0	0
2010	1	1	2	1	1	1	0	0	0	0	0
2011	2	2	4	4	2	1	1	1	1	1	0
2012	1	1	1	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	57	59	59	48	41	32	26	19	14	12	11
Number of years flows NOT achieved for threshold period	1	7	9	16	17	22	24	28	31	33	34

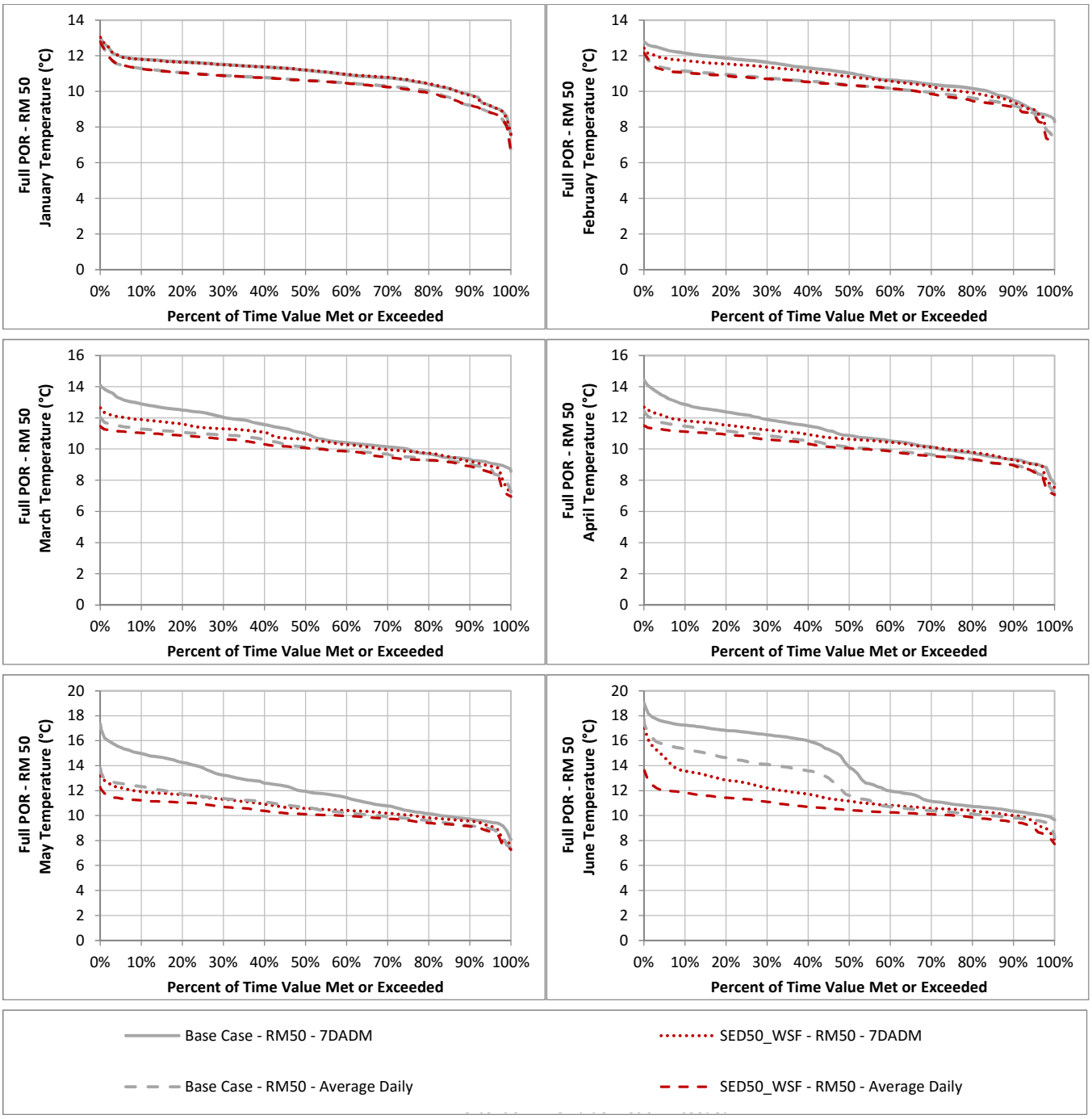
Table 11. February through June La Grange Consecutive 14 Day Flow Count

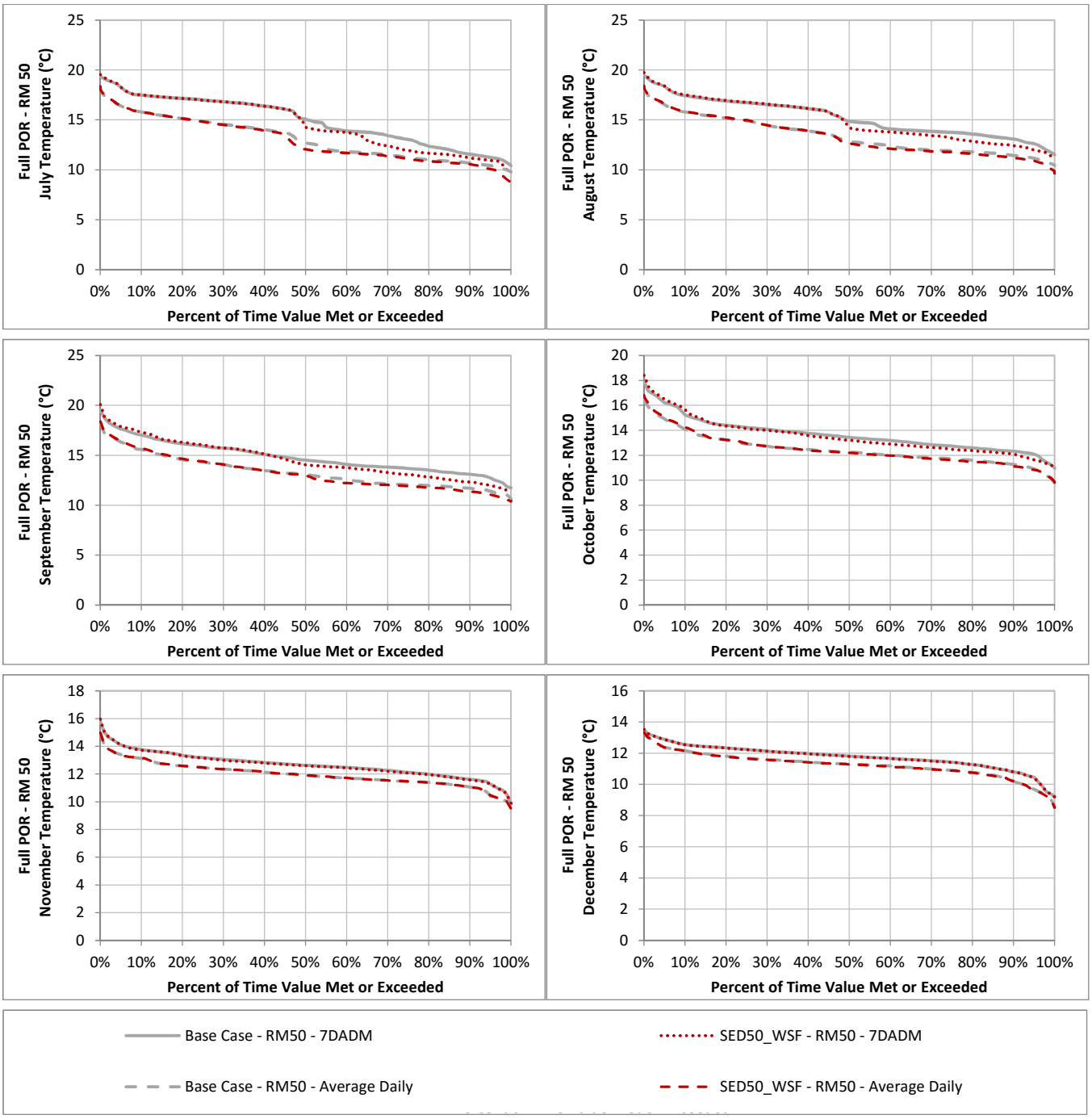
	SED50_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	1	2	2	1	0	0	0	0	0	0
1972	2	2	2	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	1	1	0	0	0
1974	1	2	2	1	1	0	0	0	0	0	0
1975	1	1	1	1	1	1	1	1	0	0	0
1976	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	1	1	0	0	0	0
1979	3	1	1	1	1	1	1	1	0	0	0
1980	1	1	3	3	2	1	1	1	1	0	0
1981	1	2	1	0	0	0	0	0	0	0	0
1982	1	3	2	2	3	4	1	1	1	1	1
1983	1	1	1	2	3	3	3	3	3	3	3
1984	2	3	2	3	2	1	1	0	0	0	0
1985	1	2	0	0	0	0	0	0	0	0	0
1986	1	3	3	1	1	1	0	0	0	0	0
1987	1	0	0	0	0	0	0	0	0	0	0
1988	1	0	0	0	0	0	0	0	0	0	0
1989	2	2	1	0	0	0	0	0	0	0	0
1990	1	0	0	0	0	0	0	0	0	0	0
1991	1	1	1	1	0	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	2	1	2	1	0	0	0	0	0	0
1994	1	0	0	0	0	0	0	0	0	0	0
1995	1	2	2	2	3	1	0	0	0	0	0
1996	1	1	2	1	1	1	1	0	0	0	0
1997	2	2	2	2	1	1	1	1	1	1	1
1998	2	2	2	2	2	2	2	1	1	1	0
1999	1	2	3	2	2	2	1	0	0	0	0
2000	1	2	2	2	2	0	0	0	0	0	0
2001	2	1	1	1	1	0	0	0	0	0	0
2002	1	2	2	0	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	0	0
2004	2	2	1	0	0	0	0	0	0	0	0
2005	1	2	1	1	1	1	1	1	1	1	1
2006	2	2	2	2	2	3	2	1	1	1	1
2007	1	0	0	0	0	0	0	0	0	0	0
2008	1	1	1	0	0	0	0	0	0	0	0
2009	3	1	1	1	1	1	1	0	0	0	0
2010	1	1	2	1	1	1	0	0	0	0	0
2011	1	1	3	3	1	1	1	1	1	1	0
2012	1	1	1	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	54	56	54	42	37	29	21	14	11	9	7
Number of years flows NOT achieved for threshold period	1	7	9	16	17	22	25	30	33	35	37

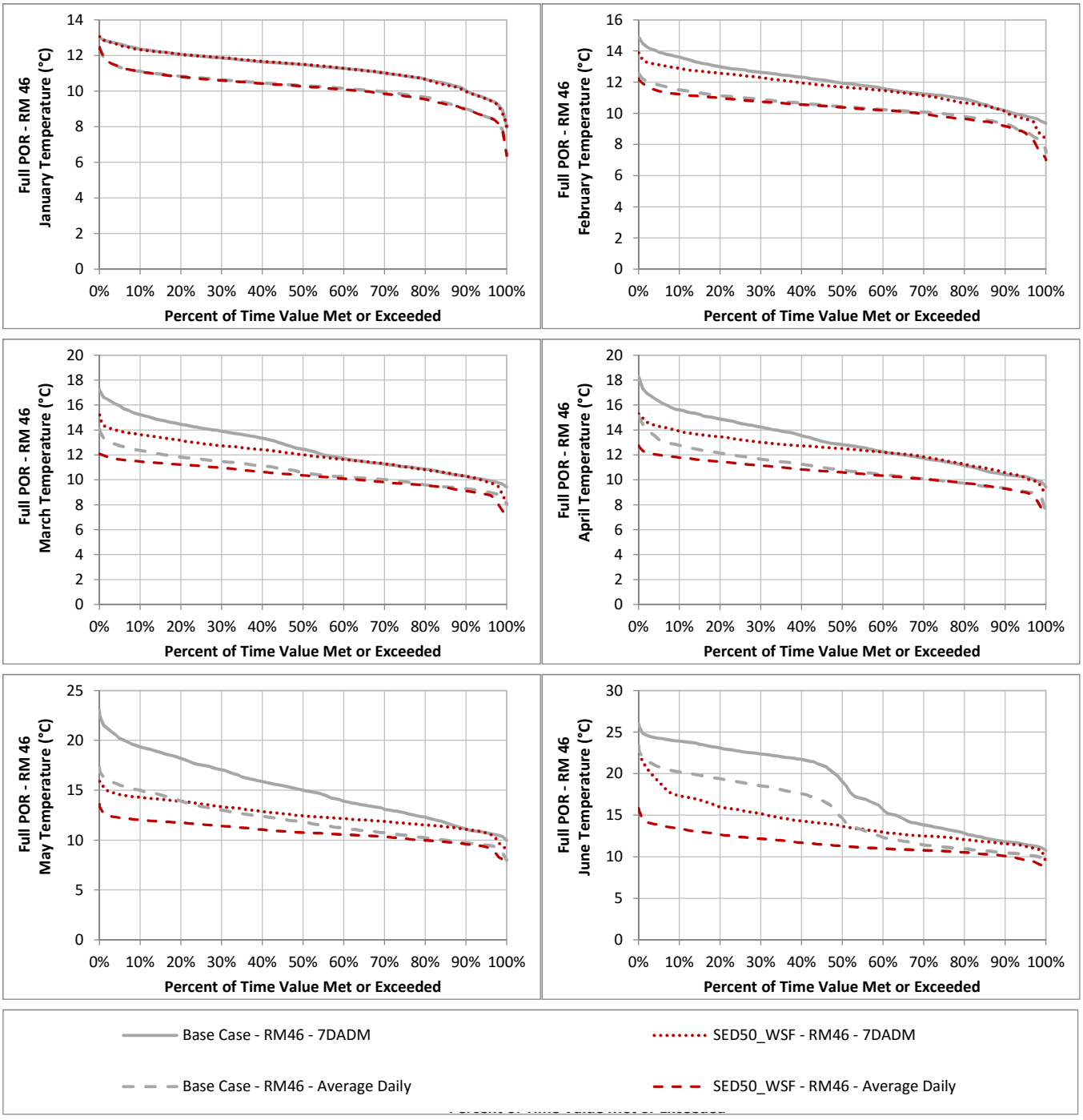
SED50_WSF

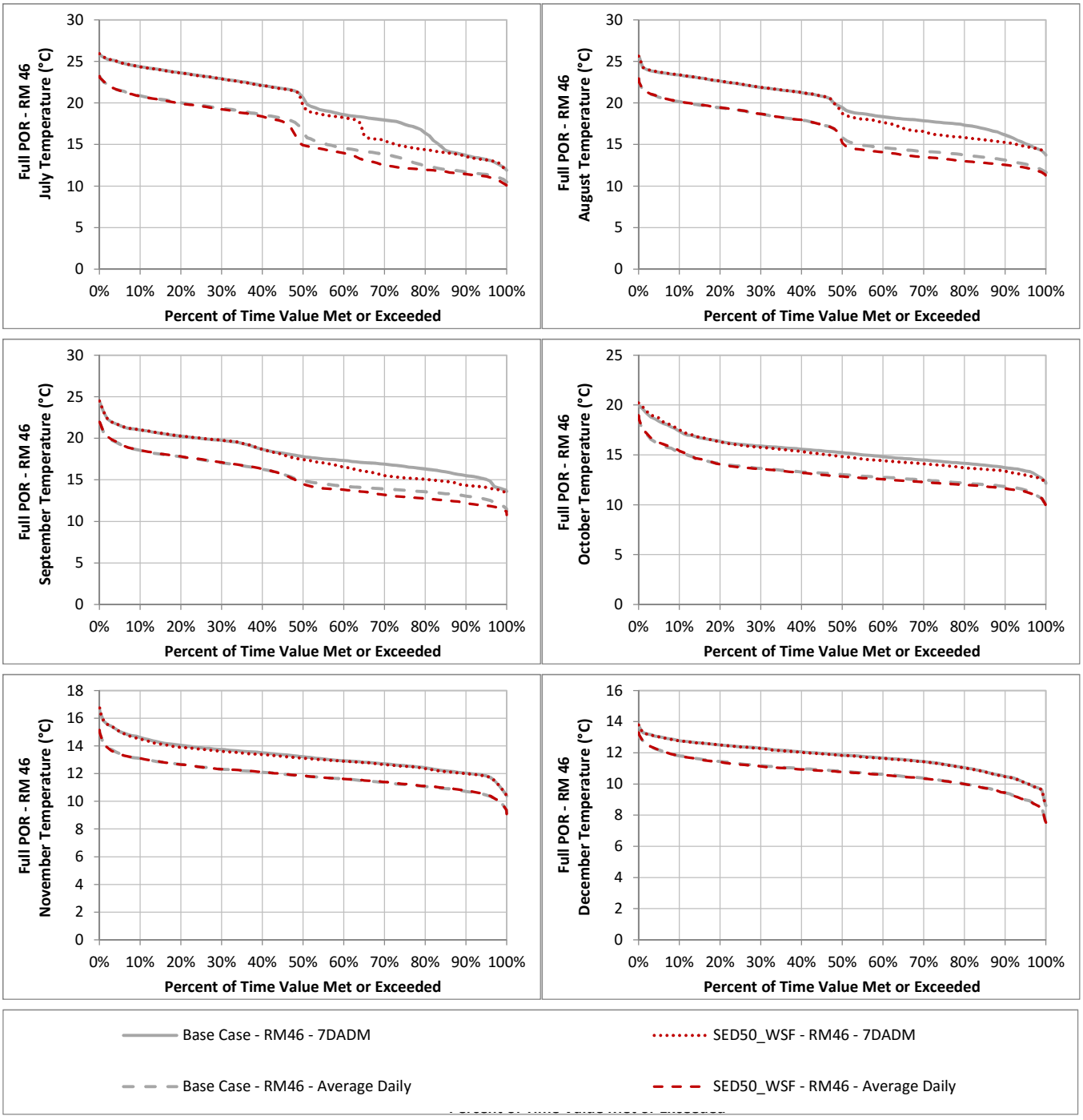
Dynamic Routing

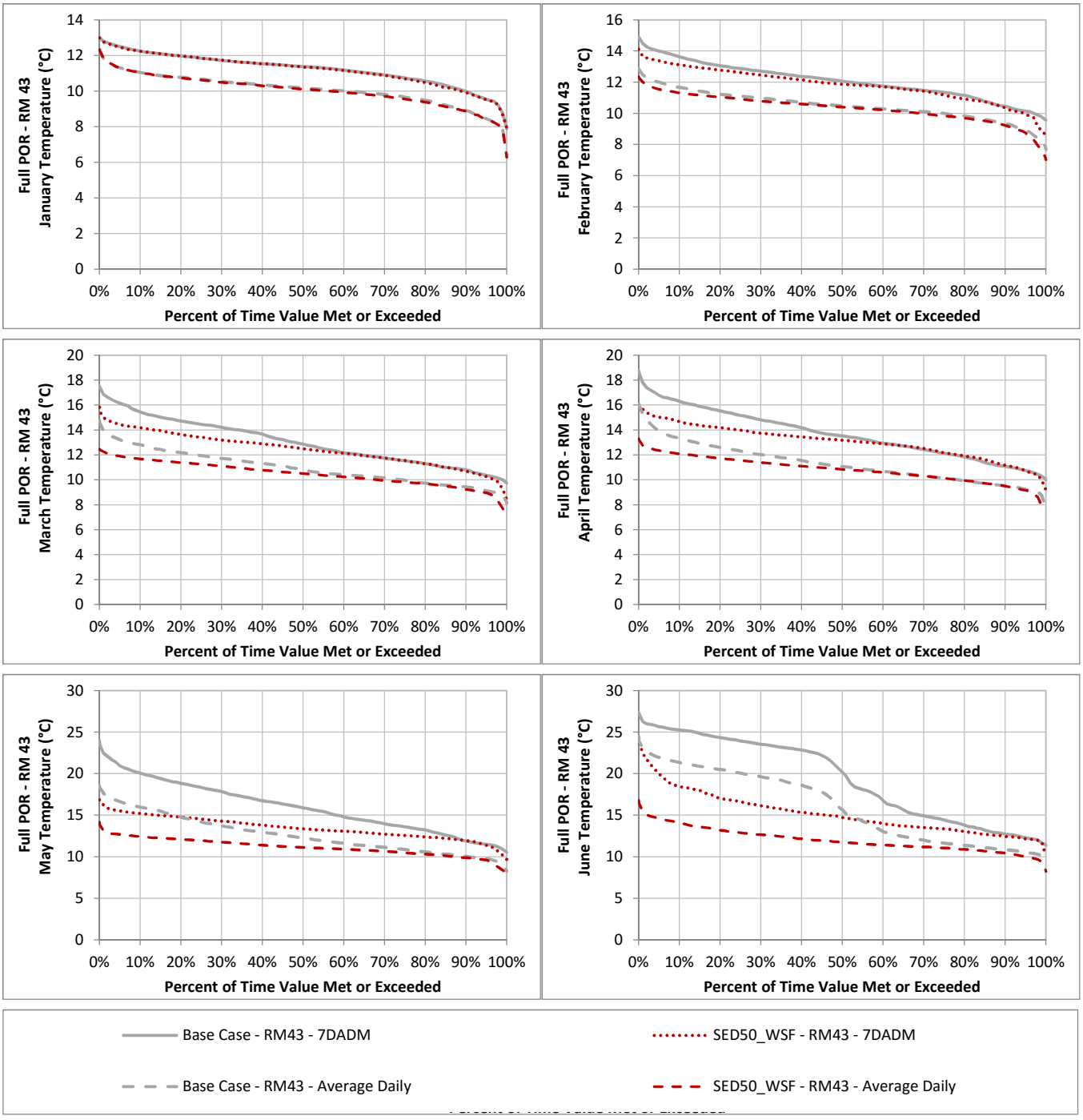
Results Summary

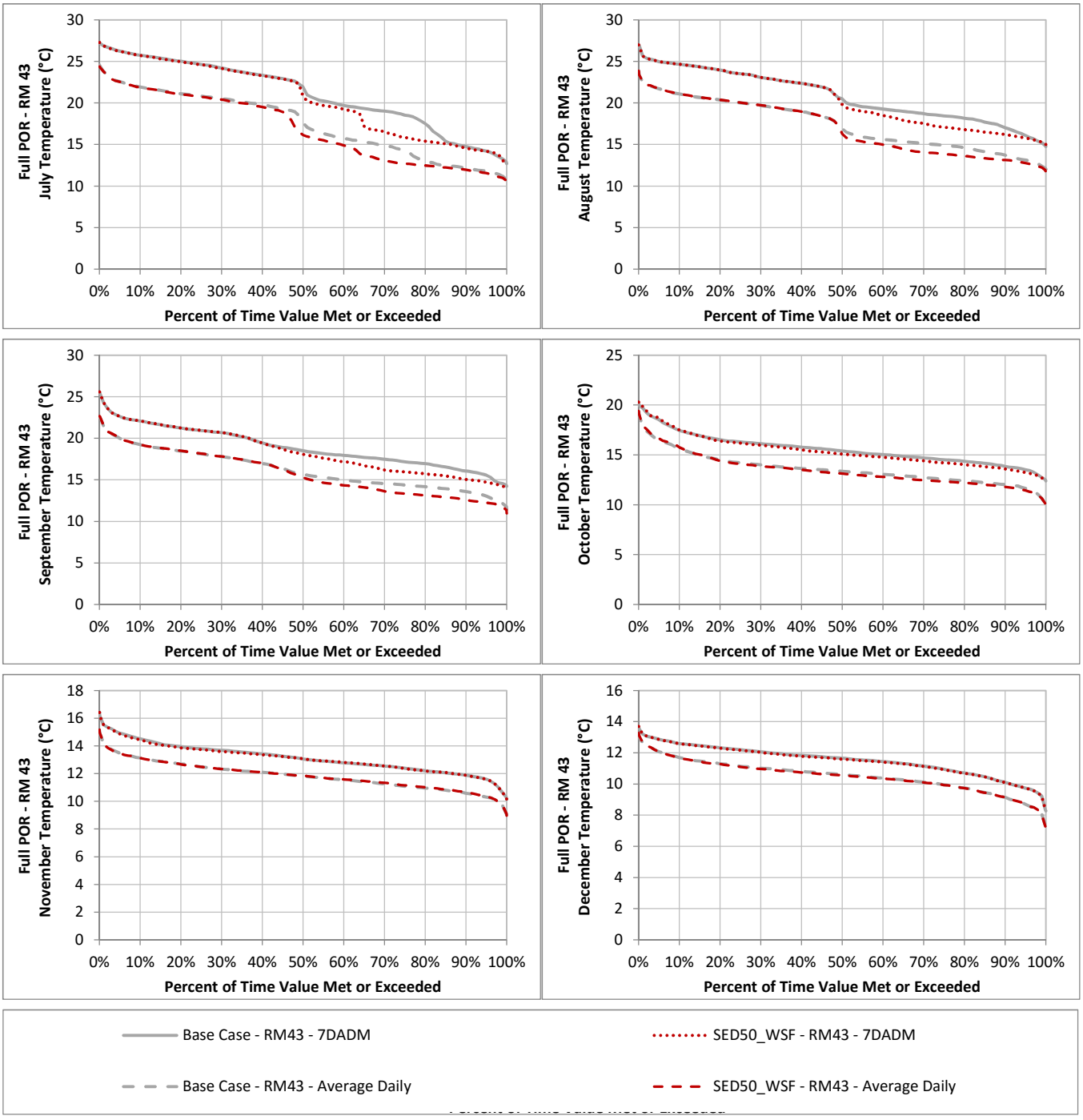

Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM50 - 7DADM
SED50_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED50_WSF - RM50 - Average Daily

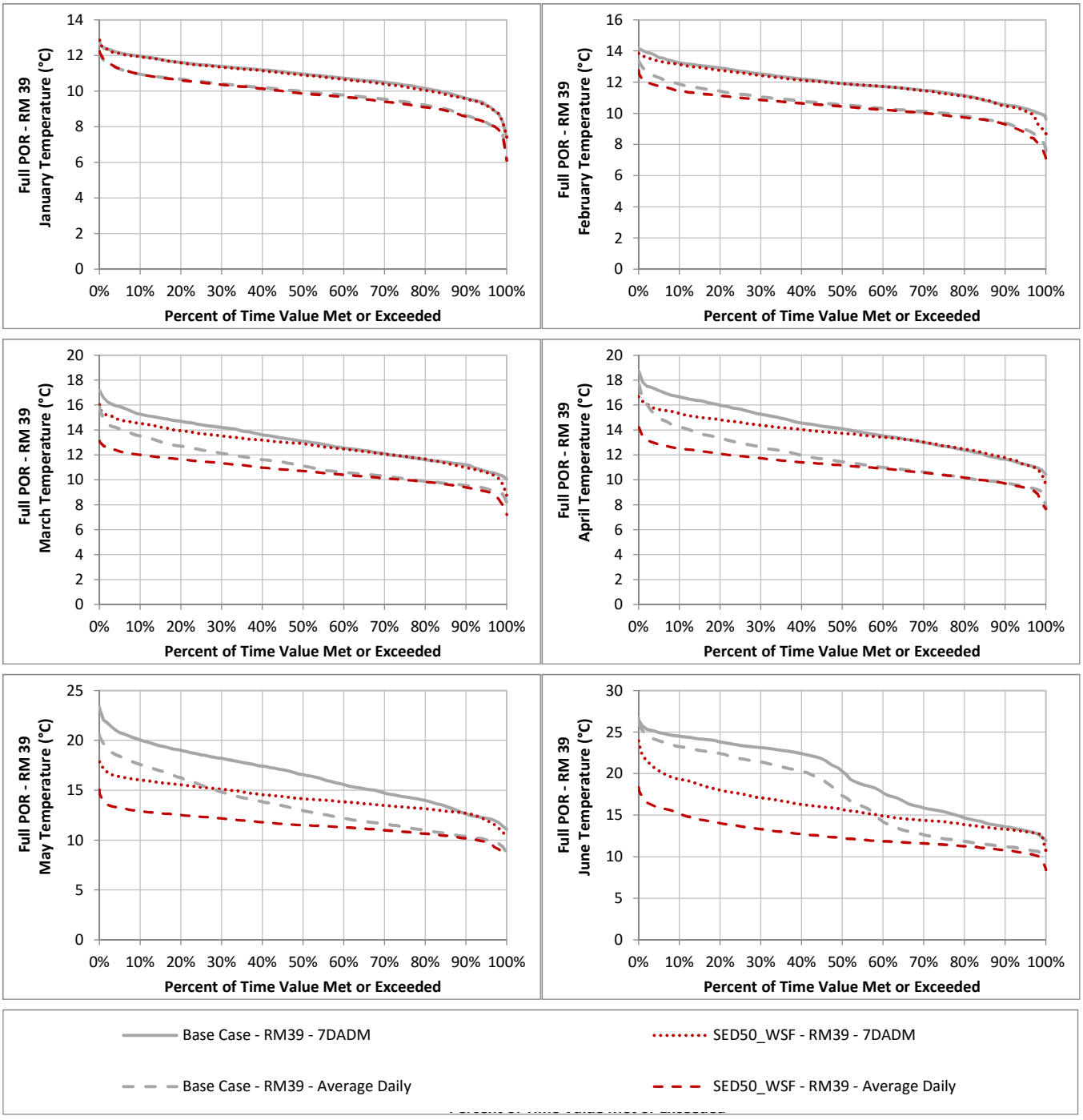

Full POR - RM 50 July Temperature (°C)
Full POR - RM 50 August Temperature (°C)
Full POR - RM 50 September Temperature (°C)
Full POR - RM 50 October Temperature (°C)
Full POR - RM 50 November Temperature (°C)
Full POR - RM 50 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
SED50_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED50_WSF - RM50 - Average Daily

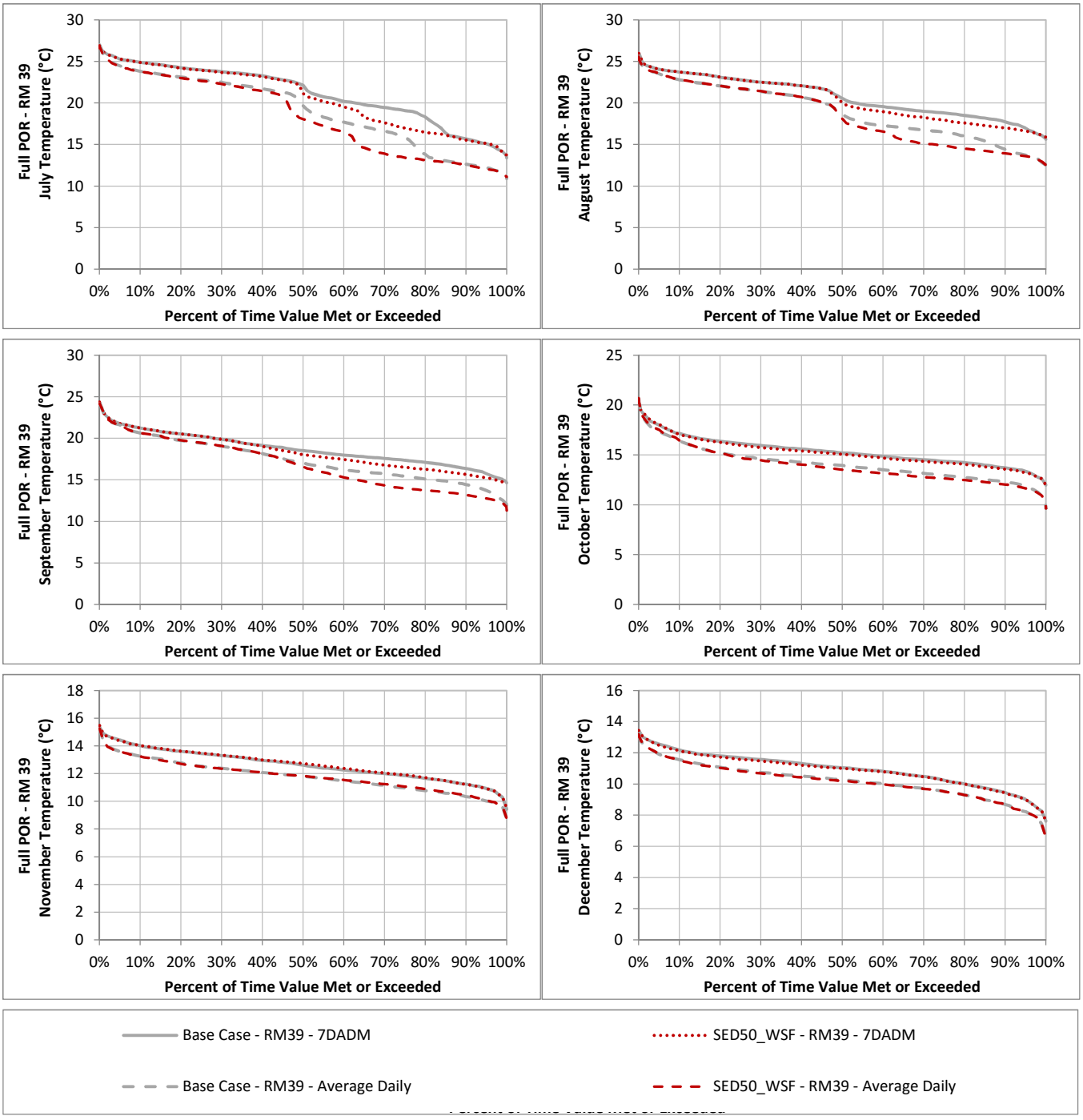

Full POR - RM 46 January Temperature (°C)
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED50_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED50_WSF - RM46 - Average Daily

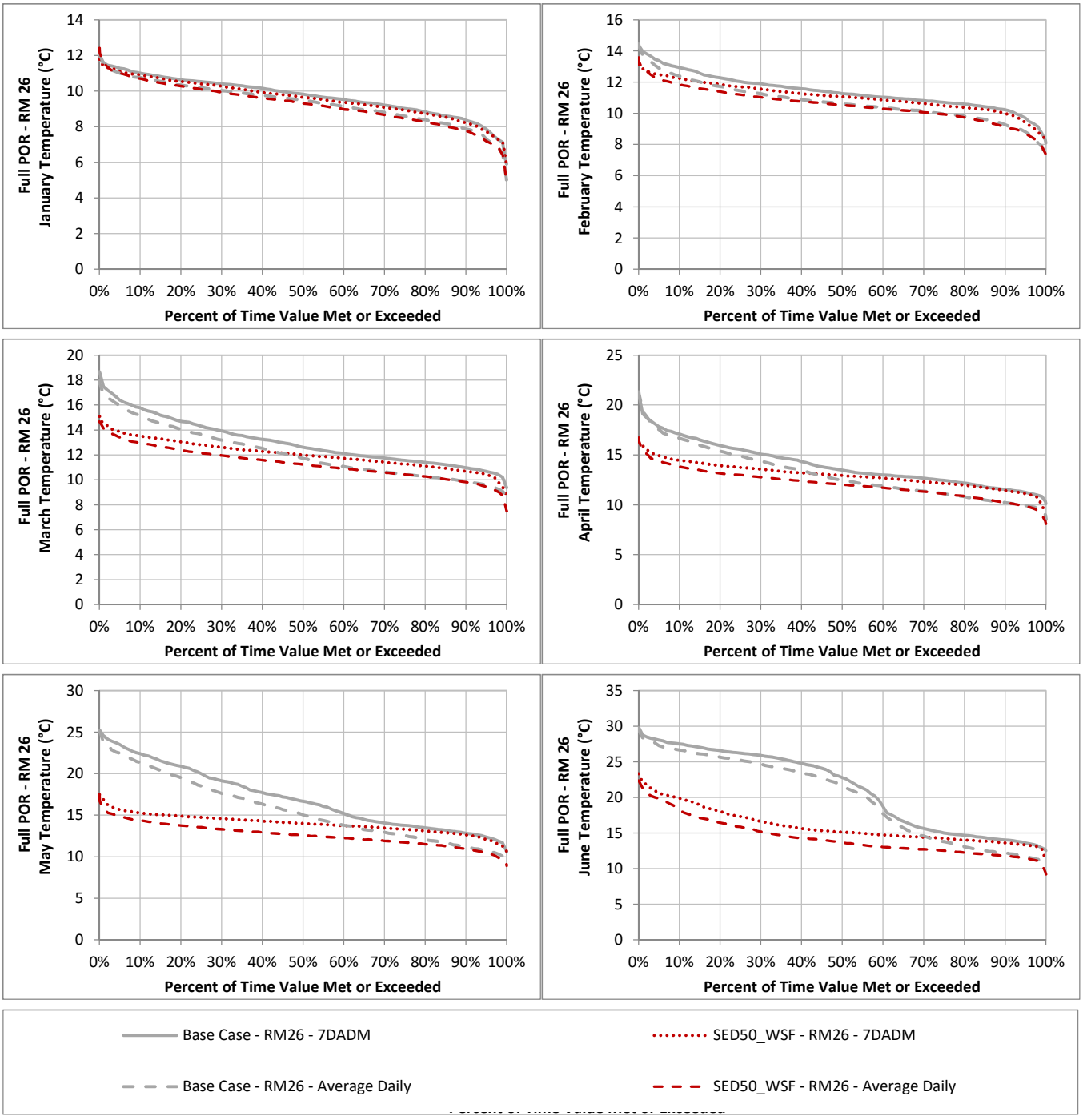

Full POR - RM 46 July Temperature (°C)
Full POR - RM 46 August Temperature (°C)
Full POR - RM 46 September Temperature (°C)
Full POR - RM 46 October Temperature (°C)
Full POR - RM 46 November Temperature (°C)
Full POR - RM 46 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED50_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED50_WSF - RM46 - Average Daily

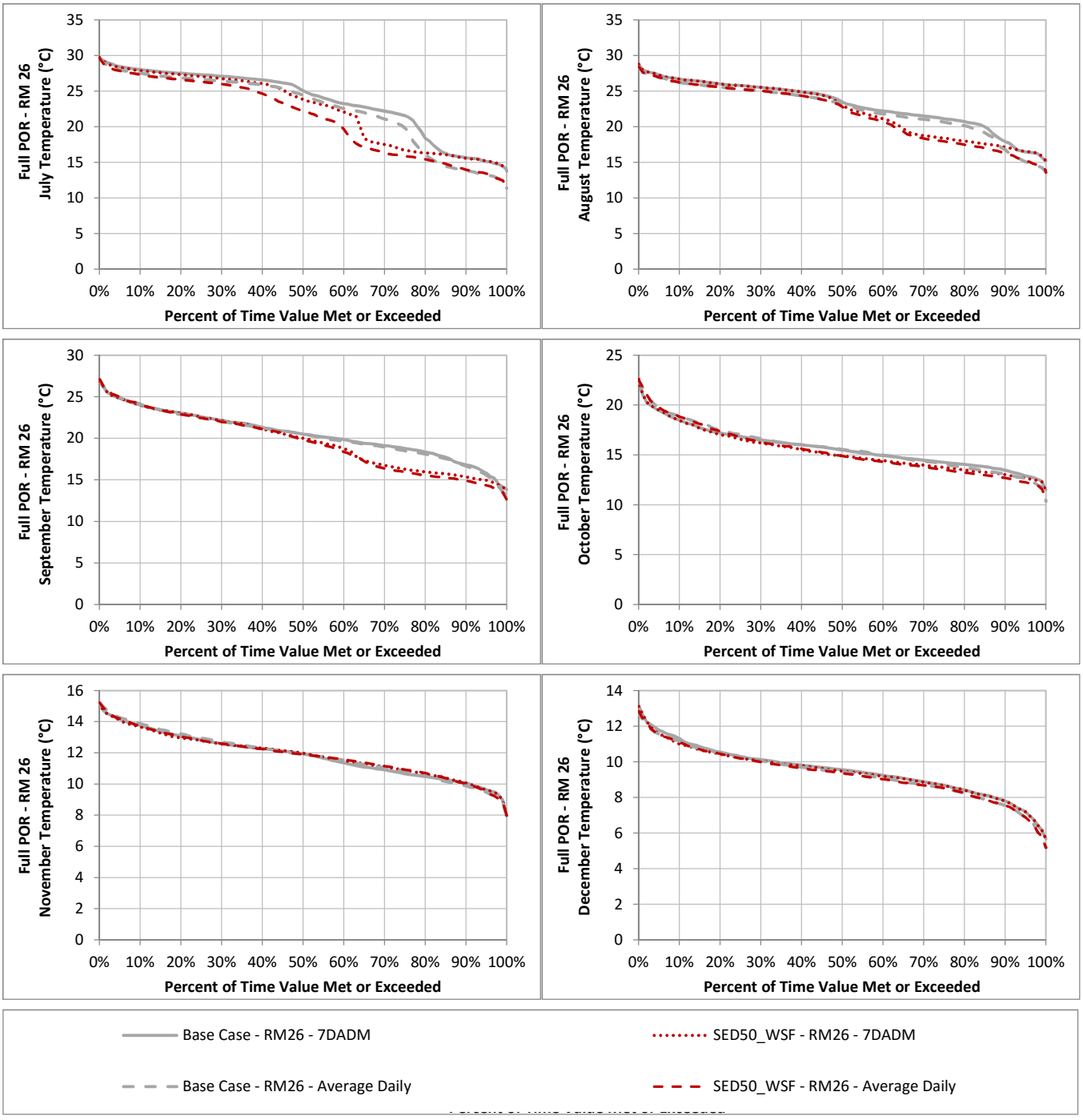

Full POR - RM 43 January Temperature (°C)
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED50_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED50_WSF - RM43 - Average Daily

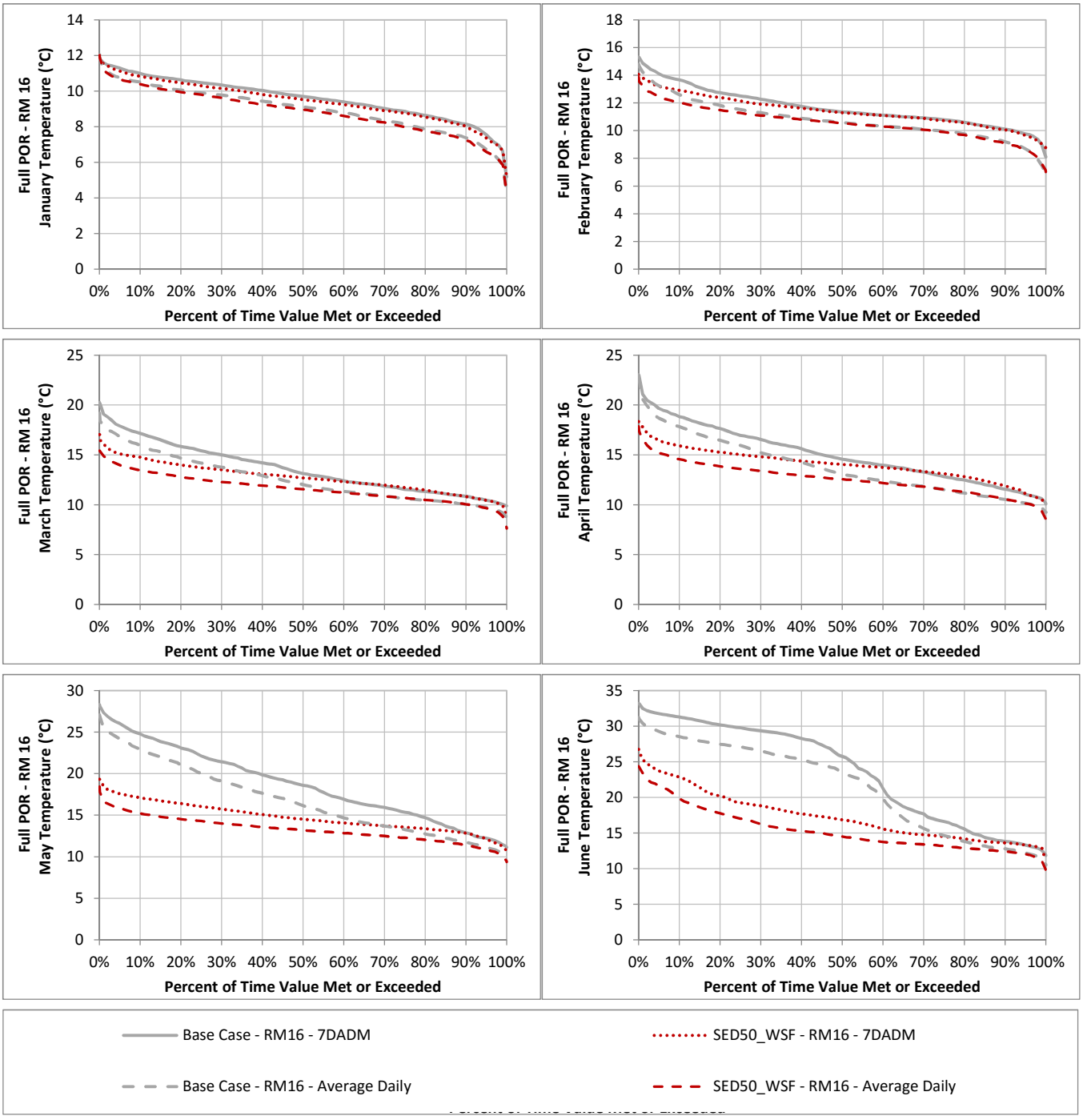

Full POR - RM 43
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED50_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED50_WSF - RM43 - Average Daily

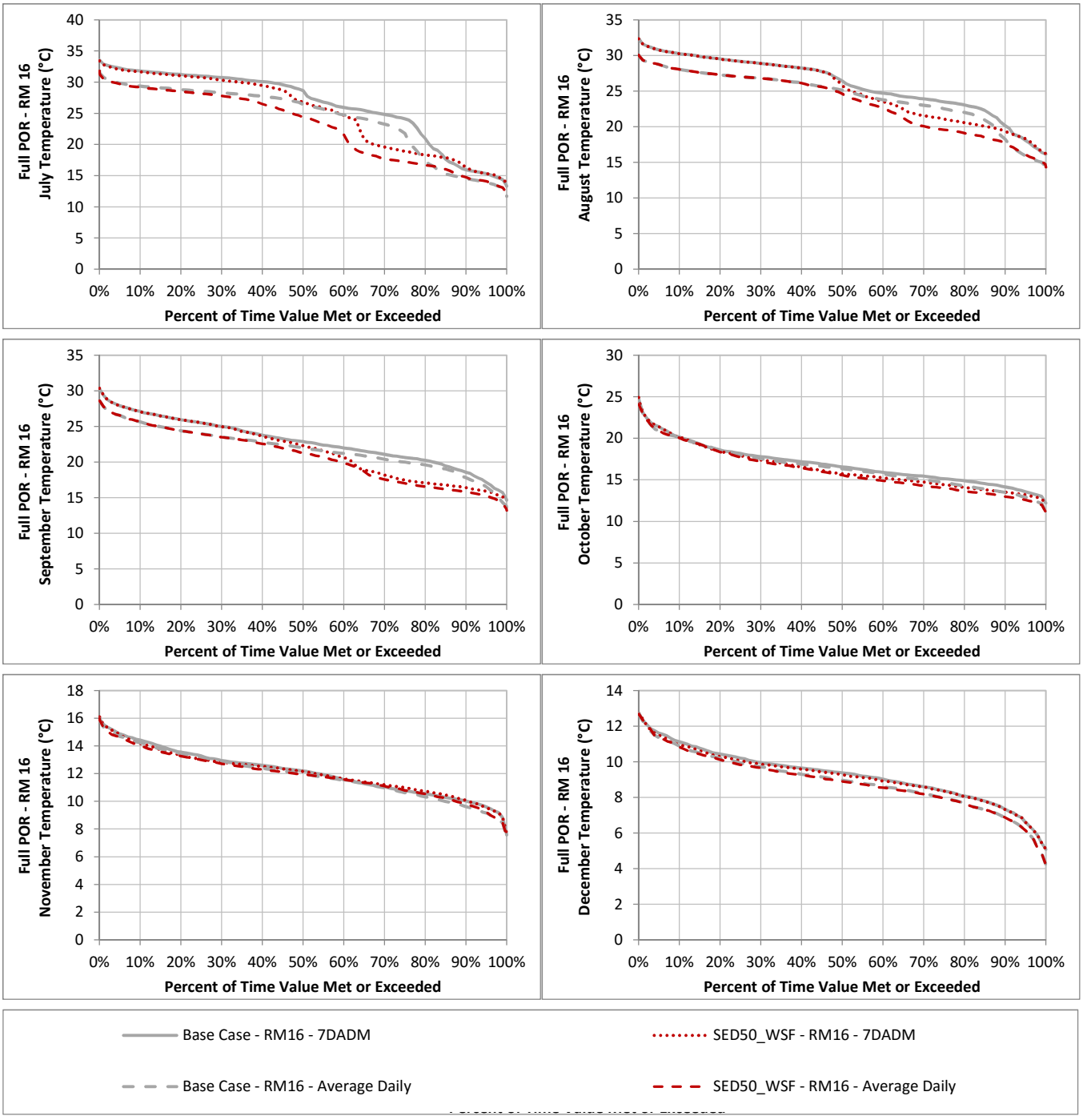

Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED50_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED50_WSF - RM39 - Average Daily

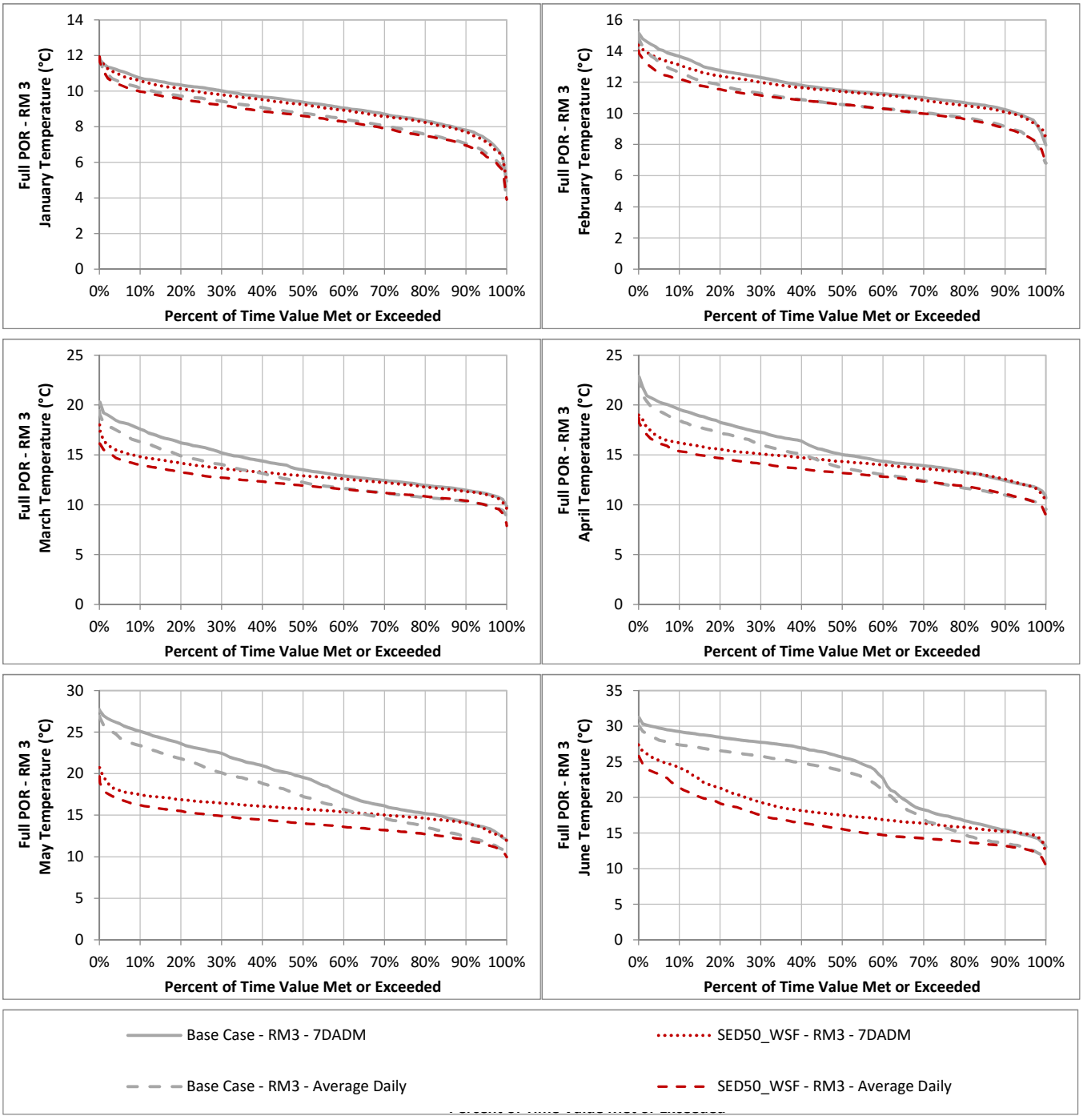

Full POR - RM 39 July Temperature (°C)
Full POR - RM 39 August Temperature (°C)
Full POR - RM 39 September Temperature (°C)
Full POR - RM 39 October Temperature (°C)
Full POR - RM 39 November Temperature (°C)
Full POR - RM 39 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED50_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED50_WSF - RM39 - Average Daily

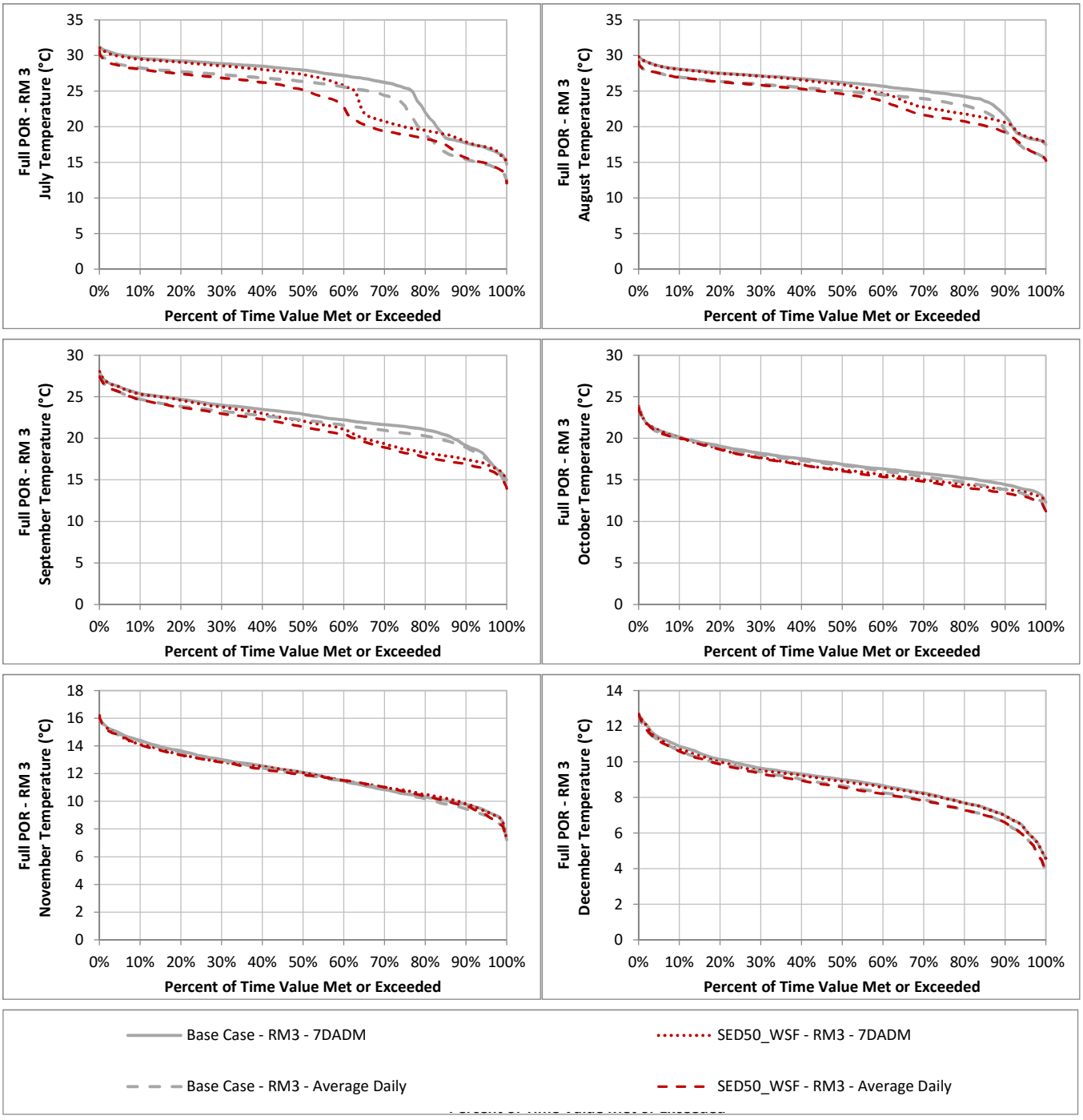

Full POR - RM 26 January Temperature (°C)
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED50_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED50_WSF - RM26 - Average Daily


Full POR - RM 26 July Temperature (°C)
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED50_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED50_WSF - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED50_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED50_WSF - RM16 - Average Daily


Full POR - RM 16
July Temperature (°C)
Full POR - RM 16
August Temperature (°C)
Full POR - RM 16
September Temperature (°C)
Full POR - RM 16
October Temperature (°C)
Full POR - RM 16
November Temperature (°C)
Full POR - RM 16
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED50_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED50_WSF - RM16 - Average Daily


Full POR - RM 3 January Temperature (°C)
Full POR - RM 3 February Temperature (°C)
Full POR - RM 3 March Temperature (°C)
Full POR - RM 3 April Temperature (°C)
Full POR - RM 3 May Temperature (°C)
Full POR - RM 3 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED50_WSF - RM3 - 7DADM
SED50_WSF - RM3 - Average Daily


Full POR - RM 3
July Temperature (°C)
Full POR - RM 3
August Temperature (°C)
Full POR - RM 3
September Temperature (°C)
Full POR - RM 3
October Temperature (°C)
Full POR - RM 3
November Temperature (°C)
Full POR - RM 3
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
SED50_WSF - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED50_WSF - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–6

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE 60% FEBRUARY THROUGH JUNE UNIMPAIRED FLOW (UIF)

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

SED60_WSF is the designation for a simulation of an alternative Don Pedro Project operations scenario identified by the SWB in the 2016 SED as the preferred option to protect the SJR and Delta if protection of fish were the only consideration. The "WSF" in the simulation name indicates that the Districts' normal reservoir operation rules are modeled which represent Don Pedro operational rules consistent with those implemented historically. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced to conserve water. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375 TAF, the amount of "buffer" storage retained in the reservoir historically and under the Base Case. The CCSF Hetch Hetchy system operations contribute 51.7 percent of the required releases greater than the current FERC license flows.

The minimum instream flows included in the SED60_WSF are always greater than or equal to the current FERC license flow requirements. Therefore the modeled minimum instream flows at La Grange gage are set to the greater of either the current FERC requirement or the following:

- 60% of the 7-day rolling average unimpaired inflow to Don Pedro Reservoir[1] for the period February through June, inclusive. The 7-day rolling average unimpaired inflow to La Grange is calculated for each day by averaging the current day with the previous 6 days. Unimpaired inflow is based on the Operations Model hydrologic dataset for the period of record 10/1/1970 – 9/30/2012.

- Maintenance of a minimum flow in the San Joaquin River (SJR) at Vernalis from February through June of 1,000 cfs. Additional flow is added to the minimum flow

[1]This is assumed to be the same as the calculated La Grange gage UIF. There are only minor intermittent drainages between La Grange gage and the upper end of Don Pedro Reservoir.

requirement at La Grange to support a minimum flow of 1,000 cfs at Vernalis from February through June. The amount added is calculated based on 47 percent (the Tuolumne River share) of the difference between 1,000 cfs and 60% of Vernalis unimpaired flow. Vernalis unimpaired flow is calculated as the sum of unimpaired flows from the Merced, Stanislaus, and Tuolumne rivers, plus the impaired flows from the Upper San Joaquin River.

- Although the SWB's draft SED states that the flow targets would apply at the Tuolumne River at Modesto gage, the Districts found the SWB's estimates of accretion to be outdated and over-optimistic, thereby understating the potential flows required to be released at Don Pedro Reservoir. In addition, the impracticality of continuously trying to predict what flows may occur at the Modesto gage given the travel time ranging between 20 and 30 hours from La Grange to Modesto, with unknown and varying imprecise accretion or depletion occurring in the intervening 52 miles of river, and with authorized and unauthorized riparian withdrawals occurring in this reach would mean the Districts would, in the end, have to provide the required flows at the La Grange gage as a guarantee of compliance. Therefore, the SED's target flows at Modesto are treated as target flows at La Grange.

SED60_WSF

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	SED60_WSF	% of Base Case
January	1,063,873	629,578	59%
February	1,722,819	1,507,893	88%
March	3,042,430	2,795,474	92%
April	3,481,703	3,430,568	99%
May	3,491,340	4,684,263	134%
June	3,434,821	4,104,737	120%
July	3,521,988	2,765,736	79%
August	2,710,847	2,145,120	79%
September	1,340,662	1,261,346	94%
October	918,413	924,759	101%
November	402,483	514,107	128%
December	613,223	421,519	69%
Total	25,744,602	25,185,098	98%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		SED60_WSF		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	477	29%	26%
87-92	Drought	5,198	4,590	88%	3,063	67%	59%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	607	63%	63%
1973	AN	865	865	100%	839	97%	97%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	266	29%	29%
1977	C	921	713	77%	211	30%	23%
1978	W	767	752	98%	724	96%	94%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	584	65%	65%
1986	W	839	839	100%	813	97%	97%
1987	C	895	895	100%	555	62%	62%
1988	C	855	759	89%	498	66%	58%
1989	C	846	744	88%	493	66%	58%
1990	C	876	771	88%	512	66%	58%
1991	C	881	774	88%	514	66%	58%
1992	C	844	647	77%	491	76%	58%
1993	W	823	807	98%	796	99%	97%
1994	C	835	835	100%	241	29%	29%
1995	W	774	774	100%	732	95%	95%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	548	63%	63%
2002	D	898	898	100%	538	60%	60%
2003	BN	885	885	100%	551	62%	62%
2004	D	940	940	100%	565	60%	60%
2005	W	874	874	100%	848	97%	97%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	564	61%	61%
2008	C	882	882	100%	534	61%	61%
2009	BN	903	903	100%	876	97%	97%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	693	82%	80%
Total		36,190	35,343	98%	29,126	82%	80%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			SED60_WSF	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	221	42%
87-92	C	1,600	1,502	94%	281	18%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	186	10%
1973	AN	267	219	100%	83	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	194	10%
1977	C	267	269	90%	27	5%
1978	W	267	205	100%	83	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	194	10%
1988	C	267	267	90%	32	5%
1989	C	267	250	90%	21	5%
1990	C	267	240	90%	15	5%
1991	C	267	243	90%	14	5%
1992	C	267	235	90%	5	5%
1993	W	267	211	100%	85	100%
1994	C	267	264	100%	179	5%
1995	W	267	189	100%	85	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	169	10%
2003	BN	267	234	100%	85	100%
2004	D	267	249	100%	166	5%
2005	W	267	193	100%	85	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	183	10%
2008	C	267	247	100%	5	10%
2009	BN	267	240	100%	84	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	157	59%
Total		11,197	9,676	86%	6,577	59%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

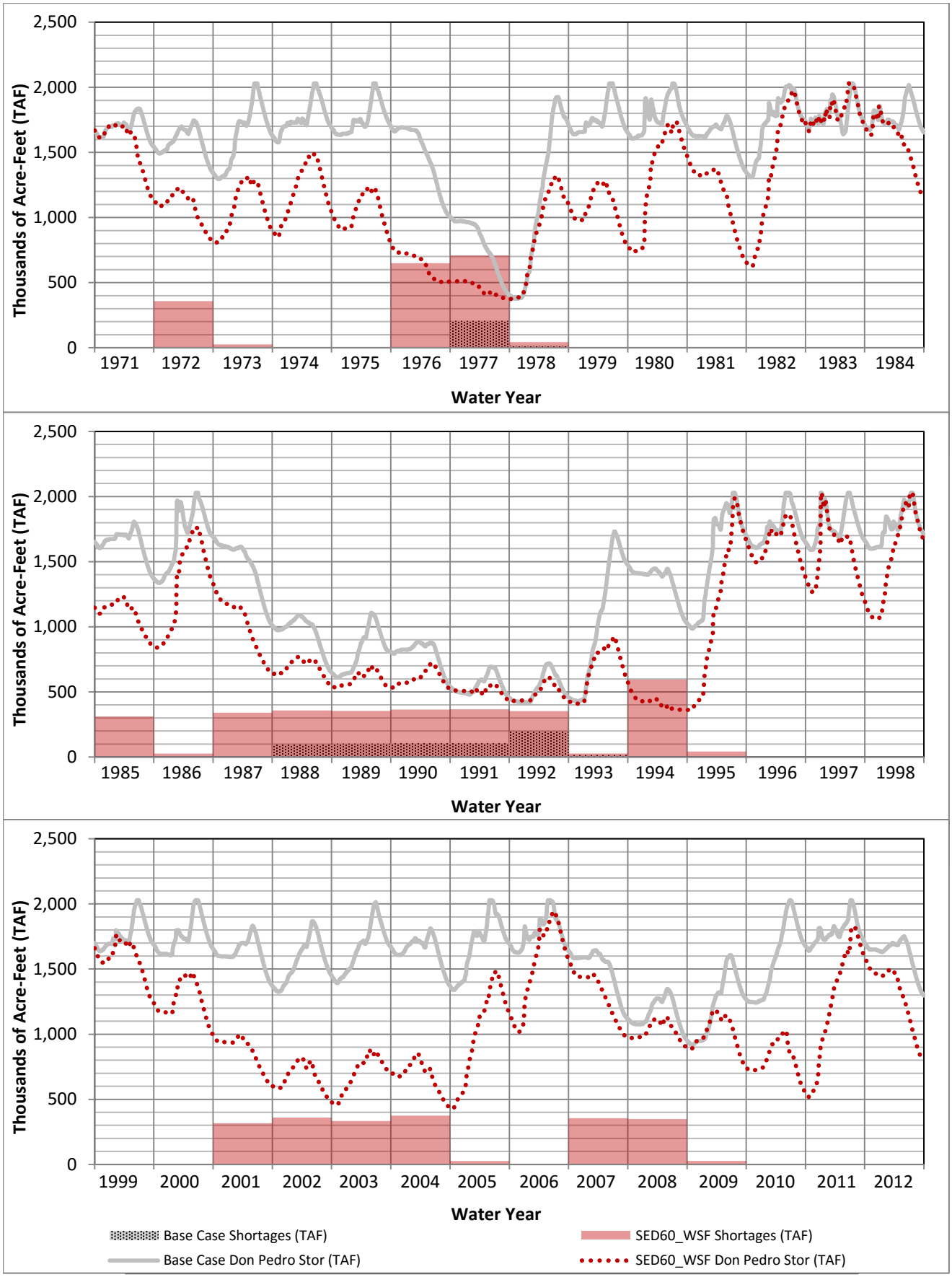


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

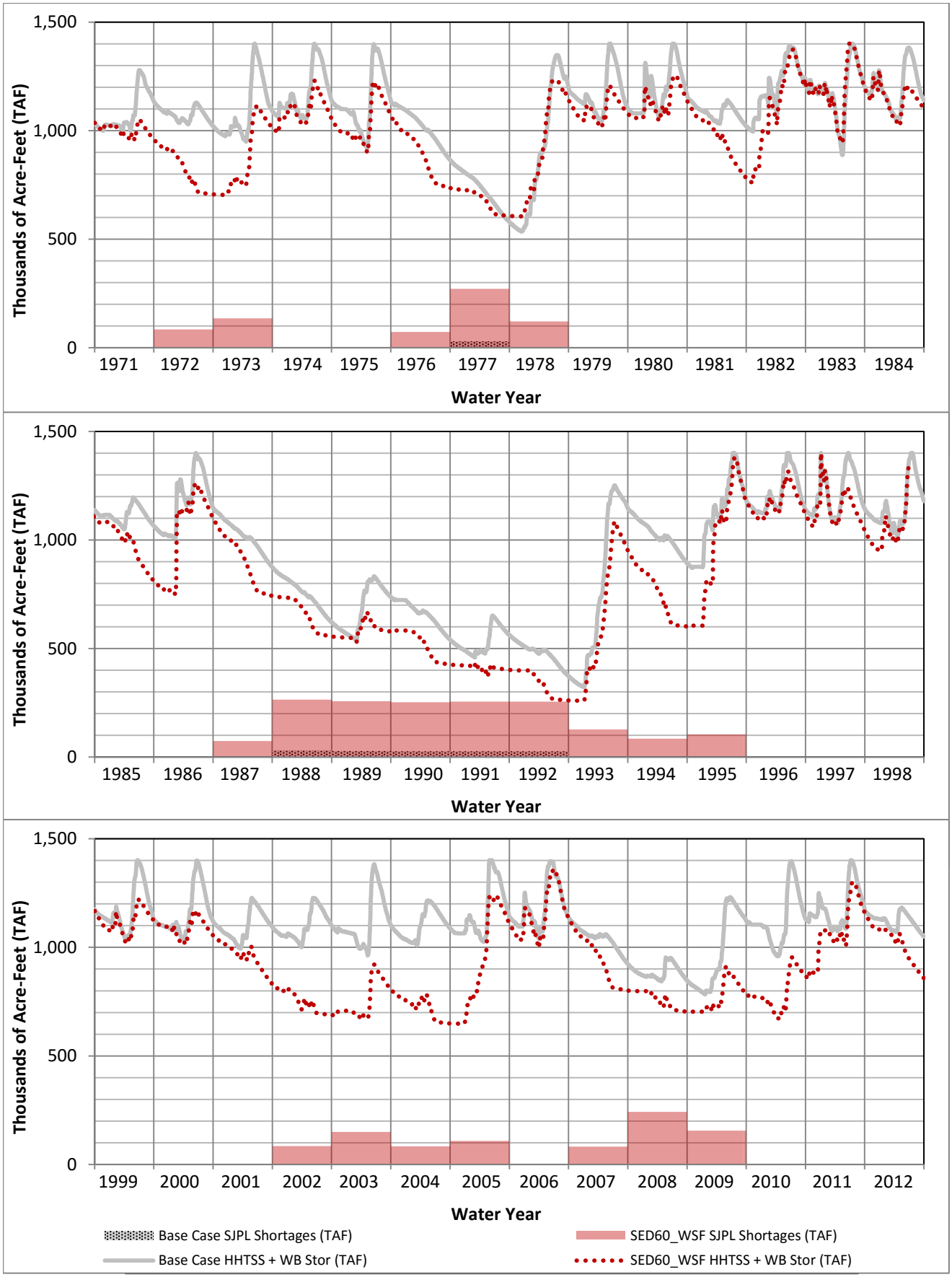


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		SED60_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	718	718	271%	258%
87-92	Drought	713	713	3,277	3,277	460%	460%
1971	BN	266	539	810	954	304%	177%
1972	D	138	151	640	640	463%	425%
1973	AN	237	613	1,079	1,075	456%	176%
1974	W	301	1,050	981	981	326%	93%
1975	W	301	887	1,154	1,154	384%	130%
1976	C	171	185	451	451	263%	244%
1977	C	94	94	268	268	285%	285%
1978	W	235	349	1,268	1,268	539%	363%
1979	AN	301	876	1,156	1,156	384%	132%
1980	W	302	1,818	1,193	1,180	396%	65%
1981	D	194	252	727	727	375%	289%
1982	W	250	2,275	1,574	1,602	629%	70%
1983	W	301	3,689	1,830	3,688	608%	100%
1984	AN	302	1,463	1,091	1,964	362%	134%
1985	D	205	340	679	679	332%	200%
1986	W	237	1,496	1,484	1,368	627%	91%
1987	C	179	179	539	539	301%	301%
1988	C	94	94	424	424	450%	450%
1989	C	116	116	751	751	648%	648%
1990	C	103	103	458	458	444%	444%
1991	C	116	116	650	650	562%	562%
1992	C	105	105	454	454	434%	434%
1993	W	235	235	1,146	1,146	487%	487%
1994	C	182	182	610	610	336%	336%
1995	W	237	2,098	1,506	1,657	636%	79%
1996	W	302	1,281	1,291	1,518	428%	118%
1997	W	301	1,954	1,064	2,158	354%	110%
1998	W	301	2,226	1,515	1,803	503%	81%
1999	AN	301	974	1,205	1,390	400%	143%
2000	AN	302	916	1,139	1,139	378%	124%
2001	D	193	233	677	677	351%	291%
2002	D	137	137	728	728	533%	533%
2003	BN	180	233	834	824	462%	355%
2004	D	141	355	715	715	506%	201%
2005	W	237	1,488	1,325	1,308	560%	88%
2006	W	301	2,270	1,632	1,807	542%	80%
2007	C	182	182	615	615	338%	338%
2008	C	119	119	640	640	537%	537%
2009	BN	156	156	885	885	568%	568%
2010	AN	249	349	979	975	393%	279%
2011	W	301	2,376	1,368	1,367	454%	58%
2012	D	192	213	620	620	323%	291%
Average (1971-2012)		216	828	956	1,072	442%	129%
Average (1980-2009)		210	903	979	1,137	466%	126%
Total (1971-2012)		9,092	34,765	40,150	45,012	442%	129%
Total (1980-2009)		6,306	27,083	29,378	34,103	466%	126%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		SED60_WSF			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	504	504	380%	380%
87-92	Drought	403	403	2,885	2,885	716%	716%
1971	BN	173	399	717	814	414%	204%
1972	D	84	96	586	586	697%	607%
1973	AN	154	515	996	993	645%	193%
1974	W	176	760	732	732	415%	96%
1975	W	176	728	823	823	467%	113%
1976	C	83	83	280	280	339%	339%
1977	C	50	50	223	223	449%	449%
1978	W	154	193	1,063	1,063	688%	551%
1979	AN	176	683	950	950	539%	139%
1980	W	177	1,205	943	931	534%	77%
1981	D	101	151	552	552	548%	367%
1982	W	159	1,862	1,358	1,315	855%	71%
1983	W	176	2,287	1,498	2,191	851%	96%
1984	AN	177	552	884	1,065	500%	193%
1985	D	112	247	586	586	525%	237%
1986	W	154	1,388	1,277	1,161	827%	84%
1987	C	91	91	369	369	407%	407%
1988	C	50	50	380	380	759%	759%
1989	C	72	72	707	707	985%	985%
1990	C	59	59	414	414	703%	703%
1991	C	72	72	606	606	847%	847%
1992	C	60	60	410	410	679%	679%
1993	W	154	154	941	941	609%	609%
1994	C	93	93	440	440	471%	471%
1995	W	154	1,482	1,299	1,258	841%	85%
1996	W	177	1,126	960	1,187	543%	105%
1997	W	176	859	733	1,206	416%	140%
1998	W	176	1,667	1,183	1,184	672%	71%
1999	AN	176	774	998	1,183	567%	153%
2000	AN	177	791	1,014	1,014	574%	128%
2001	D	100	140	584	584	584%	417%
2002	D	86	86	677	677	785%	785%
2003	BN	130	182	784	774	602%	425%
2004	D	82	295	656	656	796%	223%
2005	W	154	1,289	1,118	1,101	724%	85%
2006	W	176	1,759	1,301	1,476	738%	84%
2007	C	94	94	445	445	475%	475%
2008	C	75	75	595	595	795%	795%
2009	BN	106	106	835	835	791%	791%
2010	AN	158	218	888	884	562%	405%
2011	W	176	1,489	1,118	1,118	635%	75%
2012	D	104	118	449	449	434%	382%
Average (1971-2012)		129	581	795	837	617%	144%
Average (1980-2009)		125	636	818	875	655%	138%
Total (1971-2012)		5,411	24,398	33,372	35,158	617%	144%
Total (1980-2009)		3,746	19,067	24,547	26,243	655%	138%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	141	105	57	49	40	27	14	8	0	0	0
1972	82	65	42	34	13	4	0	0	0	0	0
1973	124	91	71	60	56	46	41	34	32	27	19
1974	106	80	57	43	37	32	26	10	0	0	0
1975	104	61	52	41	39	37	35	32	25	19	13
1976	30	17	7	0	0	0	0	0	0	0	0
1977	13	0	0	0	0	0	0	0	0	0	0
1978	132	119	99	85	72	60	47	34	19	15	13
1979	139	107	75	51	48	39	33	23	18	16	14
1980	118	101	92	74	55	47	36	15	6	4	4
1981	79	64	44	36	17	7	2	0	0	0	0
1982	165	150	132	101	95	90	80	65	45	29	23
1983	346	306	277	252	215	193	191	169	146	132	115
1984	227	211	187	152	108	87	78	67	44	36	21
1985	85	64	49	36	23	8	0	0	0	0	0
1986	137	136	122	101	71	56	45	38	27	21	18
1987	44	36	17	0	0	0	0	0	0	0	0
1988	43	16	11	0	0	0	0	0	0	0	0
1989	110	101	79	45	27	10	2	0	0	0	0
1990	66	30	9	0	0	0	0	0	0	0	0
1991	99	61	48	32	24	18	9	0	0	0	0
1992	49	34	21	1	0	0	0	0	0	0	0
1993	119	109	90	76	70	54	32	13	7	2	0
1994	60	43	27	10	3	0	0	0	0	0	0
1995	163	144	136	124	96	92	73	57	41	34	25
1996	150	139	132	124	82	69	48	26	19	12	9
1997	173	161	149	137	93	81	65	58	54	53	53
1998	180	159	140	120	108	88	74	58	49	38	24
1999	146	132	125	100	88	67	44	39	23	18	15
2000	142	135	112	84	63	40	32	20	13	7	4
2001	71	57	46	40	30	26	12	4	0	0	0
2002	92	76	61	49	32	19	8	0	0	0	0
2003	98	66	46	37	32	28	25	22	19	18	15
2004	99	78	63	34	19	12	3	0	0	0	0
2005	138	121	94	68	63	50	38	30	27	22	20
2006	124	118	103	95	90	87	86	75	62	60	57
2007	72	38	17	3	0	0	0	0	0	0	0
2008	82	63	40	19	12	10	8	6	3	1	0
2009	123	99	57	51	41	35	27	21	14	9	5
2010	110	84	72	66	55	38	30	23	12	11	9
2011	128	116	112	101	83	58	41	24	18	17	16
2012	52	38	31	20	13	10	8	5	4	0	0
Total number of days greater than threshold flow	4,761	3,931	3,201	2,551	2,013	1,625	1,293	976	727	601	492
Number of years flows NOT achieved for threshold period	0	1	1	5	7	8	10	15	18	19	21

Table 7. February through June La Grange 1 Day Flow Count

	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	139	105	57	49	40	27	14	8	0	0	0
1972	82	65	42	34	13	4	0	0	0	0	0
1973	124	91	71	60	56	46	41	34	32	27	19
1974	104	80	57	43	37	32	26	10	0	0	0
1975	102	61	52	41	39	37	35	32	25	19	13
1976	28	17	7	0	0	0	0	0	0	0	0
1977	13	0	0	0	0	0	0	0	0	0	0
1978	132	119	99	85	72	60	47	34	19	15	13
1979	137	107	75	51	48	39	33	23	18	16	14
1980	116	101	92	74	55	47	36	15	6	4	4
1981	77	64	44	36	17	7	2	0	0	0	0
1982	136	135	121	100	95	90	80	65	45	29	23
1983	150	149	149	138	134	133	132	130	126	115	101
1984	151	142	124	89	52	38	29	26	23	15	7
1985	83	64	49	36	23	8	0	0	0	0	0
1986	137	136	122	101	71	56	45	38	27	21	18
1987	42	36	17	0	0	0	0	0	0	0	0
1988	43	16	11	0	0	0	0	0	0	0	0
1989	110	101	79	45	27	10	2	0	0	0	0
1990	66	30	9	0	0	0	0	0	0	0	0
1991	99	61	48	32	24	18	9	0	0	0	0
1992	49	34	21	1	0	0	0	0	0	0	0
1993	119	109	90	76	70	54	32	13	7	2	0
1994	58	43	27	10	3	0	0	0	0	0	0
1995	128	116	108	96	82	78	68	57	41	34	25
1996	148	139	132	124	82	69	48	26	19	12	9
1997	141	131	119	107	63	51	35	30	26	26	26
1998	140	129	110	90	78	63	52	41	33	26	20
1999	144	132	125	100	88	67	44	39	23	18	15
2000	140	135	112	84	63	40	32	20	13	7	4
2001	69	57	46	40	30	26	12	4	0	0	0
2002	92	76	61	49	32	19	8	0	0	0	0
2003	98	66	46	37	32	28	25	22	19	18	15
2004	99	78	63	34	19	12	3	0	0	0	0
2005	138	121	94	68	63	50	38	30	27	22	20
2006	122	118	103	95	90	87	86	75	62	60	57
2007	70	38	17	3	0	0	0	0	0	0	0
2008	82	63	40	19	12	10	8	6	3	1	0
2009	123	99	57	51	41	35	27	21	14	9	5
2010	110	84	72	66	55	38	30	23	12	11	9
2011	126	116	112	101	83	58	41	24	18	17	16
2012	50	38	31	20	13	10	8	5	4	0	0
Total number of days greater than threshold flow	4,317	3,602	2,911	2,285	1,802	1,447	1,128	851	642	524	433
Number of years flows NOT achieved for threshold period	0	1	1	5	7	8	10	15	18	19	21

Table 8. La Grange Consecutive 7 Day Flow Count

	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	3	3	2	2	1	1	1	0	0	0
1972	2	2	2	2	1	0	0	0	0	0	0
1973	4	2	1	1	1	2	1	1	1	1	2
1974	2	3	2	2	2	2	2	0	0	0	0
1975	4	2	1	1	1	1	1	2	1	1	1
1976	1	1	1	0	0	0	0	0	0	0	0
1977	1	0	0	0	0	0	0	0	0	0	0
1978	2	3	5	2	1	1	1	2	1	1	1
1979	1	4	3	1	1	2	1	1	1	1	1
1980	2	2	2	4	4	4	3	0	0	0	0
1981	2	1	2	2	1	1	0	0	0	0	0
1982	3	3	4	3	2	2	4	4	3	3	1
1983	2	3	6	8	7	5	5	6	6	5	4
1984	1	2	4	4	3	3	3	3	4	3	2
1985	1	1	2	3	2	0	0	0	0	0	0
1986	1	1	3	5	3	3	3	3	3	1	1
1987	1	1	1	0	0	0	0	0	0	0	0
1988	3	1	1	0	0	0	0	0	0	0	0
1989	1	2	4	3	2	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	2	1	1	1	1	1	0	0	0	0	0
1992	1	1	1	0	0	0	0	0	0	0	0
1993	2	1	2	2	2	2	2	1	1	0	0
1994	1	3	3	0	0	0	0	0	0	0	0
1995	4	2	3	4	3	4	3	2	4	3	1
1996	1	2	2	2	4	4	5	3	1	0	0
1997	2	2	2	3	3	2	2	2	2	2	2
1998	3	3	4	5	4	4	5	4	3	2	1
1999	1	2	2	3	3	3	3	3	2	1	1
2000	1	1	2	5	4	2	2	2	1	1	0
2001	2	2	2	1	1	1	1	0	0	0	0
2002	1	1	2	2	3	2	0	0	0	0	0
2003	1	3	1	1	1	1	1	1	1	1	1
2004	2	3	3	3	2	1	0	0	0	0	0
2005	1	2	3	2	1	1	1	1	1	1	1
2006	2	3	3	1	1	1	1	3	2	2	2
2007	2	2	1	0	0	0	0	0	0	0	0
2008	1	2	2	1	1	1	1	0	0	0	0
2009	2	4	2	1	2	1	1	1	1	1	0
2010	3	1	1	2	3	1	1	1	1	1	1
2011	1	1	1	3	5	4	3	1	1	1	1
2012	1	1	1	1	1	1	1	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	74	81	91	86	78	64	58	48	41	32	24
Number of years flows NOT achieved for threshold period	0	1	2	8	8	11	15	20	21	23	25

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	3	3	2	2	1	1	1	0	0	0
1972	2	2	2	2	1	0	0	0	0	0	0
1973	4	2	1	1	1	2	1	1	1	1	2
1974	2	3	2	2	2	2	2	0	0	0	0
1975	4	2	1	1	1	1	1	2	1	1	1
1976	1	1	1	0	0	0	0	0	0	0	0
1977	1	0	0	0	0	0	0	0	0	0	0
1978	2	3	5	2	1	1	1	2	1	1	1
1979	1	4	3	1	1	2	1	1	1	1	1
1980	2	2	2	4	4	4	3	0	0	0	0
1981	2	1	2	2	1	1	0	0	0	0	0
1982	1	2	3	3	2	2	4	4	3	3	1
1983	1	2	2	4	4	4	4	3	5	4	4
1984	1	2	3	3	2	1	1	1	2	1	1
1985	1	1	2	3	2	0	0	0	0	0	0
1986	1	1	3	5	3	3	3	3	3	1	1
1987	1	1	1	0	0	0	0	0	0	0	0
1988	3	1	1	0	0	0	0	0	0	0	0
1989	1	2	4	3	2	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	2	1	1	1	1	1	0	0	0	0	0
1992	1	1	1	0	0	0	0	0	0	0	0
1993	2	1	2	2	2	2	2	1	1	0	0
1994	1	3	3	0	0	0	0	0	0	0	0
1995	3	1	2	3	2	3	3	2	4	3	1
1996	1	2	2	2	4	4	5	3	1	0	0
1997	2	2	2	3	3	2	2	1	1	1	1
1998	2	2	3	4	3	3	3	2	1	1	1
1999	1	2	2	3	3	3	3	3	2	1	1
2000	1	1	2	5	4	2	2	2	1	1	0
2001	2	2	2	1	1	1	1	0	0	0	0
2002	1	1	2	2	3	2	0	0	0	0	0
2003	1	3	1	1	1	1	1	1	1	1	1
2004	2	3	3	3	2	1	0	0	0	0	0
2005	1	2	3	2	1	1	1	1	1	1	1
2006	2	3	3	1	1	1	1	3	2	2	2
2007	2	2	1	0	0	0	0	0	0	0	0
2008	1	2	2	1	1	1	1	0	0	0	0
2009	2	4	2	1	2	1	1	1	1	1	0
2010	3	1	1	2	3	1	1	1	1	1	1
2011	1	1	1	3	5	4	3	1	1	1	1
2012	1	1	1	1	1	1	1	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	69	77	83	79	72	59	53	40	35	27	22
Number of years flows NOT achieved for threshold period	0	1	2	8	8	11	15	20	21	23	25

Table 10. La Grange Consecutive 14 Day Flow Count

	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	2	2	2	2	1	1	0	0	0	0
1972	2	1	2	2	0	0	0	0	0	0	0
1973	2	1	1	1	1	1	1	1	1	1	0
1974	1	1	2	2	2	1	1	0	0	0	0
1975	1	1	1	1	1	1	1	1	1	1	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	1	1	1	1	1	0
1979	1	1	1	1	1	1	1	1	1	1	1
1980	2	2	2	2	1	1	1	0	0	0	0
1981	1	1	2	1	0	0	0	0	0	0	0
1982	2	3	2	1	1	1	3	2	0	0	0
1983	1	2	4	6	4	4	4	3	3	3	3
1984	1	2	3	4	3	3	3	3	2	1	1
1985	1	1	2	0	0	0	0	0	0	0	0
1986	1	1	3	3	2	1	1	1	0	0	0
1987	1	1	0	0	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	1	2	2	1	1	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	1	1	1	1	1	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	1	2	1	1	2	1	0	0	0	0
1994	1	2	0	0	0	0	0	0	0	0	0
1995	2	2	3	3	3	4	2	1	0	0	0
1996	1	1	1	2	3	2	1	0	0	0	0
1997	2	2	2	2	2	2	1	2	2	2	2
1998	3	3	4	3	3	3	2	1	1	1	1
1999	1	2	2	3	2	3	1	1	1	0	0
2000	1	1	2	2	2	2	1	0	0	0	0
2001	2	2	1	1	1	1	0	0	0	0	0
2002	1	1	2	2	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	1
2004	1	3	2	1	0	0	0	0	0	0	0
2005	1	1	2	1	1	1	1	1	1	1	1
2006	2	2	1	1	1	1	1	1	1	1	1
2007	2	1	0	0	0	0	0	0	0	0	0
2008	1	1	1	1	0	0	0	0	0	0	0
2009	2	3	1	1	1	1	1	1	1	0	0
2010	2	1	1	2	1	1	1	1	0	0	0
2011	1	1	1	3	3	2	1	1	1	1	1
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	55	60	61	60	46	42	33	24	18	15	12
Number of years flows NOT achieved for threshold period	1	1	8	9	15	17	18	24	28	30	33

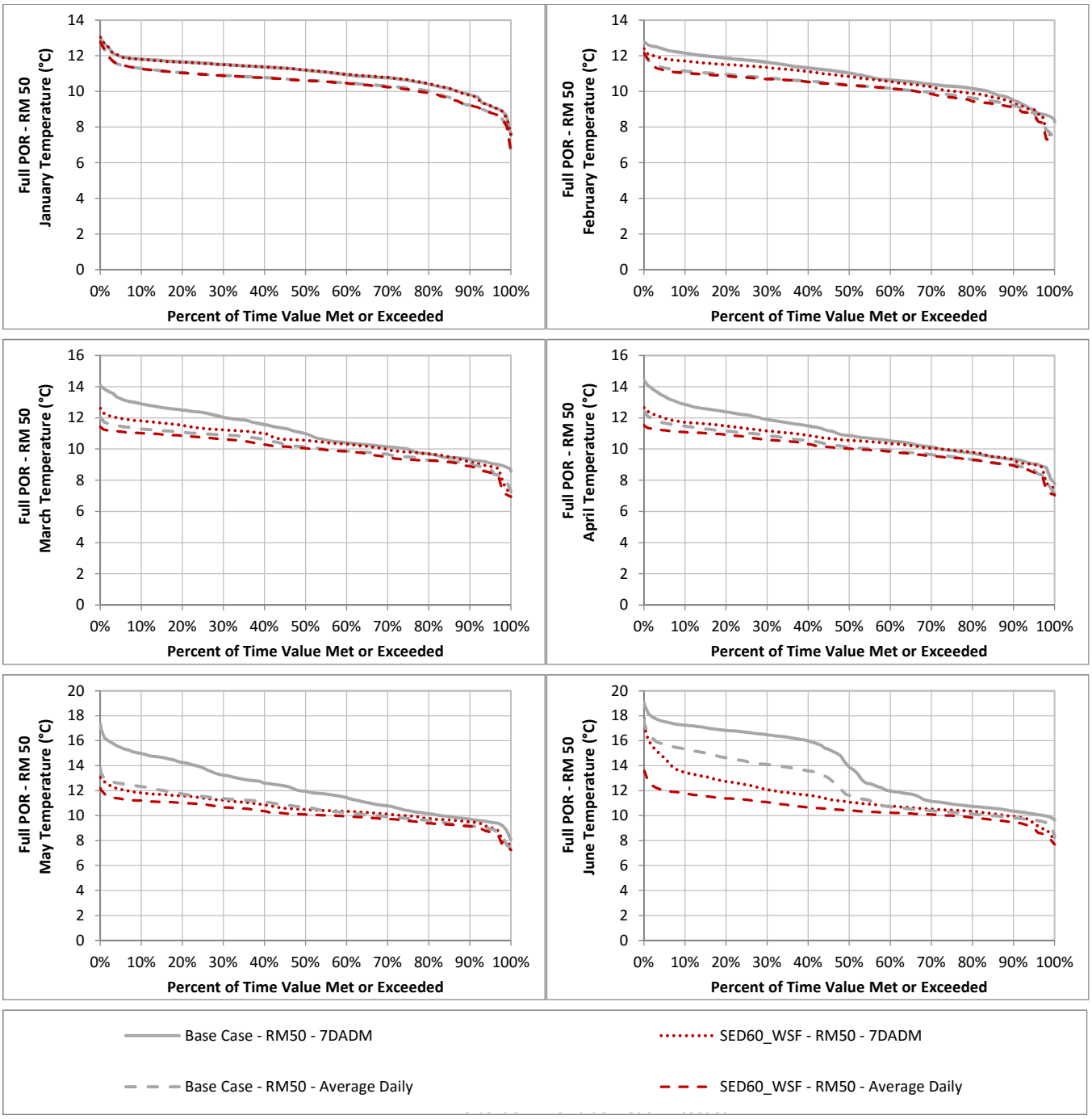
Table 11. February through June La Grange Consecutive 14 Day Flow Count

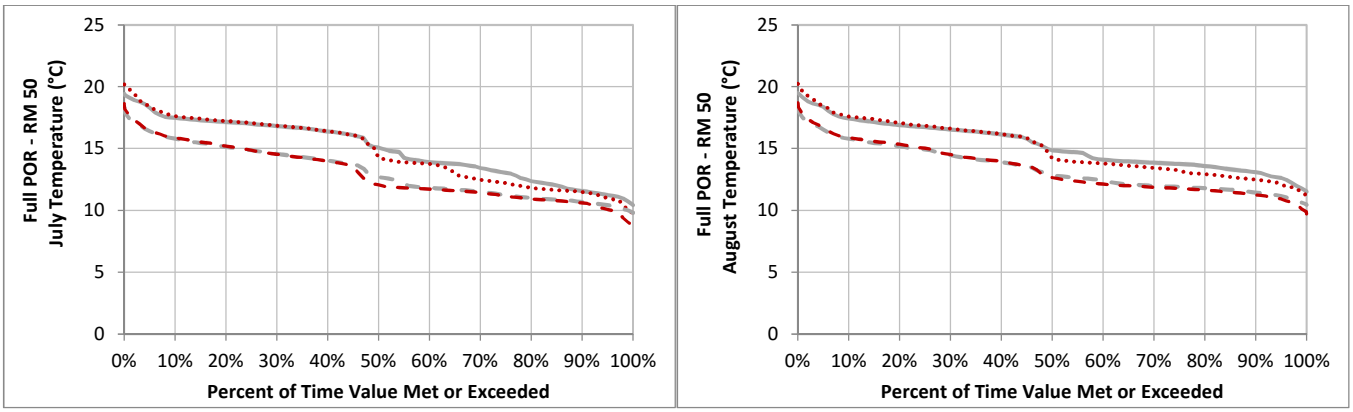
	SED60_WSF Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	2	2	2	2	1	1	0	0	0	0
1972	2	1	2	2	0	0	0	0	0	0	0
1973	2	1	1	1	1	1	1	1	1	1	0
1974	1	1	2	2	2	1	1	0	0	0	0
1975	1	1	1	1	1	1	1	1	1	1	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	1	1	1	1	1	1	1	1	0
1979	1	1	1	1	1	1	1	1	1	1	1
1980	2	2	2	2	1	1	1	0	0	0	0
1981	1	1	2	1	0	0	0	0	0	0	0
1982	1	2	2	1	1	1	3	2	0	0	0
1983	1	1	1	3	3	3	3	3	3	3	3
1984	1	2	2	3	2	1	1	1	1	0	0
1985	1	1	2	0	0	0	0	0	0	0	0
1986	1	1	3	3	2	1	1	1	0	0	0
1987	1	1	0	0	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	1	2	2	1	1	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	1	1	1	1	1	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	1	2	1	1	2	1	0	0	0	0
1994	1	2	0	0	0	0	0	0	0	0	0
1995	1	1	2	2	2	3	2	1	0	0	0
1996	1	1	1	2	3	2	1	0	0	0	0
1997	2	2	2	2	2	2	1	1	1	1	1
1998	2	2	3	2	2	2	1	1	1	1	1
1999	1	2	2	3	2	3	1	1	1	0	0
2000	1	1	2	2	2	2	1	0	0	0	0
2001	2	2	1	1	1	1	0	0	0	0	0
2002	1	1	2	2	0	0	0	0	0	0	0
2003	1	1	1	1	1	1	1	1	1	1	1
2004	1	3	2	1	0	0	0	0	0	0	0
2005	1	1	2	1	1	1	1	1	1	1	1
2006	2	2	1	1	1	1	1	1	1	1	1
2007	2	1	0	0	0	0	0	0	0	0	0
2008	1	1	1	1	0	0	0	0	0	0	0
2009	2	3	1	1	1	1	1	1	1	0	0
2010	2	1	1	2	1	1	1	1	0	0	0
2011	1	1	1	3	3	2	1	1	1	1	1
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	52	56	55	54	42	37	29	21	16	13	10
Number of years flows NOT achieved for threshold period	1	1	8	9	15	17	18	24	28	31	34

SED60_WSF

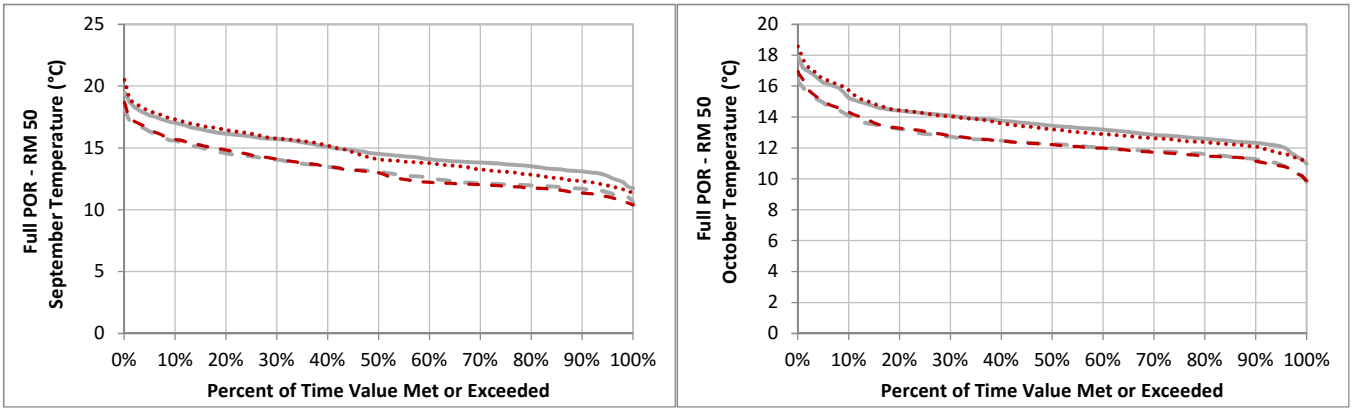
Dynamic Routing

Results Summary

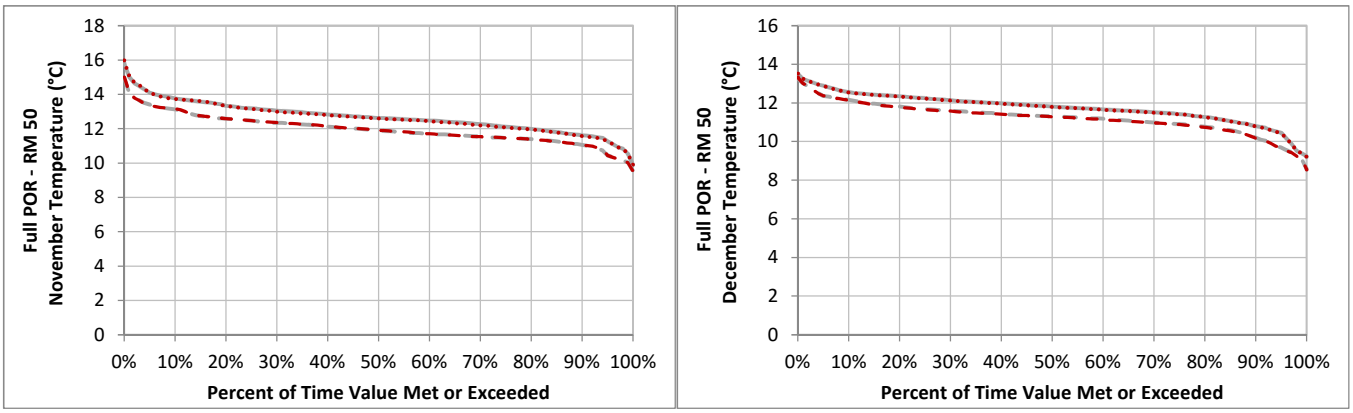

Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM50 - 7DADM
SED60_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED60_WSF - RM50 - Average Daily


Full POR - RM 50
July Temperature (°C)
Percent of Time Value Met or Exceeded

Full POR - RM 50
August Temperature (°C)
Percent of Time Value Met or Exceeded

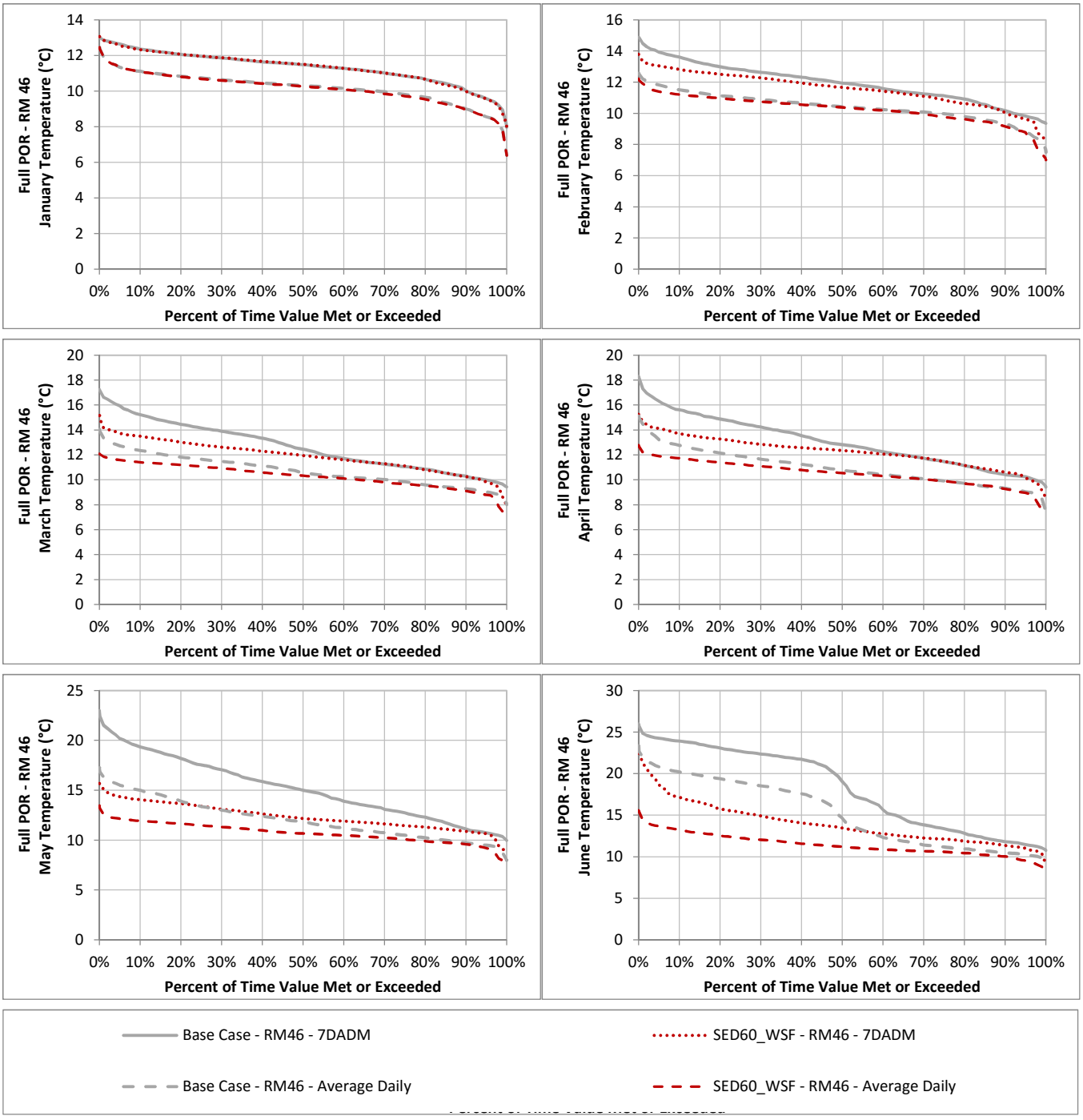

Full POR - RM 50
September Temperature (°C)
Percent of Time Value Met or Exceeded

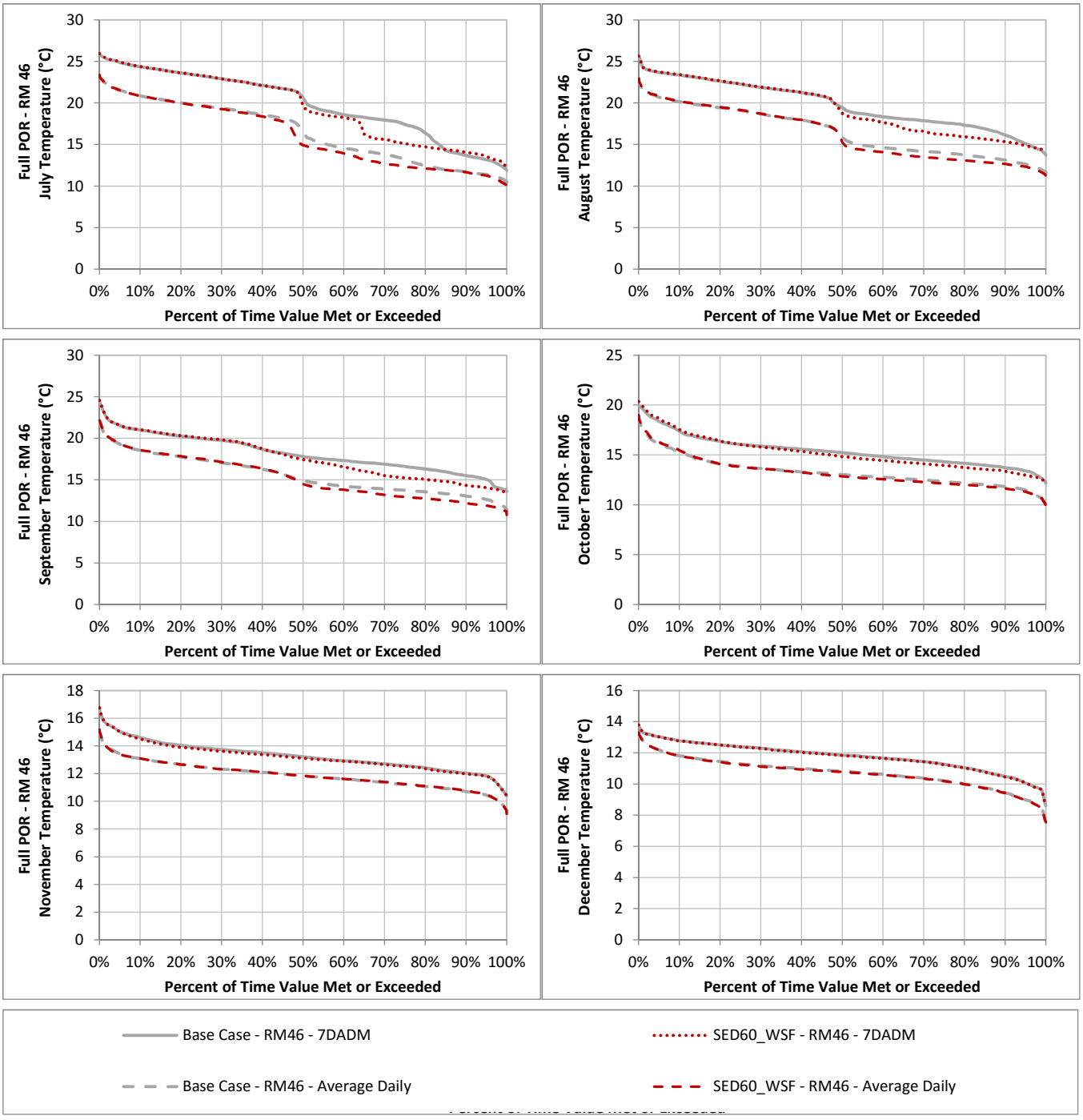
Full POR - RM 50
October Temperature (°C)
Percent of Time Value Met or Exceeded

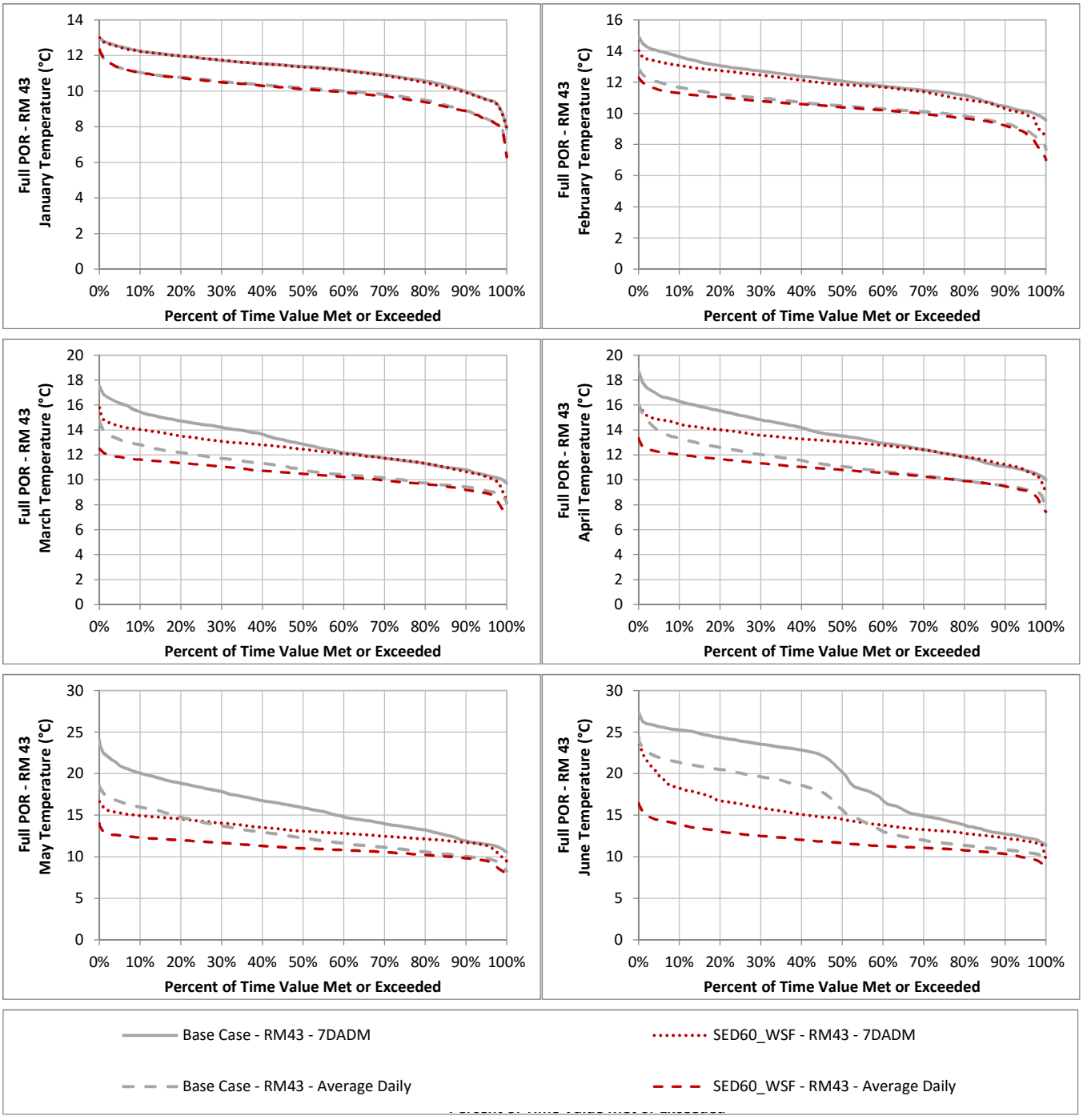

Full POR - RM 50
November Temperature (°C)
Percent of Time Value Met or Exceeded

Full POR - RM 50
December Temperature (°C)
Percent of Time Value Met or Exceeded


Base Case - RM50 - 7DADM
SED60_WSF - RM50 - 7DADM
Base Case - RM50 - Average Daily
SED60_WSF - RM50 - Average Daily


Full POR - RM 46 January Temperature (°C)
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED60_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED60_WSF - RM46 - Average Daily


Full POR - RM 46 July Temperature (°C)
Full POR - RM 46 August Temperature (°C)
Full POR - RM 46 September Temperature (°C)
Full POR - RM 46 October Temperature (°C)
Full POR - RM 46 November Temperature (°C)
Full POR - RM 46 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
SED60_WSF - RM46 - 7DADM
Base Case - RM46 - Average Daily
SED60_WSF - RM46 - Average Daily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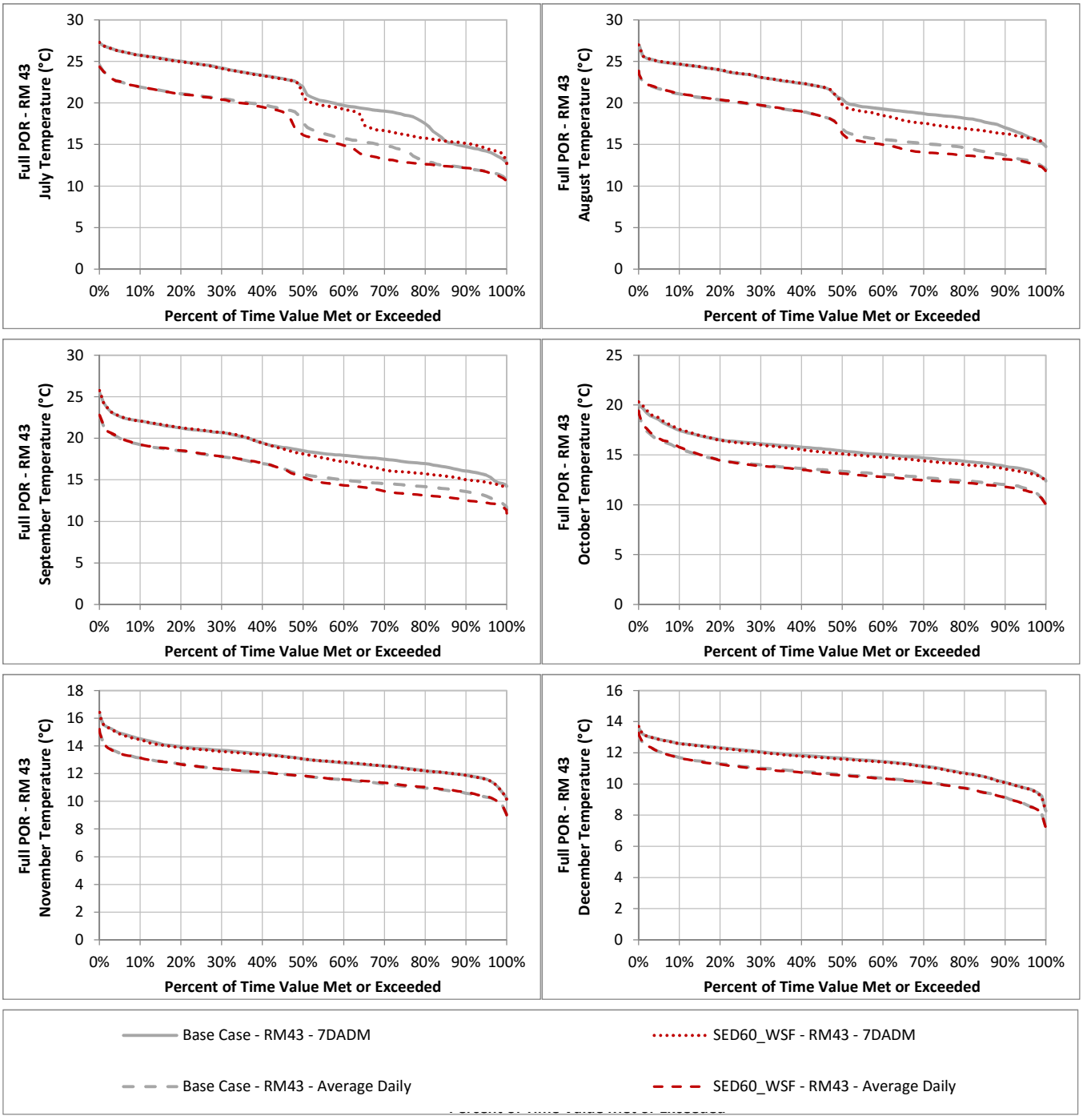
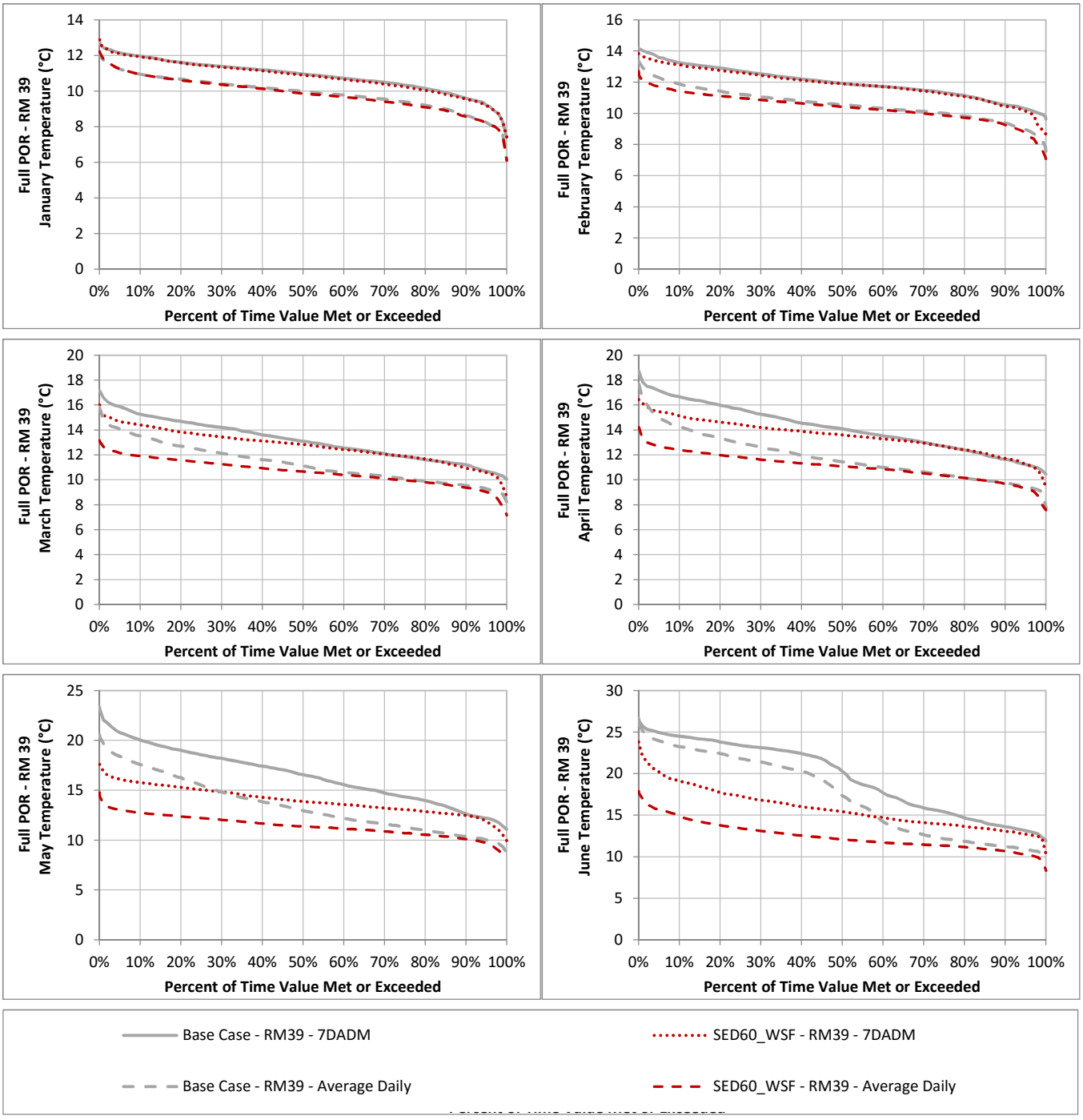
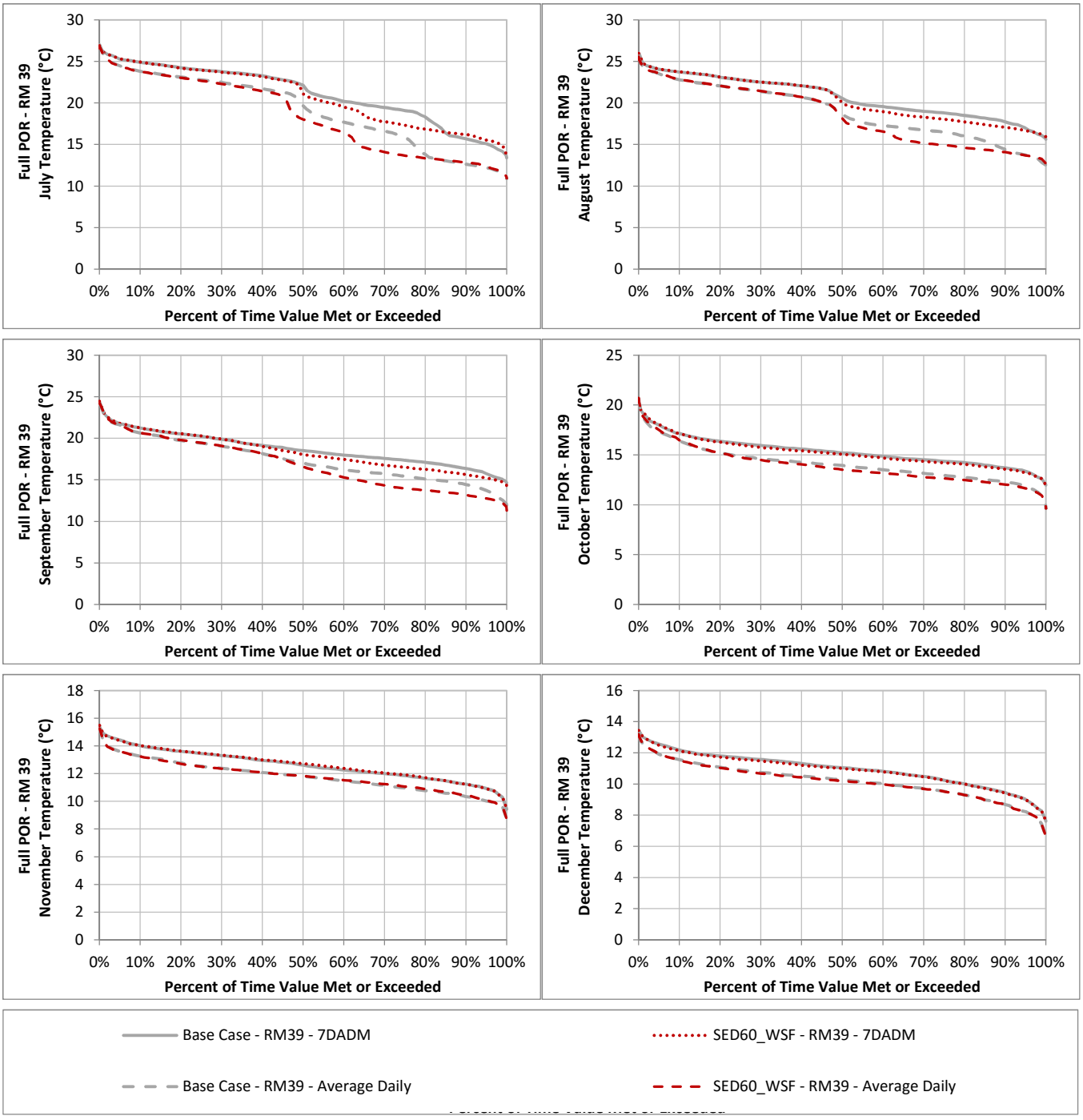
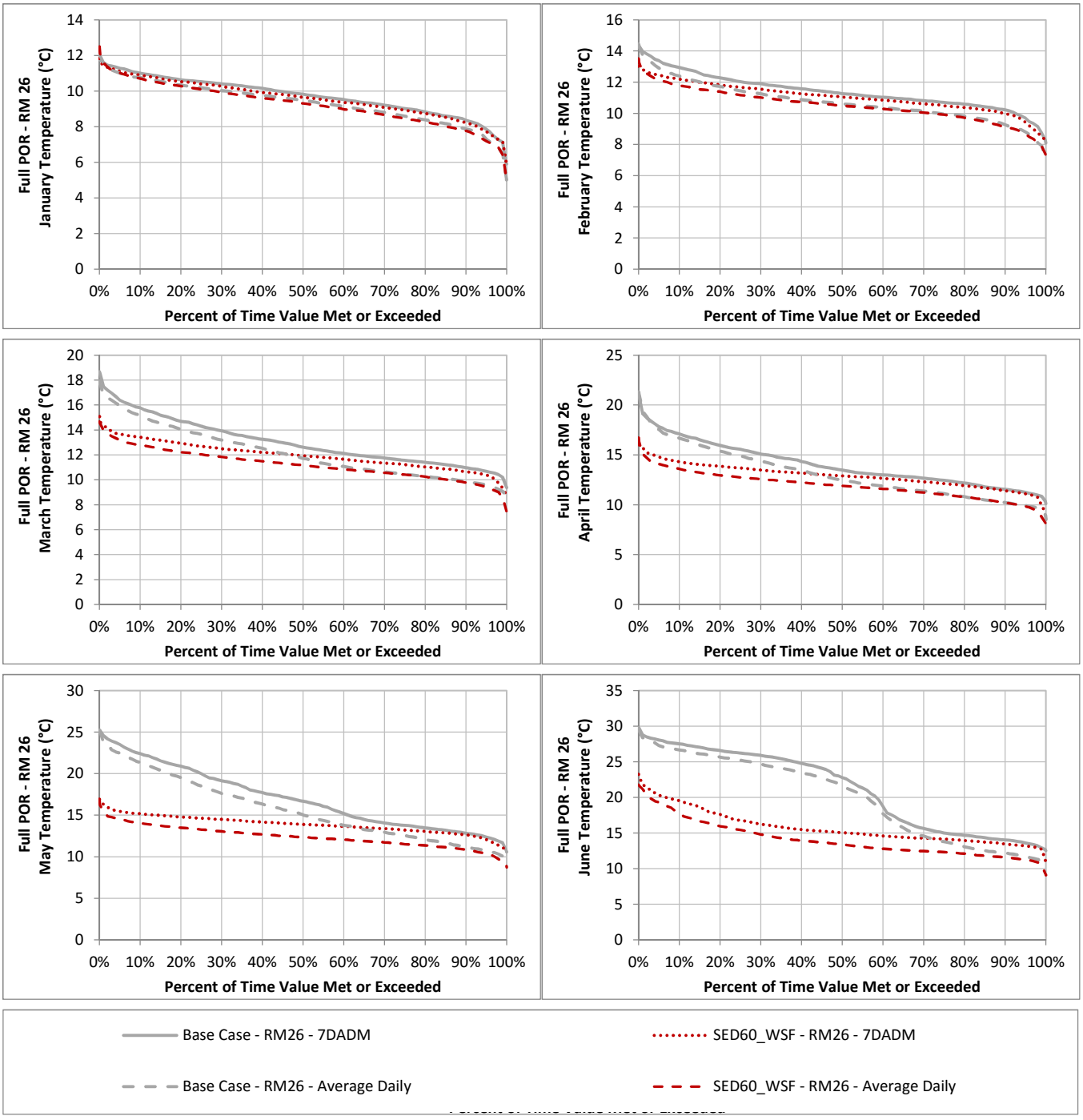
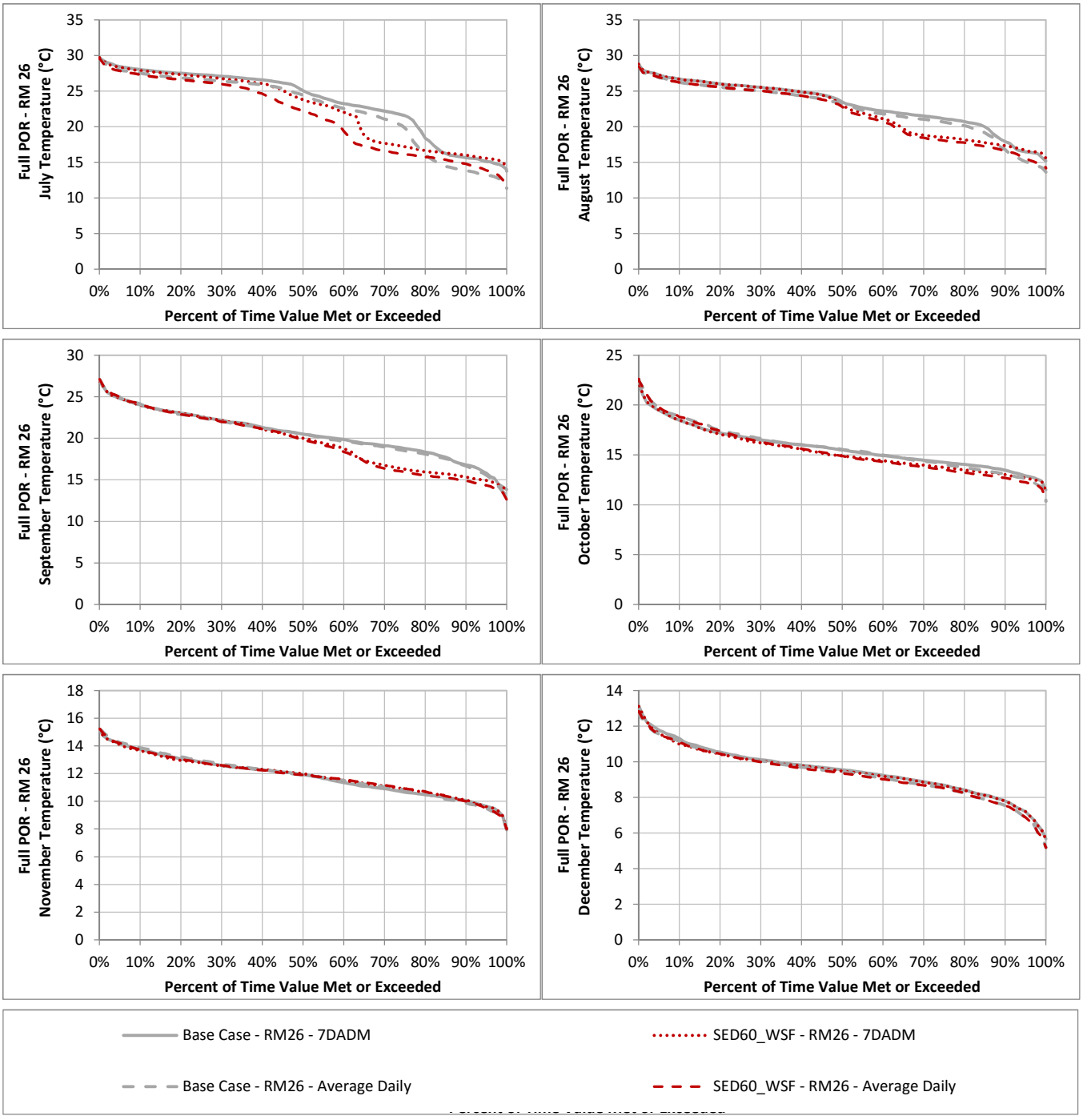
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED60_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED60_WSF - RM43 - Average Daily

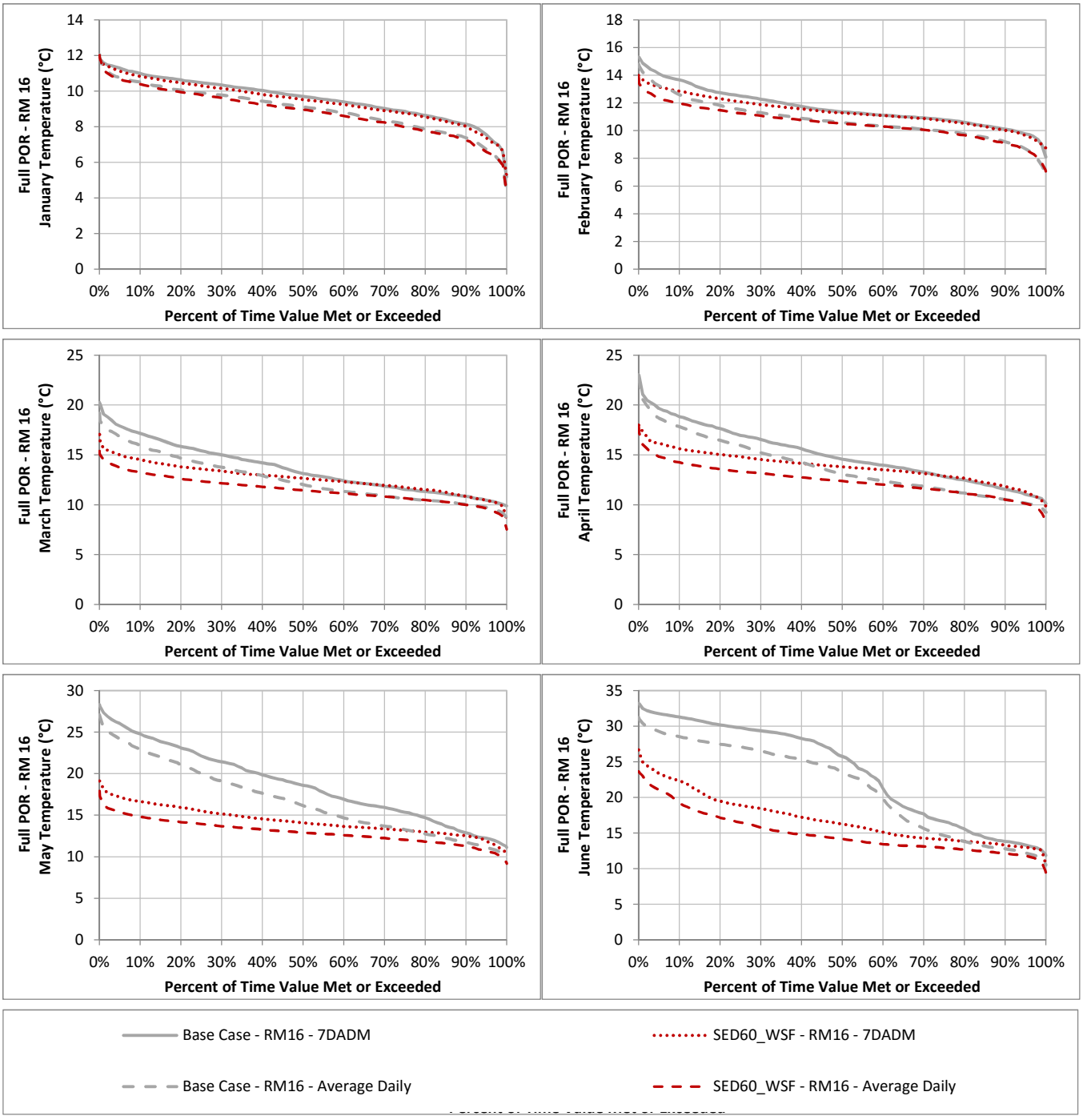

Full POR - RM 43
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
SED60_WSF - RM43 - 7DADM
Base Case - RM43 - Average Daily
SED60_WSF - RM43 - Average Daily

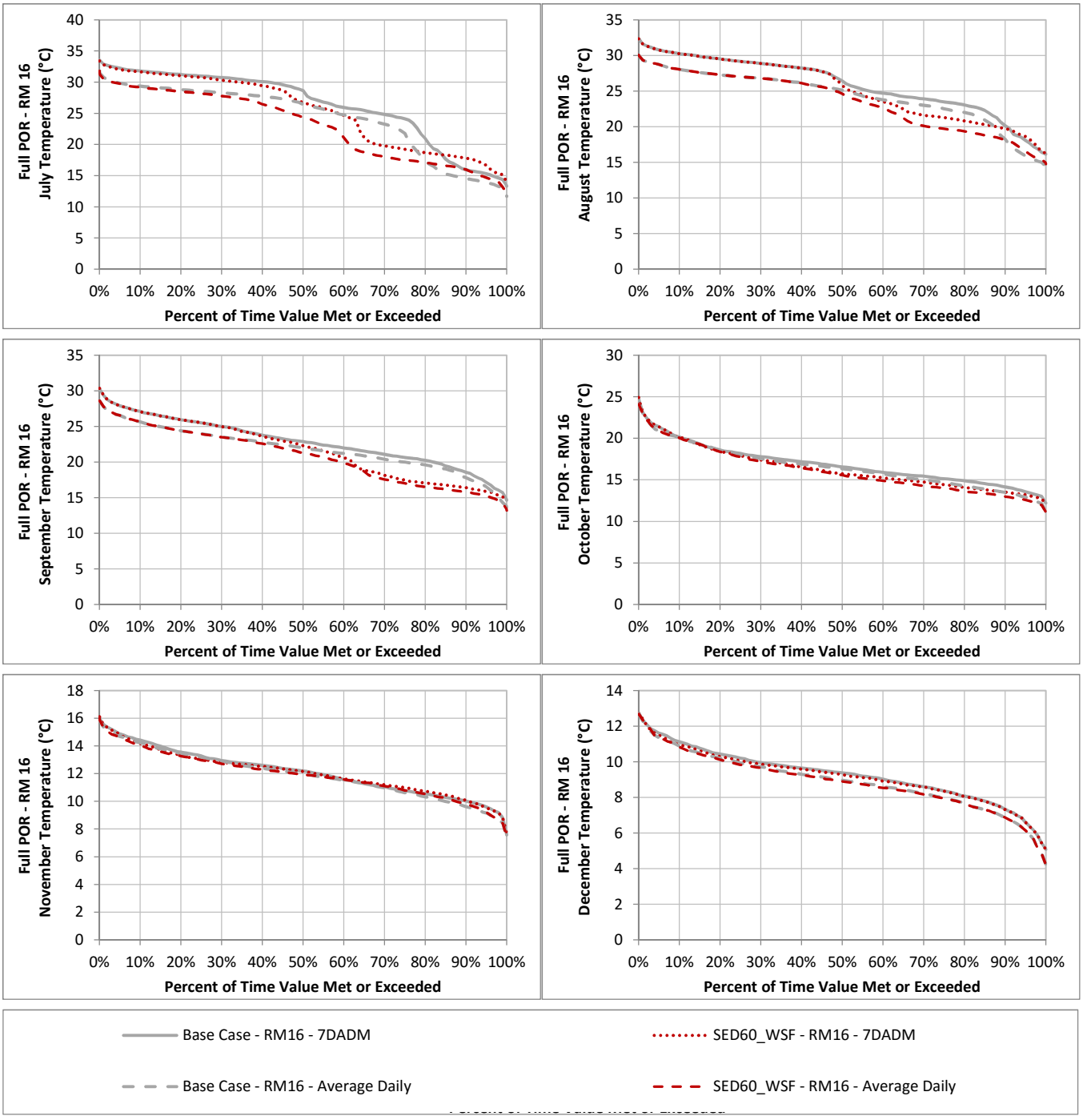

Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED60_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED60_WSF - RM39 - Average Daily

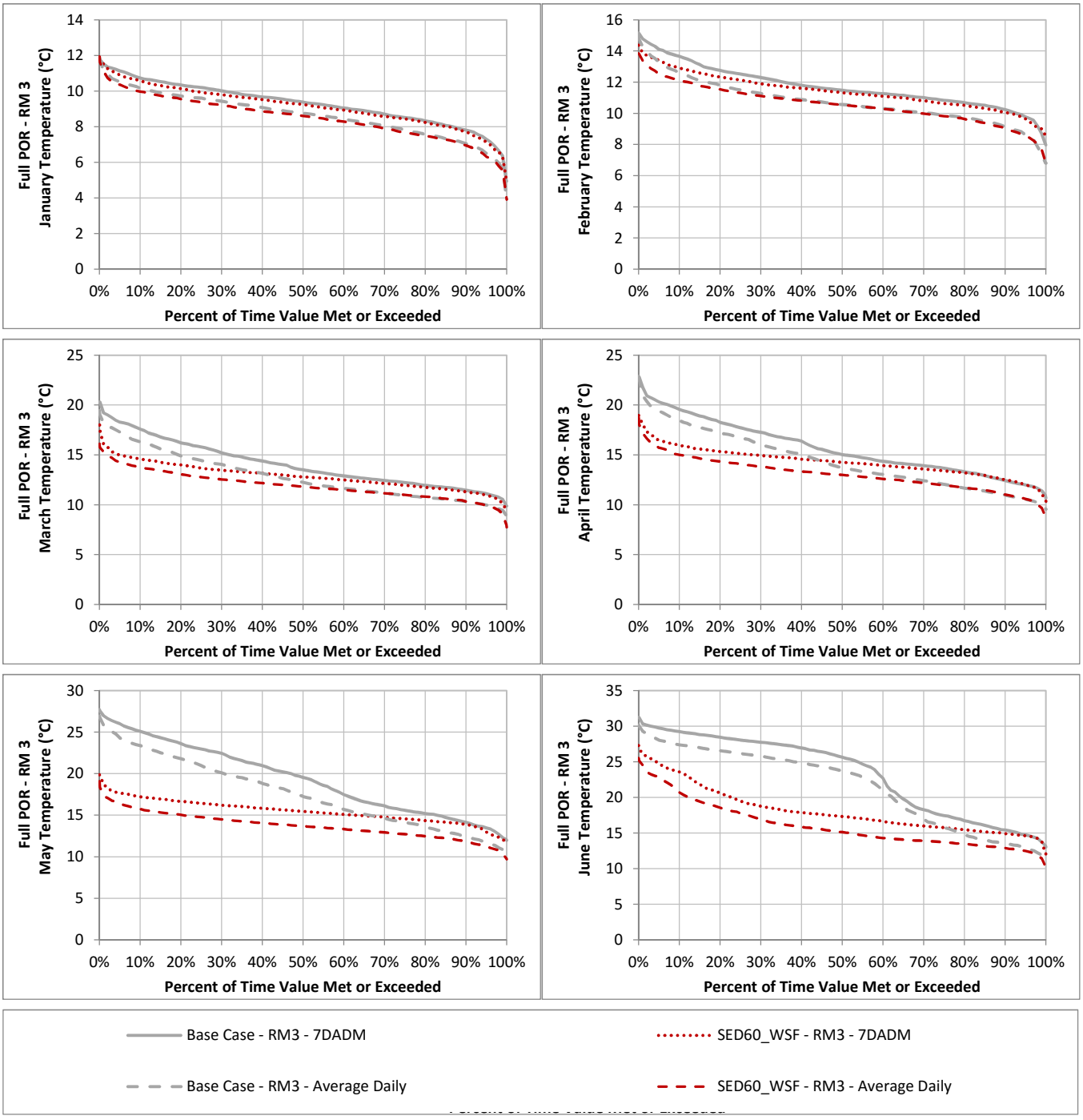

Full POR - RM 39 July Temperature (°C)
Full POR - RM 39 August Temperature (°C)
Full POR - RM 39 September Temperature (°C)
Full POR - RM 39 October Temperature (°C)
Full POR - RM 39 November Temperature (°C)
Full POR - RM 39 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
SED60_WSF - RM39 - 7DADM
Base Case - RM39 - Average Daily
SED60_WSF - RM39 - Average Daily

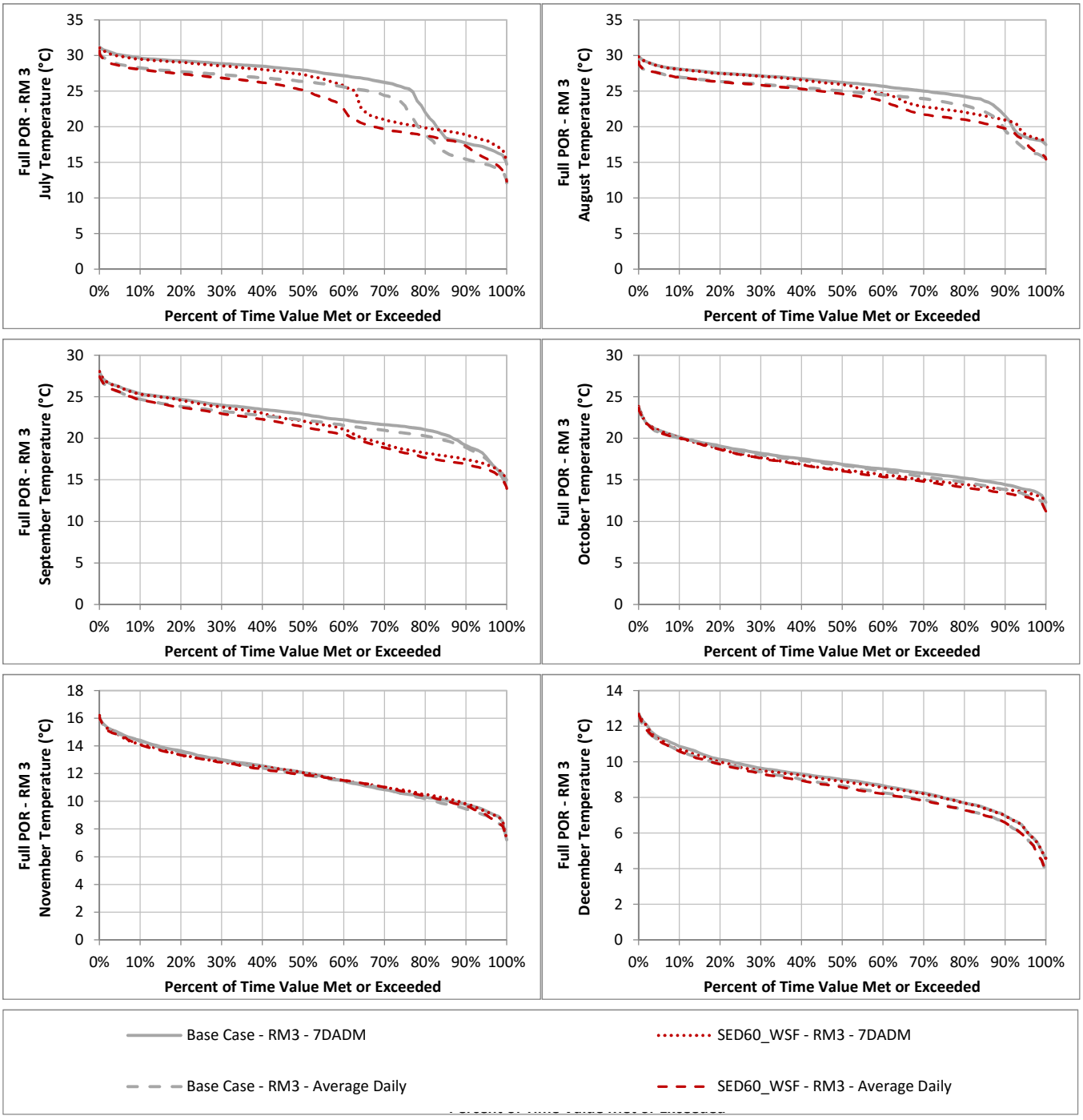

Full POR - RM 26 January Temperature (°C)
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED60_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED60_WSF - RM26 - Average Daily


Full POR - RM 26 July Temperature (°C)
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
SED60_WSF - RM26 - 7DADM
Base Case - RM26 - Average Daily
SED60_WSF - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED60_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED60_WSF - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
SED60_WSF - RM16 - 7DADM
Base Case - RM16 - Average Daily
SED60_WSF - RM16 - Average Daily


Full POR - RM 3 January Temperature (°C)
Full POR - RM 3 February Temperature (°C)
Full POR - RM 3 March Temperature (°C)
Full POR - RM 3 April Temperature (°C)
Full POR - RM 3 May Temperature (°C)
Full POR - RM 3 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED60_WSF - RM3 - 7DADM
SED60_WSF - RM3 - Average Daily


Full POR - RM 3 July Temperature (°C)
Full POR - RM 3 August Temperature (°C)
Full POR - RM 3 September Temperature (°C)
Full POR - RM 3 October Temperature (°C)
Full POR - RM 3 November Temperature (°C)
Full POR - RM 3 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
SED60_WSF - RM3 - 7DADM
SED60_WSF - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–7

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE USFWS SCENARIO PROVIDED IN COMMENTS TO THE DON PEDRO DRAFT LICENSE APPLICATION

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

ALJ_13C@rm40 is the designation for a simulation of an alternative provided by the USFWS in its comments to the Don Pedro draft license application. The flow requirements are similar to a proposal originally made by USFWS during the 2009 interim flow proceeding before a FERC Administrative Law Judge (hence, the "ALJ" designation).

The minimum instream flows included in the modeled scenario consist of the following:

- a year-round minimum flow of 275 cfs at the La Grange gage.
- during all WY types, from Oct. 15 through Feb. 15, release the greater of the 275 cfs minimum base flow, a 1,200 cfs mid-October 10-day immigration flow, or the flow required to maintain stream water temperatures of 13°C or less from the La Grange powerhouse (RM 52) to Robert's Ferry Bridge (RM 40).

The **13C@rm40** in the simulation name ***ALJ_13C@rm40*** indicates that the estimated required releases to meet the Element #3 temperature criteria of 13 degrees C at river mile 40 were modeled to determine the release at La Grange and were constrained to be no less than the minimum releases specified in the table below. Since the specific dates of minimum pulse flows were not specified in the flow proposal, dates for modeling purposes were provided as shown in Table 1. The modeled minimum flow at La Grange is set to:

Table 1. Minimum Base Flows.

Time Period	W	AN	BN	D	C
1/1 – 2/14	275	275	275	275	275
2/15 – 2/15	3000	3000	3000	275	275
2/16 – 2/24	3000	3000	3000	275	275
2/25	3000	3000	3000	3000	3000
2/26	3000	3000	3000	3000	3000
2/27 – 2/28	3000	3000	3000	275	275
2/29 – 3/1	275	275	275	275	275
3/2 – 3/8	3000	3000	275	275	275
3/9 – 3/19	275	275	275	275	275
3/20 - 4/20	275	275	275	275	275
4/21 – 4/30	275	275	275	275	275
5/1 – 5/15	275	275	275	275	275
5/16 – 10/14	275	275	275	275	275
10/15	275	275	275	275	275
10/16	1200	1200	1200	1200	1200
10/17 – 10/25	1200	1200	1200	1200	1200
10/26 - 11/3	275	275	275	275	275
11/4 – 12/31	275	275	275	275	275

Table 2. Maximum Daily Temperatures at RM 40.

Time Period	W	AN	BN	D	C
1/1 – 2/14	13	13	13	13	13
2/15 – 2/15	13	13	13	13	13
2/16 – 2/24	--	--	--	--	--
2/25	--	--	--	--	--
2/26	--	--	--	--	--
2/27 – 2/28	--	--	--	--	--
2/29 – 3/1	--	--	--	--	--
3/2 – 3/8	--	--	--	--	--
3/9 – 3/19	--	--	--	--	--
3/20 - 4/20	--	--	--	--	--
4/21 – 4/30	--	--	--	--	--
5/1 – 5/15	--	--	--	--	--
5/16 – 10/14	--	--	--	--	--
10/15	13	13	13	13	13
10/16	13	13	13	13	13
10/17 – 10/25	13	13	13	13	13
10/26 - 11/3	13	13	13	13	13
11/4 – 12/31	13	13	13	13	13

A mini-model of flow vs temperature power functions was developed in order to back-calculate required flow based on required temperature without running and iterating HEC-RAS. The needed flows for specific temperatures at specific locations are calculated using this mini model – first checking whether it is even possible to meet the temperature given the base case reservoir outflow temperature. The aggregate min/temp/max flow time series is computed by: releasing 2000 cfs if the estimated flow requirement for temperature exceeds 2000 cfs; releasing the Table 1 minimum flows if estimated flow requirement for temperature is below the minimum; and releasing the estimated flow requirement for Table 2 temperature if the estimated flow is between the Table 1 minimum and 2000 cfs. The resulting timeseries is used as the LaGrange minimum flow in the operations model.

For operations modeling of the resulting time series, modeling assumes shared operations (where 51.7 percent of required releases which are greater than the current FERC flows are accounted to CCSF). Water Supply Factor (WSF) determines the amount of water allowed to be delivered. WSF is established by forecasting upcoming water supply, based on antecedent storage and anticipated inflow to Don Pedro. As the storage and inflow drop below specified index values, the WSF is reduced. WSF and storage/inflow index values are balanced by the modeler so that Don Pedro reservoir storage does not drop below approximately 375,000 TAF (the minimum amount kept in the reservoir for Base Case).

ALJ_13C@RM40

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	ALJ_13C_RM40	% of Base Case
January	1,063,873	1,336,599	126%
February	1,722,819	1,796,638	104%
March	3,042,430	2,250,454	74%
April	3,481,703	2,719,622	78%
May	3,491,340	3,053,471	87%
June	3,434,821	3,467,944	101%
July	3,521,988	3,461,594	98%
August	2,710,847	2,653,083	98%
September	1,340,662	1,354,671	101%
October	918,413	1,438,374	157%
November	402,483	935,956	233%
December	613,223	1,503,181	245%
Total	25,744,602	25,971,588	101%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		ALJ_13C_RM40		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	1,092	67%	59%
87-92	Drought	5,198	4,590	88%	3,659	80%	70%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	665	73%	73%
1977	C	921	713	77%	427	60%	46%
1978	W	767	752	98%	733	98%	96%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	650	73%	73%
1988	C	855	759	89%	598	79%	70%
1989	C	846	744	88%	591	80%	70%
1990	C	876	771	88%	614	80%	70%
1991	C	881	774	88%	617	80%	70%
1992	C	844	647	77%	590	91%	70%
1993	W	823	807	98%	803	100%	98%
1994	C	835	835	100%	835	100%	100%
1995	W	774	774	100%	774	100%	100%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	885	100%	100%
2004	D	940	940	100%	692	74%	74%
2005	W	874	874	100%	856	98%	98%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	636	72%	72%
2009	BN	903	903	100%	884	98%	98%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	793	94%	92%
Total		36,190	35,343	98%	33,320	94%	92%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			ALJ_13C_RM40	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	342	64%
87-92	C	1,600	1,502	94%	670	42%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	270	100%
1973	AN	267	219	100%	219	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	227	50%
1977	C	267	269	90%	115	30%
1978	W	267	205	100%	106	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	248	100%
1982	W	267	189	100%	189	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	257	100%
1986	W	267	233	100%	233	100%
1987	C	267	268	100%	227	50%
1988	C	267	267	90%	126	30%
1989	C	267	250	90%	88	30%
1990	C	267	240	90%	81	30%
1991	C	267	243	90%	81	30%
1992	C	267	235	90%	66	30%
1993	W	267	211	100%	111	100%
1994	C	267	264	100%	204	50%
1995	W	267	189	100%	115	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	251	100%
2002	D	267	253	100%	253	100%
2003	BN	267	234	100%	234	100%
2004	D	267	249	100%	249	100%
2005	W	267	193	100%	193	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	219	50%
2008	C	267	247	100%	113	50%
2009	BN	267	240	100%	153	100%
2010	AN	267	226	100%	226	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	220	100%
Average		267	230	86%	192	72%
Total		11,197	9,676	86%	8,050	72%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

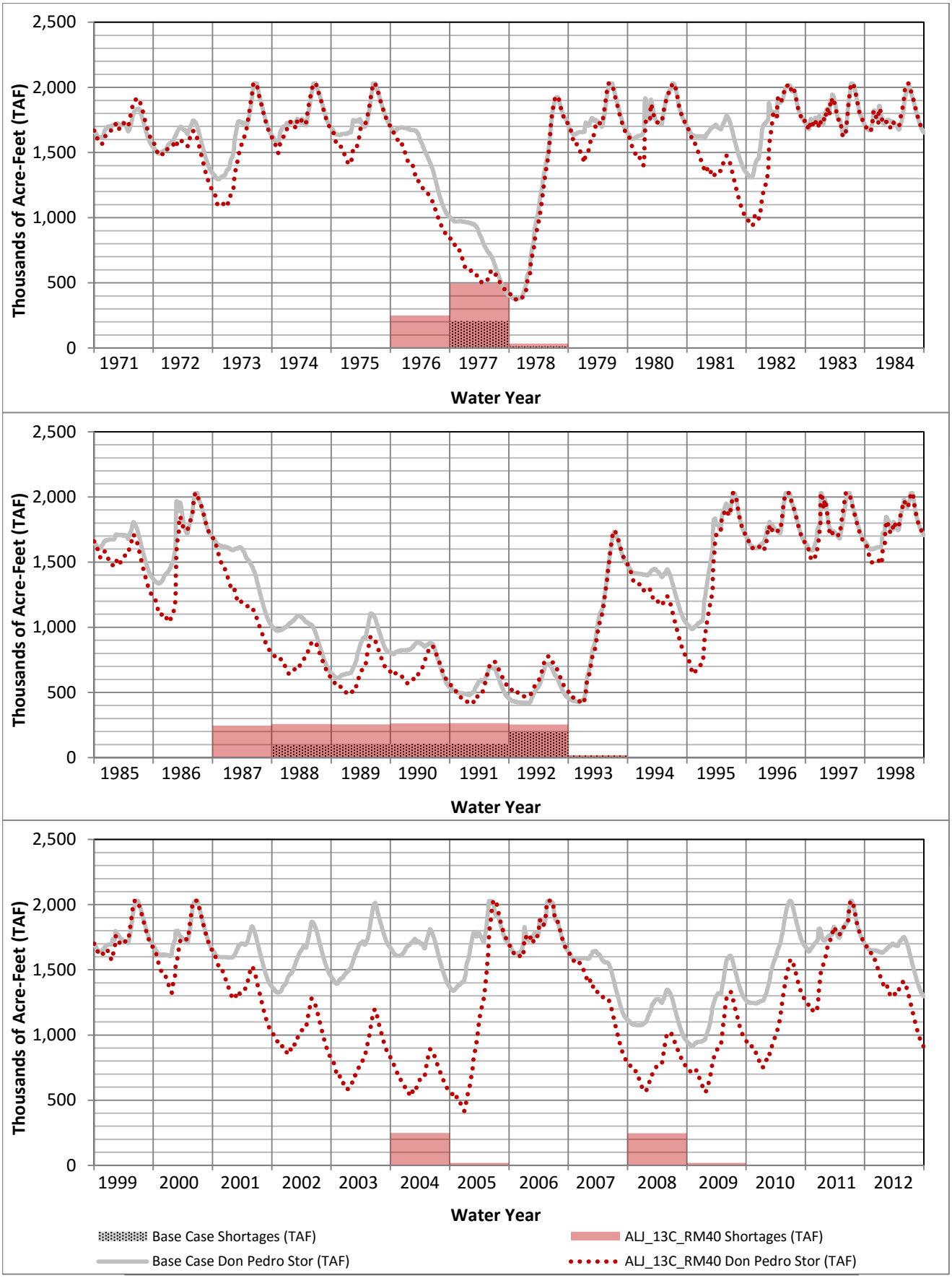


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

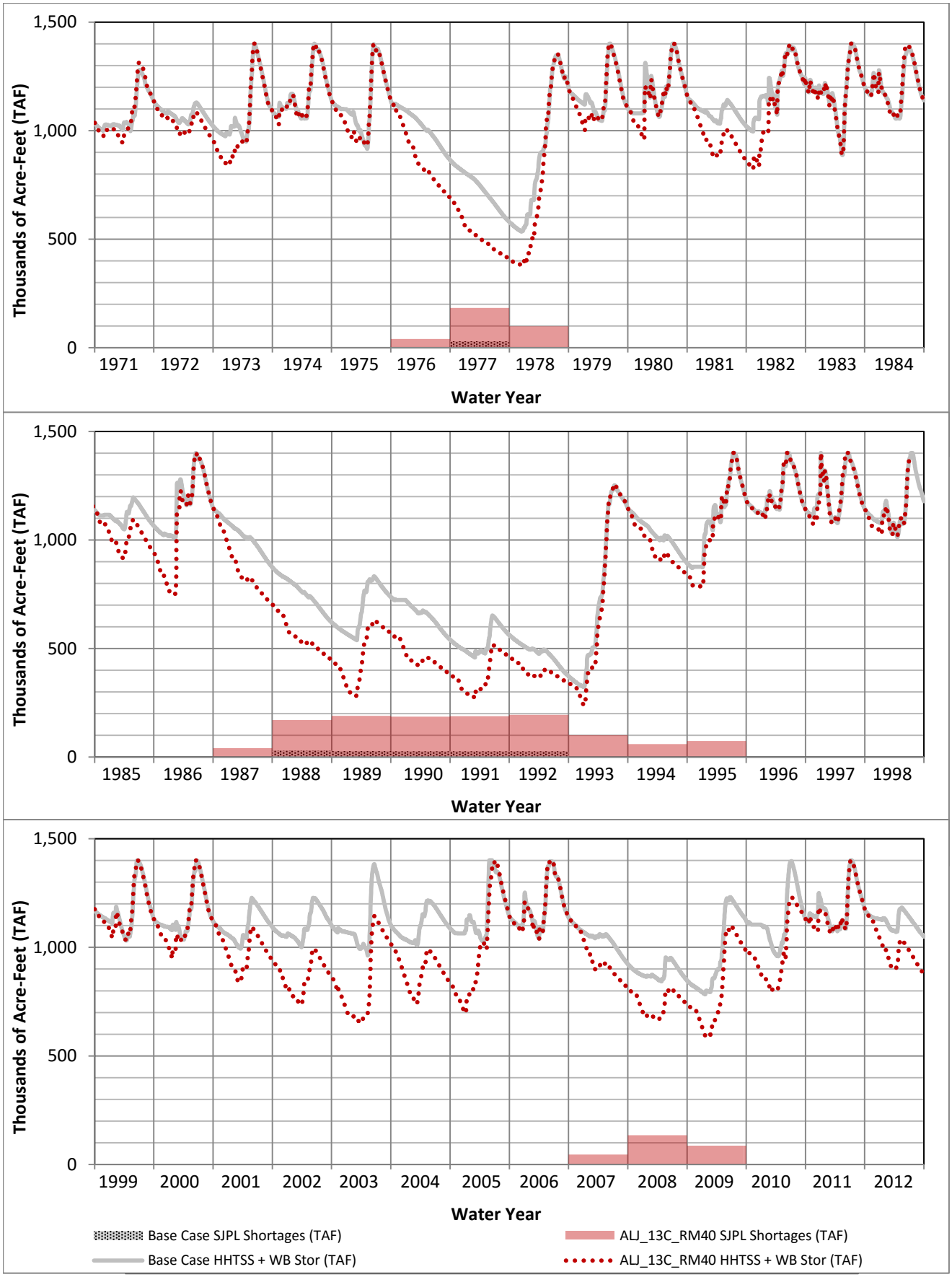


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		ALJ_13C_RM40			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	991	997	374%	358%
87-92	Drought	713	713	2,456	2,456	345%	345%
1971	BN	266	539	333	502	125%	93%
1972	D	138	151	320	320	231%	212%
1973	AN	237	613	316	494	134%	81%
1974	W	301	1,050	356	1,049	118%	100%
1975	W	301	887	553	877	184%	99%
1976	C	171	185	595	601	348%	325%
1977	C	94	94	396	396	422%	422%
1978	W	235	349	283	486	120%	139%
1979	AN	301	876	571	896	190%	102%
1980	W	302	1,818	532	1,799	177%	99%
1981	D	194	252	598	606	309%	241%
1982	W	250	2,275	360	1,928	144%	85%
1983	W	301	3,689	512	3,689	170%	100%
1984	AN	302	1,463	390	1,457	129%	100%
1985	D	205	340	489	489	239%	144%
1986	W	237	1,496	439	1,357	186%	91%
1987	C	179	179	638	638	357%	357%
1988	C	94	94	377	377	399%	399%
1989	C	116	116	425	425	366%	366%
1990	C	103	103	403	403	391%	391%
1991	C	116	116	316	316	273%	273%
1992	C	105	105	297	297	284%	284%
1993	W	235	235	362	362	154%	154%
1994	C	182	182	453	453	249%	249%
1995	W	237	2,098	291	1,975	123%	94%
1996	W	302	1,281	400	1,284	133%	100%
1997	W	301	1,954	469	1,967	156%	101%
1998	W	301	2,226	440	2,210	146%	99%
1999	AN	301	974	472	991	157%	102%
2000	AN	302	916	563	908	187%	99%
2001	D	193	233	579	579	300%	249%
2002	D	137	137	427	427	312%	312%
2003	BN	180	233	465	465	257%	200%
2004	D	141	355	584	584	413%	164%
2005	W	237	1,488	424	700	179%	47%
2006	W	301	2,270	437	2,281	145%	100%
2007	C	182	182	509	509	280%	280%
2008	C	119	119	384	384	323%	323%
2009	BN	156	156	423	423	272%	272%
2010	AN	249	349	458	458	184%	131%
2011	W	301	2,376	438	1,967	146%	83%
2012	D	192	213	601	608	313%	285%
Average (1971-2012)		216	828	445	927	205%	112%
Average (1980-2009)		210	903	449	1,009	213%	112%
Total (1971-2012)		9,092	34,765	18,678	38,933	205%	112%
Total (1980-2009)		6,306	27,083	13,458	30,280	213%	112%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		ALJ_13C_RM40			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	288	288	218%	218%
87-92	Drought	403	403	660	660	164%	164%
1971	BN	173	399	157	321	91%	80%
1972	D	84	96	158	158	188%	164%
1973	AN	154	515	93	248	60%	48%
1974	W	176	760	157	760	89%	100%
1975	W	176	728	195	489	111%	67%
1976	C	83	83	196	196	237%	237%
1977	C	50	50	93	93	186%	186%
1978	W	154	193	93	215	60%	111%
1979	AN	176	683	195	495	111%	72%
1980	W	177	1,205	158	1,129	89%	94%
1981	D	101	151	195	195	194%	130%
1982	W	159	1,862	93	1,394	58%	75%
1983	W	176	2,287	195	2,285	111%	100%
1984	AN	177	552	196	540	111%	98%
1985	D	112	247	157	157	141%	64%
1986	W	154	1,388	93	988	60%	71%
1987	C	91	91	195	195	216%	216%
1988	C	50	50	94	94	188%	188%
1989	C	72	72	93	93	129%	129%
1990	C	59	59	93	93	157%	157%
1991	C	72	72	93	93	130%	130%
1992	C	60	60	93	93	154%	154%
1993	W	154	154	93	93	60%	60%
1994	C	93	93	195	195	209%	209%
1995	W	154	1,482	93	1,244	60%	84%
1996	W	177	1,126	196	1,050	111%	93%
1997	W	176	859	195	859	111%	100%
1998	W	176	1,667	195	1,575	111%	94%
1999	AN	176	774	195	685	111%	88%
2000	AN	177	791	158	498	89%	63%
2001	D	100	140	157	157	158%	113%
2002	D	86	86	93	93	107%	107%
2003	BN	130	182	93	93	71%	51%
2004	D	82	295	161	161	196%	55%
2005	W	154	1,289	93	227	60%	18%
2006	W	176	1,759	198	1,757	112%	100%
2007	C	94	94	199	199	212%	212%
2008	C	75	75	93	93	124%	124%
2009	BN	106	106	93	93	88%	88%
2010	AN	158	218	157	157	100%	72%
2011	W	176	1,489	157	1,348	89%	91%
2012	D	104	118	199	199	192%	169%
Average (1971-2012)		129	581	145	502	113%	86%
Average (1980-2009)		125	636	142	547	113%	86%
Total (1971-2012)		5,411	24,398	6,099	21,101	113%	86%
Total (1980-2009)		3,746	19,067	4,247	16,422	113%	86%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	56	29	14	14	10	3	3	0	0	0	0
1972	24	20	14	14	0	0	0	0	0	0	0
1973	68	48	16	11	8	5	5	3	2	0	0
1974	156	126	89	56	19	18	11	11	0	0	0
1975	139	124	36	32	7	3	3	3	3	3	2
1976	100	99	21	21	0	0	0	0	0	0	0
1977	51	51	2	2	0	0	0	0	0	0	0
1978	66	49	2	2	0	0	0	0	0	0	0
1979	152	133	38	29	6	3	2	2	1	1	0
1980	269	267	156	121	67	38	37	35	28	26	20
1981	101	101	21	21	0	0	0	0	0	0	0
1982	192	176	138	123	112	112	111	92	72	65	28
1983	354	304	271	248	228	213	208	189	165	160	148
1984	158	139	97	82	73	69	57	49	41	33	33
1985	76	76	14	14	0	0	0	0	0	0	0
1986	193	172	97	96	86	34	30	21	21	14	13
1987	116	116	21	21	0	0	0	0	0	0	0
1988	45	45	2	2	0	0	0	0	0	0	0
1989	59	58	2	2	0	0	0	0	0	0	0
1990	52	51	2	2	0	0	0	0	0	0	0
1991	27	27	2	2	0	0	0	0	0	0	0
1992	22	22	2	2	0	0	0	0	0	0	0
1993	41	41	2	2	0	0	0	0	0	0	0
1994	61	60	21	21	0	0	0	0	0	0	0
1995	170	163	140	140	131	131	130	85	75	73	72
1996	171	164	109	102	66	43	25	24	23	13	6
1997	163	144	94	69	66	62	62	54	54	54	54
1998	226	225	174	170	156	147	145	97	75	71	61
1999	155	118	47	37	32	29	18	17	10	10	3
2000	159	154	60	22	0	0	0	0	0	0	0
2001	100	100	14	14	0	0	0	0	0	0	0
2002	60	60	2	2	0	0	0	0	0	0	0
2003	72	72	2	2	0	0	0	0	0	0	0
2004	99	98	14	14	0	0	0	0	0	0	0
2005	126	116	12	8	5	3	3	2	0	0	0
2006	214	213	171	170	151	138	102	96	84	68	67
2007	73	72	21	21	0	0	0	0	0	0	0
2008	47	47	2	2	0	0	0	0	0	0	0
2009	59	59	2	2	0	0	0	0	0	0	0
2010	62	62	14	14	0	0	0	0	0	0	0
2011	220	220	168	161	137	124	109	71	62	24	23
2012	98	98	21	21	0	0	0	0	0	0	0
Total number of days greater than threshold flow	4,852	4,519	2,147	1,911	1,360	1,175	1,061	851	716	615	530
Number of years flows NOT achieved for threshold period	0	0	0	0	24	24	24	25	27	28	29

Table 7. February through June La Grange 1 Day Flow Count

	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	46	21	14	14	10	3	3	0	0	0	0
1972	14	14	14	14	0	0	0	0	0	0	0
1973	32	20	16	11	8	5	5	3	2	0	0
1974	114	99	82	56	19	18	11	11	0	0	0
1975	65	51	36	32	7	3	3	3	3	3	2
1976	21	21	21	21	0	0	0	0	0	0	0
1977	2	2	2	2	0	0	0	0	0	0	0
1978	33	33	2	2	0	0	0	0	0	0	0
1979	75	60	38	29	6	3	2	2	1	1	0
1980	151	151	121	93	47	34	34	33	26	25	20
1981	21	21	21	21	0	0	0	0	0	0	0
1982	114	113	113	113	104	104	104	85	65	65	28
1983	150	149	149	148	148	148	148	147	146	144	135
1984	77	63	37	22	20	20	8	8	7	0	0
1985	14	14	14	14	0	0	0	0	0	0	0
1986	119	105	97	96	86	34	30	21	21	14	13
1987	21	21	21	21	0	0	0	0	0	0	0
1988	2	2	2	2	0	0	0	0	0	0	0
1989	2	2	2	2	0	0	0	0	0	0	0
1990	2	2	2	2	0	0	0	0	0	0	0
1991	2	2	2	2	0	0	0	0	0	0	0
1992	2	2	2	2	0	0	0	0	0	0	0
1993	2	2	2	2	0	0	0	0	0	0	0
1994	21	21	21	21	0	0	0	0	0	0	0
1995	93	93	93	93	91	91	91	61	61	61	61
1996	144	137	109	102	66	43	25	24	23	13	6
1997	82	64	57	39	36	32	32	26	26	26	26
1998	146	146	139	136	122	121	121	76	64	64	54
1999	107	77	47	37	32	29	18	17	10	10	3
2000	76	72	60	22	0	0	0	0	0	0	0
2001	14	14	14	14	0	0	0	0	0	0	0
2002	2	2	2	2	0	0	0	0	0	0	0
2003	2	2	2	2	0	0	0	0	0	0	0
2004	15	15	14	14	0	0	0	0	0	0	0
2005	32	32	6	6	4	3	3	2	0	0	0
2006	148	148	140	140	133	128	92	86	77	61	60
2007	22	22	21	21	0	0	0	0	0	0	0
2008	2	2	2	2	0	0	0	0	0	0	0
2009	2	2	2	2	0	0	0	0	0	0	0
2010	14	14	14	14	0	0	0	0	0	0	0
2011	134	134	127	127	118	113	103	65	58	20	19
2012	22	22	21	21	0	0	0	0	0	0	0
Total number of days greater than threshold flow	2,159	1,989	1,701	1,536	1,057	932	833	670	590	507	427
Number of years flows NOT achieved for threshold period	0	0	0	0	24	24	24	25	27	29	30

Table 8. La Grange Consecutive 7 Day Flow Count

	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	3	3	1	1	1	0	0	0	0	0	0
1972	2	1	1	1	0	0	0	0	0	0	0
1973	3	3	1	1	1	0	0	0	0	0	0
1974	4	4	5	4	1	1	0	0	0	0	0
1975	6	5	3	3	0	0	0	0	0	0	0
1976	4	4	2	2	0	0	0	0	0	0	0
1977	2	2	0	0	0	0	0	0	0	0	0
1978	3	2	0	0	0	0	0	0	0	0	0
1979	6	6	4	2	0	0	0	0	0	0	0
1980	3	4	2	3	3	1	1	1	1	1	1
1981	3	3	2	2	0	0	0	0	0	0	0
1982	4	4	3	2	2	2	2	3	3	3	1
1983	2	4	5	6	6	6	6	5	5	4	3
1984	4	4	5	4	3	3	3	3	3	2	2
1985	3	3	1	1	0	0	0	0	0	0	0
1986	3	4	2	2	3	1	1	1	1	1	1
1987	4	4	2	2	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	1	1	0	0	0	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	1	1	0	0	0	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	1	0	0	0	0	0	0	0	0	0
1994	4	4	2	2	0	0	0	0	0	0	0
1995	2	2	1	1	1	1	2	2	1	1	1
1996	2	2	3	3	3	3	2	2	2	1	0
1997	5	5	3	2	2	1	1	2	2	2	2
1998	3	3	3	3	3	4	4	4	3	3	2
1999	3	5	4	3	2	2	1	1	1	1	0
2000	5	4	2	2	0	0	0	0	0	0	0
2001	3	3	1	1	0	0	0	0	0	0	0
2002	3	3	0	0	0	0	0	0	0	0	0
2003	2	2	0	0	0	0	0	0	0	0	0
2004	3	2	1	1	0	0	0	0	0	0	0
2005	3	3	0	0	0	0	0	0	0	0	0
2006	3	3	4	4	5	4	4	4	3	2	2
2007	4	3	2	2	0	0	0	0	0	0	0
2008	1	1	0	0	0	0	0	0	0	0	0
2009	1	1	0	0	0	0	0	0	0	0	0
2010	2	2	1	1	0	0	0	0	0	0	0
2011	5	5	2	2	2	1	2	2	2	1	1
2012	3	3	2	2	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	122	122	70	65	38	30	29	30	27	22	16
Number of years flows NOT achieved for threshold period	0	0	13	13	27	29	30	30	30	30	32

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	2	1	1	1	0	0	0	0	0	0
1972	1	1	1	1	0	0	0	0	0	0	0
1973	1	1	1	1	1	0	0	0	0	0	0
1974	3	3	4	4	1	1	0	0	0	0	0
1975	4	3	3	3	0	0	0	0	0	0	0
1976	2	2	2	2	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	4	4	4	2	0	0	0	0	0	0	0
1980	1	1	1	2	1	1	1	1	1	1	1
1981	2	2	2	2	0	0	0	0	0	0	0
1982	1	2	2	2	2	2	2	3	3	3	1
1983	1	2	2	3	3	3	3	2	3	3	3
1984	4	4	3	2	1	1	1	1	1	0	0
1985	1	1	1	1	0	0	0	0	0	0	0
1986	1	2	2	2	3	1	1	1	1	1	1
1987	2	2	2	2	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0
1994	2	2	2	2	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	1	1	1	1	1
1996	1	1	3	3	3	3	2	2	2	1	0
1997	3	3	3	2	2	1	1	1	1	1	1
1998	1	1	2	2	2	3	3	3	3	3	2
1999	2	4	4	3	2	2	1	1	1	1	0
2000	3	2	2	2	0	0	0	0	0	0	0
2001	1	1	1	1	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0
2004	1	1	1	1	0	0	0	0	0	0	0
2005	1	1	0	0	0	0	0	0	0	0	0
2006	3	3	3	3	4	4	4	4	3	2	2
2007	2	2	2	2	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0
2010	1	1	1	1	0	0	0	0	0	0	0
2011	2	2	2	2	1	1	2	2	2	1	1
2012	2	2	2	2	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	57	60	60	57	28	24	22	22	22	18	13
Number of years flows NOT achieved for threshold period	11	11	13	13	27	29	30	30	30	31	33

Table 10. La Grange Consecutive 14 Day Flow Count

	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	2	1	1	1	0	0	0	0	0	0	0
1972	1	1	1	1	0	0	0	0	0	0	0
1973	2	2	1	0	0	0	0	0	0	0	0
1974	4	3	3	3	0	0	0	0	0	0	0
1975	5	4	2	1	0	0	0	0	0	0	0
1976	3	3	1	1	0	0	0	0	0	0	0
1977	1	1	0	0	0	0	0	0	0	0	0
1978	3	2	0	0	0	0	0	0	0	0	0
1979	4	4	1	1	0	0	0	0	0	0	0
1980	3	4	2	3	2	1	1	1	1	1	1
1981	2	2	1	1	0	0	0	0	0	0	0
1982	3	4	3	2	2	2	2	3	2	2	1
1983	1	2	3	3	2	3	3	3	2	2	2
1984	2	2	3	3	3	3	2	2	2	1	1
1985	3	3	1	1	0	0	0	0	0	0	0
1986	3	4	2	2	2	1	1	1	1	1	0
1987	3	3	1	1	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	1	1	0	0	0	0	0	0	0	0	0
1990	1	1	0	0	0	0	0	0	0	0	0
1991	1	1	0	0	0	0	0	0	0	0	0
1992	1	1	0	0	0	0	0	0	0	0	0
1993	1	1	0	0	0	0	0	0	0	0	0
1994	2	2	1	1	0	0	0	0	0	0	0
1995	2	2	1	1	1	1	2	1	1	1	1
1996	2	2	3	2	2	2	1	1	1	0	0
1997	5	4	2	1	1	1	1	2	2	2	2
1998	2	2	3	3	3	4	3	3	3	3	1
1999	3	5	2	1	1	1	1	1	0	0	0
2000	4	4	2	1	0	0	0	0	0	0	0
2001	3	3	1	1	0	0	0	0	0	0	0
2002	1	1	0	0	0	0	0	0	0	0	0
2003	2	2	0	0	0	0	0	0	0	0	0
2004	2	2	1	1	0	0	0	0	0	0	0
2005	2	2	0	0	0	0	0	0	0	0	0
2006	3	3	4	4	3	3	2	2	2	2	2
2007	2	2	1	1	0	0	0	0	0	0	0
2008	1	1	0	0	0	0	0	0	0	0	0
2009	1	1	0	0	0	0	0	0	0	0	0
2010	2	2	1	1	0	0	0	0	0	0	0
2011	4	4	2	2	1	1	2	2	2	1	1
2012	2	2	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	96	97	51	45	23	23	21	22	19	16	12
Number of years flows NOT achieved for threshold period	0	0	13	14	30	30	30	30	31	32	33

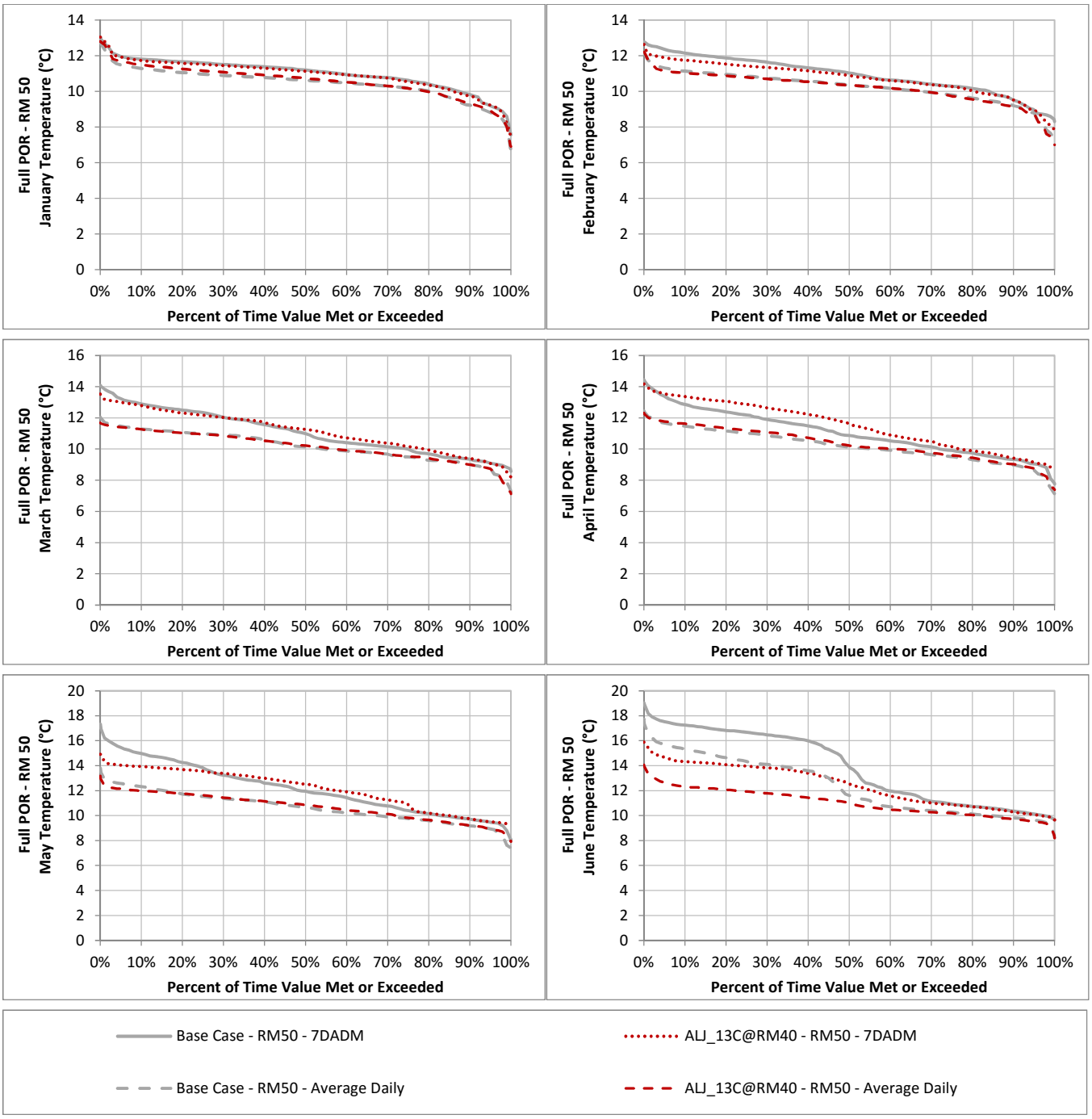
Table 11. February through June La Grange Consecutive 14 Day Flow Count

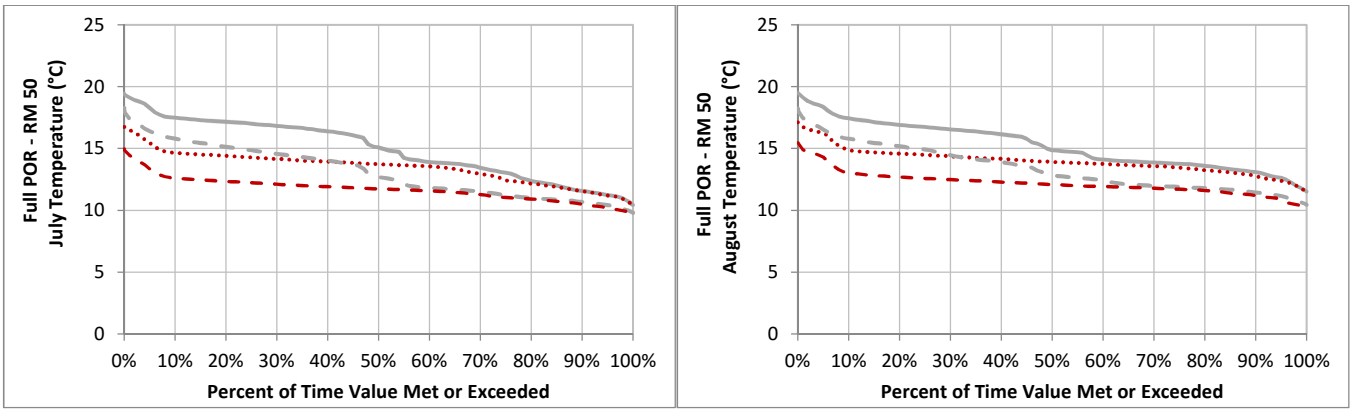
	ALJ_13C_RM40 Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	1	1	1	0	0	0	0	0	0	0
1972	1	1	1	1	0	0	0	0	0	0	0
1973	1	1	1	0	0	0	0	0	0	0	0
1974	3	2	3	3	0	0	0	0	0	0	0
1975	3	2	2	1	0	0	0	0	0	0	0
1976	1	1	1	1	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	2	2	1	1	0	0	0	0	0	0	0
1980	1	1	1	2	1	1	1	1	1	1	1
1981	1	1	1	1	0	0	0	0	0	0	0
1982	1	2	2	2	2	2	2	3	2	2	1
1983	1	1	1	2	2	2	2	2	2	2	2
1984	2	2	1	1	1	1	0	0	0	0	0
1985	1	1	1	1	0	0	0	0	0	0	0
1986	1	2	2	2	2	1	1	1	1	1	0
1987	1	1	1	1	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0
1994	1	1	1	1	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	1	1	1	1	1
1996	1	1	3	2	2	2	1	1	1	0	0
1997	3	2	2	1	1	1	1	1	1	1	1
1998	1	1	2	2	2	3	3	3	3	3	1
1999	2	4	2	1	1	1	1	1	0	0	0
2000	2	2	2	1	0	0	0	0	0	0	0
2001	1	1	1	1	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0
2004	1	1	1	1	0	0	0	0	0	0	0
2005	1	1	0	0	0	0	0	0	0	0	0
2006	3	3	3	3	3	3	2	2	2	2	2
2007	1	1	1	1	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0
2010	1	1	1	1	0	0	0	0	0	0	0
2011	2	2	2	2	1	1	2	2	2	1	1
2012	1	1	1	1	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	45	45	43	39	19	19	17	18	16	14	10
Number of years flows NOT achieved for threshold period	11	11	13	14	30	30	31	31	32	33	34

ALJ_13C@RM40

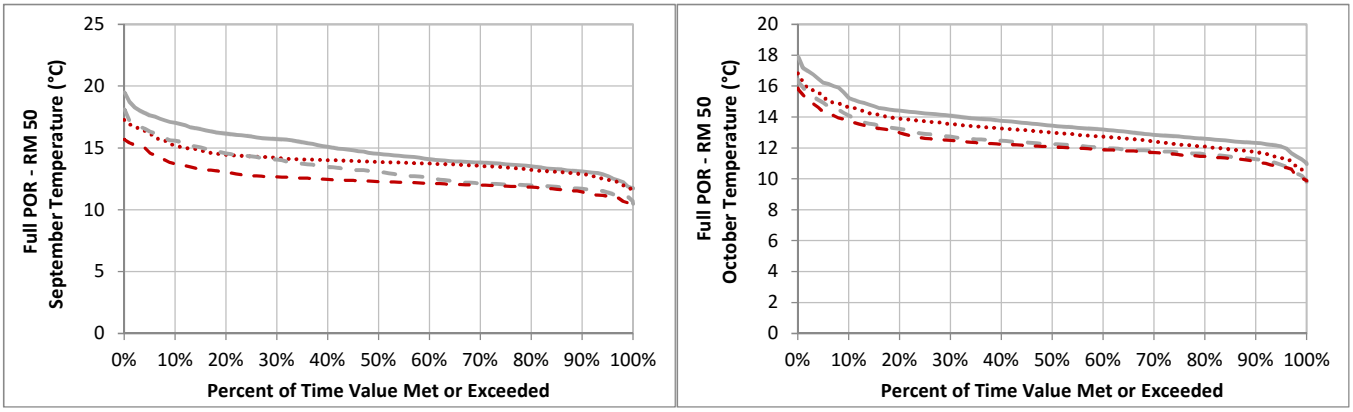
Dynamic Routing

Results Summary

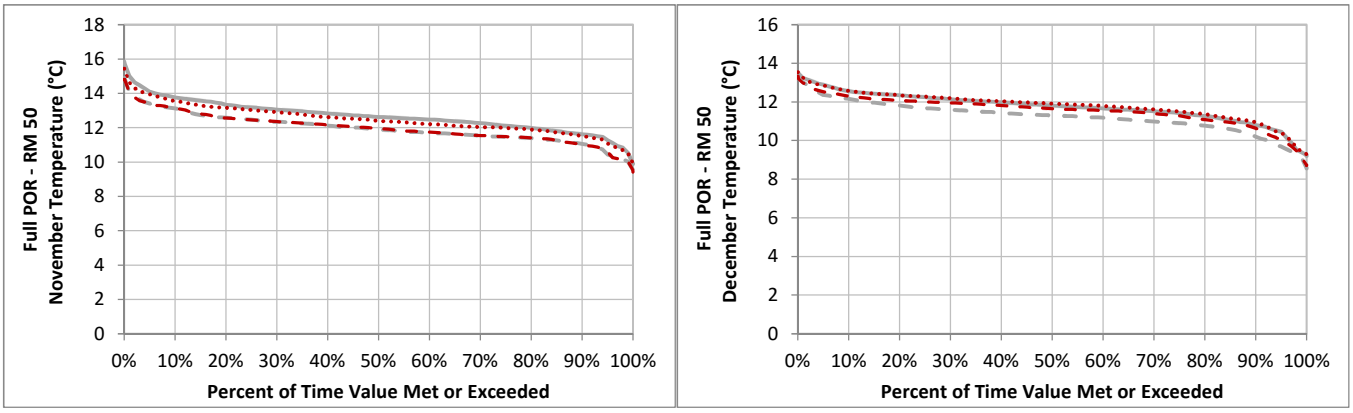

Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
ALJ_13C@RM40 - RM50 - 7DADM
Base Case - RM50 - Average Daily
ALJ_13C@RM40 - RM50 - Average Daily


Full POR - RM 50
July Temperature (°C)
Percent of Time Value Met or Exceeded

Full POR - RM 50
August Temperature (°C)
Percent of Time Value Met or Exceeded

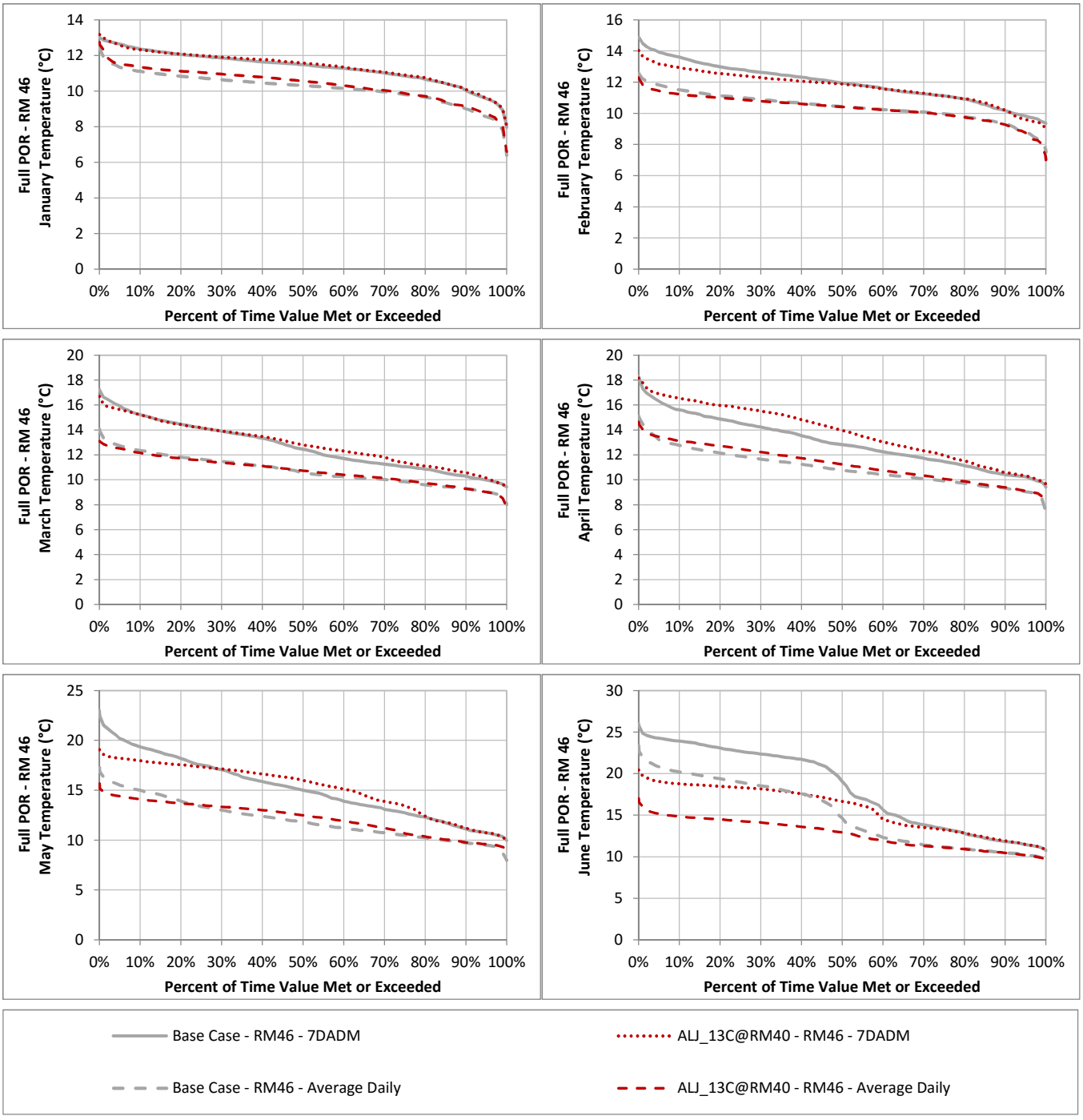

Full POR - RM 50
September Temperature (°C)
Percent of Time Value Met or Exceeded

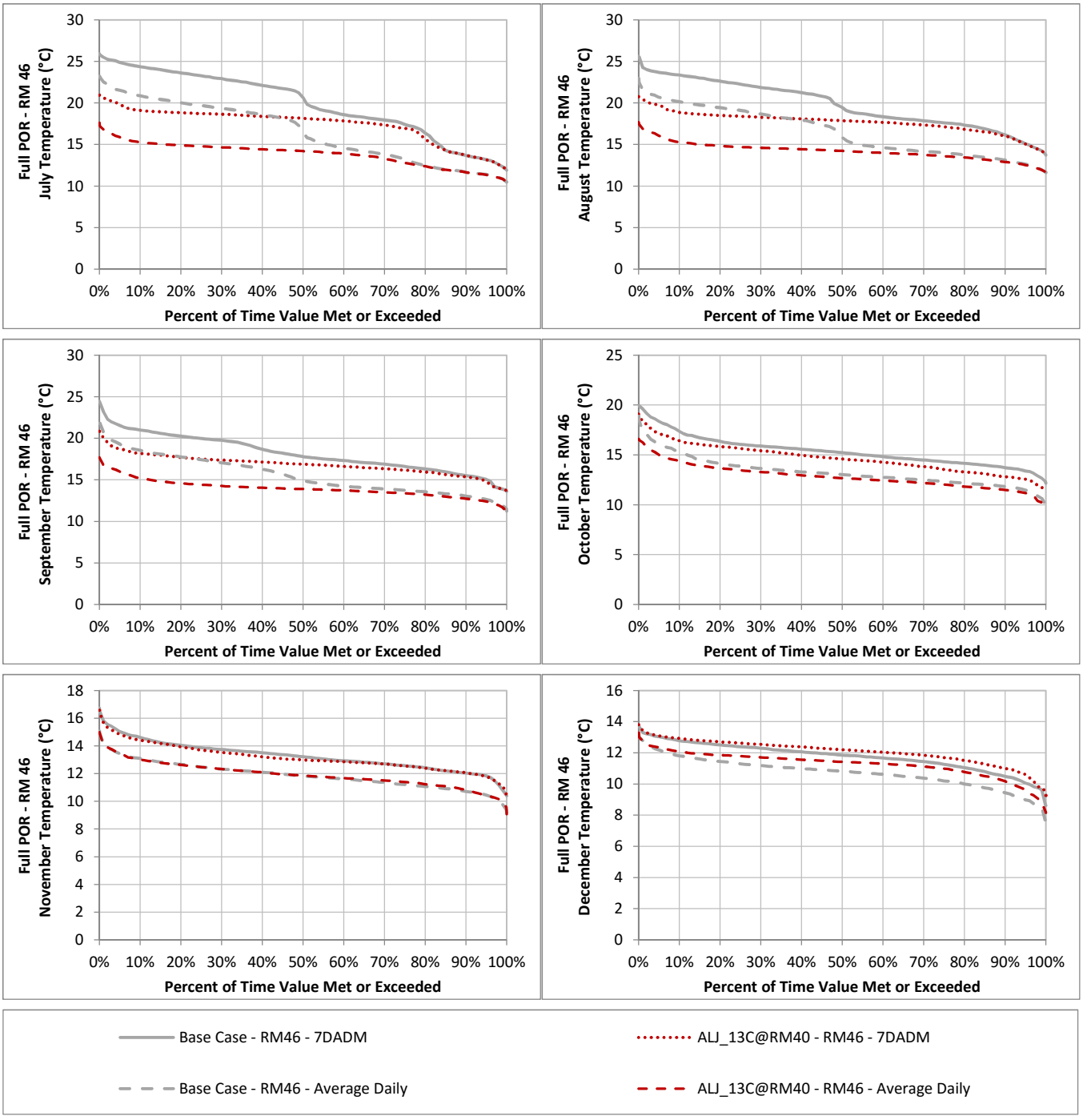
Full POR - RM 50
October Temperature (°C)
Percent of Time Value Met or Exceeded

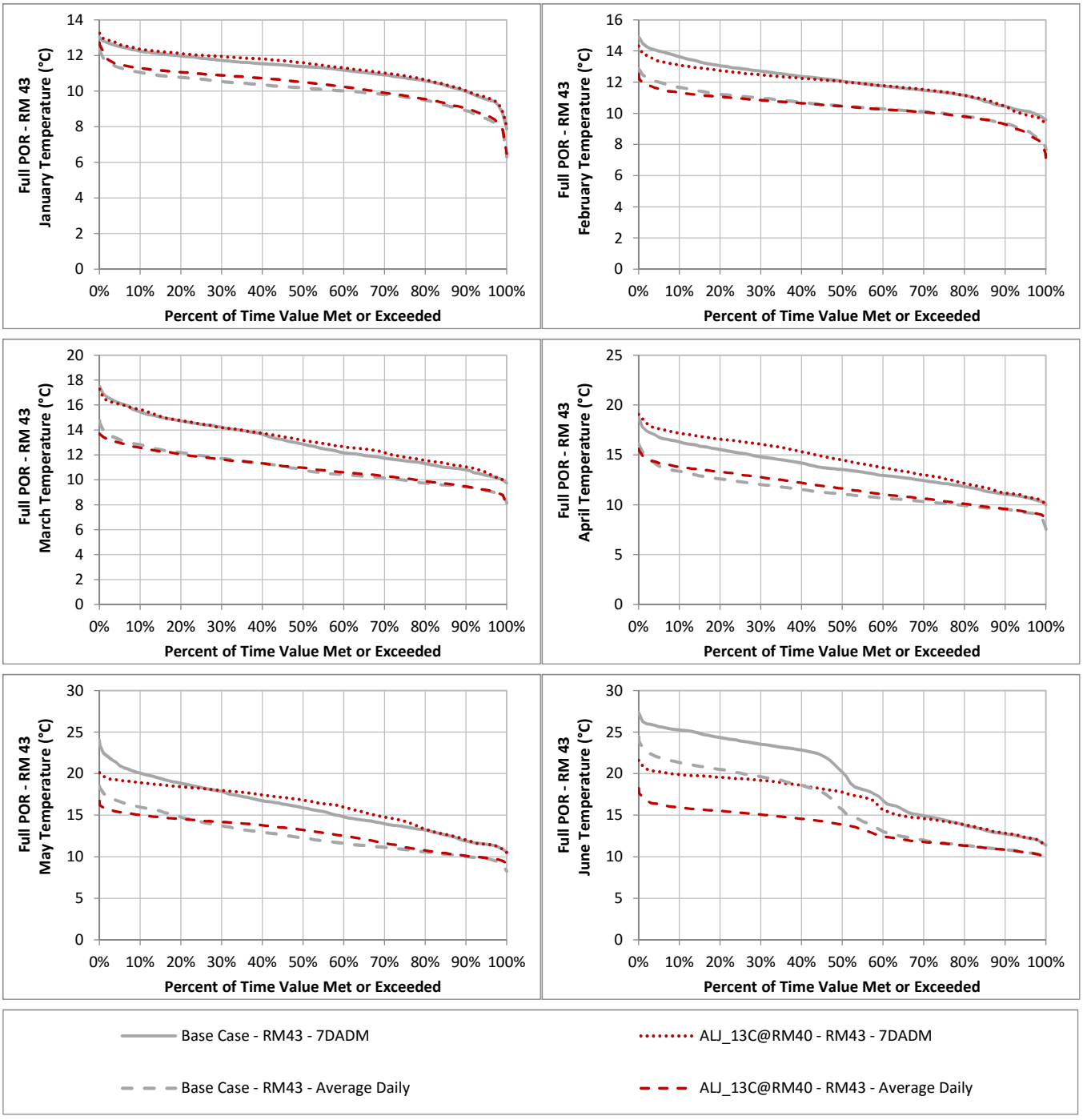

Full POR - RM 50
November Temperature (°C)
Percent of Time Value Met or Exceeded

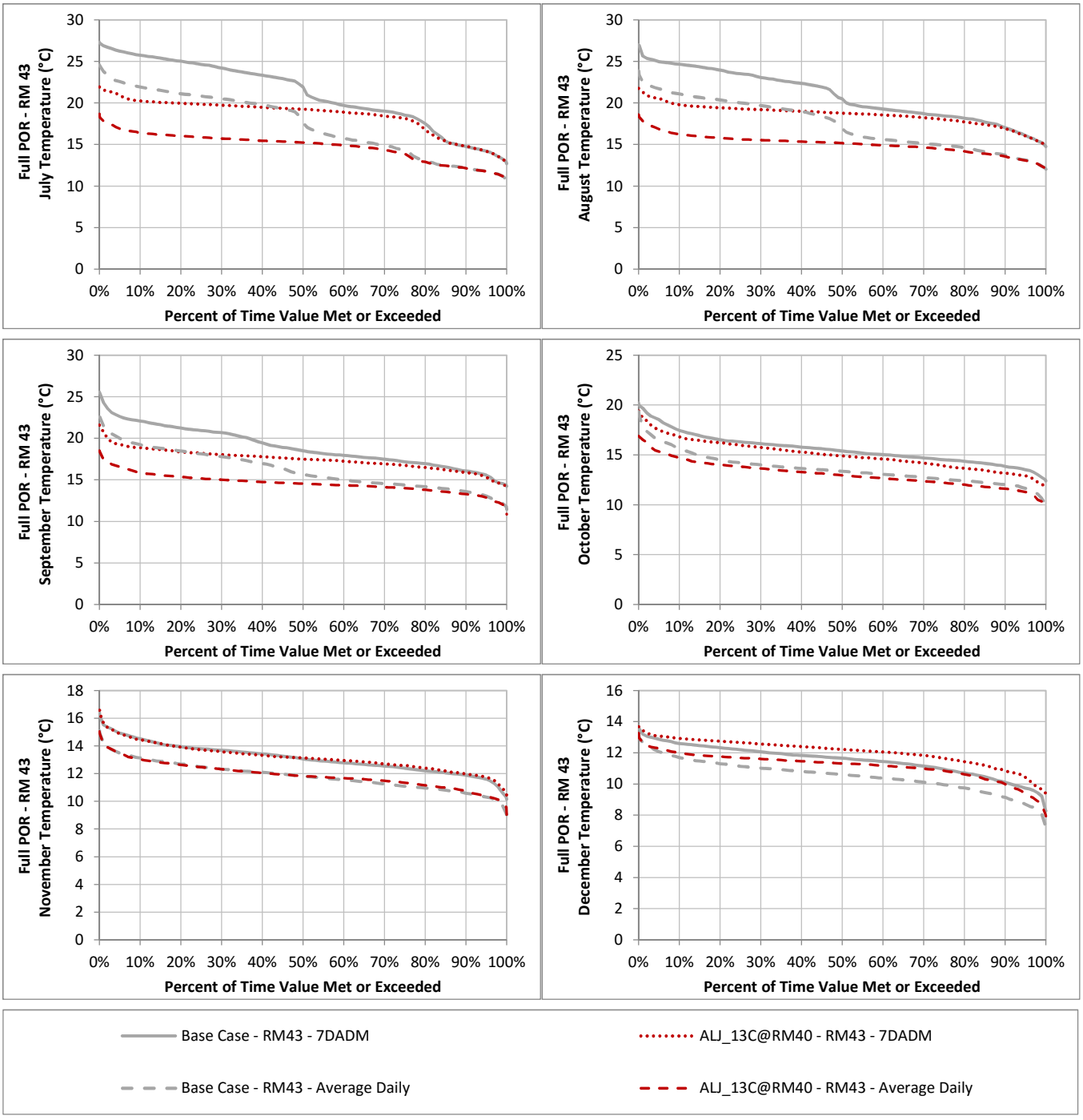
Full POR - RM 50
December Temperature (°C)
Percent of Time Value Met or Exceeded

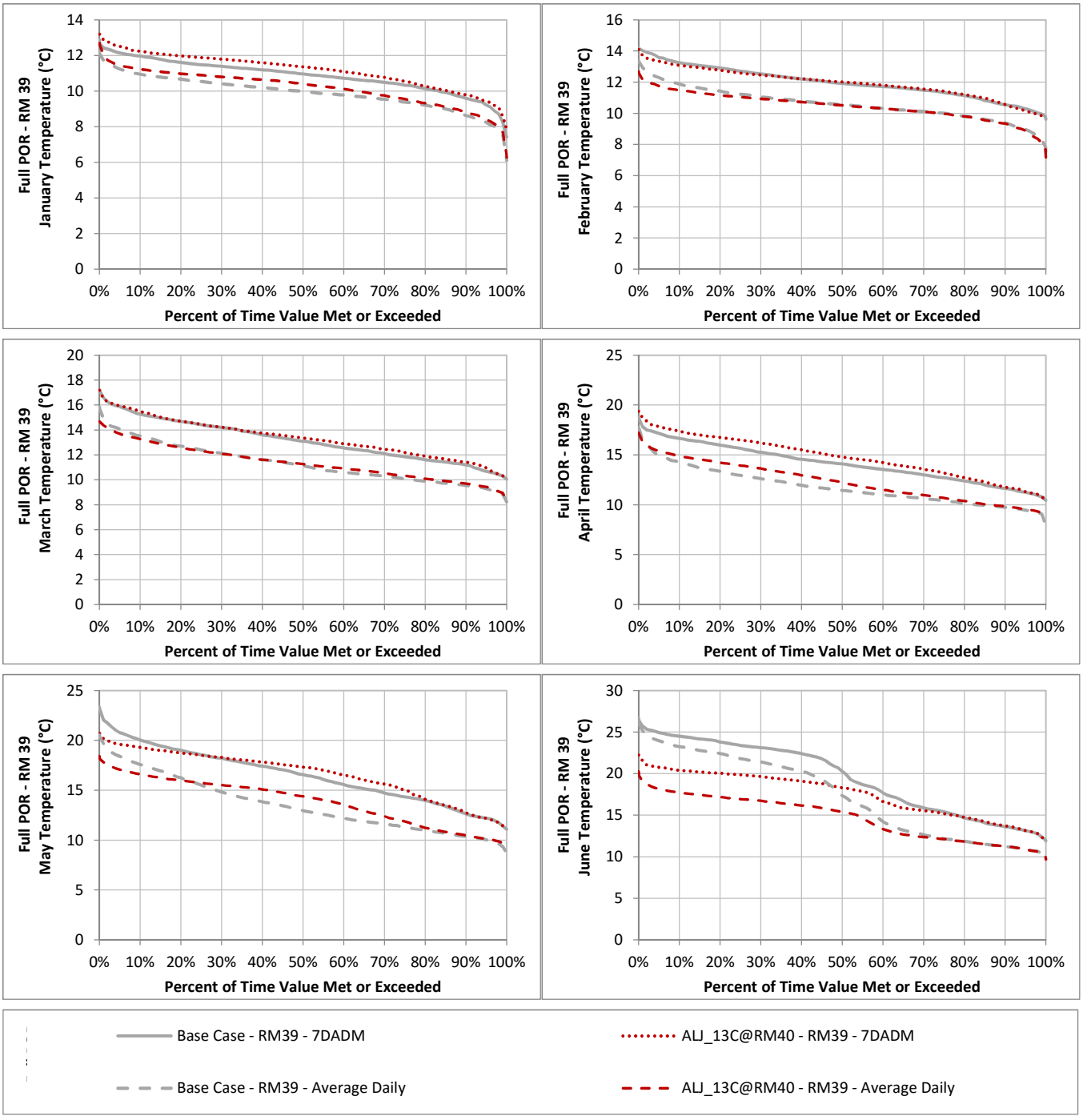

Base Case - RM50 - 7DADM
ALJ_13C@RM40 - RM50 - 7DADM
Base Case - RM50 - Average Daily
ALJ_13C@RM40 - RM50 - Average Daily

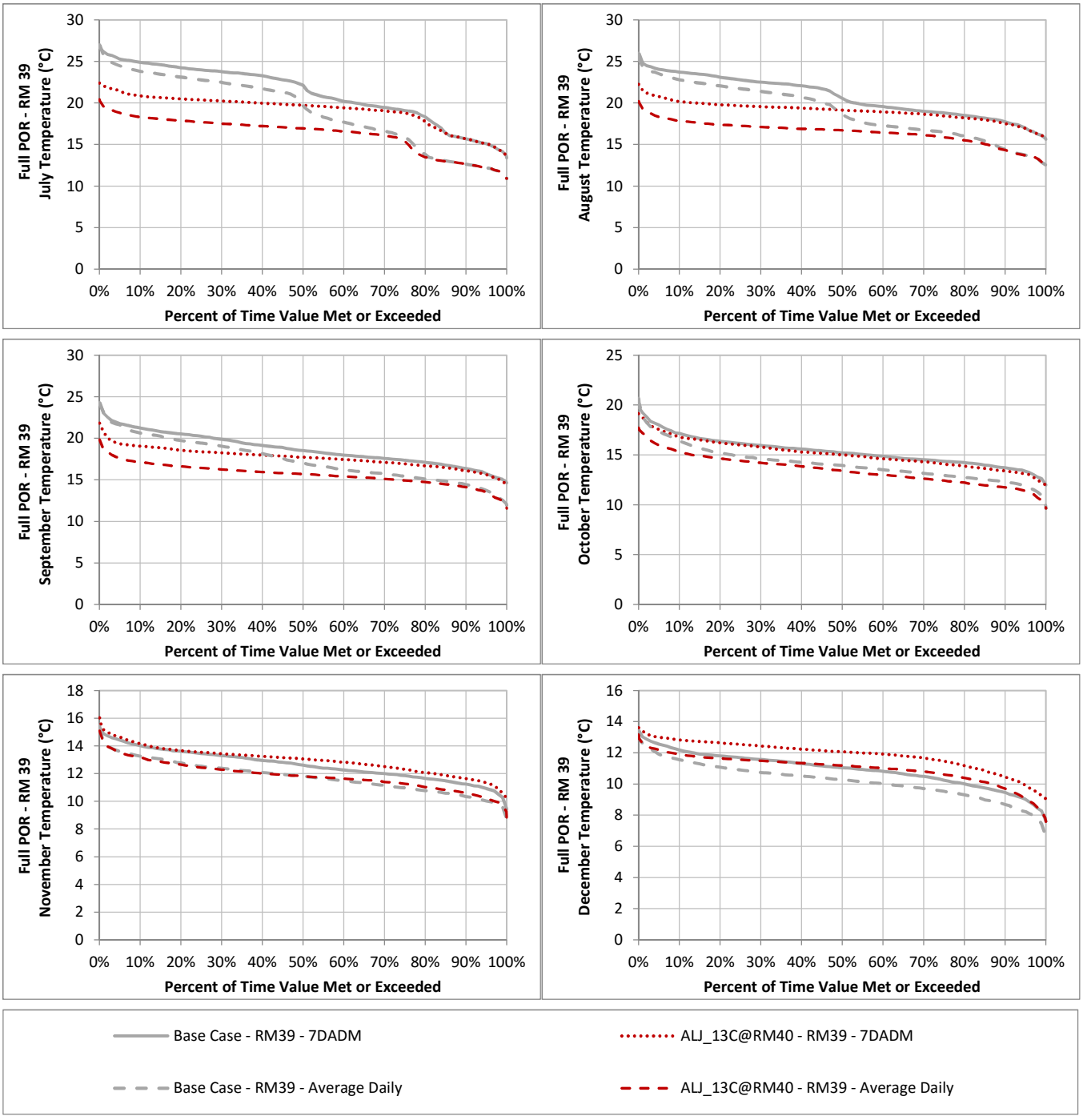

Full POR - RM 46 January Temperature (°C)
Full POR - RM 46 February Temperature (°C)
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
ALJ_13C@RM40 - RM46 - 7DADM
Base Case - RM46 - Average Daily
ALJ_13C@RM40 - RM46 - Average Daily

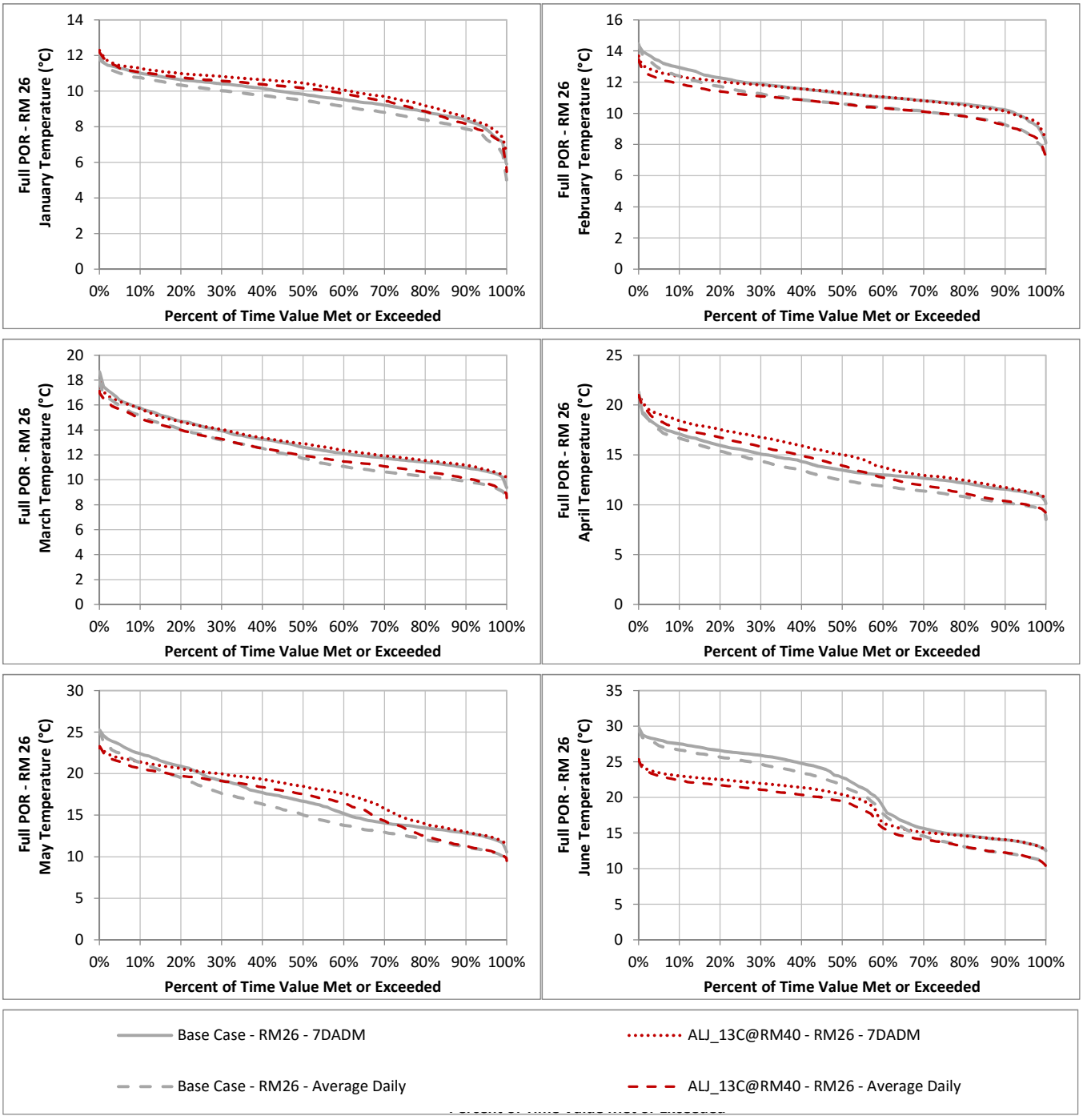

Full POR - RM 46
July Temperature (°C)
Full POR - RM 46
August Temperature (°C)
Full POR - RM 46
September Temperature (°C)
Full POR - RM 46
October Temperature (°C)
Full POR - RM 46
November Temperature (°C)
Full POR - RM 46
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
ALJ_13C@RM40 - RM46 - 7DADM
Base Case - RM46 - Average Daily
ALJ_13C@RM40 - RM46 - Average Daily

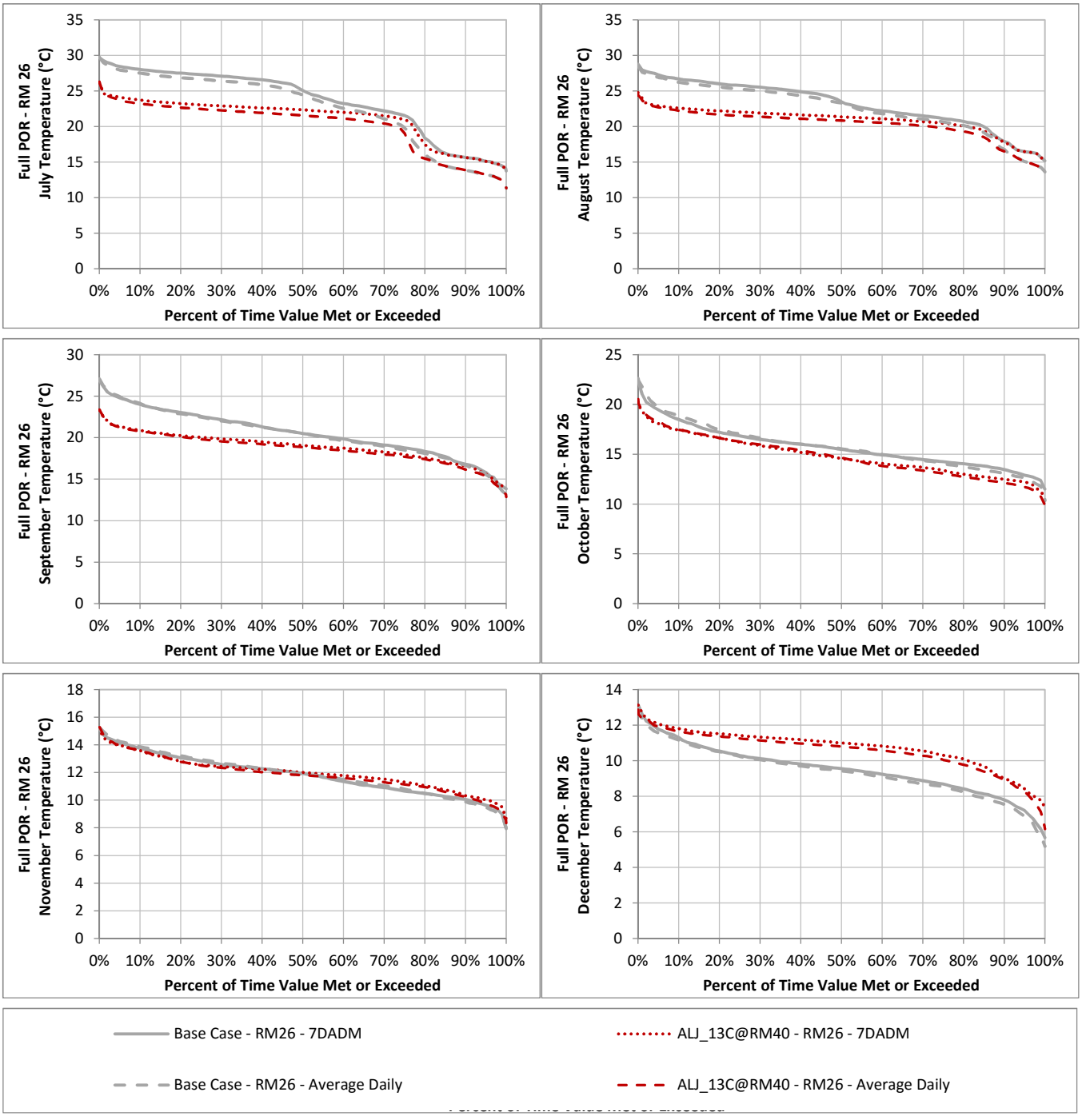

Full POR - RM 43 January Temperature (°C)
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
ALJ_13C@RM40 - RM43 - 7DADM
Base Case - RM43 - Average Daily
ALJ_13C@RM40 - RM43 - Average Daily

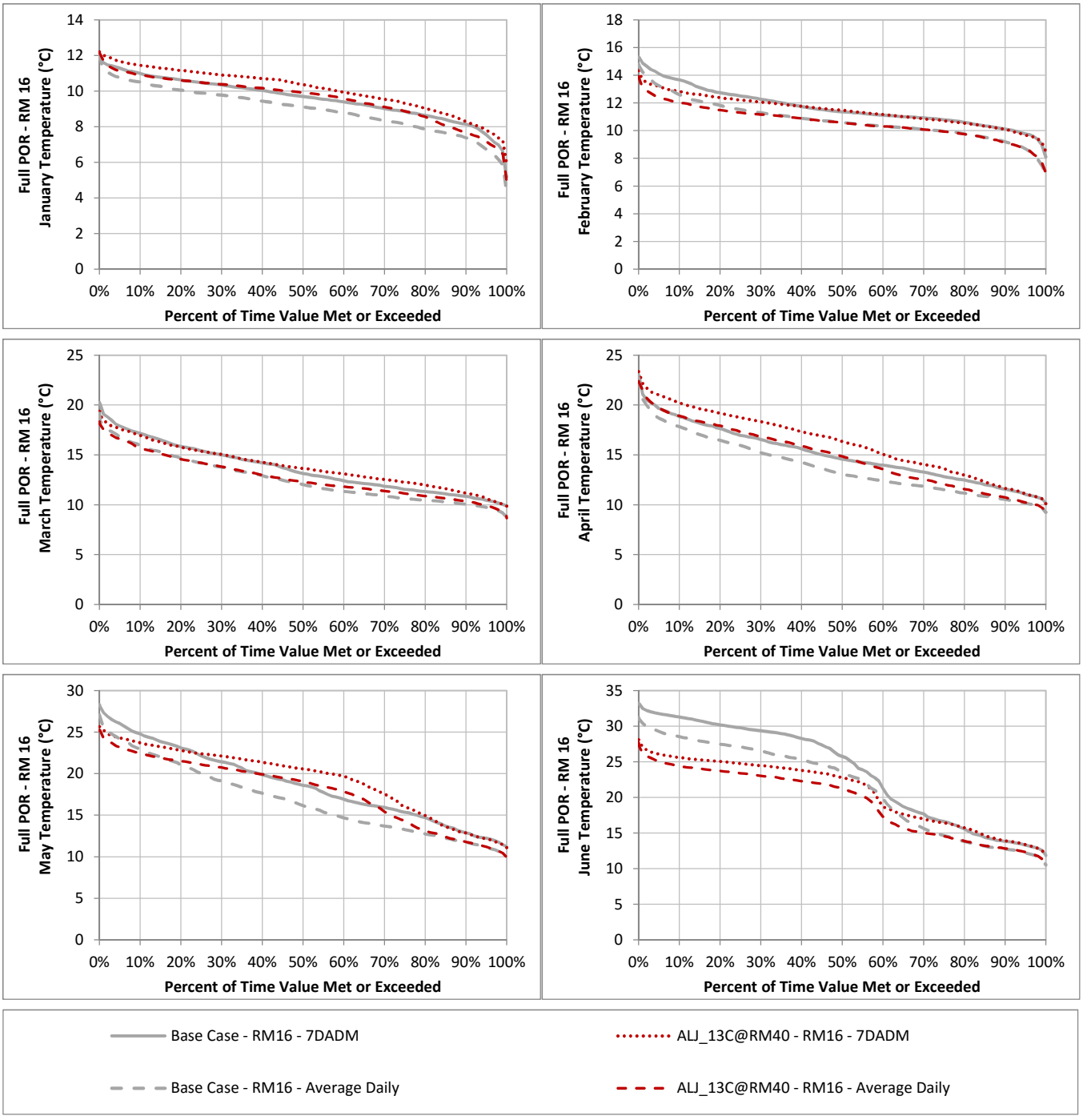

Full POR - RM 43
July Temperature (°C)
Full POR - RM 43
August Temperature (°C)
Full POR - RM 43
September Temperature (°C)
Full POR - RM 43
October Temperature (°C)
Full POR - RM 43
November Temperature (°C)
Full POR - RM 43
December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
ALJ_13C@RM40 - RM43 - 7DADM
Base Case - RM43 - Average Daily
ALJ_13C@RM40 - RM43 - Average Daily

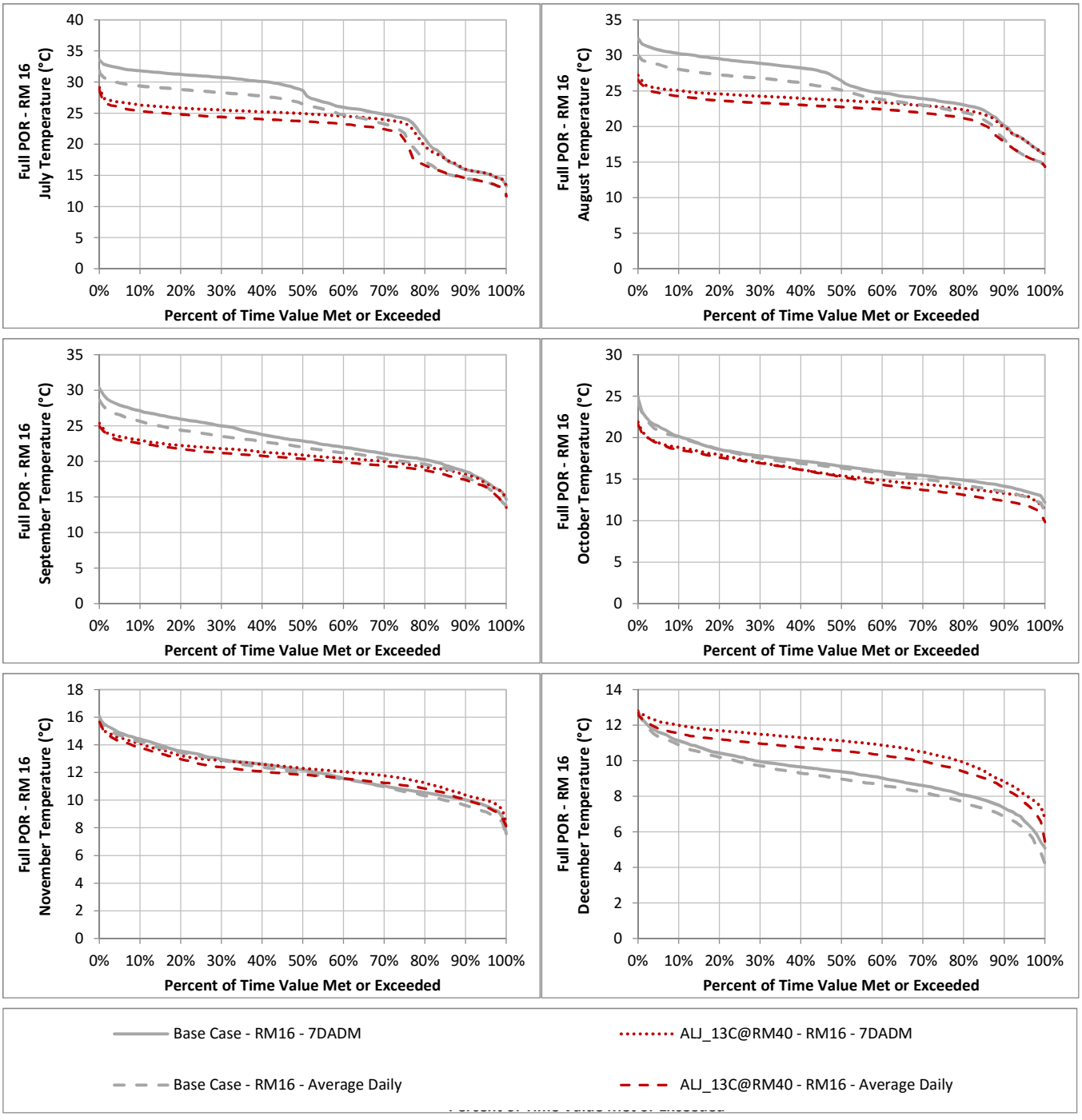

Full POR - RM 39 January Temperature (°C)
Full POR - RM 39 February Temperature (°C)
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
ALJ_13C@RM40 - RM39 - 7DADM
Base Case - RM39 - Average Daily
ALJ_13C@RM40 - RM39 - Average Daily

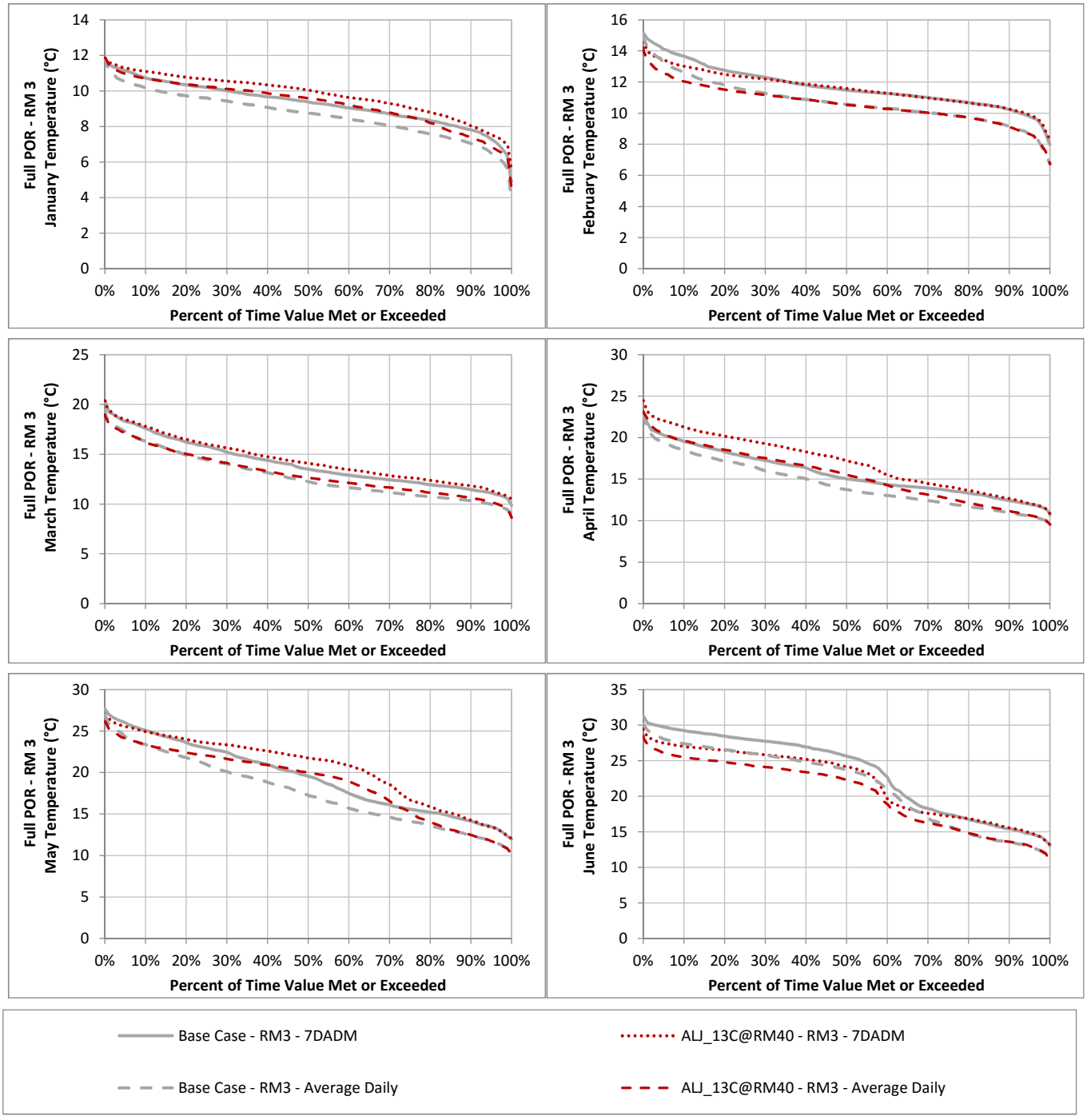

Full POR - RM 39
July Temperature (°C)
Full POR - RM 39
August Temperature (°C)
Full POR - RM 39
September Temperature (°C)
Full POR - RM 39
October Temperature (°C)
Full POR - RM 39
November Temperature (°C)
Full POR - RM 39
December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
ALJ_13C@RM40 - RM39 - 7DADM
Base Case - RM39 - Average Daily
ALJ_13C@RM40 - RM39 - Average Daily

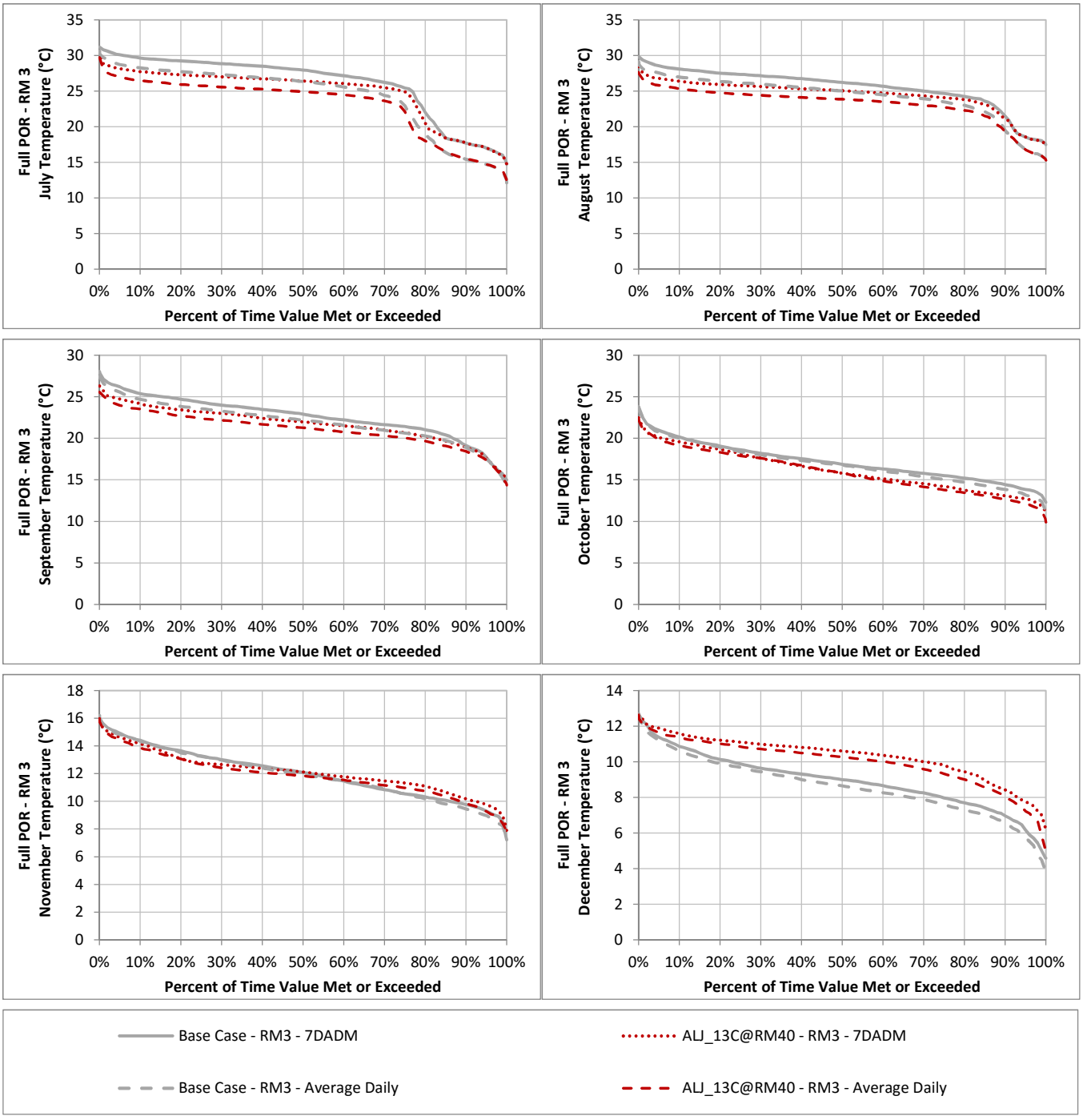

Full POR - RM 26 January Temperature (°C)
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
ALJ_13C@RM40 - RM26 - 7DADM
Base Case - RM26 - Average Daily
ALJ_13C@RM40 - RM26 - Average Daily


Full POR - RM 26 July Temperature (°C)
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
ALJ_13C@RM40 - RM26 - 7DADM
Base Case - RM26 - Average Daily
ALJ_13C@RM40 - RM26 - Average Daily


Full POR - RM 16 January Temperature (°C)
Full POR - RM 16 February Temperature (°C)
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
ALJ_13C@RM40 - RM16 - 7DADM
Base Case - RM16 - Average Daily
ALJ_13C@RM40 - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
ALJ_13C@RM40 - RM16 - 7DADM
Base Case - RM16 - Average Daily
ALJ_13C@RM40 - RM16 - Average Daily


Full POR - RM 3
January Temperature (°C)
Full POR - RM 3
February Temperature (°C)
Full POR - RM 3
March Temperature (°C)
Full POR - RM 3
April Temperature (°C)
Full POR - RM 3
May Temperature (°C)
Full POR - RM 3
June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM3 - 7DADM
ALJ_13C@RM40 - RM3 - 7DADM
Base Case - RM3 - Average Daily
ALJ_13C@RM40 - RM3 - Average Daily


Full POR - RM 3
July Temperature (°C)
August Temperature (°C)
September Temperature (°C)
October Temperature (°C)
November Temperature (°C)
December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM3 - 7DADM
Base Case - RM3 - Average Daily
ALJ_13C@RM40 - RM3 - 7DADM
ALJ_13C@RM40 - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–8

SUMMARY DESCRIPTION AND RESULTS OF OPERATIONS AND RIVER TEMPERATURE MODEL SIMULATION OF THE "EPA 2003: SCENARIO 2" ALTERNATIVE

Base Case depicts the operation of the Don Pedro Project in accordance with the current FERC license, ACOE flood control management guidelines, and the Districts' irrigation and M&I water management practices. Under FERC policy, the Base Case represents the "No Action" alternative for purposes of evaluating future operation scenarios under NEPA. For purposes of representing the City and County of San Francisco (CCSF) operations, the Base Case also includes changes that are permitted under CEQA, approved by CCSF, and authorized (funded), but not yet fully implemented at the time of model development. Under Base Case conditions, the Districts are responsible for meeting 100% of the FERC license minimum flows. For a complete description of the Base Case, including Districts' and CCSF water supply operations, see W&AR-02: Tuolumne River Operations Model documentation provided in the AFLA.

- ***EPA 2003: Scenario 2*** is the designation for a simulation of an alternative Don Pedro Project operations scenario intended to meet the temperature benchmarks identified by EPA (2003) as applied by the EPA to the Tuolumne River. A full description of the scenario is provided in the text of Section 5.14.2.9 of the Developmental Analysis.

EPA

Operations Modeling

Results Summary

Table 1. Generation by Month in MWh

	Base Case	EPA	% of Base Case
January	1,063,873	619,216	58%
February	1,722,819	896,875	52%
March	3,042,430	1,899,029	62%
April	3,481,703	3,082,990	89%
May	3,491,340	4,042,997	116%
June	3,434,821	3,666,313	107%
July	3,521,988	3,486,838	99%
August	2,710,847	2,761,622	102%
September	1,340,662	2,626,681	196%
October	918,413	2,180,461	237%
November	402,483	960,679	239%
December	613,223	859,653	140%
Total	25,744,602	27,083,353	105%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case		EPA		
			TAF	% of Full	TAF	% of Base Case	% of Full
76-77	Drought	1,836	1,629	89%	623	38%	34%
87-92	Drought	5,198	4,590	88%	2,325	51%	45%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	444	49%	49%
1977	C	921	713	77%	179	25%	19%
1978	W	767	752	98%	723	96%	94%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	436	49%	49%
1988	C	855	759	89%	375	49%	44%
1989	C	846	744	88%	370	50%	44%
1990	C	876	771	88%	386	50%	44%
1991	C	881	774	88%	388	50%	44%
1992	C	844	647	77%	370	57%	44%
1993	W	823	807	98%	788	98%	96%
1994	C	835	835	100%	404	48%	48%
1995	W	774	774	100%	741	96%	96%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	448	50%	50%
2003	BN	885	885	100%	435	49%	49%
2004	D	940	940	100%	434	46%	46%
2005	W	874	874	100%	839	96%	96%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	491	53%	53%
2008	C	882	882	100%	386	44%	44%
2009	BN	903	903	100%	868	96%	96%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	694	83%	81%
Total		36,190	35,343	98%	29,159	83%	81%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case			EPA	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	533	536	100%	183	34%
87-92	C	1,600	1,502	94%	183	11%
1971	BN	267	235	100%	235	100%
1972	D	267	270	100%	250	80%
1973	AN	267	219	100%	186	100%
1974	W	267	194	100%	194	100%
1975	W	267	204	100%	204	100%
1976	C	267	267	100%	183	0%
1977	C	267	269	90%	0	0%
1978	W	267	205	100%	83	100%
1979	AN	267	243	100%	243	100%
1980	W	267	198	100%	198	100%
1981	D	267	248	100%	225	80%
1982	W	267	189	100%	160	100%
1983	W	267	178	100%	178	100%
1984	AN	267	235	100%	235	100%
1985	D	267	257	100%	238	80%
1986	W	267	233	100%	199	100%
1987	C	267	268	100%	183	0%
1988	C	267	267	90%	0	0%
1989	C	267	250	90%	0	0%
1990	C	267	240	90%	0	0%
1991	C	267	243	90%	0	0%
1992	C	267	235	90%	0	0%
1993	W	267	211	100%	67	80%
1994	C	267	264	100%	143	0%
1995	W	267	189	100%	85	100%
1996	W	267	215	100%	215	100%
1997	W	267	222	100%	222	100%
1998	W	267	196	100%	196	100%
1999	AN	267	225	100%	225	100%
2000	AN	267	219	100%	219	100%
2001	D	267	251	100%	233	80%
2002	D	267	253	100%	133	0%
2003	BN	267	234	100%	67	80%
2004	D	267	249	100%	131	0%
2005	W	267	193	100%	85	100%
2006	W	267	199	100%	199	100%
2007	C	267	265	100%	180	0%
2008	C	267	247	100%	0	0%
2009	BN	267	240	100%	0	0%
2010	AN	267	226	100%	83	100%
2011	W	267	212	100%	212	100%
2012	D	267	220	100%	202	80%
Average		267	230	86%	145	54%
Total		11,197	9,676	86%	6,089	54%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

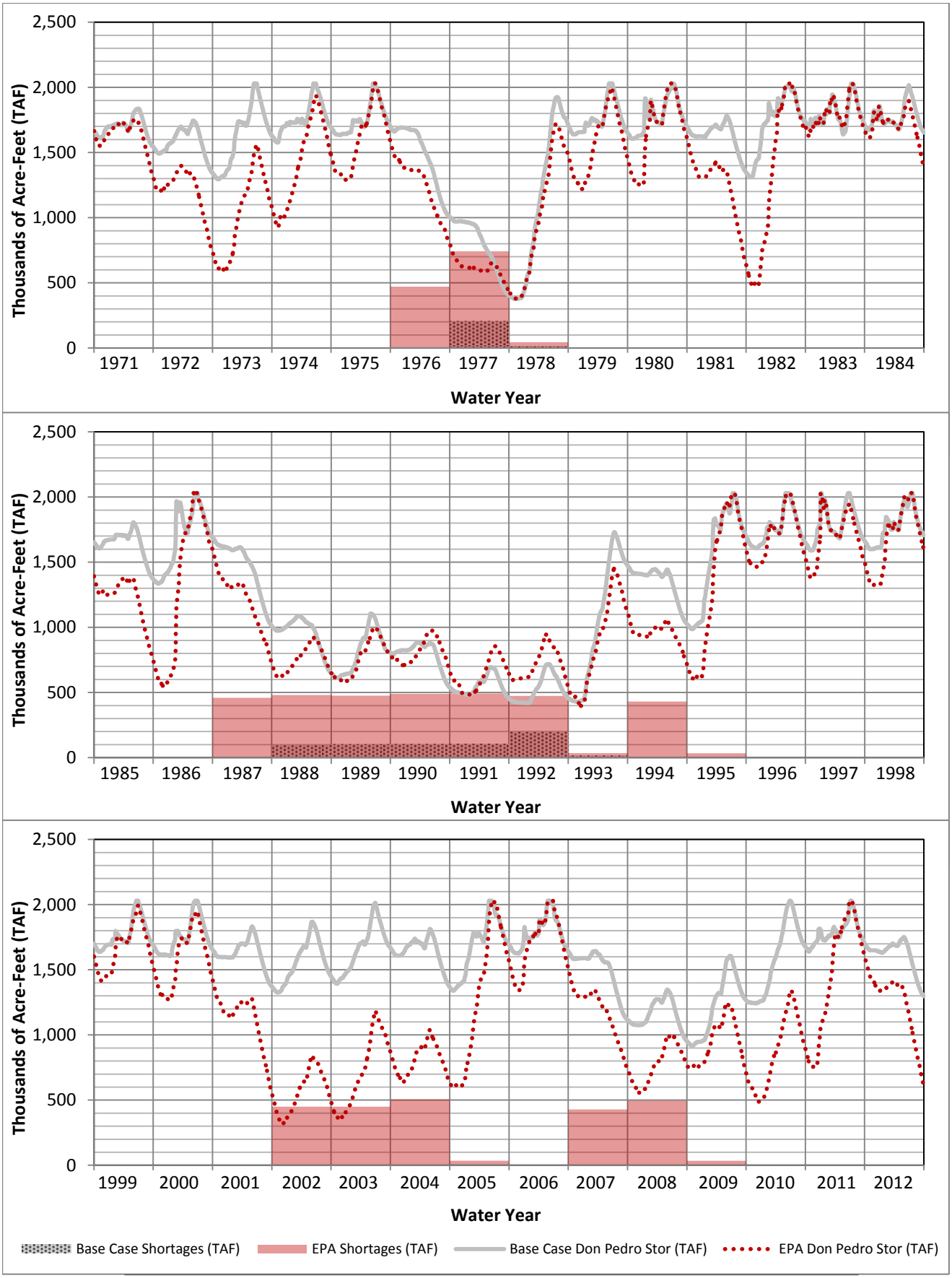


Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

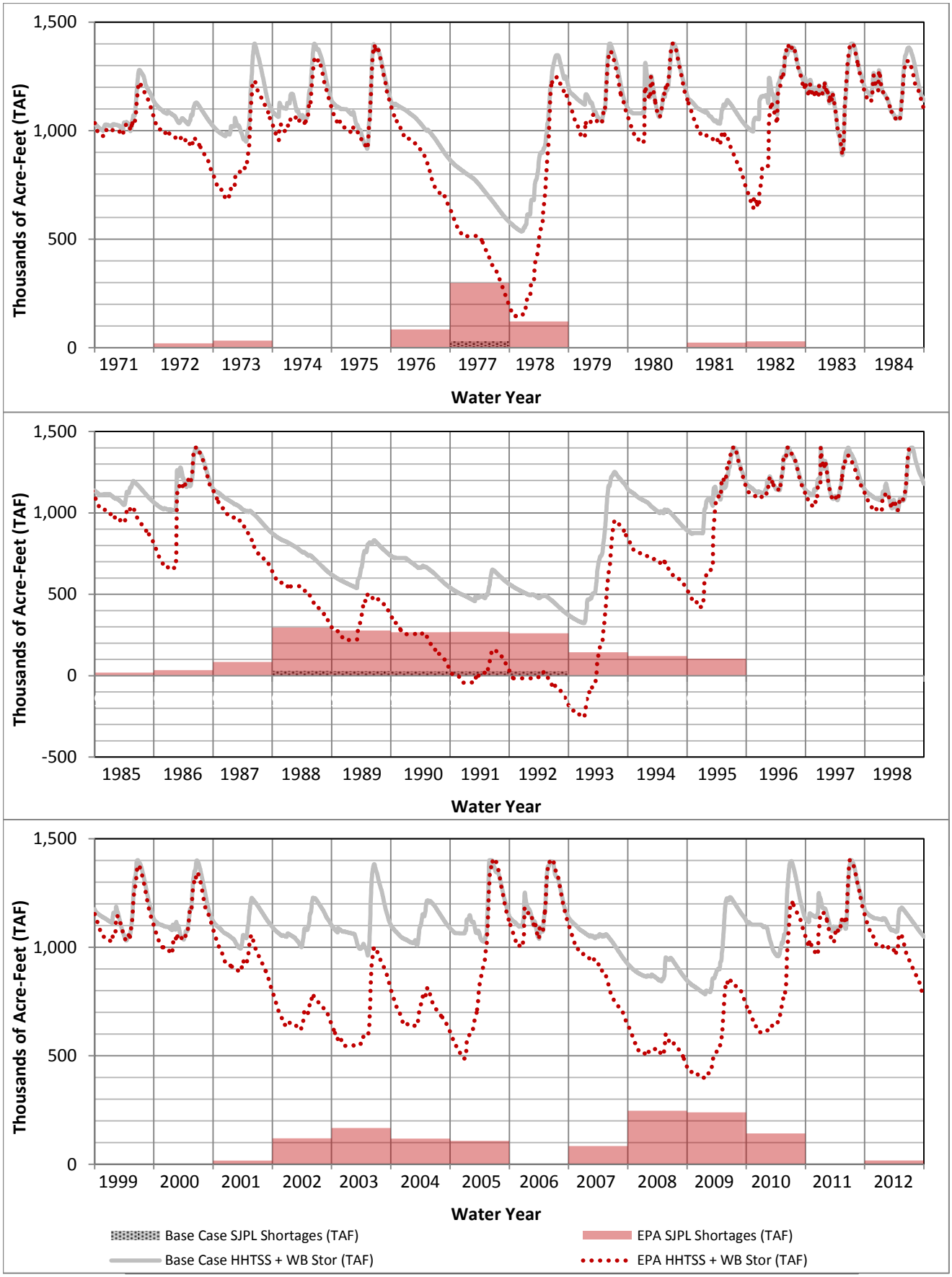


Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base Case		EPA			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	265	279	1,696	1,696	640%	609%
87-92	Drought	713	713	4,421	4,421	620%	620%
1971	BN	266	539	562	770	211%	143%
1972	D	138	151	530	530	383%	352%
1973	AN	237	613	624	624	264%	102%
1974	W	301	1,050	718	718	238%	68%
1975	W	301	887	692	792	230%	89%
1976	C	171	185	752	752	440%	407%
1977	C	94	94	944	944	1004%	1004%
1978	W	235	349	566	566	241%	162%
1979	AN	301	876	803	842	267%	96%
1980	W	302	1,818	757	1,714	251%	94%
1981	D	194	252	879	879	454%	349%
1982	W	250	2,275	754	1,661	301%	73%
1983	W	301	3,689	851	3,700	283%	100%
1984	AN	302	1,463	624	1,679	207%	115%
1985	D	205	340	711	711	348%	209%
1986	W	237	1,496	692	1,024	292%	68%
1987	C	179	179	840	840	470%	470%
1988	C	94	94	791	791	839%	839%
1989	C	116	116	695	695	599%	599%
1990	C	103	103	849	849	823%	823%
1991	C	116	116	640	640	553%	553%
1992	C	105	105	606	606	579%	579%
1993	W	235	235	539	539	229%	229%
1994	C	182	182	619	619	341%	341%
1995	W	237	2,098	747	2,115	316%	101%
1996	W	302	1,281	646	1,298	214%	101%
1997	W	301	1,954	649	2,006	216%	103%
1998	W	301	2,226	663	2,161	220%	97%
1999	AN	301	974	705	1,034	234%	106%
2000	AN	302	916	803	994	266%	108%
2001	D	193	233	826	826	428%	355%
2002	D	137	137	815	815	597%	597%
2003	BN	180	233	785	785	435%	337%
2004	D	141	355	859	859	608%	242%
2005	W	237	1,488	805	1,101	340%	74%
2006	W	301	2,270	788	2,272	262%	100%
2007	C	182	182	862	862	474%	474%
2008	C	119	119	854	854	717%	717%
2009	BN	156	156	657	657	421%	421%
2010	AN	249	349	796	796	320%	228%
2011	W	301	2,376	751	1,695	250%	71%
2012	D	192	213	815	815	425%	383%
Average (1971-2012)		216	828	735	1,082	339%	131%
Average (1980-2009)		210	903	744	1,186	354%	131%
Total (1971-2012)		9,092	34,765	30,863	45,427	339%	131%
Total (1980-2009)		6,306	27,083	22,310	35,584	354%	131%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case		EPA			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case Required	% of Base Case Resulting
76-77	Drought	133	133	620	620	468%	468%
87-92	Drought	403	403	1,772	1,772	440%	440%
1971	BN	173	399	285	493	165%	124%
1972	D	84	96	274	274	326%	284%
1973	AN	154	515	287	287	186%	56%
1974	W	176	760	297	297	169%	39%
1975	W	176	728	290	377	165%	52%
1976	C	83	83	290	290	351%	351%
1977	C	50	50	330	330	663%	663%
1978	W	154	193	280	280	181%	145%
1979	AN	176	683	312	351	177%	51%
1980	W	177	1,205	301	1,034	170%	86%
1981	D	101	151	346	346	344%	230%
1982	W	159	1,862	280	989	176%	53%
1983	W	176	2,287	292	2,225	166%	97%
1984	AN	177	552	307	675	173%	122%
1985	D	112	247	332	332	297%	135%
1986	W	154	1,388	291	601	188%	43%
1987	C	91	91	350	350	387%	387%
1988	C	50	50	330	330	658%	658%
1989	C	72	72	304	304	424%	424%
1990	C	59	59	336	336	570%	570%
1991	C	72	72	210	210	294%	294%
1992	C	60	60	243	243	401%	401%
1993	W	154	154	234	234	151%	151%
1994	C	93	93	250	250	268%	268%
1995	W	154	1,482	262	1,122	170%	76%
1996	W	177	1,126	320	972	181%	86%
1997	W	176	859	293	939	167%	109%
1998	W	176	1,667	258	1,372	147%	82%
1999	AN	176	774	303	632	172%	82%
2000	AN	177	791	353	544	199%	69%
2001	D	100	140	333	333	333%	238%
2002	D	86	86	317	317	367%	367%
2003	BN	130	182	295	295	227%	162%
2004	D	82	295	373	373	452%	127%
2005	W	154	1,289	292	501	189%	39%
2006	W	176	1,759	305	1,709	173%	97%
2007	C	94	94	396	396	423%	423%
2008	C	75	75	332	332	443%	443%
2009	BN	106	106	313	313	296%	296%
2010	AN	158	218	305	305	193%	140%
2011	W	176	1,489	277	886	157%	59%
2012	D	104	118	314	314	303%	267%
Average (1971-2012)		129	581	302	550	235%	95%
Average (1980-2009)		125	636	305	620	244%	98%
Total (1971-2012)		5,411	24,398	12,693	23,091	235%	95%
Total (1980-2009)		3,746	19,067	9,152	18,607	244%	98%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. La Grange 1 Day Flow Count

	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	131	69	12	0	0	0	0	0	0	0	0
1972	78	60	0	0	0	0	0	0	0	0	0
1973	115	76	0	0	0	0	0	0	0	0	0
1974	136	108	0	0	0	0	0	0	0	0	0
1975	145	115	18	5	2	0	0	0	0	0	0
1976	135	128	0	0	0	0	0	0	0	0	0
1977	209	188	0	0	0	0	0	0	0	0	0
1978	94	69	0	0	0	0	0	0	0	0	0
1979	165	149	11	0	0	0	0	0	0	0	0
1980	257	236	120	86	67	43	34	33	26	24	24
1981	161	155	0	0	0	0	0	0	0	0	0
1982	206	196	107	93	73	73	65	65	58	36	30
1983	355	351	263	248	222	219	207	189	172	151	138
1984	238	206	119	91	56	42	42	41	27	27	27
1985	119	103	0	0	0	0	0	0	0	0	0
1986	171	155	48	39	38	17	12	9	6	5	1
1987	155	141	0	0	0	0	0	0	0	0	0
1988	136	115	0	0	0	0	0	0	0	0	0
1989	120	104	0	0	0	0	0	0	0	0	0
1990	161	147	0	0	0	0	0	0	0	0	0
1991	103	84	0	0	0	0	0	0	0	0	0
1992	102	97	0	0	0	0	0	0	0	0	0
1993	96	44	0	0	0	0	0	0	0	0	0
1994	94	65	0	0	0	0	0	0	0	0	0
1995	233	223	138	138	112	105	105	100	80	75	50
1996	156	145	94	87	74	45	38	30	16	0	0
1997	222	182	93	70	63	63	56	54	54	54	47
1998	234	224	168	168	152	134	114	88	81	56	46
1999	189	158	49	35	18	7	0	0	0	0	0
2000	168	150	49	25	12	1	0	0	0	0	0
2001	146	124	0	0	0	0	0	0	0	0	0
2002	156	145	0	0	0	0	0	0	0	0	0
2003	154	124	0	0	0	0	0	0	0	0	0
2004	159	145	0	0	0	0	0	0	0	0	0
2005	203	157	46	37	15	15	15	15	14	6	4
2006	235	220	150	150	128	128	112	86	71	58	55
2007	152	135	0	0	0	0	0	0	0	0	0
2008	165	155	0	0	0	0	0	0	0	0	0
2009	113	108	0	0	0	0	0	0	0	0	0
2010	158	126	0	0	0	0	0	0	0	0	0
2011	225	215	133	126	112	96	62	32	19	17	9
2012	149	138	0	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	6,899	6,035	1,618	1,398	1,144	988	862	742	624	509	431
Number of years flows NOT achieved for threshold period	0	0	25	27	27	28	30	30	30	31	31

Table 7. February through June La Grange 1 Day Flow Count

	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 1 Day										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	97	49	12	0	0	0	0	0	0	0	0
1972	48	39	0	0	0	0	0	0	0	0	0
1973	62	46	0	0	0	0	0	0	0	0	0
1974	62	44	0	0	0	0	0	0	0	0	0
1975	73	63	18	5	2	0	0	0	0	0	0
1976	54	53	0	0	0	0	0	0	0	0	0
1977	66	62	0	0	0	0	0	0	0	0	0
1978	62	41	0	0	0	0	0	0	0	0	0
1979	72	59	11	0	0	0	0	0	0	0	0
1980	145	134	84	64	46	37	29	29	22	21	21
1981	67	62	0	0	0	0	0	0	0	0	0
1982	77	77	77	77	65	65	58	58	58	36	30
1983	150	149	149	148	148	148	148	147	146	134	124
1984	136	115	56	28	7	0	0	0	0	0	0
1985	66	63	0	0	0	0	0	0	0	0	0
1986	91	77	48	39	38	17	12	9	6	5	1
1987	70	67	0	0	0	0	0	0	0	0	0
1988	64	46	0	0	0	0	0	0	0	0	0
1989	62	58	0	0	0	0	0	0	0	0	0
1990	67	53	0	0	0	0	0	0	0	0	0
1991	32	22	0	0	0	0	0	0	0	0	0
1992	45	43	0	0	0	0	0	0	0	0	0
1993	44	2	0	0	0	0	0	0	0	0	0
1994	35	27	0	0	0	0	0	0	0	0	0
1995	91	91	91	91	72	65	65	61	61	61	37
1996	125	122	94	87	74	45	38	30	16	0	0
1997	133	111	63	40	33	33	26	26	26	26	19
1998	132	132	132	132	116	98	86	65	59	45	38
1999	118	104	49	35	18	7	0	0	0	0	0
2000	92	85	49	25	12	1	0	0	0	0	0
2001	58	50	0	0	0	0	0	0	0	0	0
2002	61	54	0	0	0	0	0	0	0	0	0
2003	62	36	0	0	0	0	0	0	0	0	0
2004	75	66	0	0	0	0	0	0	0	0	0
2005	77	56	30	30	15	15	15	15	14	6	4
2006	141	141	141	141	120	120	105	79	64	58	55
2007	79	64	0	0	0	0	0	0	0	0	0
2008	64	60	0	0	0	0	0	0	0	0	0
2009	58	54	0	0	0	0	0	0	0	0	0
2010	62	46	0	0	0	0	0	0	0	0	0
2011	92	92	92	92	86	85	52	22	10	8	1
2012	57	57	0	0	0	0	0	0	0	0	0
Total number of days greater than threshold flow	3,324	2,872	1,196	1,034	852	736	634	541	482	400	330
Number of years flows NOT achieved for threshold period	0	0	25	27	27	29	31	31	31	32	32

Table 8. La Grange Consecutive 7 Day Flow Count

	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
Water Year	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**
1971	5	6	1	0	0	0	0	0	0	0	0
1972	4	4	0	0	0	0	0	0	0	0	0
1973	5	4	0	0	0	0	0	0	0	0	0
1974	4	4	0	0	0	0	0	0	0	0	0
1975	5	6	2	0	0	0	0	0	0	0	0
1976	4	5	0	0	0	0	0	0	0	0	0
1977	5	6	0	0	0	0	0	0	0	0	0
1978	3	1	0	0	0	0	0	0	0	0	0
1979	4	5	1	0	0	0	0	0	0	0	0
1980	4	6	3	4	4	2	1	1	1	1	1
1981	5	5	0	0	0	0	0	0	0	0	0
1982	5	5	2	2	2	2	2	2	2	2	1
1983	3	4	5	5	5	5	5	4	4	5	4
1984	2	4	2	3	3	2	2	2	2	2	2
1985	5	4	0	0	0	0	0	0	0	0	0
1986	4	4	2	2	2	1	1	1	0	0	0
1987	4	5	0	0	0	0	0	0	0	0	0
1988	7	4	0	0	0	0	0	0	0	0	0
1989	4	4	0	0	0	0	0	0	0	0	0
1990	5	6	0	0	0	0	0	0	0	0	0
1991	5	3	0	0	0	0	0	0	0	0	0
1992	3	3	0	0	0	0	0	0	0	0	0
1993	5	1	0	0	0	0	0	0	0	0	0
1994	3	4	0	0	0	0	0	0	0	0	0
1995	4	4	1	1	1	1	1	2	1	1	2
1996	3	3	3	3	4	1	1	1	2	0	0
1997	5	6	1	1	1	1	1	2	2	2	2
1998	4	4	1	1	2	4	4	4	5	2	3
1999	4	5	2	2	1	1	0	0	0	0	0
2000	4	5	1	2	1	0	0	0	0	0	0
2001	5	4	0	0	0	0	0	0	0	0	0
2002	6	4	0	0	0	0	0	0	0	0	0
2003	4	4	0	0	0	0	0	0	0	0	0
2004	7	6	0	0	0	0	0	0	0	0	0
2005	5	5	2	1	1	1	1	1	1	0	0
2006	5	5	2	2	2	2	3	3	2	3	3
2007	6	6	0	0	0	0	0	0	0	0	0
2008	4	5	0	0	0	0	0	0	0	0	0
2009	4	5	0	0	0	0	0	0	0	0	0
2010	4	4	0	0	0	0	0	0	0	0	0
2011	4	4	1	1	2	1	2	3	1	1	1
2012	4	4	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	185	186	32	30	31	24	24	26	23	19	19
Number of years flows NOT achieved for threshold period	0	0	25	28	28	29	30	30	31	33	33

Table 9. February through June La Grange Consecutive 7 Day Flow Count

	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 7 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	3	5	1	0	0	0	0	0	0	0	0
1972	2	3	0	0	0	0	0	0	0	0	0
1973	1	2	0	0	0	0	0	0	0	0	0
1974	1	1	0	0	0	0	0	0	0	0	0
1975	2	3	2	0	0	0	0	0	0	0	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	2	2	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	1	2	1	0	0	0	0	0	0	0	0
1980	1	3	1	2	2	1	1	1	1	1	1
1981	2	2	0	0	0	0	0	0	0	0	0
1982	1	1	1	1	2	2	2	2	2	2	1
1983	1	2	2	3	3	3	3	2	3	4	4
1984	1	3	1	2	1	0	0	0	0	0	0
1985	2	2	0	0	0	0	0	0	0	0	0
1986	1	1	2	2	2	1	1	1	0	0	0
1987	1	1	0	0	0	0	0	0	0	0	0
1988	4	1	0	0	0	0	0	0	0	0	0
1989	2	2	0	0	0	0	0	0	0	0	0
1990	1	2	0	0	0	0	0	0	0	0	0
1991	2	1	0	0	0	0	0	0	0	0	0
1992	1	2	0	0	0	0	0	0	0	0	0
1993	2	0	0	0	0	0	0	0	0	0	0
1994	1	1	0	0	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	1	1	1	1	2
1996	1	1	3	3	4	1	1	1	2	0	0
1997	2	4	1	1	1	1	1	1	1	1	1
1998	1	1	1	1	2	4	3	3	4	2	2
1999	1	3	2	2	1	1	0	0	0	0	0
2000	1	2	1	2	1	0	0	0	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	3	1	0	0	0	0	0	0	0	0	0
2003	1	1	0	0	0	0	0	0	0	0	0
2004	3	2	0	0	0	0	0	0	0	0	0
2005	1	1	1	1	1	1	1	1	1	0	0
2006	2	2	2	2	2	2	3	3	2	3	3
2007	2	2	0	0	0	0	0	0	0	0	0
2008	1	2	0	0	0	0	0	0	0	0	0
2009	1	2	0	0	0	0	0	0	0	0	0
2010	1	1	0	0	0	0	0	0	0	0	0
2011	1	1	1	1	1	1	2	2	0	0	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least seven consecutive days	62	73	24	24	24	19	19	18	17	14	14
Number of years flows NOT achieved for threshold period	0	1	25	28	28	30	31	31	33	35	35

Table 10. La Grange Consecutive 14 Day Flow Count

	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	4	2	0	0	0	0	0	0	0	0	0
1972	2	1	0	0	0	0	0	0	0	0	0
1973	3	2	0	0	0	0	0	0	0	0	0
1974	3	3	0	0	0	0	0	0	0	0	0
1975	4	4	0	0	0	0	0	0	0	0	0
1976	4	4	0	0	0	0	0	0	0	0	0
1977	5	6	0	0	0	0	0	0	0	0	0
1978	2	1	0	0	0	0	0	0	0	0	0
1979	4	5	0	0	0	0	0	0	0	0	0
1980	4	5	2	3	2	1	1	1	1	1	1
1981	4	4	0	0	0	0	0	0	0	0	0
1982	5	5	2	1	2	2	2	2	2	1	1
1983	3	4	3	4	3	3	2	3	2	3	3
1984	2	3	2	2	2	2	2	2	1	1	1
1985	4	4	0	0	0	0	0	0	0	0	0
1986	3	3	2	2	2	1	0	0	0	0	0
1987	3	3	0	0	0	0	0	0	0	0	0
1988	3	3	0	0	0	0	0	0	0	0	0
1989	4	4	0	0	0	0	0	0	0	0	0
1990	4	5	0	0	0	0	0	0	0	0	0
1991	3	3	0	0	0	0	0	0	0	0	0
1992	3	3	0	0	0	0	0	0	0	0	0
1993	4	1	0	0	0	0	0	0	0	0	0
1994	3	2	0	0	0	0	0	0	0	0	0
1995	4	4	1	1	1	1	1	2	1	1	1
1996	2	2	2	1	1	1	1	1	0	0	0
1997	4	4	1	1	1	1	1	2	2	2	2
1998	3	2	1	1	2	3	4	2	2	2	1
1999	3	4	2	2	1	0	0	0	0	0	0
2000	3	3	1	0	0	0	0	0	0	0	0
2001	4	3	0	0	0	0	0	0	0	0	0
2002	4	4	0	0	0	0	0	0	0	0	0
2003	4	4	0	0	0	0	0	0	0	0	0
2004	4	4	0	0	0	0	0	0	0	0	0
2005	4	3	1	1	1	1	1	1	0	0	0
2006	4	4	2	2	2	2	3	2	2	1	1
2007	4	3	0	0	0	0	0	0	0	0	0
2008	4	4	0	0	0	0	0	0	0	0	0
2009	3	4	0	0	0	0	0	0	0	0	0
2010	4	3	0	0	0	0	0	0	0	0	0
2011	4	4	1	1	2	1	2	0	0	0	0
2012	4	4	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	149	143	23	22	22	19	20	18	13	12	11
Number of years flows NOT achieved for threshold period	0	0	28	29	29	30	31	32	34	34	34

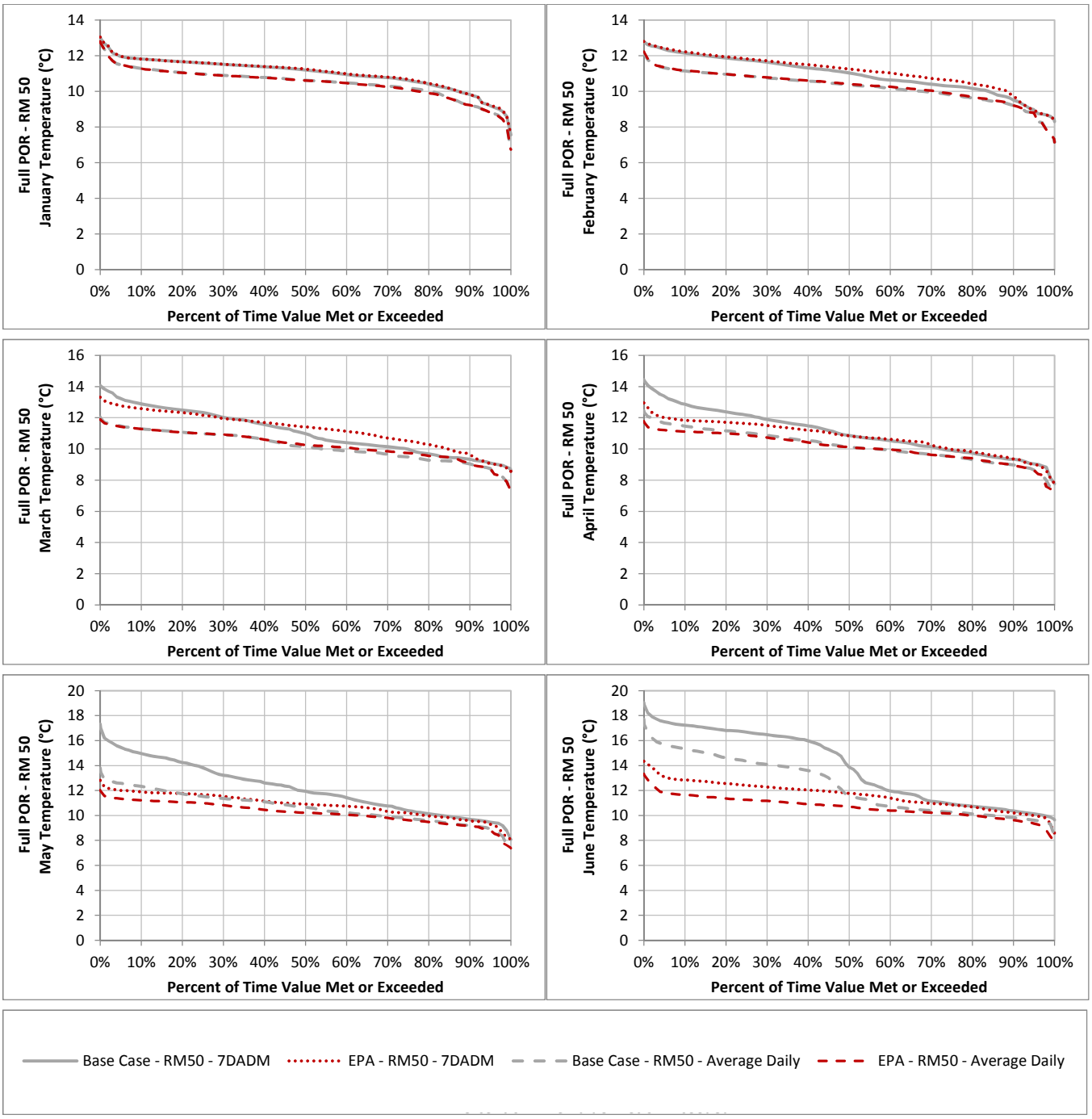
Table 11. February through June La Grange Consecutive 14 Day Flow Count

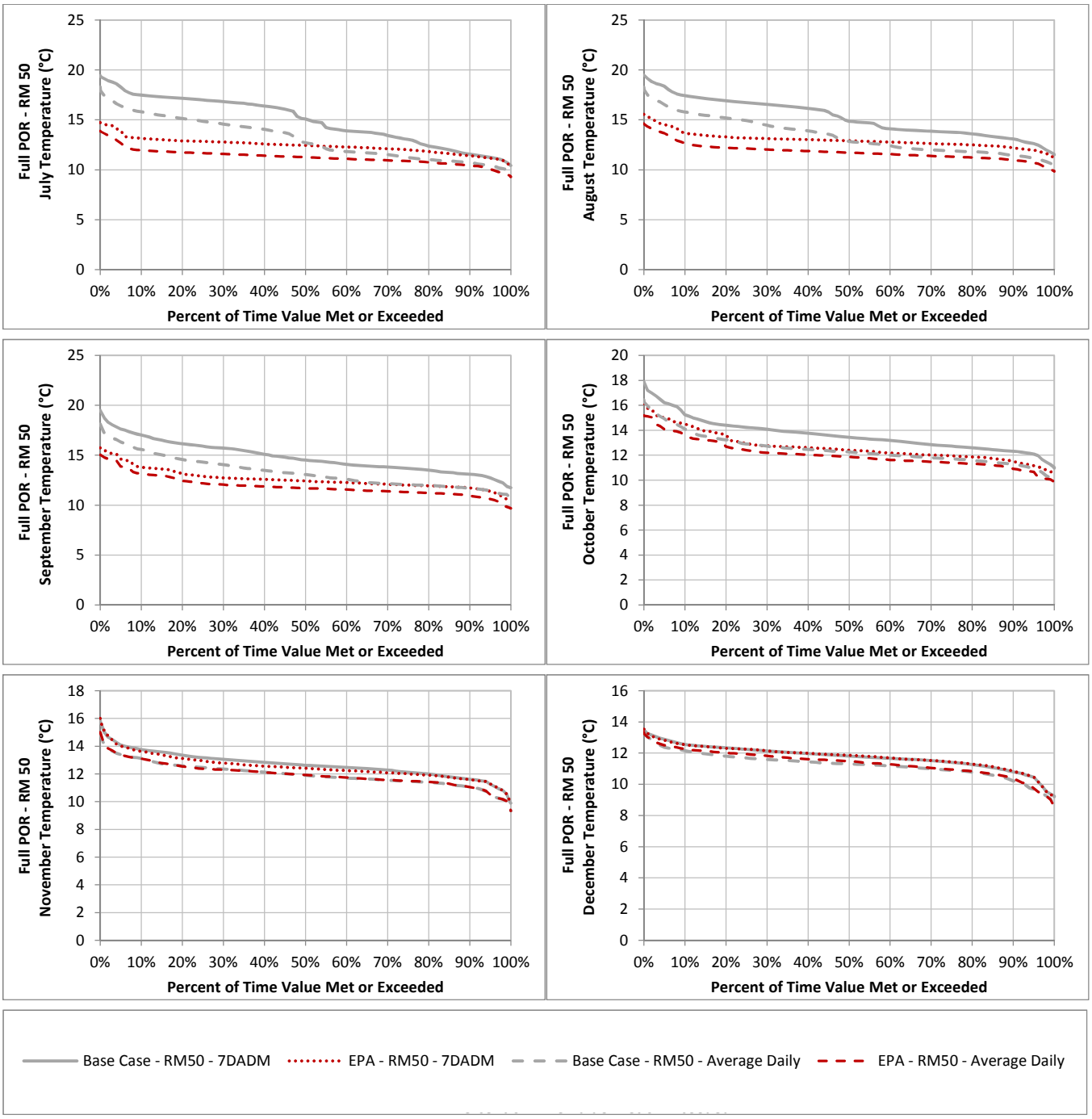
	EPA Total La Grange Flow										
	Occurrences Of Flows Greater Than or Equal To Threshold Flow Value (cfs) For At Least 14 Days										
February through June of Water Year	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
1971	2	1	0	0	0	0	0	0	0	0	0
1972	1	1	0	0	0	0	0	0	0	0	0
1973	1	1	0	0	0	0	0	0	0	0	0
1974	1	1	0	0	0	0	0	0	0	0	0
1975	1	2	0	0	0	0	0	0	0	0	0
1976	1	1	0	0	0	0	0	0	0	0	0
1977	2	2	0	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0	0	0	0
1979	1	2	0	0	0	0	0	0	0	0	0
1980	1	2	1	2	1	1	1	1	1	1	1
1981	1	1	0	0	0	0	0	0	0	0	0
1982	1	1	1	1	2	2	2	2	2	1	1
1983	1	1	1	2	2	2	2	2	2	3	3
1984	1	2	1	1	0	0	0	0	0	0	0
1985	2	2	0	0	0	0	0	0	0	0	0
1986	1	1	2	2	2	1	0	0	0	0	0
1987	1	1	0	0	0	0	0	0	0	0	0
1988	1	1	0	0	0	0	0	0	0	0	0
1989	2	2	0	0	0	0	0	0	0	0	0
1990	1	2	0	0	0	0	0	0	0	0	0
1991	1	1	0	0	0	0	0	0	0	0	0
1992	1	2	0	0	0	0	0	0	0	0	0
1993	1	0	0	0	0	0	0	0	0	0	0
1994	1	1	0	0	0	0	0	0	0	0	0
1995	1	1	1	1	1	1	1	1	1	1	1
1996	1	1	2	1	1	1	1	1	0	0	0
1997	2	3	1	1	1	1	1	1	1	1	1
1998	1	1	1	1	2	3	3	2	2	2	1
1999	1	3	2	2	1	0	0	0	0	0	0
2000	1	2	1	0	0	0	0	0	0	0	0
2001	1	1	0	0	0	0	0	0	0	0	0
2002	1	1	0	0	0	0	0	0	0	0	0
2003	1	1	0	0	0	0	0	0	0	0	0
2004	1	1	0	0	0	0	0	0	0	0	0
2005	1	1	1	1	1	1	1	1	0	0	0
2006	2	2	2	2	2	2	3	2	2	1	1
2007	2	1	0	0	0	0	0	0	0	0	0
2008	1	1	0	0	0	0	0	0	0	0	0
2009	1	1	0	0	0	0	0	0	0	0	0
2010	1	1	0	0	0	0	0	0	0	0	0
2011	1	1	1	1	1	1	2	0	0	0	0
2012	1	1	0	0	0	0	0	0	0	0	0
Total number of periods where flow is greater than threshold flow for at least fourteen consecutive days	49	56	18	18	17	16	17	13	11	10	9
Number of years flows NOT achieved for threshold period	0	1	28	29	30	31	32	33	35	35	35

EPA

Dynamic Routing

Results Summary


Full POR - RM 50 January Temperature (°C)
Full POR - RM 50 February Temperature (°C)
Full POR - RM 50 March Temperature (°C)
Full POR - RM 50 April Temperature (°C)
Full POR - RM 50 May Temperature (°C)
Full POR - RM 50 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM50 - 7DADM
EPA - RM50 - 7DADM
Base Case - RM50 - Average Daily
EPA - RM50 - Average Daily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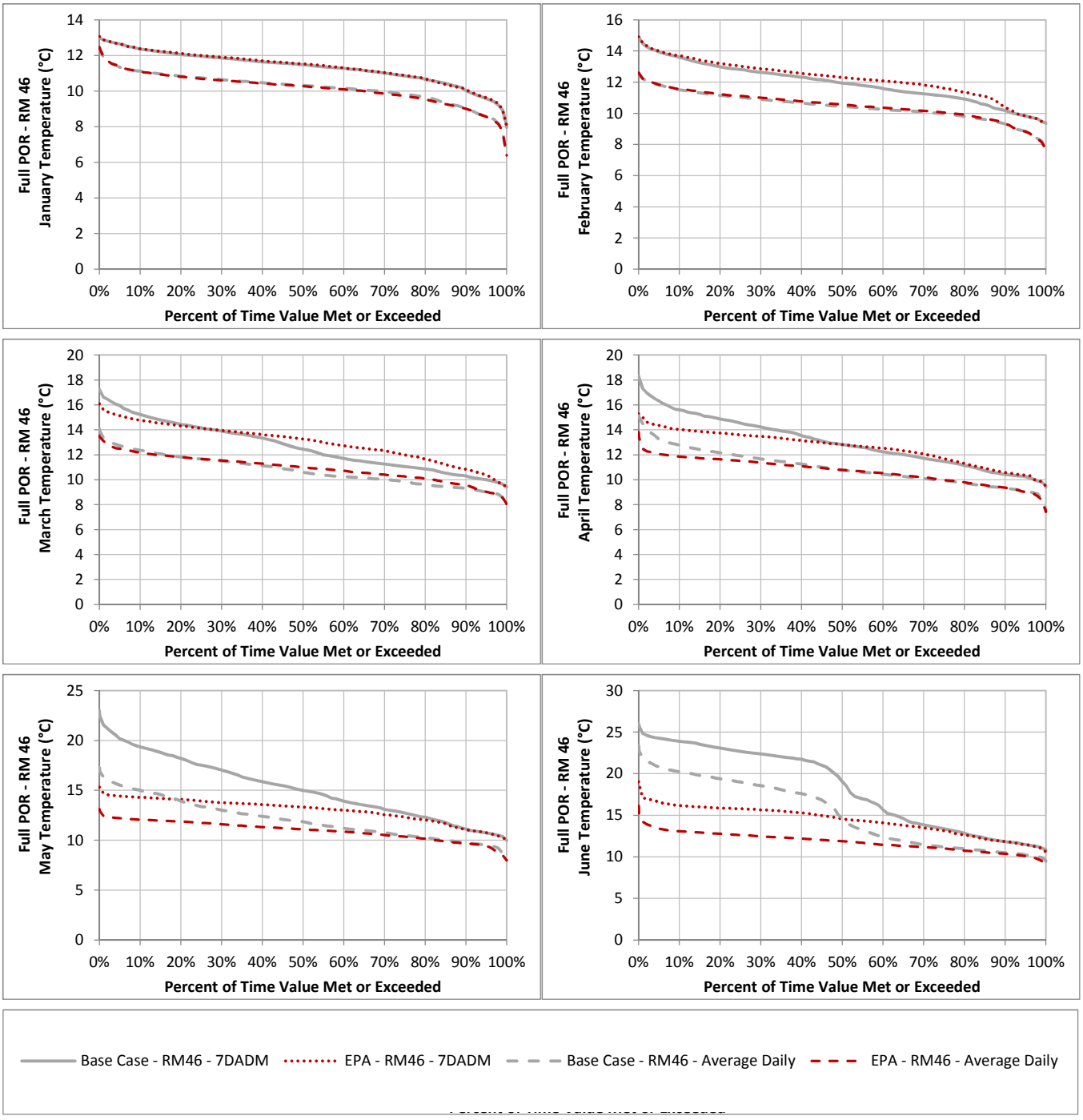
Full POR - RM 50 August Temperature (°C)
Full POR - RM 50 September Temperature (°C)
Full POR - RM 50 October Temperature (°C)
Full POR - RM 50 November Temperature (°C)
Full POR - RM 50 December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM50 - 7DADM
EPA - RM50 - 7DADM
Base Case - RM50 - Average Daily
EPA - RM50 - Average Daily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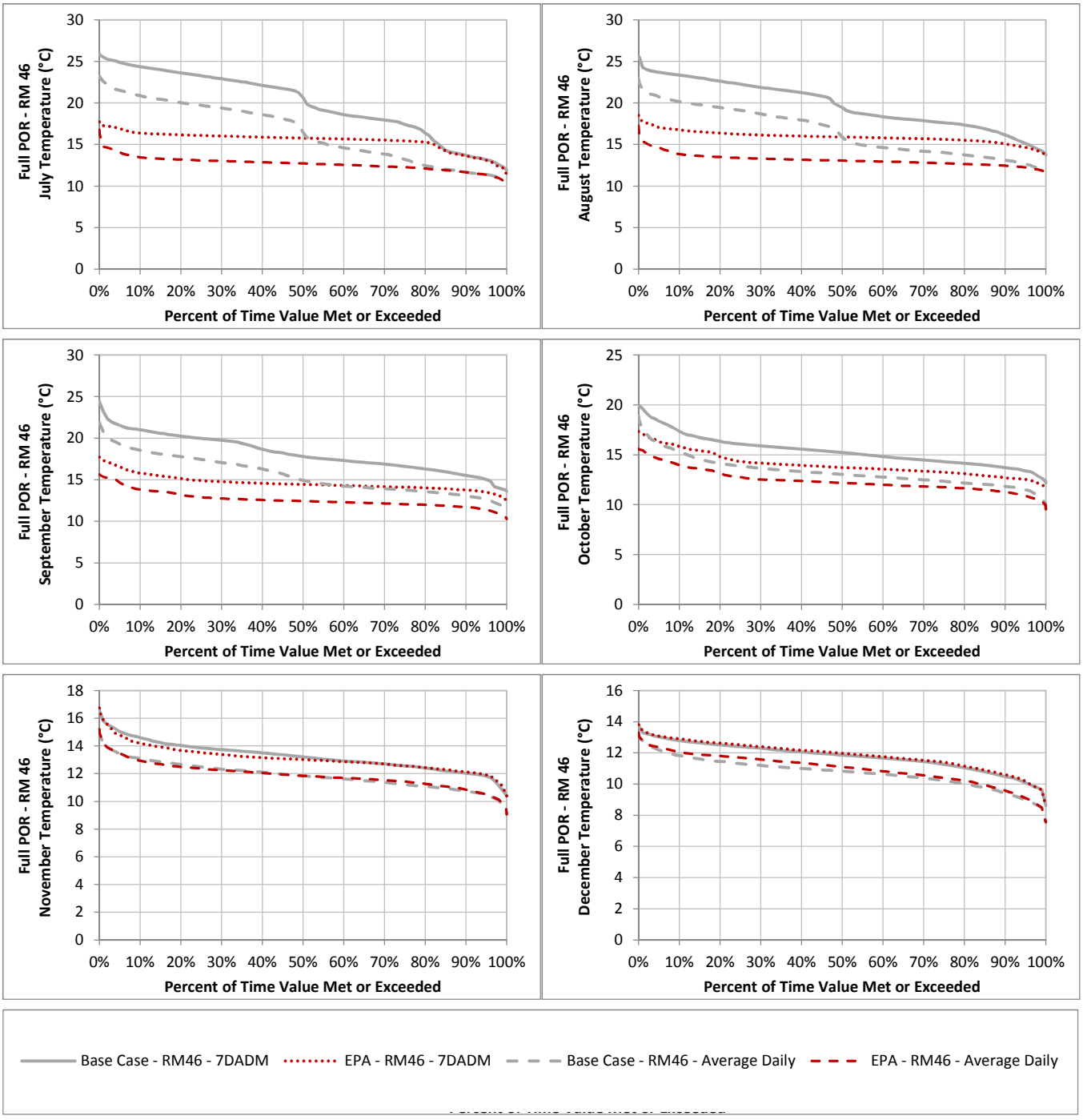
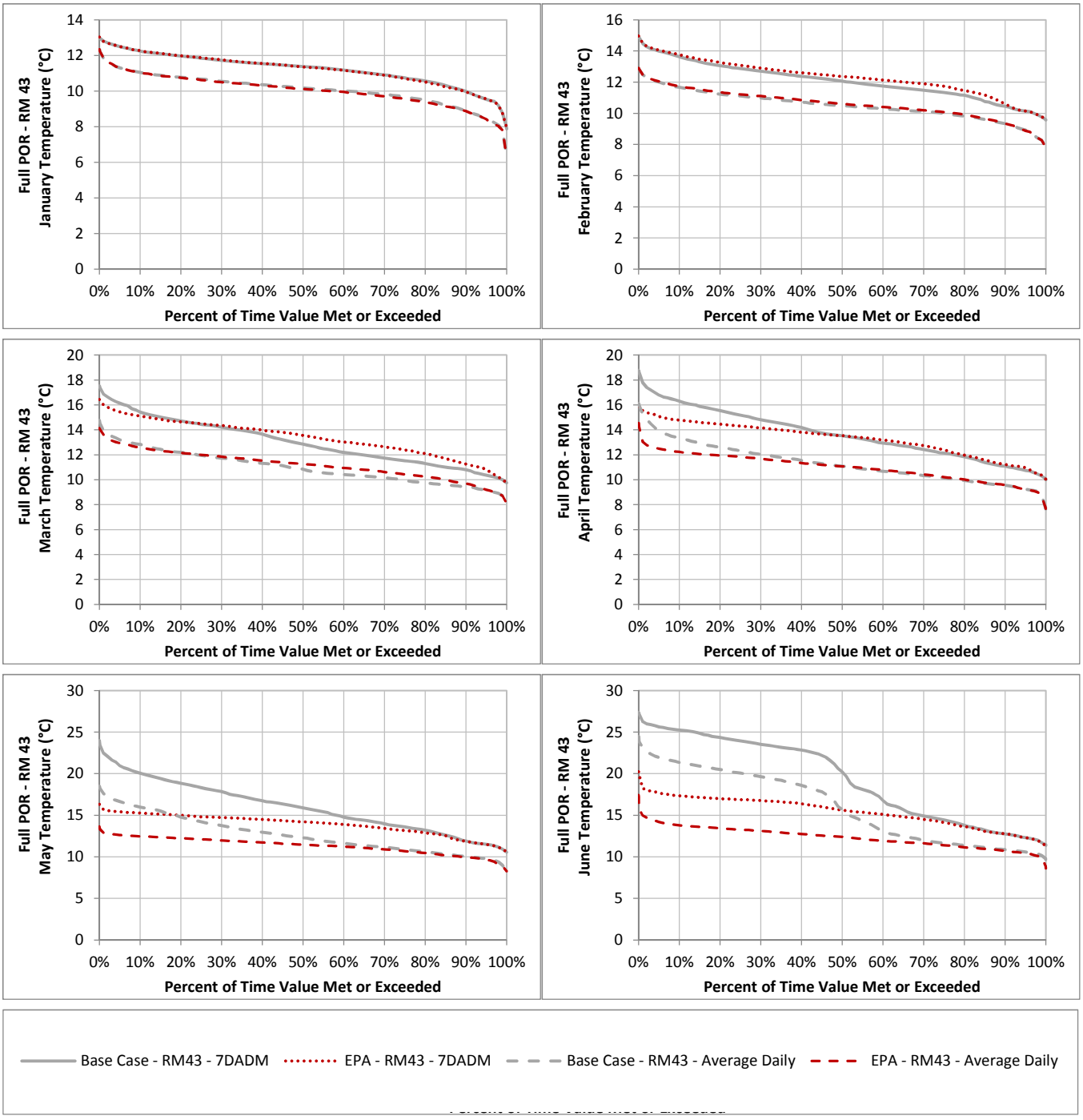
Full POR - RM 46 March Temperature (°C)
Full POR - RM 46 April Temperature (°C)
Full POR - RM 46 May Temperature (°C)
Full POR - RM 46 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
EPA - RM46 - 7DADM
Base Case - RM46 - Average Daily
EPA - RM46 - Average Daily


Full POR - RM 46 July Temperature (°C)
Full POR - RM 46 August Temperature (°C)
Full POR - RM 46 September Temperature (°C)
Full POR - RM 46 October Temperature (°C)
Full POR - RM 46 November Temperature (°C)
Full POR - RM 46 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM46 - 7DADM
EPA - RM46 - 7DADM
Base Case - RM46 - Average Daily
EPA - RM46 - Average Daily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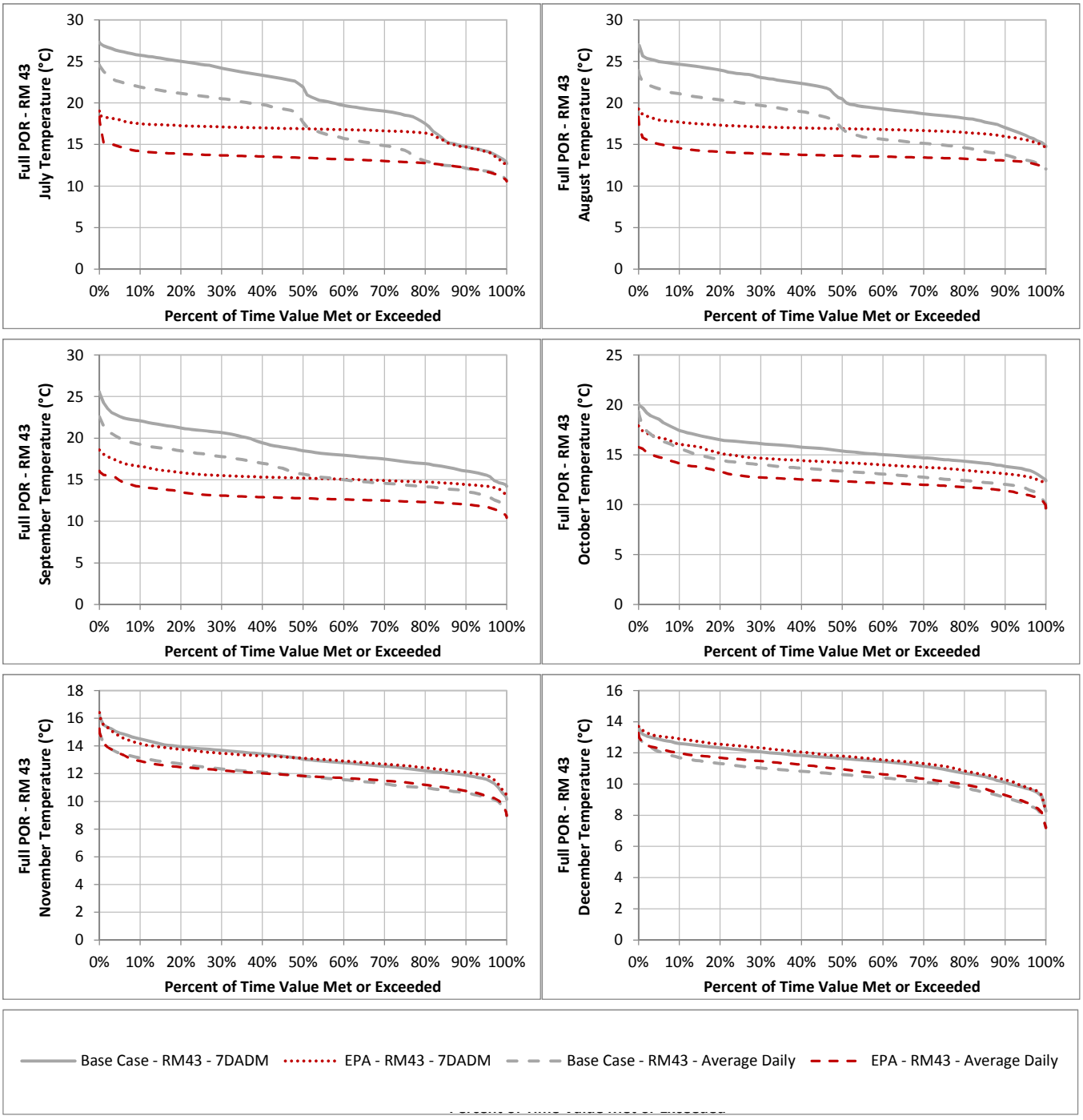
Full POR - RM 43 February Temperature (°C)
Full POR - RM 43 March Temperature (°C)
Full POR - RM 43 April Temperature (°C)
Full POR - RM 43 May Temperature (°C)
Full POR - RM 43 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM43 - 7DADM
EPA - RM43 - 7DADM
Base Case - RM43 - Average Daily
EPA - RM43 - Average Daily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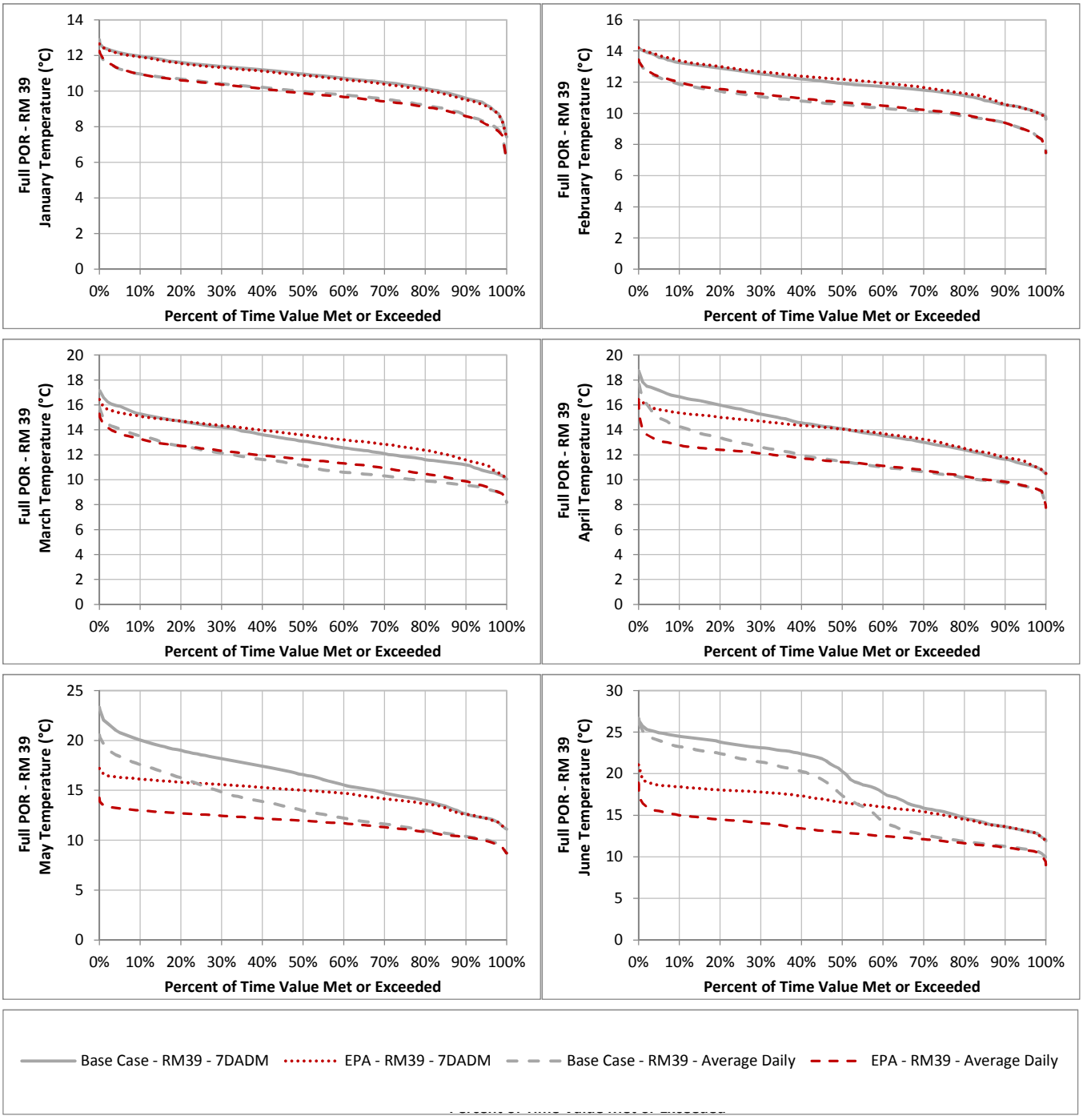
Full POR - RM 43 September Temperature (°C)
Full POR - RM 43 October Temperature (°C)
Full POR - RM 43 November Temperature (°C)
Full POR - RM 43 December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM43 - 7DADM
EPA - RM43 - 7DADM
Base Case - RM43 - Average Daily
EPA - RM43 - Average Daily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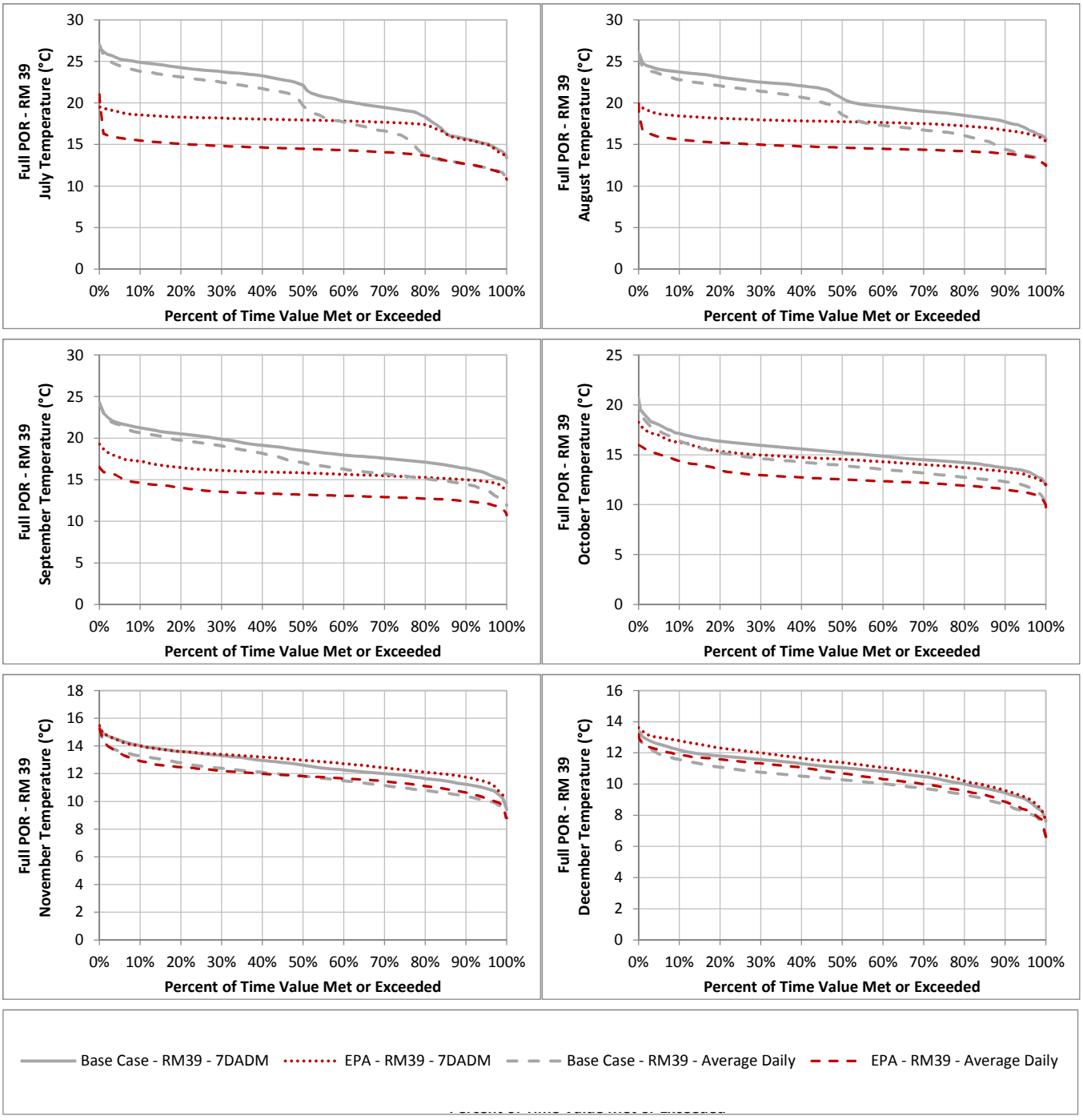
Full POR - RM 39 March Temperature (°C)
Full POR - RM 39 April Temperature (°C)
Full POR - RM 39 May Temperature (°C)
Full POR - RM 39 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM39 - 7DADM
EPA - RM39 - 7DADM
Base Case - RM39 - Average Daily
EPA - RM39 - Average Daily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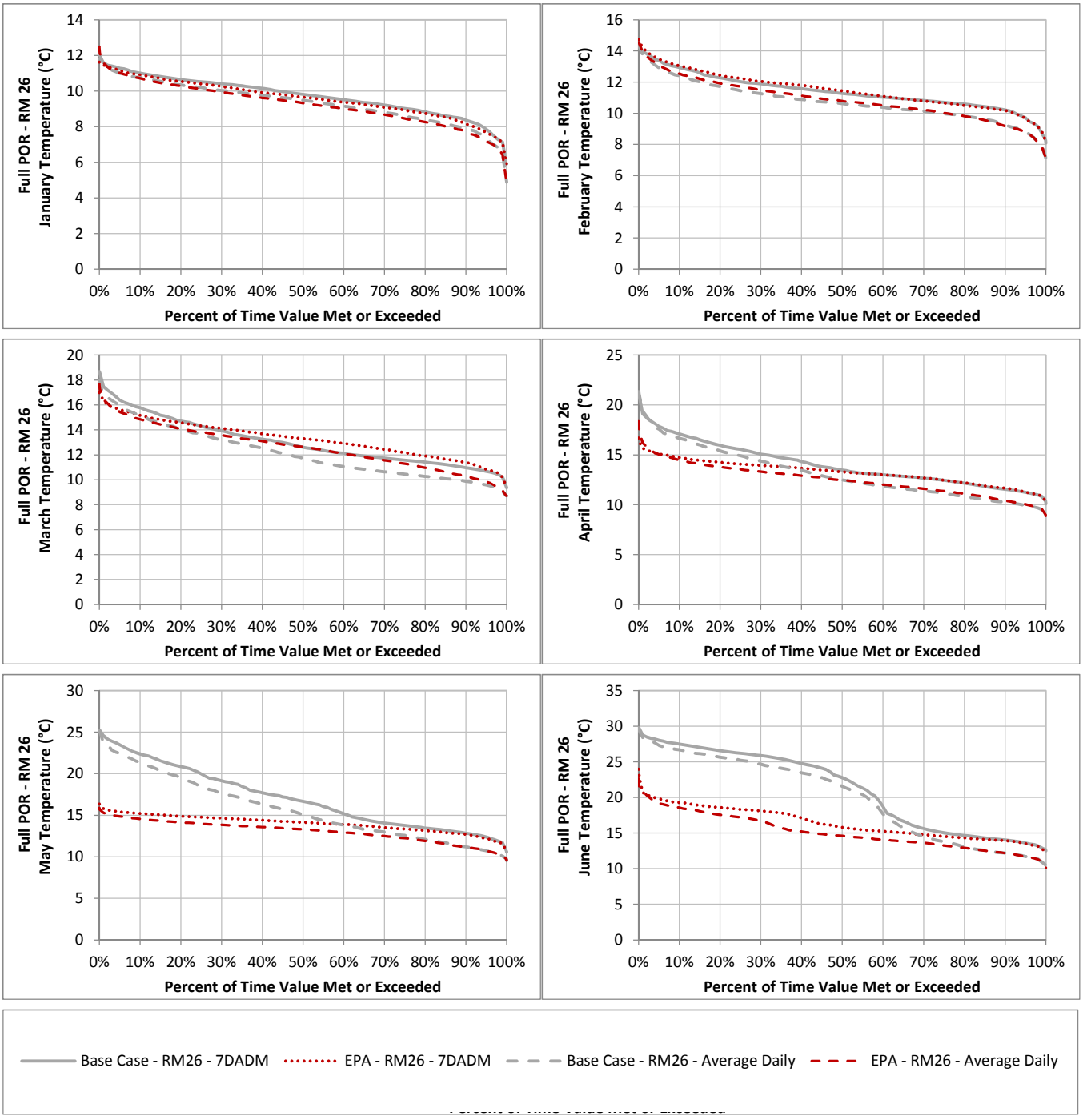
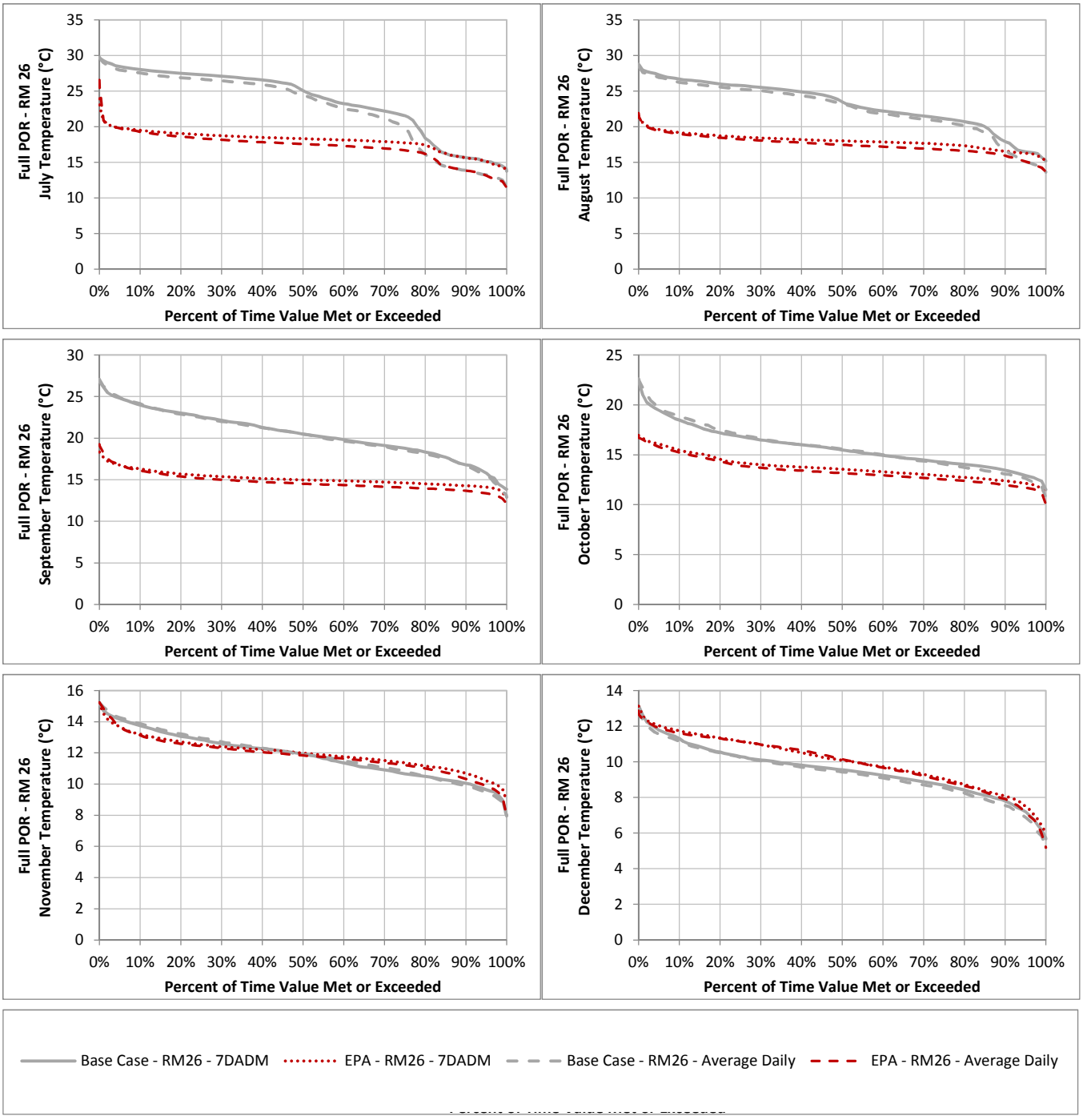
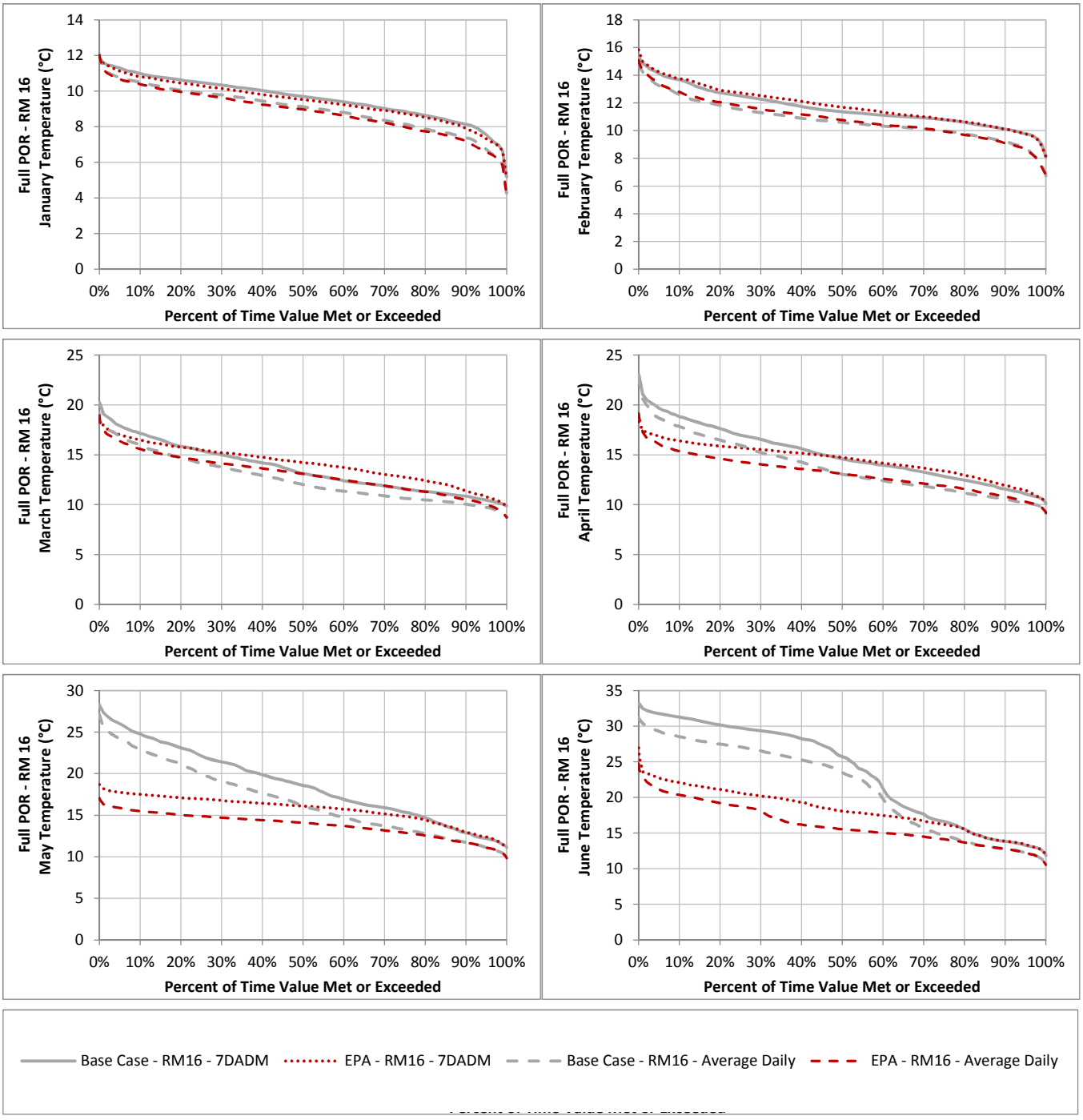
Full POR - RM 39 August Temperature (°C)
Full POR - RM 39 September Temperature (°C)
Full POR - RM 39 October Temperature (°C)
Full POR - RM 39 November Temperature (°C)
Full POR - RM 39 December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM39 - 7DADM
EPA - RM39 - 7DADM
Base Case - RM39 - Average Daily
EPA - RM39 - Average Daily


Full POR - RM 26 January Temperature (°C)
Full POR - RM 26 February Temperature (°C)
Full POR - RM 26 March Temperature (°C)
Full POR - RM 26 April Temperature (°C)
Full POR - RM 26 May Temperature (°C)
Full POR - RM 26 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM26 - 7DADM
EPA - RM26 - 7DADM
Base Case - RM26 - Average Daily
EPA - RM26 - Average Daily


Full POR - RM 26 July Temperature (°C)
Full POR - RM 26 August Temperature (°C)
Full POR - RM 26 September Temperature (°C)
Full POR - RM 26 October Temperature (°C)
Full POR - RM 26 November Temperature (°C)
Full POR - RM 26 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM26 - 7DADM
EPA - RM26 - 7DADM
Base Case - RM26 - Average Daily
EPA - RM26 - Average Daily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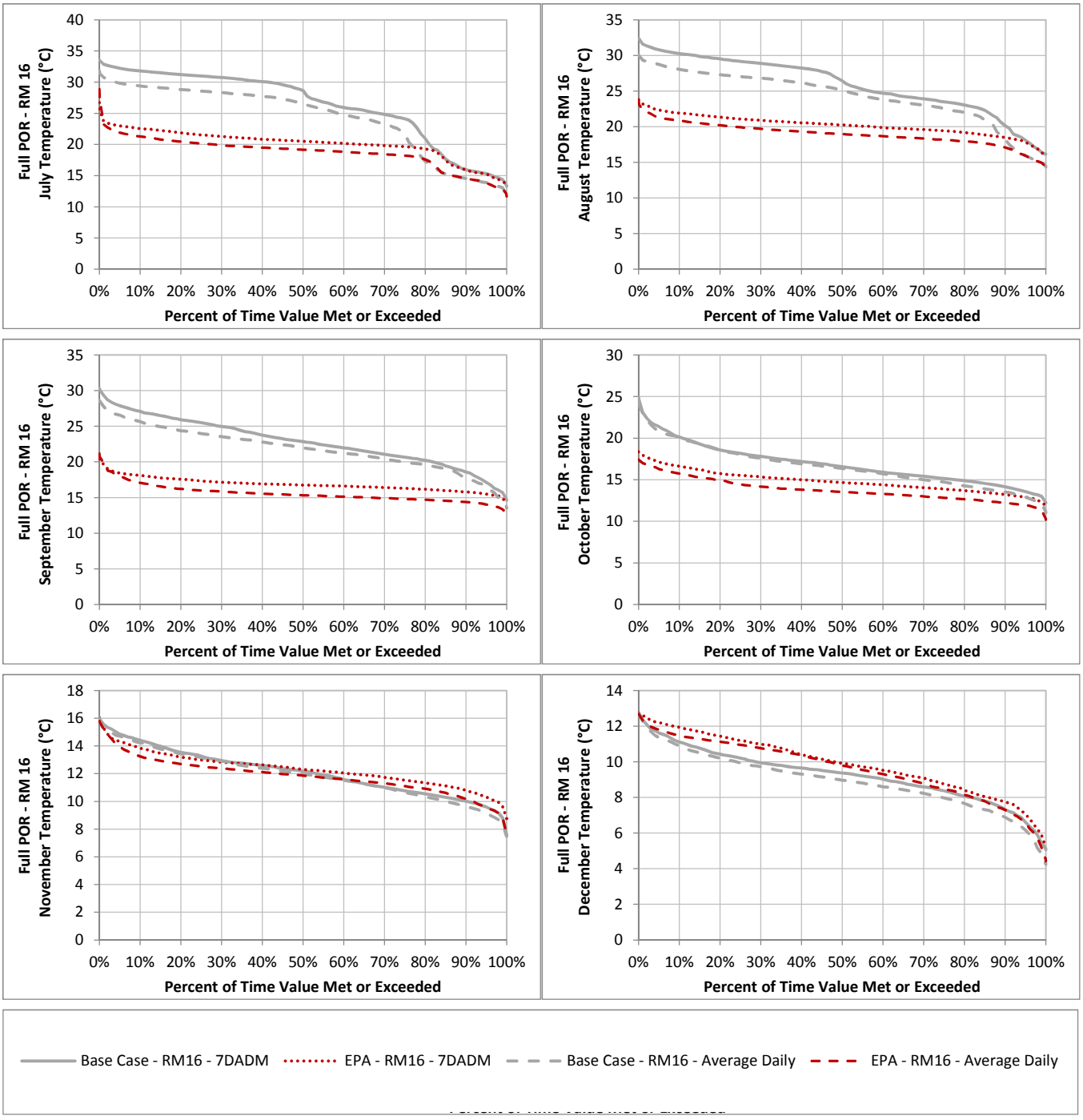
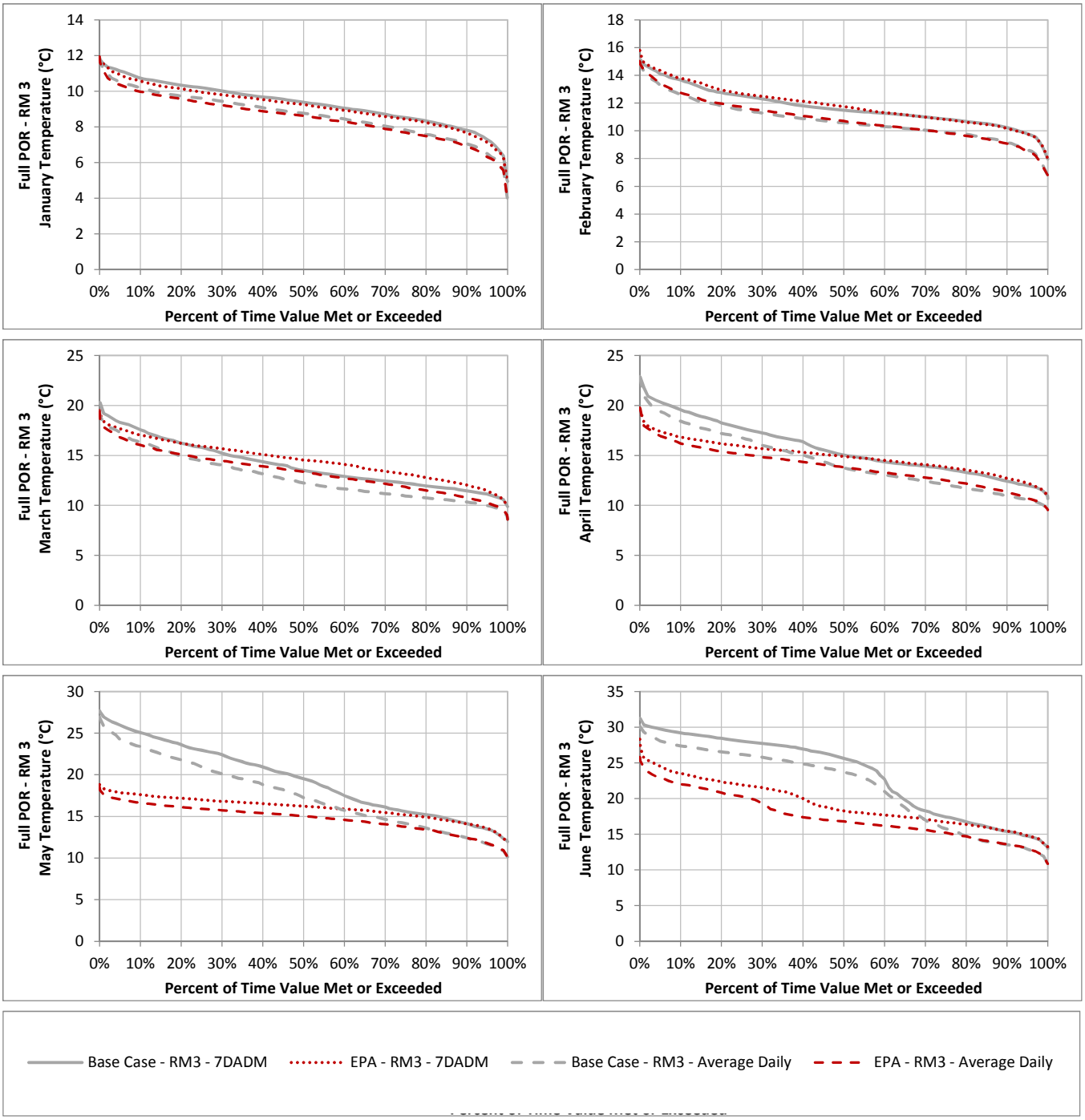
Full POR - RM 16 March Temperature (°C)
Full POR - RM 16 April Temperature (°C)
Full POR - RM 16 May Temperature (°C)
Full POR - RM 16 June Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
EPA - RM16 - 7DADM
Base Case - RM16 - Average Daily
EPA - RM16 - Average Daily


Full POR - RM 16 July Temperature (°C)
Full POR - RM 16 August Temperature (°C)
Full POR - RM 16 September Temperature (°C)
Full POR - RM 16 October Temperature (°C)
Full POR - RM 16 November Temperature (°C)
Full POR - RM 16 December Temperature (°C)
Percent of Time Value Met or Exceeded
Base Case - RM16 - 7DADM
EPA - RM16 - 7DADM
Base Case - RM16 - Average Daily
EPA - RM16 - Average Daily


Full POR - RM 3 January Temperature (°C)
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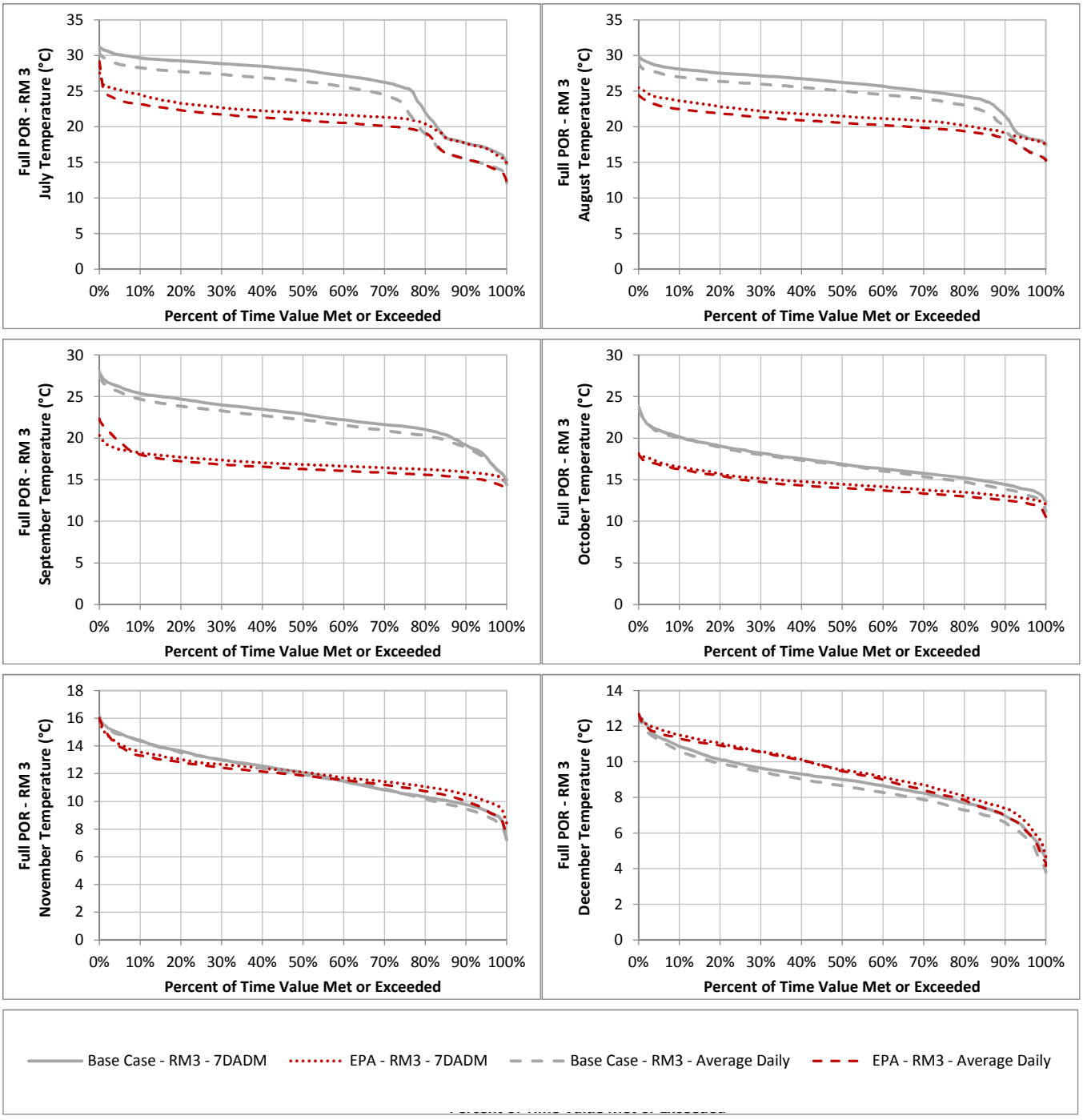
Full POR - RM 3 March Temperature (°C)
Full POR - RM 3 April Temperature (°C)
Full POR - RM 3 May Temperature (°C)
Full POR - RM 3 June Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM3 - 7DADM
EPA - RM3 - 7DADM
Base Case - RM3 - Average Daily
EPA - RM3 - Average Daily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Full POR - RM 3 September Temperature (°C)
Full POR - RM 3 October Temperature (°C)
Full POR - RM 3 November Temperature (°C)
Full POR - RM 3 December Temperature (°C)
Percent of Time Value Met or Exceeded
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Base Case - RM3 - 7DADM
EPA - RM3 - 7DADM
Base Case - RM3 - Average Daily
EPA - RM3 - Average Daily

APPENDIX E-1
ATTACHMENT H–9

OPERATIONS MODEL SIMULATION OF WATER SUPPLY EFFECTS TO CCSF BASED ON PROJECTED WATER DEMAND OF 265 MGD IN 2040

Attachment H-9 contains Tuolumne River Operations Model results that evaluate the projected future demand of the City and County of San Francisco's (CCSF) service territory. The new FERC license for the Don Pedro Project will extend beyond the current planning horizon of the CCSF. Consistent with its responsibilities for water supply planning, CCSF has developed projections of future demand in its service territory. CCSF indicates total demand is projected to increase to 265 mgd by the year 2040. Future availability of water from the Hetch Hetchy system may be affected by the terms and conditions of the new FERC license; therefore, the Developmental Analysis has included an evaluation of the water supply effects to CCSF of the Districts' Preferred Plan (herein Attachment H-9A), the SWB's scenario of a minimum instream flow at La Grange gage of 20% of the February through June unimpaired flow (herein Attachment H-9B), and the SWB SED's preferred alternative scenario of requiring a minimum instream flow of 40% of the February through June unimpaired flow at La Grange gage (herein Attachment H-9C). The H-9C model results are based on using the Districts' Don Pedro Reservoir operation rules instead of the SED's more restrictive reservoir operation rules as these rules make no difference in the effects to CCSF water supply operations, and only effect the Districts' water supplies.

ATTACHMENT H–9A

EVALUATION OF THE WATER SUPPLY EFFECTS TO CCSF OF THE DISTRICTS' PREFERRED PLAN

Table 1. Generation by Month in MWh

	Base Case (SF 265 MGD)	DPP_SF265	% of Base Case
January	1,044,537	1,033,574	99%
February	1,693,713	1,650,231	97%
March	3,004,128	2,918,680	97%
April	3,443,307	3,391,975	99%
May	3,466,889	3,974,983	115%
June	3,349,911	3,175,228	95%
July	3,513,260	3,453,117	98%
August	2,706,053	2,664,740	98%
September	1,338,078	1,322,002	99%
October	915,079	880,259	96%
November	396,113	415,385	105%
December	606,220	628,963	104%
Total	25,477,289	25,509,137	100%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case (SF 265 MGD)		DPP_SF265		
			TAF	% of Full	TAF	% of Base Case (SF 265 MGD)	% of Full
76-77	Drought	1,836	1,629	89%	1,590	98%	87%
87-92	Drought	5,198	4,590	88%	4,541	99%	87%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	915	100%	100%
1977	C	921	713	77%	675	95%	73%
1978	W	767	752	98%	751	100%	98%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	895	100%	100%
1988	C	855	759	89%	755	99%	88%
1989	C	846	744	88%	740	100%	87%
1990	C	876	771	88%	767	99%	87%
1991	C	881	774	88%	770	99%	87%
1992	C	844	647	77%	613	95%	73%
1993	W	823	807	98%	806	100%	98%
1994	C	835	835	100%	835	100%	100%
1995	W	774	774	100%	774	100%	100%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	885	100%	100%
2004	D	940	940	100%	940	100%	100%
2005	W	874	874	100%	874	100%	100%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	882	100%	100%
2009	BN	903	903	100%	903	100%	100%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	839	100%	97%
Total		36,190	35,343	98%	35,254	100%	97%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case (SF 265 MGD)			DPP_SF265	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	594	537	90%	537	90%
87-92	C	1,781	1,527	86%	1,467	82%
1971	BN	297	258	100%	258	100%
1972	D	297	291	100%	291	100%
1973	AN	297	233	100%	233	100%
1974	W	297	218	100%	218	100%
1975	W	297	220	100%	220	100%
1976	C	297	282	90%	282	90%
1977	C	297	255	80%	255	80%
1978	W	297	202	100%	202	100%
1979	AN	297	272	100%	272	100%
1980	W	297	220	100%	220	100%
1981	D	297	270	100%	270	100%
1982	W	297	206	100%	206	100%
1983	W	297	190	100%	190	100%
1984	AN	297	257	100%	257	100%
1985	D	297	275	100%	275	100%
1986	W	297	254	100%	254	100%
1987	C	297	292	100%	283	90%
1988	C	297	284	90%	254	80%
1989	C	297	264	90%	243	90%
1990	C	297	243	80%	243	80%
1991	C	297	227	80%	227	80%
1992	C	297	218	80%	218	80%
1993	W	297	206	100%	206	100%
1994	C	297	294	100%	294	100%
1995	W	297	203	100%	203	100%
1996	W	297	236	100%	236	100%
1997	W	297	246	100%	246	100%
1998	W	297	218	100%	218	100%
1999	AN	297	255	100%	255	100%
2000	AN	297	248	100%	248	100%
2001	D	297	282	100%	282	100%
2002	D	297	276	100%	276	100%
2003	BN	297	259	100%	259	100%
2004	D	297	273	100%	273	100%
2005	W	297	213	100%	213	100%
2006	W	297	221	100%	221	100%
2007	C	297	278	90%	278	90%
2008	C	297	243	100%	243	100%
2009	BN	297	271	100%	271	100%
2010	AN	297	248	100%	248	100%
2011	W	297	231	100%	231	100%
2012	D	297	270	100%	270	100%
Average		297	248	83%	246	83%
Total		12,467	10,403	83%	10,343	83%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

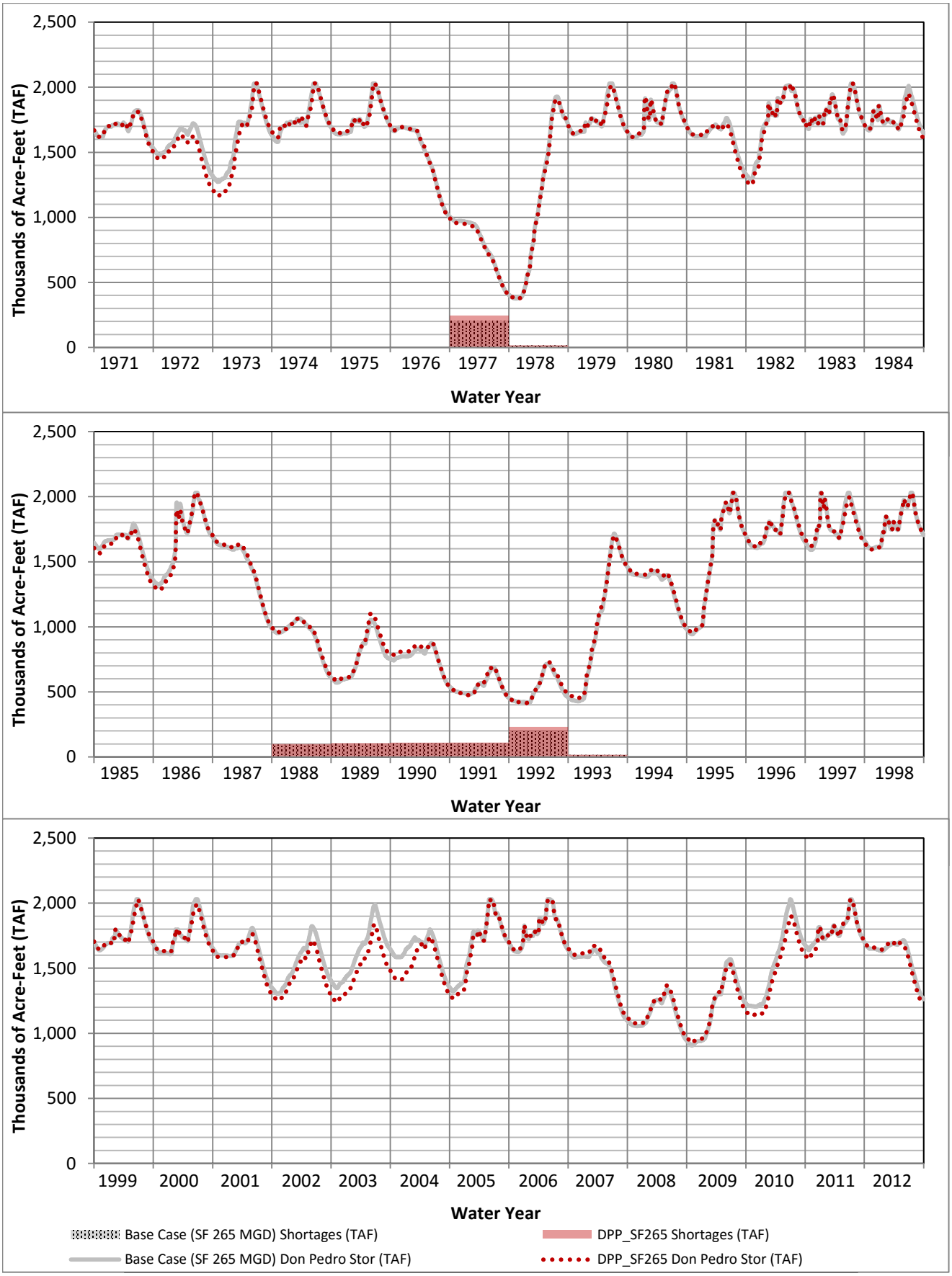

Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

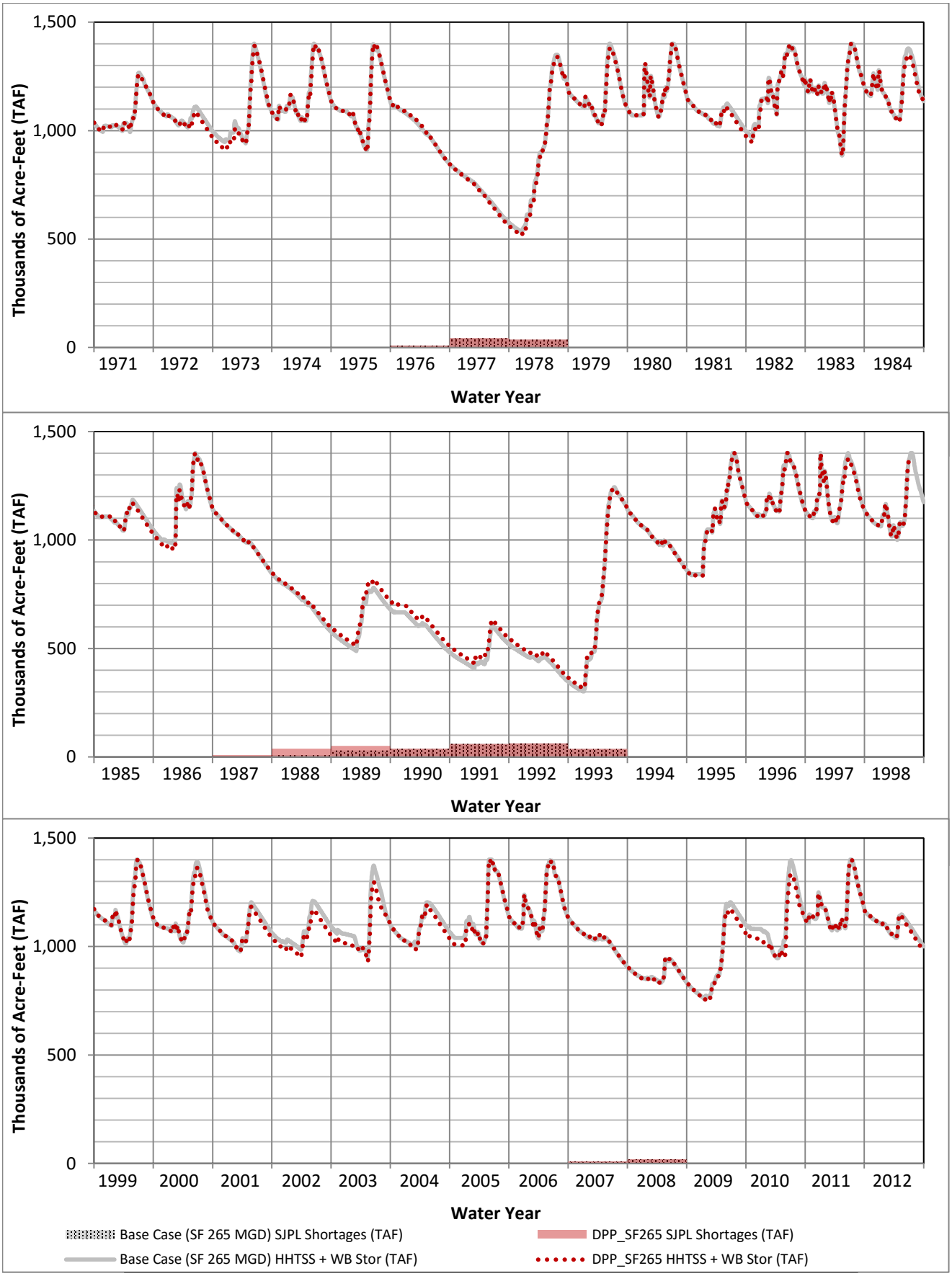

Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base_Case_SF265		DPP_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	Base_Case_SF265 Required	Base_Case_SF265 Resulting
76-77	Drought	265	279	401	425	151%	153%
87-92	Drought	713	713	1,100	1,108	154%	155%
1971	BN	266	535	306	606	115%	113%
1972	D	138	138	270	270	195%	195%
1973	AN	237	575	339	489	143%	85%
1974	W	301	1,025	356	1,091	118%	106%
1975	W	301	872	356	924	118%	106%
1976	C	171	185	226	250	132%	136%
1977	C	94	94	175	175	186%	186%
1978	W	235	352	330	401	140%	114%
1979	AN	301	841	356	886	118%	105%
1980	W	302	1,801	357	1,847	118%	103%
1981	D	194	247	270	348	139%	141%
1982	W	250	2,239	339	2,236	136%	100%
1983	W	301	3,674	356	3,719	118%	101%
1984	AN	302	1,453	357	1,540	118%	106%
1985	D	205	329	270	380	132%	116%
1986	W	237	1,460	339	1,459	143%	100%
1987	C	179	180	225	233	126%	130%
1988	C	94	94	175	175	186%	186%
1989	C	116	116	175	175	151%	151%
1990	C	103	103	175	175	170%	170%
1991	C	116	116	175	175	151%	151%
1992	C	105	105	175	175	167%	167%
1993	W	235	235	330	330	140%	140%
1994	C	182	182	225	225	124%	124%
1995	W	237	2,039	330	2,096	139%	103%
1996	W	302	1,258	357	1,281	118%	102%
1997	W	301	1,931	356	2,013	118%	104%
1998	W	301	2,204	356	2,234	118%	101%
1999	AN	301	943	356	977	118%	104%
2000	AN	302	887	357	966	118%	109%
2001	D	193	226	270	305	140%	135%
2002	D	137	137	252	252	185%	185%
2003	BN	180	185	289	289	160%	156%
2004	D	141	326	270	270	191%	83%
2005	W	237	1,451	339	1,434	143%	99%
2006	W	301	2,248	356	2,288	118%	102%
2007	C	182	182	225	225	124%	124%
2008	C	119	119	175	175	147%	147%
2009	BN	156	156	280	280	180%	180%
2010	AN	249	291	356	356	143%	123%
2011	W	301	2,356	356	2,326	118%	99%
2012	D	192	203	270	304	141%	150%
Average (1970-2012)	-	216	812	291	866	134%	107%
Average (1980-2009)		210	887	284	943	135%	106%
Total (1970-2012)	-	9,092	34,093	12,210	36,358	134%	107%
Total (1980-2009)		6,306	26,625	8,512	28,279	135%	106%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case (SF 265 MGD)		DPP_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case (SF 265 MGD) Required	% of Base Case (SF 265 MGD) Resulting
76-77	Drought	133	133	172	172	129%	129%
87-92	Drought	403	403	451	451	112%	112%
1971	BN	173	395	173	413	100%	105%
1972	D	84	84	146	146	174%	174%
1973	AN	154	480	219	368	142%	77%
1974	W	176	733	223	740	127%	101%
1975	W	176	712	223	734	127%	103%
1976	C	83	83	102	102	123%	123%
1977	C	50	50	70	70	140%	140%
1978	W	154	193	216	219	140%	113%
1979	AN	176	653	223	675	127%	103%
1980	W	177	1,189	224	1,211	126%	102%
1981	D	101	146	146	214	145%	147%
1982	W	159	1,853	219	1,837	138%	99%
1983	W	176	2,282	223	2,293	127%	100%
1984	AN	177	550	224	614	126%	112%
1985	D	112	236	146	256	130%	108%
1986	W	154	1,355	219	1,308	142%	97%
1987	C	91	91	101	101	112%	112%
1988	C	50	50	70	70	140%	140%
1989	C	72	72	70	70	97%	97%
1990	C	59	59	70	70	119%	119%
1991	C	72	72	70	70	98%	98%
1992	C	60	60	70	70	116%	116%
1993	W	154	154	216	216	140%	140%
1994	C	93	93	101	101	108%	108%
1995	W	154	1,423	216	1,437	140%	101%
1996	W	177	1,103	224	1,118	126%	101%
1997	W	176	848	223	886	127%	104%
1998	W	176	1,645	223	1,655	127%	101%
1999	AN	176	744	223	751	127%	101%
2000	AN	177	763	224	825	126%	108%
2001	D	100	133	146	181	146%	136%
2002	D	86	86	142	142	165%	165%
2003	BN	130	134	169	169	130%	126%
2004	D	82	267	146	146	177%	55%
2005	W	154	1,252	219	1,192	142%	95%
2006	W	176	1,750	223	1,759	127%	101%
2007	C	94	94	101	101	108%	108%
2008	C	75	75	70	70	94%	94%
2009	BN	106	106	166	166	157%	157%
2010	AN	158	160	223	223	141%	140%
2011	W	176	1,484	223	1,494	127%	101%
2012	D	104	108	146	172	141%	159%
Average (1971-2012)		129	567	168	582	131%	103%
Average (1980-2009)		125	623	163	637	130%	102%
Total (1971-2012)		5,411	23,818	7,073	24,457	131%	103%
Total (1980-2009)		3,746	18,685	4,885	19,101	130%	102%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 6. Minimum Required and Resulting River Flows Below RM 26

WY	SJI	Base Case (SF 265 MGD)		DPP_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base_Case_SF265 Required	% of Base_Case_SF265 Resulting
76-77	Drought	265	396	293	435	111%	110%
87-92	Drought	713	1,082	772	1,146	108%	106%
1971	BN	266	596	261	626	98%	105%
1972	D	138	198	220	280	159%	141%
1973	AN	237	656	291	569	123%	87%
1974	W	301	1,093	311	1,138	103%	104%
1975	W	301	937	311	960	103%	102%
1976	C	171	243	173	257	101%	105%
1977	C	94	152	120	178	127%	117%
1978	W	235	434	282	432	120%	100%
1979	AN	301	909	311	926	103%	102%
1980	W	302	1,884	312	1,919	103%	102%
1981	D	194	313	220	369	114%	118%
1982	W	250	2,325	291	2,311	116%	99%
1983	W	301	3,788	311	3,802	103%	100%
1984	AN	302	1,535	312	1,588	103%	103%
1985	D	205	389	220	402	107%	103%
1986	W	237	1,540	291	1,528	123%	99%
1987	C	179	242	173	240	97%	99%
1988	C	94	154	120	179	127%	117%
1989	C	116	175	120	179	103%	102%
1990	C	103	162	120	178	116%	110%
1991	C	116	179	120	183	103%	102%
1992	C	105	171	120	186	115%	109%
1993	W	235	315	282	362	120%	115%
1994	C	182	241	173	232	95%	96%
1995	W	237	2,134	282	2,189	119%	103%
1996	W	302	1,334	312	1,336	103%	100%
1997	W	301	2,020	311	2,071	103%	103%
1998	W	301	2,311	311	2,325	103%	101%
1999	AN	301	1,007	311	1,025	103%	102%
2000	AN	302	963	312	1,004	103%	104%
2001	D	193	286	220	345	114%	120%
2002	D	137	202	200	265	146%	131%
2003	BN	180	243	241	300	134%	123%
2004	D	141	387	220	351	156%	91%
2005	W	237	1,534	291	1,513	123%	99%
2006	W	301	2,334	311	2,351	103%	101%
2007	C	182	241	173	232	95%	96%
2008	C	119	185	120	186	101%	101%
2009	BN	156	216	232	292	149%	135%
2010	AN	249	355	311	376	125%	106%
2011	W	301	2,440	311	2,442	103%	100%
2012	D	192	262	220	324	115%	124%
Average (1970-2012)	-	216	883	242	904	112%	102%
Average (1980-2009)		210	960	234	981	112%	102%
Total (1970-2012)	-	9,092	34,093	12,210	36,358	134%	107%
Total (1980-2009)		6,306	28,808	7,032	29,444	112%	102%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 7. Minimum Required and Resulting River February - June Flows Below RM 26

WY	SJI	Base Case (SF 265 MGD)		DPP_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case (SF 265 MGD) Required	% of Base Case (SF 265 MGD) Resulting
76-77	Drought	133	183	157	207	118%	113%
87-92	Drought	403	572	407	576	101%	101%
1971	BN	173	420	168	437	97%	104%
1972	D	84	110	139	164	165%	150%
1973	AN	154	520	214	450	139%	86%
1974	W	176	762	218	790	123%	104%
1975	W	176	742	218	777	123%	105%
1976	C	83	108	94	120	114%	111%
1977	C	50	75	62	88	126%	117%
1978	W	154	238	210	257	136%	108%
1979	AN	176	682	218	715	123%	105%
1980	W	177	1,225	218	1,272	123%	104%
1981	D	101	176	138	242	137%	137%
1982	W	159	1,900	214	1,903	135%	100%
1983	W	176	2,343	218	2,353	123%	100%
1984	AN	177	576	218	637	123%	111%
1985	D	112	263	138	287	124%	109%
1986	W	154	1,401	214	1,383	139%	99%
1987	C	91	120	94	123	104%	103%
1988	C	50	76	63	88	126%	117%
1989	C	72	98	62	89	87%	91%
1990	C	59	84	62	88	106%	104%
1991	C	72	101	62	92	87%	91%
1992	C	60	94	63	96	104%	103%
1993	W	154	185	210	241	136%	130%
1994	C	93	119	94	120	100%	100%
1995	W	154	1,467	210	1,521	136%	104%
1996	W	177	1,141	218	1,172	123%	103%
1997	W	176	873	218	907	123%	104%
1998	W	176	1,704	218	1,733	123%	102%
1999	AN	176	773	218	804	123%	104%
2000	AN	177	804	218	868	123%	108%
2001	D	100	160	138	230	138%	143%
2002	D	86	112	135	160	156%	143%
2003	BN	130	160	164	189	126%	118%
2004	D	82	295	139	236	168%	80%
2005	W	154	1,288	214	1,266	139%	98%
2006	W	176	1,796	218	1,810	123%	101%
2007	C	94	119	94	119	100%	100%
2008	C	75	102	63	90	84%	88%
2009	BN	106	132	160	187	152%	141%
2010	AN	158	190	218	247	138%	130%
2011	W	176	1,522	218	1,533	123%	101%
2012	D	104	134	139	201	134%	151%
Average (1971-2012)		129	600	162	621	126%	104%
Average (1980-2009)		125	656	156	677	125%	103%
Total (1971-2012)		5,411	25,190	6,806	26,085	126%	104%
Total (1980-2009)		3,746	19,688	4,692	20,306	125%	103%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

ATTACHMENT H–9B

EVALUATION OF THE WATER SUPPLY EFFECTS TO CCSF OF THE SWB'S SCENARIO OF A MINIMUM INSTREAM FLOW AT LA GRANGE GAGE OF 20% OF THE FEBRUARY THROUGH JUNE UNIMPAIRED FLOW

Table 1. Generation by Month in MWh

	Base Case (SF 265 MGD)	SED20_SF265	% of Base Case
January	1,044,537	958,175	92%
February	1,693,713	1,721,801	102%
March	3,004,128	2,949,843	98%
April	3,443,307	3,354,784	97%
May	3,466,889	3,957,730	114%
June	3,349,911	3,848,725	115%
July	3,513,260	3,381,383	96%
August	2,706,053	2,621,994	97%
September	1,338,078	1,277,687	95%
October	915,079	886,369	97%
November	396,113	391,021	99%
December	606,220	552,030	91%
Total	25,477,289	25,901,543	102%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case (SF 265 MGD)		SED20_SF265		
			TAF	% of Full	TAF	% of Base Case (SF 265 MGD)	% of Full
76-77	Drought	1,836	1,629	89%	1,481	91%	81%
87-92	Drought	5,198	4,590	88%	4,250	93%	82%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	787	86%	86%
1977	C	921	713	77%	694	97%	75%
1978	W	767	752	98%	751	100%	98%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	761	85%	85%
1988	C	855	759	89%	706	93%	83%
1989	C	846	744	88%	698	94%	83%
1990	C	876	771	88%	724	94%	83%
1991	C	881	774	88%	727	94%	83%
1992	C	844	647	77%	633	98%	75%
1993	W	823	807	98%	806	100%	98%
1994	C	835	835	100%	702	84%	84%
1995	W	774	774	100%	763	99%	99%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	898	100%	100%
2003	BN	885	885	100%	885	100%	100%
2004	D	940	940	100%	940	100%	100%
2005	W	874	874	100%	874	100%	100%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	748	85%	85%
2009	BN	903	903	100%	892	99%	99%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	823	98%	96%
Total		36,190	35,343	98%	34,563	98%	96%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case (SF 265 MGD)			SED20_SF265	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	594	537	90%	455	77%
87-92	C	1,781	1,527	86%	1,178	66%
1971	BN	297	258	100%	258	100%
1972	D	297	291	100%	291	100%
1973	AN	297	233	100%	233	100%
1974	W	297	218	100%	218	100%
1975	W	297	220	100%	220	100%
1976	C	297	282	90%	264	70%
1977	C	297	255	80%	190	60%
1978	W	297	202	100%	166	100%
1979	AN	297	272	100%	272	100%
1980	W	297	220	100%	220	100%
1981	D	297	270	100%	270	100%
1982	W	297	206	100%	206	100%
1983	W	297	190	100%	190	100%
1984	AN	297	257	100%	257	100%
1985	D	297	275	100%	275	100%
1986	W	297	254	100%	254	100%
1987	C	297	292	100%	265	70%
1988	C	297	284	90%	204	70%
1989	C	297	264	90%	204	70%
1990	C	297	243	80%	184	60%
1991	C	297	227	80%	167	60%
1992	C	297	218	80%	155	60%
1993	W	297	206	100%	169	100%
1994	C	297	294	100%	256	70%
1995	W	297	203	100%	153	100%
1996	W	297	236	100%	236	100%
1997	W	297	246	100%	246	100%
1998	W	297	218	100%	218	100%
1999	AN	297	255	100%	255	100%
2000	AN	297	248	100%	248	100%
2001	D	297	282	100%	282	100%
2002	D	297	276	100%	276	100%
2003	BN	297	259	100%	259	100%
2004	D	297	273	100%	273	100%
2005	W	297	213	100%	213	100%
2006	W	297	221	100%	221	100%
2007	C	297	278	90%	258	70%
2008	C	297	243	100%	175	70%
2009	BN	297	271	100%	211	100%
2010	AN	297	248	100%	248	100%
2011	W	297	231	100%	231	100%
2012	D	297	270	100%	270	100%
Average		297	248	83%	230	77%
Total		12,467	10,403	83%	9,661	77%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

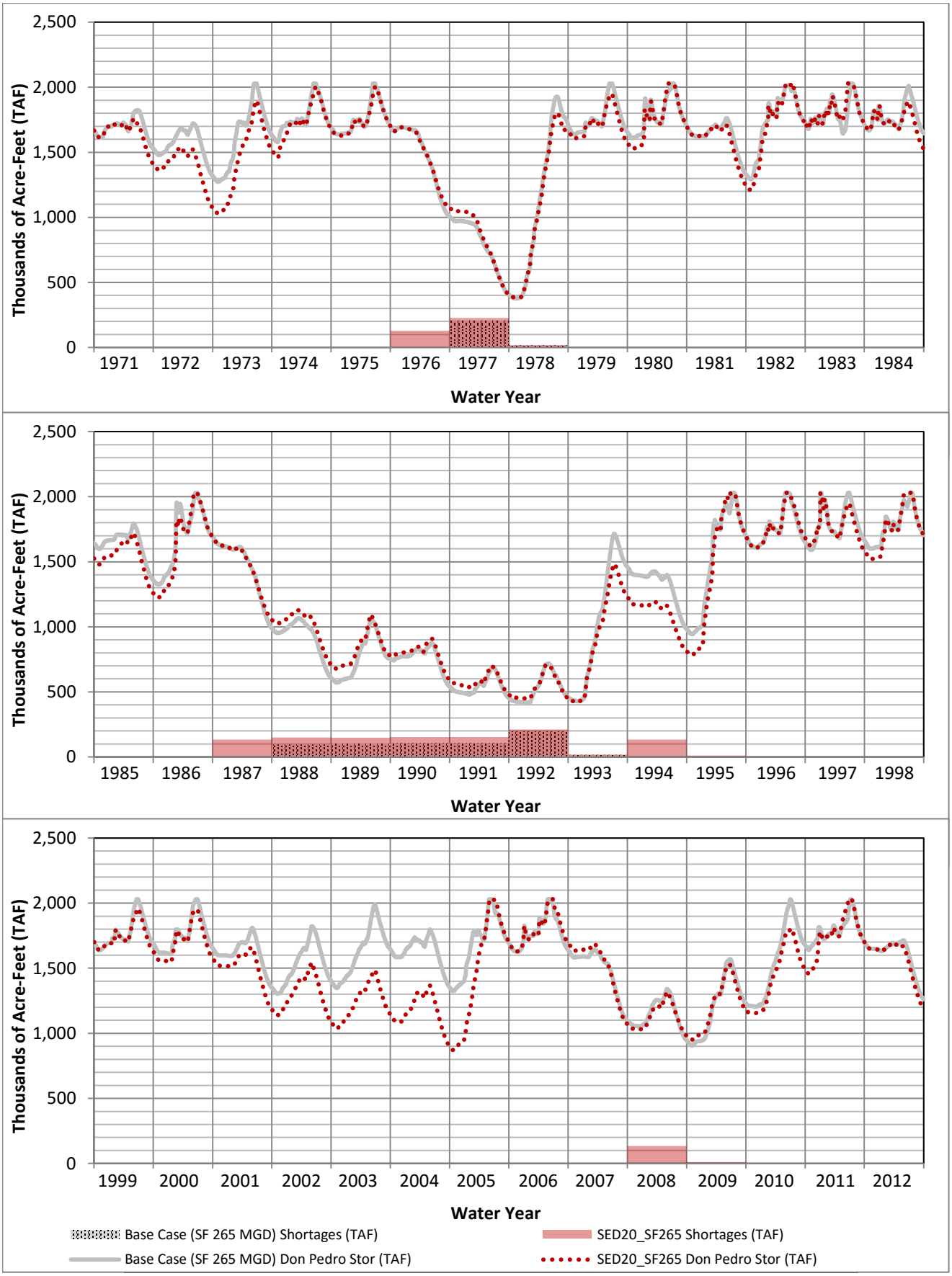

Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

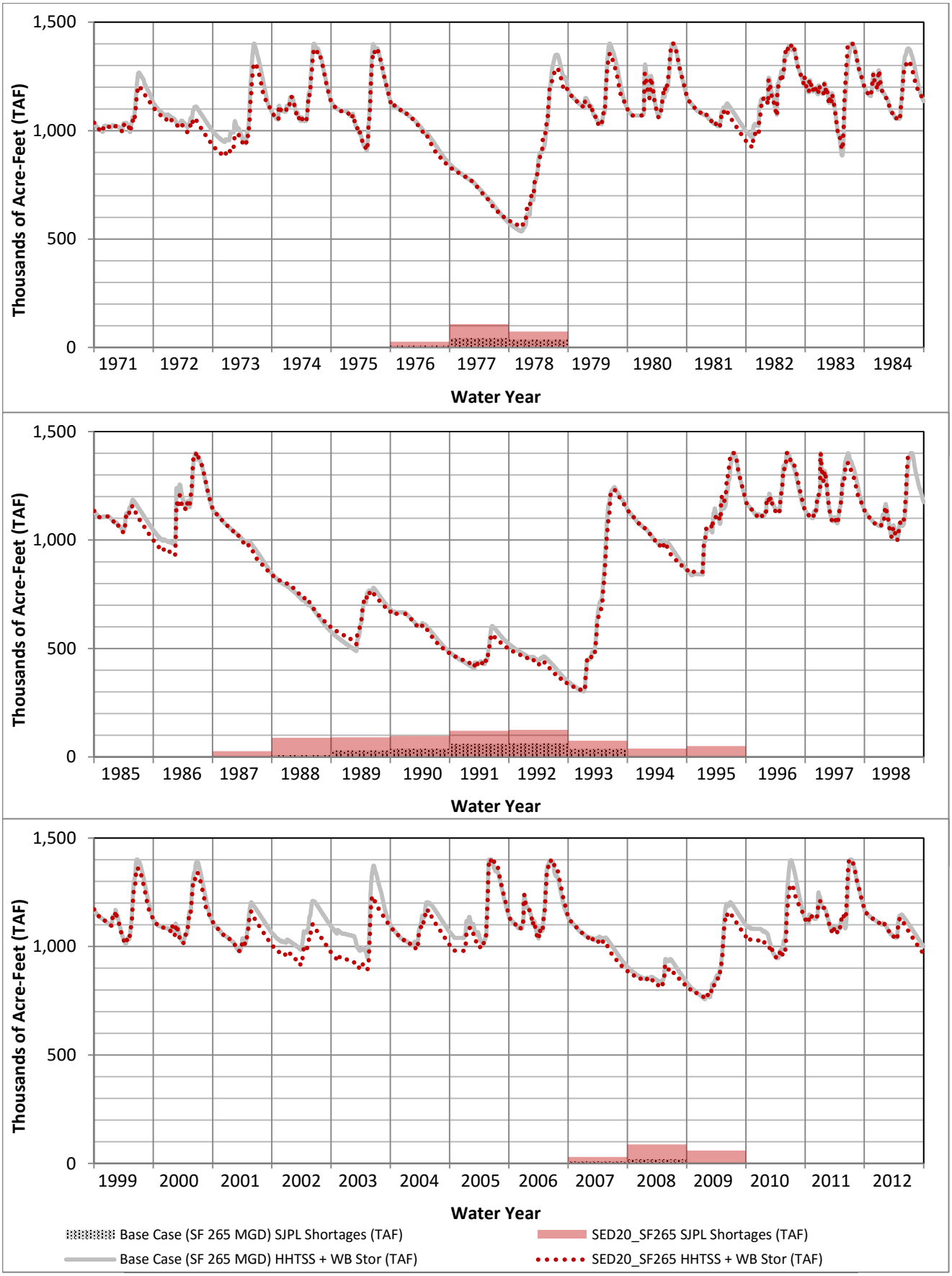

Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base_Case_SF265		SED20_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	Base_Case_SF265 Required	Base_Case_SF265 Resulting
76-77	Drought	265	279	407	421	154%	151%
87-92	Drought	713	713	1,416	1,420	199%	199%
1971	BN	266	535	409	653	154%	122%
1972	D	138	138	271	271	196%	196%
1973	AN	237	575	450	450	190%	78%
1974	W	301	1,025	481	919	160%	90%
1975	W	301	872	528	864	175%	99%
1976	C	171	185	233	247	136%	133%
1977	C	94	94	174	174	186%	186%
1978	W	235	352	525	525	223%	149%
1979	AN	301	841	481	878	160%	104%
1980	W	302	1,801	529	1,719	175%	95%
1981	D	194	247	301	333	155%	135%
1982	W	250	2,239	614	2,154	246%	96%
1983	W	301	3,674	738	3,674	245%	100%
1984	AN	302	1,453	464	1,573	154%	108%
1985	D	205	329	311	311	152%	94%
1986	W	237	1,460	617	1,357	261%	93%
1987	C	179	180	248	252	139%	140%
1988	C	94	94	196	196	208%	208%
1989	C	116	116	295	295	255%	255%
1990	C	103	103	205	205	199%	199%
1991	C	116	116	268	268	232%	232%
1992	C	105	105	202	202	193%	193%
1993	W	235	235	489	489	208%	208%
1994	C	182	182	262	262	145%	145%
1995	W	237	2,039	604	1,969	255%	97%
1996	W	302	1,258	535	1,226	177%	98%
1997	W	301	1,931	463	2,043	154%	106%
1998	W	301	2,204	608	2,125	202%	96%
1999	AN	301	943	494	1,005	164%	107%
2000	AN	302	887	490	908	163%	102%
2001	D	193	226	314	314	163%	139%
2002	D	137	137	291	291	213%	213%
2003	BN	180	185	379	379	210%	205%
2004	D	141	326	290	290	206%	89%
2005	W	237	1,451	555	990	234%	68%
2006	W	301	2,248	629	2,203	209%	98%
2007	C	182	182	260	261	143%	143%
2008	C	119	119	251	251	211%	211%
2009	BN	156	156	342	342	219%	219%
2010	AN	249	291	428	428	172%	147%
2011	W	301	2,356	582	2,172	194%	92%
2012	D	192	203	261	271	136%	133%
Average (1970-2012)	-	216	812	406	851	188%	105%
Average (1980-2009)		210	887	408	930	194%	105%
Total (1970-2012)	-	9,092	34,093	17,071	35,741	188%	105%
Total (1980-2009)		6,306	26,625	12,247	27,890	194%	105%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case (SF 265 MGD)		SED20_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case (SF 265 MGD) Required	% of Base Case (SF 265 MGD) Resulting
76-77	Drought	133	133	275	275	207%	207%
87-92	Drought	403	403	1,107	1,107	274%	274%
1971	BN	173	395	316	512	182%	130%
1972	D	84	84	217	217	258%	258%
1973	AN	154	480	368	368	238%	77%
1974	W	176	733	356	756	202%	103%
1975	W	176	712	403	729	229%	102%
1976	C	83	83	145	145	175%	175%
1977	C	50	50	130	130	262%	262%
1978	W	154	193	444	444	288%	230%
1979	AN	176	653	356	734	202%	112%
1980	W	177	1,189	404	1,115	229%	94%
1981	D	101	146	208	232	206%	159%
1982	W	159	1,853	523	1,778	330%	96%
1983	W	176	2,282	613	2,186	348%	96%
1984	AN	177	550	340	670	192%	122%
1985	D	112	236	218	218	195%	92%
1986	W	154	1,355	535	1,256	347%	93%
1987	C	91	91	160	160	177%	177%
1988	C	50	50	152	152	304%	304%
1989	C	72	72	251	251	350%	350%
1990	C	59	59	161	161	274%	274%
1991	C	72	72	224	224	313%	313%
1992	C	60	60	158	158	262%	262%
1993	W	154	154	408	408	264%	264%
1994	C	93	93	174	174	187%	187%
1995	W	154	1,423	522	1,256	338%	88%
1996	W	177	1,103	410	1,091	232%	99%
1997	W	176	848	338	929	192%	110%
1998	W	176	1,645	484	1,536	274%	93%
1999	AN	176	744	369	815	209%	109%
2000	AN	177	763	366	783	207%	103%
2001	D	100	133	221	221	221%	166%
2002	D	86	86	241	241	279%	279%
2003	BN	130	134	329	329	253%	245%
2004	D	82	267	232	232	281%	87%
2005	W	154	1,252	473	763	306%	61%
2006	W	176	1,750	504	1,723	286%	98%
2007	C	94	94	172	172	184%	184%
2008	C	75	75	207	207	277%	277%
2009	BN	106	106	291	291	276%	276%
2010	AN	158	160	338	338	214%	211%
2011	W	176	1,484	458	1,437	260%	97%
2012	D	104	108	173	175	167%	162%
Average (1971-2012)		129	567	319	612	247%	108%
Average (1980-2009)		125	623	323	658	259%	106%
Total (1971-2012)		5,411	23,818	13,391	25,718	247%	108%
Total (1980-2009)		3,746	18,685	9,687	19,733	259%	106%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

ATTACHMENT H–9C

EVALUATION OF THE WATER SUPPLY EFFECTS TO CCSF OF THE SWB SED'S PREFERRED ALTERNATIVE SCENARIO OF REQUIRING A MINIMUM INSTREAM FLOW OF 40% OF THE FEBRUARY THROUGH JUNE UNIMPAIRED FLOW AT LA GRANGE GAGE

Table 1. Generation by Month in MWh

	Base Case (SF 265 MGD)	SED40_SF265	% of Base Case
January	1,044,537	671,739	64%
February	1,693,713	1,385,330	82%
March	3,004,128	2,723,454	91%
April	3,443,307	3,336,519	97%
May	3,466,889	4,475,509	129%
June	3,349,911	4,150,799	124%
July	3,513,260	3,325,784	95%
August	2,706,053	2,499,857	92%
September	1,338,078	1,408,195	105%
October	915,079	1,017,634	111%
November	396,113	526,319	133%
December	606,220	439,771	73%
Total	25,477,289	25,960,912	102%

Table 2. TID and MID Canal Water Deliveries

WY	SJI	Full Demand (TAF)	Base Case (SF 265 MGD)		SED40_SF265		
			TAF	% of Full	TAF	% of Base Case (SF 265 MGD)	% of Full
76-77	Drought	1,836	1,629	89%	1,161	71%	63%
87-92	Drought	5,198	4,590	88%	3,684	80%	71%
1971	BN	874	874	100%	874	100%	100%
1972	D	965	965	100%	965	100%	100%
1973	AN	865	865	100%	865	100%	100%
1974	W	825	825	100%	825	100%	100%
1975	W	873	873	100%	873	100%	100%
1976	C	915	915	100%	668	73%	73%
1977	C	921	713	77%	494	69%	54%
1978	W	767	752	98%	737	98%	96%
1979	AN	878	878	100%	878	100%	100%
1980	W	852	852	100%	852	100%	100%
1981	D	916	916	100%	916	100%	100%
1982	W	770	770	100%	770	100%	100%
1983	W	753	753	100%	753	100%	100%
1984	AN	912	912	100%	912	100%	100%
1985	D	896	896	100%	896	100%	100%
1986	W	839	839	100%	839	100%	100%
1987	C	895	895	100%	654	73%	73%
1988	C	855	759	89%	602	79%	70%
1989	C	846	744	88%	596	80%	70%
1990	C	876	771	88%	618	80%	70%
1991	C	881	774	88%	621	80%	70%
1992	C	844	647	77%	594	92%	70%
1993	W	823	807	98%	803	100%	98%
1994	C	835	835	100%	609	73%	73%
1995	W	774	774	100%	756	98%	98%
1996	W	841	841	100%	841	100%	100%
1997	W	918	918	100%	918	100%	100%
1998	W	757	757	100%	757	100%	100%
1999	AN	890	890	100%	890	100%	100%
2000	AN	798	798	100%	798	100%	100%
2001	D	865	865	100%	865	100%	100%
2002	D	898	898	100%	676	75%	75%
2003	BN	885	885	100%	864	98%	98%
2004	D	940	940	100%	696	74%	74%
2005	W	874	874	100%	856	98%	98%
2006	W	830	830	100%	830	100%	100%
2007	C	920	920	100%	920	100%	100%
2008	C	882	882	100%	640	73%	73%
2009	BN	903	903	100%	884	98%	98%
2010	AN	826	826	100%	826	100%	100%
2011	W	823	823	100%	823	100%	100%
2012	D	890	890	100%	890	100%	100%
Average		862	842	98%	784	93%	91%
Total		36,190	35,343	98%	32,940	93%	91%

Table 3. SFPUC Water Supply and San Joaquin Pipeline Deliveries to Bay Area in Thousand Acre Feet

WY	SJI	Base Case (SF 265 MGD)			SED40_SF265	
		SFPUC Total Service Area Demand	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]	San Joaquin Pipeline Delivery to Bay Area [1,2]	SFPUC Delivery as % of Total Demand [2,3]
76-77	C	594	537	90%	367	62%
87-92	C	1,781	1,527	86%	780	44%
1971	BN	297	258	100%	258	100%
1972	D	297	291	100%	235	50%
1973	AN	297	233	100%	141	100%
1974	W	297	218	100%	218	100%
1975	W	297	220	100%	220	100%
1976	C	297	282	90%	246	50%
1977	C	297	255	80%	121	35%
1978	W	297	202	100%	120	100%
1979	AN	297	272	100%	272	100%
1980	W	297	220	100%	220	100%
1981	D	297	270	100%	270	100%
1982	W	297	206	100%	206	100%
1983	W	297	190	100%	190	100%
1984	AN	297	257	100%	257	100%
1985	D	297	275	100%	275	100%
1986	W	297	254	100%	254	100%
1987	C	297	292	100%	247	50%
1988	C	297	284	90%	131	35%
1989	C	297	264	90%	112	50%
1990	C	297	243	80%	121	35%
1991	C	297	227	80%	91	35%
1992	C	297	218	80%	77	35%
1993	W	297	206	100%	122	100%
1994	C	297	294	100%	230	50%
1995	W	297	203	100%	119	100%
1996	W	297	236	100%	236	100%
1997	W	297	246	100%	246	100%
1998	W	297	218	100%	218	100%
1999	AN	297	255	100%	255	100%
2000	AN	297	248	100%	248	100%
2001	D	297	282	100%	282	100%
2002	D	297	276	100%	225	50%
2003	BN	297	259	100%	161	100%
2004	D	297	273	100%	273	100%
2005	W	297	213	100%	213	100%
2006	W	297	221	100%	221	100%
2007	C	297	278	90%	238	50%
2008	C	297	243	100%	116	50%
2009	BN	297	271	100%	171	100%
2010	AN	297	248	100%	248	100%
2011	W	297	231	100%	231	100%
2012	D	297	270	100%	270	100%
Average		297	248	83%	205	69%
Total		12,467	10,403	83%	8,607	69%

Notes:

1 - San Joaquin Pipeline deliveries to the Bay Area include direct deliveries to water users in the service area and temporary deliveries to water storage facilities in the Bay Area.

2 -In the table above the Percent of Total Demand is summarized by demand year (July 1 through June 30), and the SJPL delivery is summarized by water year (October 01 through September 30). If the previous Percent of Total Demand and current Percent of Total Demand are not the same, this will result in SJPL deliveries for the water year reflecting a combination of two Percent of Total Demands.

3-Total SFPUC water deliveries include deliveries from the San Joaquin Pipeline and deliveries from Bay Area water supply facilities.

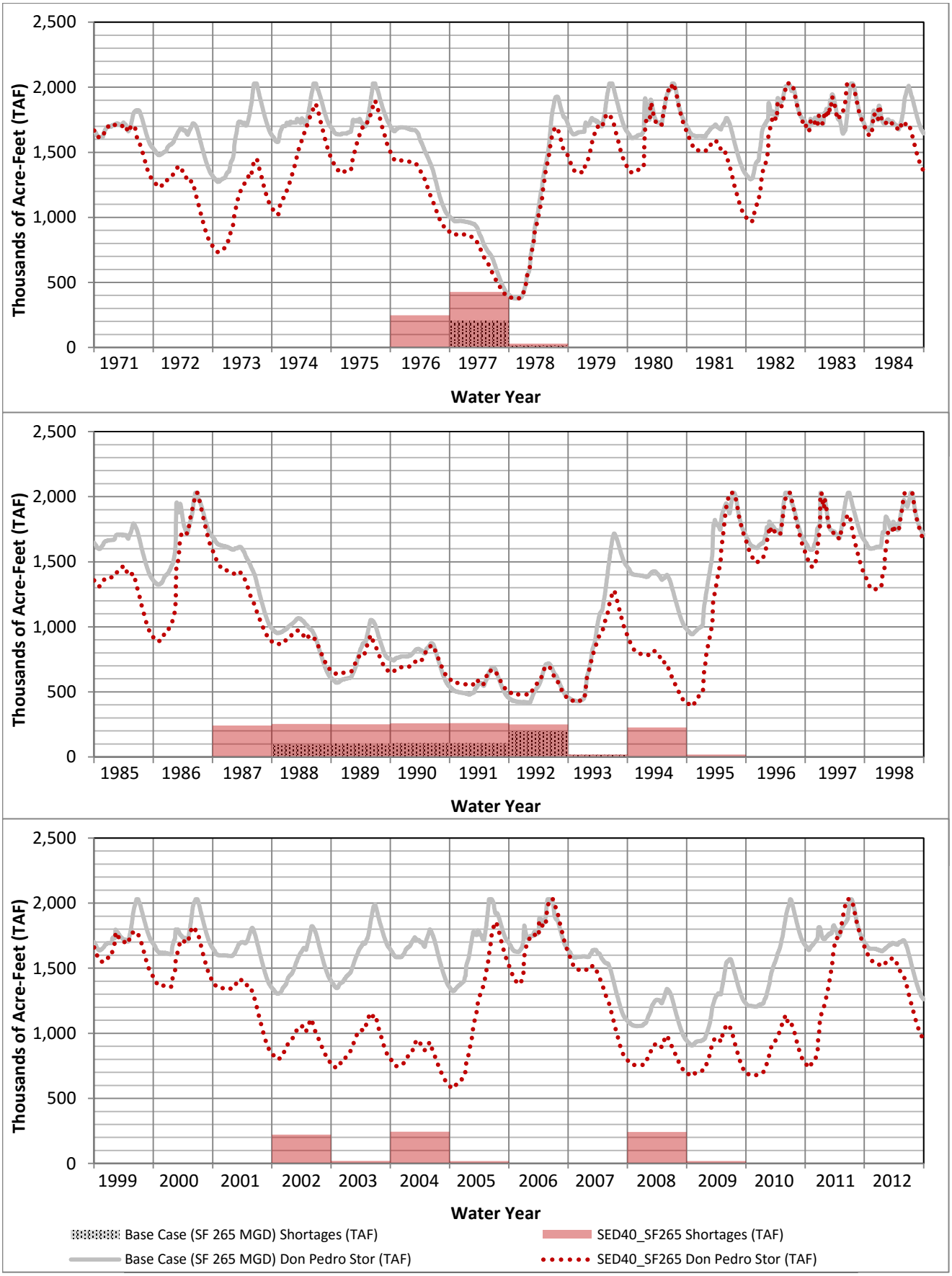

Figure 1. Don Pedro reservoir volume and total TID and MID canal shortages

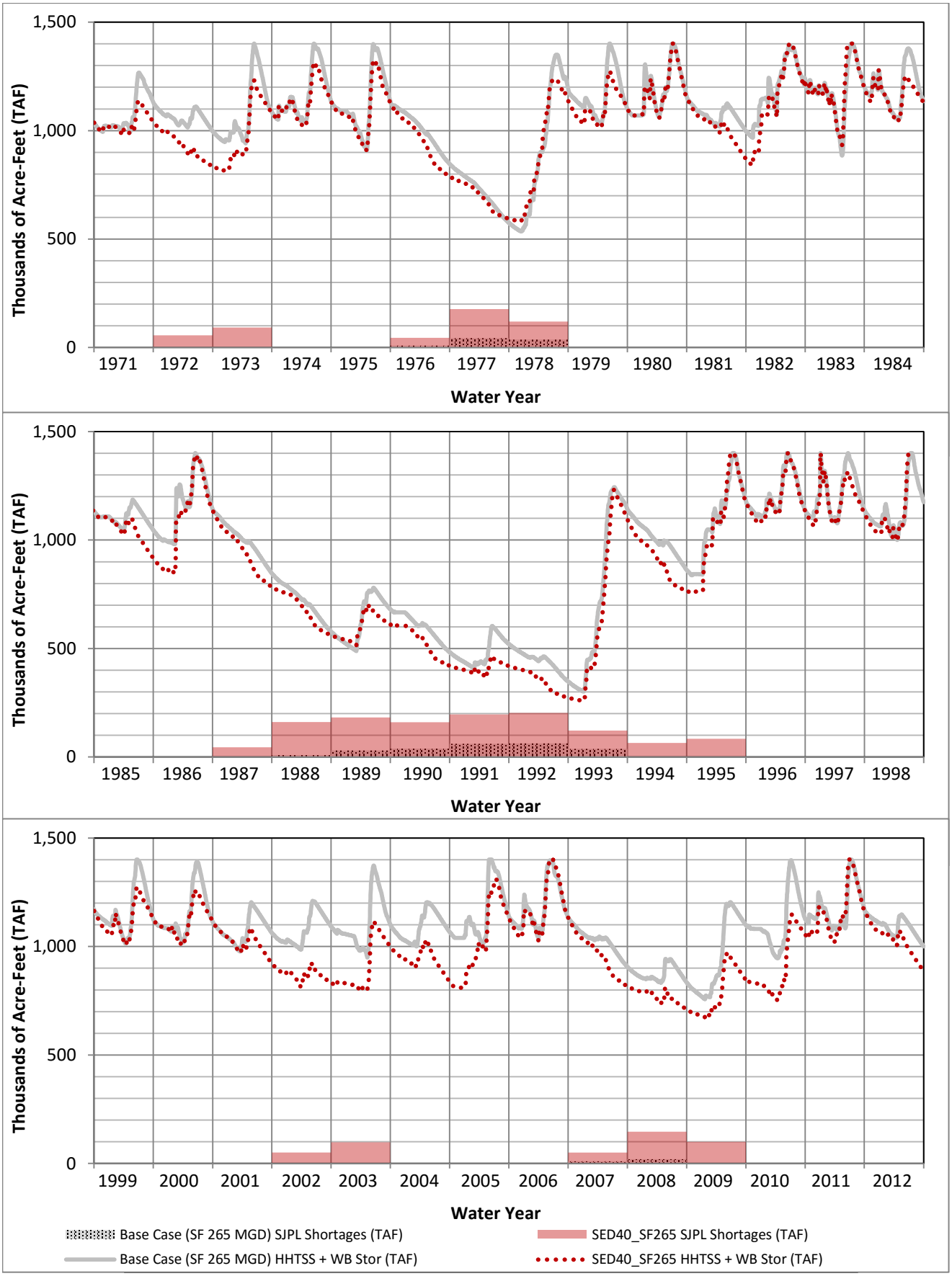

Figure 2. Hetch Hetchy Total System Storage and Water Bank Storage, and Total SJPL Shortages

Table 4. Minimum Required and Resulting River Flows at La Grange

WY	SJI	Base_Case_SF265		SED40_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	Base_Case_SF265 Required	Base_Case_SF265 Resulting
76-77	Drought	265	279	570	570	215%	205%
87-92	Drought	713	713	2,355	2,355	330%	330%
1971	BN	266	535	598	784	225%	147%
1972	D	138	138	445	445	322%	322%
1973	AN	237	575	753	752	318%	131%
1974	W	301	1,025	704	704	234%	69%
1975	W	301	872	839	841	279%	96%
1976	C	171	185	357	357	209%	193%
1977	C	94	94	213	213	227%	227%
1978	W	235	352	848	848	361%	241%
1979	AN	301	841	842	871	280%	104%
1980	W	302	1,801	818	1,578	271%	88%
1981	D	194	247	539	539	279%	218%
1982	W	250	2,239	1,052	1,924	421%	86%
1983	W	301	3,674	1,271	3,673	422%	100%
1984	AN	302	1,453	800	1,731	265%	119%
1985	D	205	329	486	486	238%	148%
1986	W	237	1,460	997	1,127	421%	77%
1987	C	179	180	426	426	238%	237%
1988	C	94	94	302	302	320%	320%
1989	C	116	116	520	520	448%	448%
1990	C	103	103	326	326	316%	316%
1991	C	116	116	456	456	394%	394%
1992	C	105	105	324	324	310%	310%
1993	W	235	235	778	778	331%	331%
1994	C	182	182	462	462	255%	255%
1995	W	237	2,039	1,008	1,676	426%	82%
1996	W	302	1,258	914	1,303	303%	104%
1997	W	301	1,931	772	2,115	257%	110%
1998	W	301	2,204	1,037	1,985	345%	90%
1999	AN	301	943	874	1,160	290%	123%
2000	AN	302	887	801	890	266%	100%
2001	D	193	226	487	487	253%	216%
2002	D	137	137	504	504	369%	369%
2003	BN	180	185	584	584	324%	316%
2004	D	141	326	498	498	353%	153%
2005	W	237	1,451	887	887	375%	61%
2006	W	301	2,248	1,129	2,095	375%	93%
2007	C	182	182	471	471	259%	259%
2008	C	119	119	442	442	371%	371%
2009	BN	156	156	607	607	390%	390%
2010	AN	249	291	686	686	276%	236%
2011	W	301	2,356	926	1,488	308%	63%
2012	D	192	203	476	476	248%	234%
Average (1970-2012)	-	216	812	673	924	311%	114%
Average (1980-2009)		210	887	686	1,012	326%	114%
Total (1970-2012)	-	9,092	34,093	28,262	38,826	311%	114%
Total (1980-2009)		6,306	26,625	20,576	30,360	326%	114%

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.

Table 5. Minimum Required and Resulting River February - June Flows at La Grange

WY	SJI	Base Case (SF 265 MGD)		SED40_SF265			
		TAF Required	TAF Resulting	TAF Required	TAF Resulting	% of Base Case (SF 265 MGD) Required	% of Base Case (SF 265 MGD) Resulting
76-77	Drought	133	133	370	370	279%	279%
87-92	Drought	403	403	1,963	1,963	487%	487%
1971	BN	173	395	505	644	291%	163%
1972	D	84	84	391	391	465%	465%
1973	AN	154	480	670	669	434%	140%
1974	W	176	733	485	485	275%	66%
1975	W	176	712	549	552	312%	78%
1976	C	83	83	201	201	243%	243%
1977	C	50	50	169	169	340%	340%
1978	W	154	193	643	643	416%	332%
1979	AN	176	653	635	664	361%	102%
1980	W	177	1,189	578	1,139	327%	96%
1981	D	101	146	370	370	368%	253%
1982	W	159	1,853	836	1,534	527%	83%
1983	W	176	2,282	940	2,186	533%	96%
1984	AN	177	550	594	841	336%	153%
1985	D	112	236	394	394	352%	167%
1986	W	154	1,355	791	919	512%	68%
1987	C	91	91	256	256	283%	283%
1988	C	50	50	258	258	515%	515%
1989	C	72	72	475	475	663%	663%
1990	C	59	59	282	282	478%	478%
1991	C	72	72	412	412	576%	576%
1992	C	60	60	280	280	464%	464%
1993	W	154	154	582	582	377%	377%
1994	C	93	93	298	298	319%	319%
1995	W	154	1,423	801	929	519%	65%
1996	W	177	1,103	590	979	334%	89%
1997	W	176	848	476	1,018	270%	120%
1998	W	176	1,645	726	1,293	412%	79%
1999	AN	176	744	667	954	379%	128%
2000	AN	177	763	676	766	382%	100%
2001	D	100	133	394	394	395%	297%
2002	D	86	86	454	454	526%	526%
2003	BN	130	134	534	534	410%	397%
2004	D	82	267	439	439	533%	165%
2005	W	154	1,252	681	681	441%	54%
2006	W	176	1,750	798	1,711	453%	98%
2007	C	94	94	301	301	322%	322%
2008	C	75	75	397	397	530%	530%
2009	BN	106	106	557	557	527%	527%
2010	AN	158	160	595	595	376%	372%
2011	W	176	1,484	677	940	384%	63%
2012	D	104	108	306	306	295%	282%
Average (1971-2012)		129	567	516	664	400%	117%
Average (1980-2009)		125	623	528	721	423%	116%
Total (1971-2012)		5,411	23,818	21,664	27,892	400%	117%
Total (1980-2009)		3,746	18,685	15,837	21,633	423%	116%

The average volume of 40% of the February - June unimpaired inflow for the period of record is 583 TAF.

The total volume of 40% of the February - June unimpaired inflow for the period of record is 24,495 TAF.

To reflect actual operations, water year type determinations are implemented in the model on April 15 of each year. Therefore, minimum flow requirements for the period October 1 through April 14 are determined based on the previous water year type. In the table above the required flow is summarized by water year (October 01 through September 30); which, if the previous year and current year water year types are not the same, will result in the required flow reflecting a combination of two water year types.