

APPENDIX H. MODEL AND WATER BUDGET SUPPLEMENTAL AND SUPPORTING DOCUMENTATION

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File Name	Change to Model Input File
C2VSimFG.in	
*	Change simulation starting time to 09/30/1985_24:00
C2VSimFG_Unsat.dat	
*	Replaced initial condition values with more representative values for revised starting
C2VSimFG_SWatersheds.dat	
*	Modified parameters to improve stream discharge match to historical values
C2VSimFG_Groundwater1985.dat	
*	Added hydrologic flow barrier at White Wolf Fault
*	Set Corcoran Clay thickness to 0 ft in areas where it is not present
*	New 10/1/1985 initial condition
*	Modified hydraulic conductivity and specific storage in Layer 1 in the Kern Water Bank
*	Kern County observation wells
C2VSimFG_ElemPump.dat	
*	FRACSK and DSTSK modified for Kern County elements with limited pumping
C2VSimFG_WellSpec.dat	
*	Added Kern County groundwater water bank recovery wells
*	Added Kern County In-District and Urban wells
C2VSimFG_PumpRates.dat	
*	Added Kern County groundwater water bank recovery pumping
*	Added Kern County In-District and Urban pumping
C2VSimFG_StreamInflow.dat	
*	Extended Poso Creek inflow through WY2015
C2VSimFG_DiverionSpec.dat	
*	Removed all Kern County diversions and renumbered remaining diversions to 1-371
*	Added Kern County diersions 372-484
C2VSimFG_Diverions.dat	
*	Removed all Kern County diversions and renumbered remaining diversions to 1-371
*	Added Kern County diersions 372-484
*	Updated diversion data for all diversions to Kern County
C2VSimFG_BypassSpecs.dat	
*	Removed bypass #17
C2VSimFG_RootZone.dat	
*	Native return flow is sent to either nearby stream nodes as runoff or out-of-model as ET
C2VSimFG_IrrPeriod.dat	
*	Adjusted Kern County irrigation periods
C2VSimFG_ReturnFlowFrac.dat	
*	Modified Kern County Ag return flow fraction
C2VSimFG_Urban.dat	
*	Added zone 106 for Metro Bakersfield and adjusted other Kern County zone areas
*	Applied estimated September 1985 initial condition

TABLE 1 - Summary of C2VSimFG-Beta modifications in the Kern County Revision applied to C2VSimFG-Kern by IWFM model input file

File Name	Change to Model Input File
C2VSimFG_Urban_Area.dat	
*	Changed Kern County oil fields from urban to native vegetation
C2VSimFG_Urban_PerCapWaterUse.dat	
*	Updated population for Kern County Urban Zones based on 1990, 2000, 2010 Census
*	Developed demands from historical data and water management plans
C2VSimFG_Urban_Population.dat	
*	Updated population for Kern County Urban Zones based on 1990, 2000, 2010 Census
C2VSimFG_Urban_WaterUseSpecs.dat	
*	Set fractions for SRs 19-21 based on local info
C2VSimFG_NonPondedCrop.dat	
*	Return flow = 0 for Kern County
C2VSimFG_NonPondedCrop_Area.dat	
*	Revised crop distributions to match historical distribution
C2VSimFG_PondedCrop_Area.dat	
*	Modified distribution of rice to be limited to areas in northwest Kern County with
C2VSimFG_NativeVeg_Area.dat	
*	Rebalanced native veg distribution after redistribution of non-ponded crop area to

TABLE 2 - Summary of data input for surface water diversion to agriculture by water district applied to C2VSimFG-Kern Historical Simulation

Water Year	Arvin-Edison WSD	Belridge WSD	Berrenda Mesa WSD	Buena Vista WSD	Cawelo WD	Kern River Canal Co.	Henry Miller WD	Kern Delta WD	Kern-Tulare WD	Lost Hills WD	North Kern WSD	Rosedale Rio Brave WSD	Semi-tropic WSD	Shafter-Wasco ID	So. San Joaquin MUD	Wheeler Ridge - Maricopa WSD	Olcese WD	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
1986	144,722	106,293	90,909	162,444	78,084	11,017	43,242	183,471	27,131	103,268	198,865	0	149,252	74,487	112,888	177,348	1,493	1,664,914
1987	127,333	106,293	90,909	142,274	89,117	10,088	43,242	137,458	27,131	123,981	112,432	0	172,161	53,753	76,193	161,949	1,493	1,475,807
1988	114,321	106,293	90,909	141,152	77,106	2,132	43,242	135,078	27,131	111,872	81,580	0	164,192	47,071	71,243	154,030	1,417	1,368,769
1989	114,591	106,293	90,909	150,341	85,190	9,389	43,242	140,360	27,131	122,044	61,797	0	190,990	50,495	94,729	178,129	1,480	1,467,110
1990	70,816	106,293	90,909	124,845	67,867	13,016	43,242	114,531	27,131	88,963	51,926	0	49,992	34,381	73,000	170,693	1,480	1,129,085
1991	40,698	106,293	90,909	100,517	50,621	9,109	43,242	117,287	27,131	9,553	28,931	0	7,926	40,595	11,683	31,030	1,480	717,005
1992	52,839	106,293	90,909	108,874	54,406	8,624	43,242	118,190	27,131	52,853	34,291	0	94,467	45,851	65,310	96,514	1,480	1,001,274
1993	137,479	93,344	85,549	151,653	75,490	9,527	43,973	174,003	26,034	77,793	181,920	5,040	226,462	72,120	108,767	137,221	1,425	1,607,800
1994	171,856	110,017	93,092	125,084	62,968	12,437	53,471	132,865	28,017	87,636	117,580	2,362	110,951	47,111	83,680	151,368	1,685	1,392,181
1995	134,559	110,993	78,521	189,797	73,155	2,866	29,047	159,595	27,333	85,963	174,020	5,591	235,347	62,105	108,778	153,783	1,425	1,632,877
1996	166,288	112,412	115,132	184,597	90,229	8,162	39,539	179,052	28,749	145,349	202,199	5,722	313,420	72,231	128,865	189,454	1,987	1,983,387
1997	185,820	143,146	97,233	197,871	88,202	8,149	50,584	179,388	29,998	122,140	191,871	4,563	313,717	67,407	124,456	188,455	1,778	1,994,778
1998	120,808	79,387	85,885	152,455	69,758	2,567	30,260	124,464	24,422	80,845	153,662	4,756	240,072	53,064	89,373	148,174	849	1,460,802
1999	152,909	101,786	93,199	142,271	86,667	7,905	53,858	141,626	28,093	108,563	146,395	4,679	307,686	57,625	110,686	166,018	1,248	1,711,214
2000	158,008	111,057	87,200	135,689	87,894	10,902	44,302	152,338	29,948	119,828	133,872	3,920	315,833	61,358	119,597	179,728	1,382	1,752,406
2001	158,432	91,642	65,734	76,718	70,873	8,577	31,379	113,044	30,109	68,302	74,725	0	70,879	48,772	98,104	136,390	1,588	1,145,268
2002	158,197	107,617	63,705	78,735	75,042	7,781	31,724	116,181	25,443	67,574	62,006	0	165,448	55,121	103,849	133,652	1,702	1,253,777
2003	139,412	103,724	64,267	96,601	75,749	7,123	33,941	161,162	24,120	62,007	106,436	1,000	265,110	55,511	106,779	120,733	2,041	1,425,716
2004	155,531	118,543	68,902	86,119	78,558	8,037	39,101	138,664	25,541	67,607	99,610	1,739	174,605	58,351	106,537	138,771	1,637	1,367,853
2005	136,887	105,523	69,372	125,522	78,101	4,715	39,248	169,747	21,445	60,844	207,612	2,784	294,595	58,711	109,716	127,846	1,939	1,614,607
2006	140,411	115,146	84,869	149,851	96,249	3,594	46,538	172,882	22,525	73,422	199,626	0	332,115	68,468	120,106	150,416	2,048	1,778,265
2007	158,526	118,036	102,971	91,196	70,811	3,650	48,482	112,341	23,348	83,116	89,195	552	146,826	37,391	75,642	164,924	1,496	1,328,502
2008	157,604	114,525	86,217	70,032	62,437	3,565	18,156	145,633	22,788	74,554	86,051	0	29,675	47,623	87,776	168,211	1,700	1,176,546
2009	145,184	113,385	86,439	73,530	67,340	3,422	12,129	126,039	21,803	83,740	84,727	0	30,808	44,265	116,967	159,502	1,781	1,171,061
2010	132,462	117,589	88,556	102,109	76,351	2,930	29,694	166,787	19,272	88,191	171,744	1,543	168,870	65,238	120,394	159,162	1,756	1,512,648
2011	130,306	121,808	87,344	121,329	88,617	3,535	39,642	192,069	20,213	92,149	173,305	4,466	337,724	74,413	124,678	156,216	1,530	1,769,343
2012	148,146	130,559	87,953	96,407	89,745	3,302	41,553	195,763	21,682	91,720	81,584	1,329	227,901	35,369	81,602	168,753	1,783	1,505,151
2013	159,887	138,131	93,311	33,558	49,978	2,913	18,533	94,682	22,252	93,322	23,343	0	81,279	26,194	58,923	170,033	1,966	1,068,305
2014	144,605	123,390	82,731	410	41,223	1,962	2,246	70,367	14,067	82,546	11,290	0	5,748	8,303	14,249	152,372	1,238	756,746
2015	114,350	117,357	81,535	134	38,195	2,154	0	68,228	10,274	80,631	9,901	0	12,226	0	3,020	145,842	1,462	685,308
2016	130,405	103,032	88,053	52,717	48,753	784	2,135	98,731	18,393	80,573	50,023	0	112,969	29,704	62,934	162,845	1,440	1,043,491
2017	146,207	115,287	92,158	203,439	73,854	2,040	39,588	162,729	21,729	88,281	108,213	17,971	359,685	59,549	115,708	176,183	1,796	1,784,418
2018	143,046	112,857	91,890	78,882	54,972	1,244	3,423	125,207	22,551	87,221	121,012	4,790	154,719	47,048	98,761	167,550	1,370	1,316,542
2019	141,323	112,486	92,189	155,033	71,223	1,664	10,496	132,097	22,648	86,336	129,766	12,929	300,178	63,306	102,801	164,232	1,721	1,600,429
2020	135,800	102,243	90,691	43,792	44,337	654	2,712	106,406	19,543	85,788	45,689	2,541	73,613	51,269	83,676	145,373	1,774	1,035,900
2021	133,553	79,606	88,546	26,999	31,995	0	1,109	58,022	13,696	92,215	30,443	238	13,670	14,849	32,221	145,862	318	763,342
2022	131,503	113,516	92,132	8,919	20,899	2,368	2,130	81,566	18,578	79,465	47,729	0	4,831	22,962	44,055	95,883	11	766,547
2023	135,444	79,073	77,817	222,548	64,766	878	44,014	163,395	18,965	79,953	289,226	11,106	301,301	124,503	102,464	106,259	753	1,822,465
Max	185,820	143,146	115,132	222,548	96,249	13,016	53,858	195,763	30,109	145,349	289,226	17,971	359,685	124,503	128,865	189,454	2,048	1,994,778
Average	136,060	109,507	86,830	110,643	68,601	5,336	31,203	135,828	23,513	86,584	109,858	2,622	172,559	50,962	88,163	150,012	1,499	1,369,780
Max	40,698	79,073	63,705	134	20,899	0	0	58,022	10,274	9,553	9,901	0	4,831	0	3,020	31,030	11	685,308

TABLE 3 - Summary of data input for surface water diversion from Kern River at different diversion and turnouts applied to C2VSimFG-Kern Historical Simulation

Water Year	Kern River to Beardsley Canal	Kern River to Carrier Canal at Rocky Point	Kern River to Carrier Canal at Calloway Weir	Kern River to CVC at Turnout #4	Kern River to River Canal	Kern River to Rio Vista at River Walk	Kern River to Rosedale Channel	Kern River to North Lake	Kern River to Pioneer Canal	Kern River to Berrenda Mesa WSD	Kern River to Pioneer Project	Kern River to Kern Water Bank	Kern River to Kern Water Bank Canal	Kern River to 2800 Acre Facility	Kern River to Buena Vista WSD BSA	Kern River to Aqueduct at Intertie	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
1986	291,715	199,035	238,877	181,392	0	0	65,684	0	63,232	0	0	0	0	97,866	86,736	0	1,224,537
1987	190,539	76,888	179,876	58,811	0	0	19,893	0	756	0	0	0	0	21,592	86,736	0	635,091
1988	111,679	25,813	163,938	21,851	0	0	345	0	0	0	0	0	0	0	86,736	0	410,362
1989	98,796	28,696	168,926	23,291	0	0	0	0	0	0	0	0	0	0	86,736	0	406,445
1990	77,389	5,373	128,753	6,577	0	0	0	0	0	0	0	0	0	0	86,736	0	304,828
1991	69,736	180,189	56,331	13,944	0	0	5,869	0	0	0	0	0	0	0	86,736	0	412,805
1992	71,521	194,315	690	11,008	0	0	3,598	0	0	0	0	0	0	0	86,736	0	367,868
1993	213,099	241,104	43,555	59,099	50,897	0	54,936	0	27,803	0	0	0	0	64,852	64,488	0	819,833
1994	187,380	213,631	18,103	26,829	67	0	0	0	0	9,882	0	0	0	28,046	38,745	0	522,683
1995	256,234	248,113	65,360	144,230	136,516	0	91,721	0	40,366	23,822	45,284	0	0	60,476	103,429	11,850	1,227,401
1996	315,988	255,792	105,845	108,405	119,999	0	78,824	0	14,286	17,382	55,074	0	0	24,037	92,768	0	1,188,400
1997	288,746	280,471	123,771	130,336	123,333	0	62,841	0	23,271	14,977	45,600	0	0	27,212	134,320	52,848	1,307,726
1998	312,857	244,337	143,422	131,398	23,346	0	95,706	0	51,802	18,483	69,637	0	0	95,160	115,019	188,048	1,489,215
1999	214,847	180,856	71,974	46,274	58,082	0	33,938	0	839	6,915	21,343	0	0	17,891	77,220	0	730,179
2000	175,718	169,844	38,793	31,596	38,147	0	20,213	0	0	1,396	15,929	0	0	30,660	47,882	0	570,178
2001	130,052	188,404	23,762	14,050	4,631	0	3,177	0	2,179	0	0	0	0	0	32,686	0	398,941
2002	91,980	203,010	4,149	23,609	7,878	0	581	0	199	431	871	0	0	0	29,404	0	362,112
2003	164,112	206,448	15,893	14,088	31,451	0	12,306	0	0	1,045	0	0	0	0	38,307	0	483,650
2004	153,148	198,769	29,338	18,247	2,301	589	1,503	165	0	2,545	2,005	0	0	0	39,412	0	448,022
2005	236,776	228,885	73,215	62,146	60,019	0	141,022	1,442	1,942	39,702	102,111	21,548	23,125	77,127	72,865	0	1,141,925
2006	257,590	247,806	53,872	122,931	33,872	3,942	87,318	1,442	9,962	24,636	116,108	25,165	34,358	42,587	97,955	0	1,159,544
2007	135,525	189,169	1,049	10,483	7,752	2,746	0	0	0	13,099	17,809	7,507	0	4,568	47,914	0	437,621
2008	137,813	229,304	53,824	22,700	0	544	0	0	0	0	0	0	0	0	34,549	0	478,734
2009	139,246	238,103	31,342	28,635	115	712	109	0	0	0	0	0	0	0	18,418	0	456,680
2010	196,135	241,876	70,315	68,944	60,087	820	10,816	776	1,775	1,165	0	0	0	13,748	66,441	0	732,898
2011	298,003	266,684	75,784	160,243	90,048	1,752	101,209	787	20,479	26,223	121,857	23,951	47,187	84,876	98,416	0	1,417,499
2012	148,513	241,953	20,495	55,303	409	1,001	10,998	0	0	7,594	20,162	582	0	7,871	45,173	0	560,054
2013	45,141	153,474	706	25,758	0	247	0	0	0	3,529	0	0	0	155	0	0	229,010
2014	26,041	122,044	0	8,356	0	283	0	0	0	0	0	0	0	0	0	0	156,724
2015	16,883	104,841	0	0	0	195	0	0	0	0	0	0	0	0	0	0	121,919
2016	76,773	171,255	232	23,435	0	1,366	0	313	0	455	0	0	0	0	0	0	273,829
2017	311,274	290,759	111,390	138,597	106,982	1,247	167,843	1,392	84,243	30,338	200,910	41,961	133,963	88,869	98,240	0	1,808,008
2018	128,159	219,428	81,635	48,406	7,818	998	13,905	794	6,657	7,556	20,942	4,107	0	34,417	0	0	574,822
2019	221,659	248,247	120,475	99,046	65,987	905	22,942	1,871	46,472	19,100	122,757	18,251	46,124	73,268	13,948	0	1,121,052
2020	96,037	188,311	81,620	40,490	123	905	10,000	1,160	12,948	8,590	2,134	0	0	23,751	0	0	466,069
2021	29,389	133,827	0	20,910	0	28	0	0	0	0	0	0	0	0	0	0	184,154
2022	30,208	151,799	2,472	27,824	0	32	0	35	0	129	0	0	0	0	0	0	212,499
2023	250,229	226,044	174,907	183,535	123,114	1,800	97,161	1,647	86,147	22,321	163,577	40,299	188,021	114,446	236,128	0	1,909,376
Max	315,988	290,759	238,877	183,535	136,516	3,942	167,843	1,871	86,147	39,702	200,910	41,961	188,021	114,446	236,128	188,048	1,909,376
Average	163,077	190,392	67,755	58,231	30,341	529	31,959	311	13,036	7,929	30,108	4,826	12,442	27,197	59,234	6,651	704,018
Max	16,883	5,373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121,919

**TABLE 4 - Summary of data input for surface water diversions for various purposes
applied to C2VSimFG-Kern Historical Simulation**

Water Year	Metro Bakersfield Urban Surface Water Supply	Metro Bakersfield Wastewater Land Disposal	Kern Nat'l Wildlife Refuge SWP Supply	Kern Nat'l Wildlife Refuge Surface Water Inflows from Poso Creek	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
1986	24,416	29,235	0	1,611	30,846
1987	25,298	30,832	0	247	31,079
1988	28,563	32,304	0	65	32,369
1989	27,818	33,785	0	136	33,921
1990	27,426	35,756	0	0	35,756
1991	20,959	36,837	0	123	36,960
1992	25,867	37,801	0	10	37,811
1993	30,261	38,774	120	852	39,746
1994	29,111	39,684	16,861	95	56,640
1995	27,248	40,709	12,097	896	53,702
1996	28,261	41,667	12,776	4,536	58,979
1997	19,216	40,832	7,964	13,811	62,607
1998	11,036	40,355	12,268	90,926	143,549
1999	26,996	39,629	14,827	1,876	56,332
2000	30,963	41,497	7,489	58	49,044
2001	28,611	41,559	13,179	0	54,738
2002	30,185	42,043	19,299	1	61,343
2003	32,206	42,962	20,945	22	63,929
2004	56,861	43,735	23,461	0	67,196
2005	43,727	44,021	23,310	9,025	76,356
2006	40,294	44,614	21,829	11,734	78,177
2007	55,334	44,643	21,607	2,440	68,690
2008	56,335	44,936	17,728	18	62,682
2009	58,834	45,416	19,494	9	64,919
2010	61,314	45,527	21,808	536	67,871
2011	64,388	46,429	26,599	7,691	80,719
2012	68,013	46,666	18,451	9	65,126
2013	66,998	45,513	23,701	0	69,214
2014	55,692	44,645	13,877	0	58,522
2015	44,981	43,256	9,203	0	52,459
2016	55,334	44,643	21,607	2,440	68,690
2017	56,335	44,936	17,728	18	62,682
2018	58,834	45,416	19,494	9	64,919
2019	61,314	45,527	21,808	536	67,871
2020	64,388	46,429	26,599	7,691	80,719
2021	68,013	46,666	18,451	9	65,126
2022	66,998	45,513	23,701	0	69,214
2023	55,692	44,645	13,877	0	58,522
Max	68,013	46,666	26,599	90,926	143,549
Average	43,003	41,827	14,267	4,143	60,238
Max	11,036	29,235	0	0	30,846

**TABLE 5 - Summary of data input for surface water diversion to groundwater banking and managed aquifer recharge for different facilities
applied to C2VSimFG-Kern Historical Simulation**

Water Year	Arvin-Edison WSD	Berrenda Mesa Project	Buena Vista WSD	Cawelo WD	Kern Delta WD	Kern River GSA	North Kern WSD	Rosedale-Rio Bravo WSD	Semi-tropic WSD	West Kern WD	City of Bakers-field	Pioneer Project	Kern Water Bank	Shafter-Wasco ID	Southern San Joaquin MUD	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft			Acre-ft
1986	63,708	0	28,948	0	74,308	33,628	115,498	103,384	0	25,559	164,861	0	0	0	0	609,894
1987	18,800	0	7,487	0	49,387	12,697	47,206	47,731	0	23,249	50,585	0	0	0	0	257,142
1988	1,434	0	227	0	38,275	11,651	11,171	19,026	0	24,594	18,294	0	0	0	0	124,672
1989	3,358	0	3,532	0	47,315	11,325	804	27,984	0	28,604	14,148	0	0	0	0	137,070
1990	4,660	0	0	0	32,009	3,816	0	11,530	0	22,368	9,564	0	0	0	0	83,947
1991	2,404	0	0	0	43,724	10,853	1,224	5,931	0	14,754	19,768	0	0	0	0	98,658
1992	3,886	0	799	0	40,038	8,459	10,236	11,880	0	10,368	23,482	0	0	0	0	109,148
1993	99,714	0	19,229	0	55,596	27,876	25,220	88,065	0	24,420	126,544	0	0	0	0	466,664
1994	28,968	0	11,485	0	48,175	12,042	12,333	26,016	0	29,233	67,418	0	0	0	0	235,670
1995	87,910	17,808	49,623	0	62,561	35,561	149,948	119,339	0	28,201	143,019	62,274	121,465	0	0	877,709
1996	69,472	23,398	18,253	0	70,055	31,979	103,277	116,704	0	37,351	75,468	51,330	232,355	0	0	829,642
1997	58,069	9,801	38,015	7,524	75,768	27,810	102,050	108,711	0	18,555	53,470	38,169	132,457	0	0	670,399
1998	97,098	9,493	63,868	9,136	64,206	26,027	196,469	136,250	0	23,133	149,426	57,357	236,320	0	0	1,068,783
1999	81,398	11,489	8,904	6,110	56,201	27,657	69,080	78,941	0	29,249	41,516	21,884	116,663	0	0	549,092
2000	95,786	1,027	238	3,446	61,068	13,858	163	44,501	0	23,082	51,444	22,032	36,551	0	0	353,196
2001	38,774	0	99	2,683	49,509	9,902	0	5,653	0	8,747	22,005	1,253	10,029	0	0	148,654
2002	4,437	0	1,065	2,596	51,729	11,698	0	1,404	0	19,467	11,840	0	13,439	0	0	117,675
2003	44,030	0	424	3,314	69,470	8,069	367	27,154	0	17,766	20,133	0	5,369	0	0	196,096
2004	7,160	3,172	0	5,172	58,314	8,401	3,039	9,626	0	3,513	22,480	10,768	53,070	0	0	184,715
2005	100,311	19,663	33,153	7,882	71,867	33,881	74,241	151,136	0	29,552	164,991	93,466	308,092	0	0	1,088,235
2006	90,722	28,268	22,966	4,219	60,633	35,837	138,698	174,051	0	14,385	113,166	64,388	308,877	0	0	1,056,210
2007	20,012	15,292	0	5,241	44,774	7,392	80,467	20,348	0	4,209	31,534	19,386	70,553	0	0	319,208
2008	4,409	0	0	5,069	46,984	6,134	0	0	92	0	8,787	0	0	0	0	71,475
2009	34,000	0	3,000	5,239	38,150	10,067	2,596	2,354	0	5,075	18,730	0	0	0	0	119,211
2010	101,606	323	19,127	6,252	80,152	28,715	18,377	76,399	0	10,419	40,113	0	8,272	0	0	389,755
2011	99,559	19,373	73,880	29,630	152,586	52,798	147,576	227,775	17,276	24,880	144,869	132,320	397,029	0	0	1,519,551
2012	27,799	20,055	0	7,162	119,694	18,339	60,613	88,019	1,865	30,166	37,046	27,293	83,991	0	0	522,042
2013	3,947	5,750	0	9,345	56,095	4,929	5,078	5,622	22	2,500	11,518	0	0	0	0	104,806
2014	3,518	0	0	2,102	43,253	3,401	0	0	0	0	9,176	0	0	0	0	61,450
2015	401	0	0	5,893	35,241	5,127	4,768	0	22	0	18,840	0	0	0	0	70,292
2016	5,788	0	0	4,802	55,202	20,147	10,223	4,117	0	0	28,649	0	0	4,206	0	128,928
2017	133,006	32,939	76,292	36,035	134,613	129,534	164,466	284,021	11,421	33,227	198,638	202,515	492,750	42,296	1,091	1,929,457
2018	56,659	6,949	6,510	7,518	85,812	56,664	19,501	89,551	2,077	10,786	71,606	39,118	104,161	17,555	2,591	556,912
2019	85,193	18,936	22,450	39,289	112,549	89,729	139,897	167,392	6,208	15,290	142,758	122,252	302,045	35,384	2,018	1,263,988
2020	6,151	9,544	974	7,126	76,180	59,436	29,316	40,211	1,642	3,023	70,678	15,767	48,767	4,574	1,203	368,814
2021	1,773	0	974	2,770	29,991	8,771	4,875	13,081	0	2,226	10,378	15,767	3,803	1,510	8	94,410
2022	1,056	210	846	5,330	42,686	11,029	15,255	0	0	1,275	18,569	0	0	4,772	129	96,256
2023	138,289	27,605	221,767	26,493	128,329	31,108	163,461	261,670	3	14,108	162,971	216,990	493,722	86,366	15,986	1,886,515
Max	138,289	32,939	221,767	39,289	152,586	129,534	196,469	284,021	17,276	37,351	198,638	216,990	493,722			1,929,457
Average	45,402	7,397	19,319	6,773	64,803	24,904	50,724	68,305	1,069	16,140	62,855	31,956	94,205			493,851
Max	401	0	0	0	29,991	3,401	0	0	0	0	8,787	0	0			61,450

TABLE 6 - Summary of data input for groundwater recovery pumping for local water supply by water district applied to C2VSimFG-Kern Historical Simulation

Water Year	Arvin-Edison WSD	Berrenda Mesa Project	Buena Vista WSD	City of Bakers-field	Cawelo WD	KCWA ID4	Kern Delta WD	Kern Water Bank	Lost Hills UD	North Kern WSD	Olcese WD	Pioneer Project	Rosedale Rio Brave WSD	Semi-tropic WSD	West Kern WD	Wheeler Ridge Maricopa WSD	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
1986	1,955	0	0	0	0	0	0	0	274	0	101	0	0	0	12,073	0	14,403
1987	21,660	0	0	0	0	0	0	0	278	41,963	101	0	0	0	12,195	0	76,196
1988	27,486	0	960	0	0	0	0	0	281	67,609	138	0	0	0	12,316	0	108,790
1989	38,231	0	2,507	0	0	0	0	0	285	79,674	132	0	0	0	12,438	0	133,266
1990	78,769	0	2,605	0	957	0	0	0	292	73,635	132	0	0	0	12,560	0	168,949
1991	82,566	0	2,511	0	4,666	0	0	0	307	80,432	132	0	0	0	12,546	0	183,160
1992	94,444	0	4,146	0	7,124	0	0	0	306	72,926	132	0	0	0	12,533	5,419	197,029
1993	21,035	0	222	0	3,469	0	0	0	308	3,950	66	0	0	0	12,530	150	41,730
1994	67,679	0	1,732	0	7,805	0	0	0	321	37,251	123	0	0	0	12,078	2,705	129,693
1995	14,191	0	73	0	4,628	0	0	0	322	4,176	66	0	0	0	11,638	0	35,094
1996	1,095	0	175	0	2,475	0	0	0	322	4,726	143	0	0	2,373	13,642	0	24,950
1997	0	0	0	0	2,406	0	0	0	322	4,261	112	0	0	5,824	13,962	0	26,887
1998	245	0	0	0	1,008	0	0	0	307	318	232	0	0	1,499	13,404	76	17,089
1999	915	0	0	0	2,099	0	0	0	333	773	105	0	0	1,241	14,692	2,806	22,963
2000	2,119	0	855	0	6,406	0	0	0	336	15,864	81	0	0	689	17,125	0	43,475
2001	100,492	19,482	6,115	13,950	8,533	0	0	86,404	350	61,988	103	52,034	0	0	15,714	6,507	371,673
2002	86,809	3,436	4,453	13,972	10,047	0	0	24,664	360	70,804	94	9,578	0	2,082	16,247	0	242,545
2003	30,906	0	1,619	3,211	5,484	1,892	0	53,591	364	21,811	56	16,181	0	2,828	17,733	24	155,699
2004	75,399	0	3,848	7,147	8,920	3,345	0	27,736	393	49,888	120	1,985	0	2,879	20,809	41	202,510
2005	25,104	589	430	0	3,563	0	0	21,553	400	6,121	111	12,951	0	2,145	20,843	0	93,809
2006	174	0	228	0	4,202	0	0	0	416	2,645	77	0	0	156	22,108	0	30,007
2007	101,515	23,022	5,858	10,000	11,039	6,220	0	167,291	419	88,841	149	54,150	2,302	0	23,107	0	493,914
2008	141,081	27,850	6,066	13,400	12,222	9,478	9,744	246,249	423	100,465	115	77,533	7,470	0	22,340	0	674,436
2009	128,043	29,745	5,315	9,086	742	5,582	15,117	166,703	389	111,798	144	78,033	6,001	449	21,629	0	578,777
2010	37,081	15,117	841	3,896	2,078	1,886	4,466	97,576	362	20,897	112	41,021	0	375	21,334	0	247,041
2011	445	0	290	0	146	0	0	0	378	683	115	0	0	500	20,801	1,037	24,395
2012	43,589	6,362	1,835	3,960	2,058	1,319	3,148	94,381	393	103,236	107	14,257	0	0	21,107	14,579	310,330
2013	123,971	1,379	4,261	5,571	20,994	2,252	19,809	171,627	373	146,543	118	41,743	14,231	0	19,494	16,518	588,883
2014	146,319	23,891	3,269	7,997	18,120	30,884	34,160	183,235	359	133,769	472	78,603	21,604	0	33,129	16,020	731,830
2015	123,618	26,298	1,267	3,516	24,146	38,294	32,918	154,687	358	118,342	109	56,634	17,237	0	20,344	13,857	631,624
2016	81,182	18,461	2,609	2,259	17,334	6,069	23,429	60,440	376	94,855	121	35,524	9,351	4,192	24,381	12,648	393,229
2017	2,492	1,629	69	2,264	1,525	470	402	253	372	13,128	61	9,025	4,631	8,302	15,198	7	59,829
2018	17,917	8,835	945	3,053	13,261	0	1,624	40,279	372	62,130	108	20,537	1,378	1,086	17,343	10,218	199,086
2019	816	786	151	3,071	2,535	0	0	774	372	15,708	112	6,446	0	2,134	15,474	328	48,707
2020	56,992	8,679	2,830	10,397	19,382	5,900	13,629	108,653	372	94,145	154	55,962	15,442	0	24,503	7,041	424,082
2021	109,315	21,427	3,019	13,801	19,480	20,058	26,322	160,044	372	124,868	198	71,207	16,302	0	19,921	5,886	612,219
2022	70,875	26,906	436	14,887	26,591	34,866	19,495	201,954	372	147,693	601	68,069	20,540	0	27,859	8,388	669,533
2023	14,002	4,423	0	3,396	2,622	8,473	2,943	50,578	372	16,849	40	14,642	4,600	0	12,977	0	135,917
Max	146,319	29,745	6,115	14,887	26,591	38,294	34,160	246,249	423	147,693	601	78,603	21,604	8,302	33,129	16,518	731,830
Average	51,856	7,061	1,883	3,917	7,318	4,658	5,453	55,755	350	55,125	137	21,477	3,713	1,020	17,635	3,270	240,625
Max	0	0	0	0	0	0	0	0	274	0	40	0	0	0	11,638	0	14,403

**TABLE 7 - Summary of data input for groundwater pumping for basin export by water district
applied to C2VSimFG-Kern Historical Simulation**

Water Year	Arvin-Edison WSD to Aqueduct	DWR to Aqueduct	North Kern WSD to Friant-Kern Canal	Rosedale Rio Brave WSD to CVC	Semi-tropic WSD to Aqueduct	Wheeler Ridge - Maricopa WSD to Aqueduct	County of Kern to BVARA	TOTAL
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
1986	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	673	673
1988	0	0	0	0	0	0	6,301	6,301
1989	0	0	0	0	0	0	5,879	5,879
1990	0	0	0	0	0	0	8,836	8,836
1991	0	0	0	0	0	0	22,114	22,114
1992	0	0	0	0	0	0	25,025	25,025
1993	0	0	0	0	0	0	7,521	7,521
1994	0	0	0	0	0	0	3,261	3,261
1995	0	2,319	0	0	0	0	4,748	7,067
1996	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	56	56
2001	0	0	0	0	1,457	638	10,024	12,119
2002	0	0	0	0	21,819	0	22,402	44,221
2003	12,380	0	0	0	0	0	9,886	22,266
2004	11,573	0	0	0	8,965	0	13,643	34,181
2005	13,939	0	0	0	19,103	0	6,071	39,113
2006	0	0	0	0	0	0	0	0
2007	7,609	0	7,276	0	6,282	0	10,437	31,604
2008	42,615	0	4,612	0	92,169	0	17,351	156,747
2009	43,080	0	5,880	0	86,194	7,243	7,786	150,183
2010	56,229	0	73	0	37,995	12,404	7,019	113,720
2011	16,065	0	0	0	0	0	369	16,434
2012	10,010	0	6,803	0	0	1,340	1,889	20,042
2013	15,111	0	7,471	12,116	5,610	3,815	9,786	53,909
2014	45,195	0	12,071	28,818	95,611	18,236	21,567	221,498
2015	67,142	0	9,752	26,314	89,453	26,943	23,330	242,934
2016	53,134	0	2,993	10,822	89,371	20,333	10,809	187,462
2017	5,963	0	17,888	1,933	0	9,616	4,037	39,437
2018	13,893	0	3,823	8,045	0	12,910	8,844	47,515
2019	6,393	0	10,136	0	0	44	7,020	23,593
2020	0	0	14,172	37,509	0	17,096	8,079	76,856
2021	0	0	10,785	65,041	43,955	23,337	10,853	153,971
2022	3,574	0	7,034	51,684	130,892	25,367	9,847	228,398
2023	0	0	0	5,365	73,252	1,270	3,771	83,658
Max	67,142	2,319	17,888	65,041	130,892	26,943	25,025	242,934
Average	11,155	61	3,178	6,517	21,109	4,752	8,138	54,910
Max	0	0	0	0	0	0	0	0

TABLE 8 - Summary of population data input by urban zone applied to C2VSimFG-Kern Historical Simulation

Water Year	Urban Zone 97	Urban Zone 98	Urban Zone 99	Urban Zone 100	Urban Zone 102	Urban Zone 103	Urban Zone 104	Urban Zone 105	Urban Zone 106	Total	Annual Growth Rate
	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population	percent
1985	18,266	4,545	54,766	199	11,589	1,845	15,756	443	229,085	336,493	
1986	18,506	4,565	56,021	184	11,631	1,868	16,127	443	245,095	354,441	5.3%
1987	18,747	4,586	57,277	170	11,673	1,892	16,498	443	261,105	372,389	5.1%
1988	18,987	4,607	58,532	155	11,715	1,915	16,869	442	277,114	390,337	4.8%
1989	19,227	4,627	59,788	141	11,758	1,939	17,240	442	293,124	408,285	4.6%
1990	19,467	4,648	61,043	126	11,800	1,962	17,611	442	309,134	426,233	4.4%
1991	19,808	4,662	64,110	132	12,190	2,023	17,570	475	316,532	437,502	2.6%
1992	20,150	4,676	67,178	138	12,581	2,084	17,528	507	323,930	448,771	2.6%
1993	20,491	4,690	70,245	144	12,971	2,145	17,487	540	331,328	460,041	2.5%
1994	20,832	4,704	73,313	150	13,362	2,206	17,445	572	338,726	471,310	2.4%
1995	21,174	4,718	76,380	156	13,752	2,268	17,404	605	346,124	482,579	2.4%
1996	21,515	4,732	79,447	161	14,142	2,329	17,363	637	353,522	493,848	2.3%
1997	21,856	4,746	82,515	167	14,533	2,390	17,321	670	360,920	505,117	2.3%
1998	22,197	4,760	85,582	173	14,923	2,451	17,280	702	368,318	516,387	2.2%
1999	22,539	4,774	88,650	179	15,314	2,512	17,238	735	375,716	527,656	2.2%
2000	22,880	4,788	91,717	185	15,704	2,573	17,197	767	383,114	538,925	2.1%
2001	23,154	4,887	94,141	193	16,313	2,601	17,609	742	395,409	555,047	3.0%
2002	23,429	4,985	96,564	200	16,922	2,628	18,020	717	407,703	571,169	2.9%
2003	23,703	5,084	98,988	208	17,532	2,656	18,432	692	419,998	587,291	2.8%
2004	23,977	5,182	101,412	215	18,141	2,683	18,844	667	432,292	603,413	2.7%
2005	24,252	5,281	103,836	223	18,750	2,711	19,256	643	444,587	619,536	2.7%
2006	24,526	5,379	106,259	230	19,359	2,738	19,667	618	456,882	635,658	2.6%
2007	24,800	5,478	108,683	238	19,968	2,766	20,079	593	469,176	651,780	2.5%
2008	25,074	5,576	111,107	245	20,578	2,793	20,491	568	481,471	667,902	2.5%
2009	25,349	5,675	113,530	253	21,187	2,821	20,902	543	493,765	684,024	2.4%
2010	25,623	5,773	115,954	260	21,796	2,848	21,314	518	506,060	700,146	2.4%
2011	25,815	5,802	117,403	261	21,959	2,862	21,474	519	512,386	708,482	1.2%
2012	26,009	5,831	118,871	261	22,124	2,877	21,635	521	518,791	716,919	1.2%
2013	26,204	5,860	120,357	262	22,290	2,891	21,797	522	525,275	725,458	1.2%
2014	26,400	5,889	121,861	263	22,457	2,905	21,961	523	531,841	734,102	1.2%
2015	26,598	5,919	123,385	263	22,626	2,920	22,125	525	538,489	742,850	1.2%
2016	27,224	5,966	127,867	264	23,159	2,932	22,302	527	551,163	761,404	2.5%
2017	27,543	5,990	130,168	265	23,430	2,938	22,392	528	557,612	770,866	1.2%
2018	27,865	6,014	132,511	265	23,704	2,943	22,481	529	564,136	780,448	1.2%
2019	28,191	6,038	134,897	266	23,981	2,949	22,571	530	570,736	790,159	1.2%
2020	28,521	6,062	137,325	266	24,262	2,955	22,661	531	577,414	799,997	1.2%
2021	28,854	6,087	139,797	267	24,545	2,961	22,752	532	584,170	809,965	1.2%
2022	29,192	6,111	142,313	267	24,833	2,967	22,843	533	591,005	820,064	1.2%
2023	29,533	6,136	144,875	268	25,123	2,973	22,934	535	597,919	830,296	1.2%
Max	29,533	6,136	144,875	268	25,123	2,973	22,934	767	597,919	830,296	5.3%
Average	23,953	5,297	100,366	212	18,239	2,576	19,545	568	437,160	607,916	2.4%
Max	18,506	4,565	56,021	126	11,631	1,868	16,127	442	245,095	354,441	1.2%

TABLE 9 - Summary of data input of per-capita water use by urban zone applied to C2VSimFG-Kern Historical simulation

Water Year	Urban Zone 97	Urban Zone 98	Urban Zone 99	Urban Zone 100	Urban Zone 102	Urban Zone 103	Urban Zone 104	Urban Zone 105	Urban Zone 106
	gdpc	gdpc	gdpc	gdpc	gdpc	gdpc	gdpc	gdpc	gdpc
1985	228	196	245	159	180	159	293	159	508
1986	228	196	245	159	180	159	293	159	478
1987	228	196	245	159	180	159	293	159	453
1988	228	196	245	159	180	159	293	159	440
1989	228	196	245	159	180	159	293	159	412
1990	228	196	245	159	180	159	293	159	421
1991	228	196	245	159	180	159	293	159	408
1992	228	196	245	159	180	159	293	159	413
1993	228	196	245	159	180	159	293	159	423
1994	228	196	245	159	180	159	293	159	413
1995	228	196	245	159	180	159	293	159	375
1996	228	196	245	159	180	159	293	159	405
1997	228	196	245	159	180	159	293	159	363
1998	228	196	245	159	180	159	293	159	287
1999	228	196	248	159	159	159	237	159	378
2000	228	196	248	159	159	159	237	159	382
2001	228	196	248	159	159	159	237	159	374
2002	228	196	248	159	159	159	237	159	374
2003	228	196	248	159	159	159	237	159	355
2004	228	196	248	159	159	159	237	159	400
2005	228	196	248	159	159	159	237	159	334
2006	228	196	248	159	159	159	237	159	330
2007	228	196	248	159	159	159	237	159	377
2008	228	196	248	159	159	159	237	159	378
2009	228	196	248	159	159	159	237	159	343
2010	228	196	248	159	159	159	237	159	330
2011	228	196	248	159	159	159	237	159	343
2012	228	196	248	159	159	159	237	159	379
2013	228	196	248	159	159	159	237	159	333
2014	228	196	248	159	159	159	237	159	329
2015	228	196	248	159	159	159	237	159	269
2016	228	196	248	159	159	159	237	159	263
2017	228	196	248	159	159	159	237	159	274
2018	228	196	248	159	159	159	237	159	261
2019	228	196	248	159	159	159	237	159	232
2020	228	196	248	159	159	159	237	159	231
2021	228	196	248	159	159	159	237	159	232
2022	228	196	248	159	159	159	237	159	226
2023	228	196	248	159	159	159	237	159	218
Max	228	196	248	159	180	159	293	159	478
Average	228	196	247	159	166	159	256	159	348
Max	228	196	245	159	159	159	237	159	218

TABLE 10 - Summary of data input for crop evapotranspiration (ET) by crop type based on METRIC satellite data applied to C2VSimFG-Kern Historical Simulation

Water Year	Grain	Cotton	Sugar Beets	Cotton	Dry Beans	Saf-flower	Other Field Crops	Alfalfa	Pasture	Tomoto-Processed	Tomato-Fresh	Curcubits	Onions & Garlic	Potatoes	Other Truck	Almonds & Pistachios	Orchards	Citrus	Vineyards	Idle	Rice	Refuge	Urban	Native
Units	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr	in/yr
1985	30.0	31.6	34.6	35.4	30.8	28.0	27.9	38.9	35.8	28.8	27.3	24.9	28.7	27.6	29.3	31.6	29.7	36.5	25.0	27.4	35.8	31.6	28.1	27.5
1986	28.2	28.9	36.4	32.8	28.0	26.2	29.2	39.3	35.5	29.8	28.8	27.7	26.5	26.2	27.9	35.1	33.6	36.8	26.9	27.1	39.3	36.2	27.8	26.8
1987	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
1988	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
1989	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
1990	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
1991	30.0	31.6	34.6	35.4	30.8	28.0	27.9	38.9	35.8	28.8	27.3	24.9	28.7	27.6	29.3	31.6	29.7	36.5	25.0	27.4	35.8	31.6	28.1	27.5
1992	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
1993	28.2	28.9	36.4	32.8	28.0	26.2	29.2	39.3	35.5	29.8	28.8	27.7	26.5	26.2	27.9	35.1	33.6	36.8	26.9	27.1	39.3	36.2	27.8	26.8
1994	29.5	34.0	36.9	37.0	31.9	24.0	36.5	37.6	31.4	32.4	27.3	27.4	34.1	28.7	31.6	37.2	37.5	38.7	29.1	33.3	26.6	23.9	27.0	27.3
1995	30.1	32.4	35.8	34.4	30.7	26.6	30.7	36.6	32.6	29.4	29.0	28.1	33.1	27.4	30.2	35.8	35.5	35.8	28.7	32.2	31.6	36.3	27.5	29.6
1996	35.0	37.1	39.7	39.2	38.2	32.6	35.8	42.3	38.7	36.1	32.7	28.7	35.3	30.4	33.0	39.3	40.1	39.4	32.1	32.8	34.1	36.4	30.2	31.0
1997	31.3	35.5	39.1	37.7	33.9	29.3	37.2	43.5	36.0	33.2	28.1	28.8	29.7	28.8	30.1	33.7	34.0	38.1	26.1	30.6	34.1	34.0	28.1	31.1
1998	28.2	28.9	36.4	32.8	28.0	26.2	29.2	39.3	35.5	29.8	28.8	27.7	26.5	26.2	27.9	35.1	33.6	36.8	26.9	27.1	39.3	36.2	27.8	26.8
1999	30.0	31.6	34.6	35.4	30.8	28.0	27.9	38.9	35.8	28.8	27.3	24.9	28.7	27.6	29.3	31.6	29.7	36.5	25.0	27.4	35.8	31.6	28.1	27.5
2000	31.1	34.6	36.0	33.2	29.4	28.7	33.8	44.0	38.6	32.2	32.3	27.3	30.5	29.4	29.5	37.0	34.6	41.0	28.9	27.6	41.2	31.4	32.3	33.0
2001	31.9	33.4	36.3	32.0	29.3	27.2	32.1	44.5	33.8	30.2	29.9	26.5	28.8	28.1	28.8	39.9	36.0	40.7	29.7	28.0	41.7	30.8	30.5	31.6
2002	33.8	35.2	39.5	33.3	31.0	26.3	31.4	44.5	33.2	34.2	28.3	27.2	31.3	30.9	31.2	41.4	37.1	43.4	32.1	30.6	40.7	32.2	32.3	33.0
2003	33.0	35.5	35.6	33.2	33.5	28.0	31.7	42.9	30.6	31.0	26.2	27.8	29.7	27.2	28.4	39.6	32.8	38.8	30.4	29.7	37.0	32.1	28.5	30.4
2004	34.5	36.6	37.3	33.5	33.3	32.8	35.6	46.4	36.1	33.1	26.4	26.1	32.4	30.3	33.1	44.2	36.7	40.0	33.1	35.5	39.0	31.5	30.1	32.4
2005	31.8	35.4	40.6	30.5	31.8	27.8	33.0	40.7	32.3	28.4	23.7	26.8	29.6	28.4	28.0	35.1	30.2	34.8	28.0	29.6	37.3	34.1	28.2	30.0
2006	30.9	33.7	33.7	31.4	31.3	24.9	31.1	41.4	33.2	25.4	26.9	29.5	26.9	31.9	28.2	33.9	28.6	35.0	27.6	27.3	39.6	39.3	27.9	29.0
2007	34.3	36.5	33.9	36.1	31.6	28.9	35.3	44.1	35.3	29.4	24.4	26.7	29.1	27.8	32.5	34.5	29.6	37.6	29.6	29.7	38.0	34.0	27.7	31.5
2008	35.2	34.1	30.6	35.3	29.7	25.1	36.0	43.8	37.2	28.0	25.1	25.7	29.7	29.1	31.3	33.2	31.5	37.9	29.6	26.9	34.2	29.9	28.3	31.4
2009	35.3	34.1	25.1	34.2	32.4	32.6	33.9	42.2	30.9	26.5	24.4	24.9	27.1	29.3	29.6	34.5	31.9	37.8	30.4	28.9	35.8	30.5	27.9	32.0
2010	31.6	28.9	25.8	30.2	28.5	23.7	29.8	38.7	26.8	23.2	23.4	26.2	25.4	26.5	27.0	37.3	31.0	35.5	32.3	28.3	33.7	30.8	27.1	30.2
2011	30.1	28.2	23.9	28.3	27.0	21.8	29.6	36.0	25.1	22.6	27.0	24.4	25.5	25.8	25.2	36.2	32.0	33.6	30.9	26.6	38.1	33.6	26.9	32.7
2012	30.2	27.3	22.5	28.7	26.3	23.0	31.0	35.8	26.1	22.6	28.1	24.3	25.8	26.1	26.1	36.6	31.7	33.9	31.2	26.0	38.4	33.8	27.5	33.0
2013	35.7	35.5	28.0	34.7	32.7	33.2	36.4	44.0	33.1	27.2	30.7	29.1	32.4	30.1	30.1	43.6	35.5	39.9	38.6	29.5	36.3	36.8	29.1	35.2
2014	33.9	33.6	25.2	32.9	28.4	28.8	36.0	40.4	28.8	25.2	28.2	28.3	28.6	28.7	29.8	42.5	33.0	37.8	34.1	28.5	36.0	35.8	29.2	34.2
2015	33.4	34.2	28.3	36.3	31.9	33.9	37.0	43.2	29.0	24.0	26.4	27.1	34.8	27.5	30.7	38.8	31.8	38.3	31.0	28.1	29.6	32.2	27.9	32.4
2016	32.5	30.3	25.9	33.0	27.8	25.6	36.2	36.9	32.7	27.1	24.9	26.0	23.5	24.6	27.6	41.8	31.9	35.5	33.8	28.9	30.5	34.4	27.9	34.1
2017	35.6	32.4	27.2	35.1	33.4	27.1	37.6	36.6	36.7	32.5	24.5	29.8	27.2	31.8	31.7	48.5	35.9	39.3	39.2	34.5	41.2	41.8	29.7	35.0
2018	36.1	32.6	37.2	36.0	34.6	34.3	37.5	36.3	36.3	35.2	32.7	33.1	26.4	29.8	31.1	46.6	35.3	38.6	38.5	35.5	32.1	34.9	29.9	34.1
2019	37.2	33.4	43.2	37.2	35.0	33.2	36.5	37.0	36.7	37.0	28.0	31.6	29.0	30.9	31.4	46.5	34.8	38.1	37.3	37.1	37.0	38.1	29.3	34.1
2020	27.8	25.1	36.9	27.6	28.0	33.2	24.3	28.2	27.6	28.4	19.6	23.3	24.1	23.6	25.2	34.5	26.0	27.7	26.8	26.9	24.0	33.5	31.7	26.3
2021	34.5	31.7	43.4	33.9	35.6	41.0	30.1	35.6	36.0	36.2	14.6	28.5	29.3	27.6	30.4	40.9	33.3	33.2	31.8	30.2	28.6	38.7	32.3	22.9
2022	30.2	28.0	49.5	32.0	39.0	34.6	33.2	31.1	35.7	34.8	24.9	27.0	33.4	26.9	29.9	35.1	28.9	29.5	30.0	29.5	24.5	35.8	33.9	25.6
2023	29.9	33.0	20.5	31.8	20.5	20.5	26.1	35.5	27.6	29.3	29.3	25.3	22.7	21.5	23.9	36.6	25.6	34.3	30.0	29.5	24.5	35.8	33.9	25.7
Average	32.4	33.4	33.0	33.4	30.9	27.8	32.9	41.5	33.0	28.8	27.5	26.9	29.3	28.5	29.5	37.3	33.3	37.7	30.3	29.1	37.1	33.6	28.8	31.3

Table 11 - Historical and Current Groundwater Budget for the Kern County Subbasin for Water Years 1995 to 2023 based on the C2VSimFG-Kern Simulation

Water Year	Deep Percolation	Managed Recharge and Canal Seepage	Net GW/SW Interactions	GW Pumping	Small Watershed Inflow	Subsurface Flow with Adjacent GW Basins	Change in Groundwater Storage
Units	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
SUMMARY: WY1995 to WY2023 Simulation Period							
Total	19,241,188	18,254,872	2,830,842	-48,089,274	1,533,153	-2,350,917	-8,580,169
Average	663,489	629,478	97,615	-1,658,251	52,867	-81,066	-295,868
SUMMARY: WY1995 to WY2014 Historical Period							
Total	13,366,806	11,671,966	1,972,014	-31,728,347	975,198	-1,741,603	-5,483,995
Average	668,340	583,598	98,601	-1,586,417	48,760	-87,080	-274,200
SUMMARY: WY2015 to WY2023 Current Period							
Total	5,874,382	6,582,905	858,828	-16,360,927	557,955	-609,314	-3,096,173
Average	652,709	731,434	95,425	-1,817,881	61,995	-67,702	-344,019
Annual Simulation Results for WY1995 to WY2023 Simulation Period							
1995	880,433	944,800	185,777	-945,538	122,287	-75,303	1,112,457
1996	801,525	926,537	106,693	-1,245,932	41,190	-84,688	545,324
1997	766,620	771,510	126,405	-1,066,862	50,548	-87,402	560,817
1998	1,034,825	1,097,180	121,413	-882,967	155,312	-87,561	1,438,202
1999	755,543	633,676	39,705	-1,107,275	32,155	-85,273	268,526
2000	616,913	462,522	91,455	-1,373,755	25,956	-83,813	-260,723
2001	551,581	222,131	66,647	-1,834,735	24,633	-81,958	-1,051,701
2002	466,234	202,687	76,147	-1,757,505	18,882	-83,943	-1,077,499
2003	502,293	297,019	118,149	-1,491,321	34,003	-85,633	-625,490
2004	487,803	284,862	83,292	-1,857,078	27,959	-89,263	-1,062,431
2005	798,245	1,147,287	132,781	-1,107,044	93,557	-89,923	974,902
2006	838,624	1,125,277	44,650	-1,149,083	40,846	-96,620	803,695
2007	560,409	403,611	26,256	-2,095,098	17,882	-91,605	-1,178,546
2008	461,504	146,763	78,837	-2,336,059	36,058	-86,288	-1,699,186
2009	485,046	186,548	73,844	-2,195,945	21,586	-85,741	-1,514,667
2010	594,742	467,683	141,708	-1,459,775	58,145	-94,580	-292,077
2011	1,073,691	1,530,123	259,377	-983,811	118,303	-94,899	1,902,783
2012	712,922	580,590	88,566	-1,580,331	19,020	-92,962	-272,194
2013	536,928	156,704	59,470	-2,441,173	19,043	-83,437	-1,752,473
2014	440,924	84,456	50,842	-2,817,057	17,832	-80,712	-2,303,716
2015	427,452	89,744	42,671	-2,723,229	21,338	-68,221	-2,210,242
2016	461,704	198,008	70,404	-1,915,137	32,445	-58,578	-1,211,157
2017	958,482	1,879,808	216,262	-1,338,694	85,850	-66,413	1,735,294
2018	568,760	614,176	81,687	-1,857,022	31,439	-69,158	-630,122
2019	766,599	1,291,624	80,305	-1,293,508	67,452	-69,164	843,311
2020	630,494	417,948	74,703	-1,529,196	80,739	-67,446	-392,758
2021	485,299	122,423	48,451	-2,446,495	65,814	-68,453	-1,792,961
2022	463,727	120,308	51,432	-2,332,183	37,427	-67,604	-1,726,892
2023	1,111,864	1,848,866	192,914	-925,464	135,451	-74,277	2,289,354

NOTES:

Deep Percolation	Precipitation and applied water that reaches the groundwater after simulated transport across the unsaturated zone
Managed Recharge and Canal Seepage	Combined groundwater recharge from managed aquifer recharge operations, groundwater banking, and seepage from canals and other conveyance
Net GW/SW Interactions	Net volumetric exchange of surface water and groundwater from streams: Positive represents a net groundwater
GW Pumping	Total groundwater pumping by wells. Groundwater banking recovery pumping is specified input whereas agricultural and municipal pumping is calculated by C2VSim based on demand
Small Watershed Inflow	Runoff and subsurface inflow from surrounding watersheds
Subsurface Flow with Adjacent GW Basins	Net subsurface groundwater flow from the Kern County Subbasin with an adjoining groundwater basin: negative is a net flow out of the Basin and positive is a net flow into the Basin
Change in Groundwater Storage	Sum of the inflow components (positive numbers) plus the outflow components (negative numbers): positive is an increase in storage typified by a rise in GW levels whereas a negative is a decrease in storage typified by a decline in GW levels

TABLE 12: Historical and Current Groundwater Recharge for WY1995 to WY2023

Water Year Units	Soil Moisture Percolation				Groundwater Recharge			
	Percolation from Agricultural Area Acre-ft	Percolation from Urban Area Acre-ft	Percolation from Native, Undeveloped or Fallow Areas Acre-ft	Percolation to Unsaturated Zone Acre-ft	GW Recharge from Unsaturated Zone Acre-ft	GW Banking, Conjunctive Use and Other Managed Recharge Acre-ft	Net GW/SW Interactions Acre-ft	Total GW Recharge Acre-ft
SUMMARY: WY1995 to WY2022 Simulation Period								
Total	15,754,960	1,507,151	2,588,815	19,850,927	19,241,188	18,254,872	2,830,842	40,326,902
Average	543,274	51,971	89,269	684,515	663,489	629,478	97,615	1,390,583
Use (ft/acre)	0.70	0.54	0.10	0.38				
Percent	79%	8%	13%	100%	48%	45%	7%	100%
SUMMARY: WY1995 to WY2014 Historical Period								
Total	10,840,033	989,312	1,624,558	13,453,903	13,366,806	11,671,966	1,972,014	27,010,786
Average	542,002	49,466	81,228	672,695	668,340	583,598	98,601	1,350,539
Use (ft/acre)	0.70	0.52	0.09	0.37				
Percent	81%	7%	12%	100%	49%	43%	7%	100%
SUMMARY: WY2016 to WY2022 Annual Report Period								
Total	4,914,927	517,839	964,257	6,397,023	5,874,382	6,582,905	858,828	13,316,115
Average	546,103	57,538	107,140	710,780	652,709	731,434	95,425	1,479,568
Use (ft/acre)	0.70	0.60	0.12	0.39				
Percent	77%	8%	15%	100%	44%	49%	6%	100%
Annual Simulation Results for WY2022 to WY2070 Simulation Period								
1995	622,877	51,743	184,664	859,285	880,433	944,800	185,777	2,011,011
1996	572,216	42,250	72,348	686,814	801,525	926,537	106,693	1,834,755
1997	615,748	49,378	100,568	765,693	766,620	771,510	126,405	1,664,534
1998	675,008	76,104	259,287	1,010,398	1,034,825	1,097,180	121,413	2,253,418
1999	559,254	48,475	82,918	690,647	755,543	633,676	39,705	1,428,924
2000	516,121	40,343	49,112	605,575	616,913	462,522	91,455	1,170,889
2001	522,620	46,161	57,907	626,689	551,581	222,131	66,647	840,359
2002	450,599	37,043	43,583	531,224	466,234	202,687	76,147	745,068
2003	470,394	52,083	58,799	581,277	502,293	297,019	118,149	917,461
2004	484,857	49,885	53,868	588,609	487,803	284,862	83,292	855,957
2005	559,713	61,040	107,289	728,043	798,245	1,147,287	132,781	2,078,314
2006	541,188	54,732	56,803	652,723	838,624	1,125,277	44,650	2,008,552
2007	506,798	37,562	31,184	575,543	560,409	403,611	26,256	990,276
2008	497,075	35,748	38,461	571,285	461,504	146,763	78,837	687,104
2009	504,450	41,539	43,124	589,113	485,046	186,548	73,844	745,438
2010	525,792	61,001	85,901	672,695	594,742	467,683	141,708	1,204,134
2011	690,946	76,143	190,426	957,515	1,073,691	1,530,123	259,377	2,863,191
2012	562,482	55,571	40,582	658,635	712,922	580,590	88,566	1,382,078
2013	490,189	39,469	35,779	565,437	536,928	156,704	59,470	753,102
2014	471,707	33,042	31,955	536,705	440,924	84,456	50,842	576,222
2015	508,357	46,568	56,187	611,112	427,452	89,744	42,671	559,867
2016	487,538	47,479	70,079	605,096	461,704	198,008	70,404	730,116
2017	654,882	58,316	148,266	861,465	958,482	1,879,808	216,262	3,054,552
2018	461,003	37,368	42,571	540,942	568,760	614,176	81,687	1,264,622
2019	503,130	49,206	88,940	641,276	766,599	1,291,624	80,305	2,138,528
2020	563,821	67,782	150,431	782,035	630,494	417,948	74,703	1,123,145
2021	466,009	59,024	47,326	572,358	485,299	122,423	48,451	656,174
2022	535,494	58,881	77,701	672,076	463,727	120,308	51,432	635,467
2023	734,692	93,214	282,758	1,110,664	1,111,864	1,848,866	192,914	3,153,644

NOTES:

Simulation of Recharge	IWFM applies two processes to simulate the movement of water from the surface to the groundwater. The root zone simulates calculates the volume of water that will percolate below the root zone based on local soil properties. This water bases to the unsaturated zone that applies a 1-D vadose zone flow that simulates the rate that water will reach the groundwater based on subsurface properties and soil moisture content.
Percolation from Agricultural Area	Total volume of rainfall and applied water calculated to meet the total agricultural demand that percolates below the root zone in irrigated agricultural areas based on C2VSim simulation.
Percolation from Urban Area	Total volume of rainfall and applied water calculated to meet urban outdoor use that percolates below the root zone in urban areas based on C2VSim simulation.
Percolation from Native, Undeveloped or Fallow Areas	Total volume of rainfall and applied water that percolates below the root zone in native, undeveloped and fallow areas based on C2VSim simulation.
Percolation to Unsaturated Zone	Total volume of rainfall and applied water that percolates below the root zone from all areas based on C2VSim simulation.
GW Recharge from Unsaturated Zone	Volume of water going from the unsaturated zone to groundwater
GW Banking, Managed Recharge and Canal Seepage	Managed aquifer recharge and groundwater banking is simulated in C2VSim by applying a high recoverable loss factor for surface water diversions. For Kern County, these operations generally assumes that 88% to 94% of surface water deliveries physically recharge groundwater. This recharge is applied directly to the groundwater without passing through the unsaturated zone.
Total GW-Surface Water Flow Interactions	Total of Net Stream GW/SW Interactions (from Kern River and Poso Creek) and Net Small Watershed recharge from surface water runoff surrounding Kern County Subbasin. A positive number is recharge, and a negative is groundwater discharge to the stream. This recharge is applied directly to the groundwater without passing through the unsaturated zone.
Total GW Recharge	Total volume to water reaching the groundwater as recharge

TABLE 13: Historical and Current Basin Boundary GW Flow for WY1995 to WY2023

Water Year	Net North Basin Boundary GW Flow	Net White Wolf GW Flow	Net Basin Boundary GW Flow	Net Stream GW/SW Interaction	Net Small Watershed Recharge	Total Stream Recharge
Units	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
SUMMARY: WY1995 to WY2022 Simulation Period						
Total	-2,571,367	220,450	-2,350,917	2,830,842	1,533,153	4,363,995
Average	-88,668	7,602	-81,066	97,615	52,867	150,483
SUMMARY: WY1995 to WY2014 Historical Period						
Total	-1,865,112	123,509	-1,741,603	1,972,014	975,198	2,947,212
Average	-93,256	6,175	-87,080	98,601	48,760	147,361
SUMMARY: WY2016 to WY2022 Annual Report Period						
Total	-706,255	96,941	-609,314	858,828	557,955	1,416,783
Average	-78,473	10,771	-67,702	95,425	61,995	157,420
Annual Simulation Results for WY2022 to WY2070 Simulation Period						
1995	-76,200	897	-75,303	185,777	122,287	308,064
1996	-82,226	-2,462	-84,688	106,693	41,190	147,883
1997	-85,077	-2,325	-87,402	126,405	50,548	176,953
1998	-82,840	-4,720	-87,561	121,413	155,312	276,726
1999	-82,203	-3,070	-85,273	39,705	32,155	71,860
2000	-82,193	-1,621	-83,813	91,455	25,956	117,411
2001	-83,287	1,329	-81,958	66,647	24,633	91,280
2002	-90,844	6,901	-83,943	76,147	18,882	95,029
2003	-93,662	8,030	-85,633	118,149	34,003	152,152
2004	-96,834	7,571	-89,263	83,292	27,959	111,251
2005	-99,147	9,224	-89,923	132,781	93,557	226,339
2006	-102,065	5,445	-96,620	44,650	40,846	85,496
2007	-98,698	7,094	-91,605	26,256	17,882	44,138
2008	-100,626	14,338	-86,288	78,837	36,058	114,895
2009	-101,563	15,822	-85,741	73,844	21,586	95,430
2010	-110,388	15,808	-94,580	141,708	58,145	199,853
2011	-102,639	7,740	-94,899	259,377	118,303	377,679
2012	-101,707	8,745	-92,962	88,566	19,020	107,585
2013	-95,325	11,888	-83,437	59,470	19,043	78,513
2014	-97,588	16,876	-80,712	50,842	17,832	68,674
2015	-87,190	18,970	-68,221	42,671	21,338	64,008
2016	-78,823	20,246	-58,578	70,404	32,445	102,849
2017	-78,475	12,061	-66,413	216,262	85,850	302,112
2018	-75,800	6,642	-69,158	81,687	31,439	113,125
2019	-75,018	5,854	-69,164	80,305	67,452	147,758
2020	-74,163	6,716	-67,446	74,703	80,739	155,442
2021	-78,411	9,958	-68,453	48,451	65,814	114,264
2022	-77,685	10,081	-67,604	51,432	37,427	88,860
2023	-80,690	6,413	-74,277	192,914	135,451	328,365

NOTES:

Net North Basin Boundary GW Flow	Difference of simulated groundwater inflows and outflows along the northern Kern County Subbasin boundary with Kings and Tule Basins
Net White Wolf GW Flow	Difference of simulated groundwater inflows and outflows along the southern Kern County Subbasin boundary with White Wolf Basin
Net Basin Boundary GW Flow	Combined subsurface GW flow from Kern County Subbasin to Kings, Tule and White Wolf Basins
Net Stream GW/SW Interaction	Net volumetric exchange between surface water in Kern River or Poso Creek and the groundwater. A positive number is surface water to groundwater, and a negative is groundwater discharge to the stream.
Net Small Watershed Recharge	Groundwater recharge from surface water runoff from small watersheds surrounding the Kern County Subbasin
Total Stream Recharge	Total of Net Stream GW/SW Interactions and Net Small Watershed Recharge

TABLE 14: Historical and Current Land Use and Water Use for WY1995 to WY2023

TABLE 14: Historical and Current Land Use and Water Use for WY1995 to WY2023												
	Land Use Summary				Groundwater Pumping Summary				Surface Water Use Summary			
Water Year	Irrigated Agricultural Area	Urban Area	Native, Undeveloped or Fallow Area	Total Area	Agricultural Pumping	Urban Pumping	GW Banking, Exchanges and "Pump-Ins"	Total Pumping	Agricultural Surface Water Deliveries	Urban Surface Water Deliveries	Other Surface Water Deliveries	Total Surface Water Deliveries
Units	Acres	Acres	Acres	Acres	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
SUMMARY: WY1995 to WY2022 Simulation Period												
Total					36,928,465	4,941,154	6,219,654	48,089,274	33,971,251	1,232,941	489,705	35,693,898
Average	773,643	98,525	930,751	1,802,919	1,273,395	170,385	214,471	1,658,251	1,171,422	42,515	16,886	1,230,824
Use (ft/acre)					1.65	1.73		0.92	0.92	0.25	0.08	0.74
Percent	43%	5%	52%	100%	77%	10%	13%	100%	95%	3%	1%	100%
SUMMARY: WY1995 to WY2014 Historical Period												
Total					24,754,927	3,522,916	3,450,504	31,728,347	24,644,409	827,781	340,492	25,812,682
Average	779,822	95,537	927,546	1,802,905	1,237,746	176,146	172,525	1,586,417	1,232,220	41,389	17,025	1,290,634
Use (ft/acre)					1.59	1.84		0.88	1.00	0.23	0.10	0.81
Percent	43%	5%	51%	100%	78%	11%	11%	100%	95%	3%	1%	100%
SUMMARY: WY2016 to WY2022 Annual Report Period												
Total					12,173,538	1,418,239	2,769,150	16,360,927	9,326,843	405,160	149,213	9,881,215
Average	759,910	105,165	937,874	1,802,949	1,352,615	157,582	307,683	1,817,881	1,036,316	45,018	16,579	1,097,913
Use (ft/acre)					1.78	1.50		1.01	0.77	0.29	0.05	0.60
Percent	42%	6%	52%	100%	74%	9%	17%	100%	94%	4%	2%	100%
Annual Simulation Results for WY2022 to WY2070 Simulation Period												
1995	780,803	58,394	963,756	1,802,952	779,673	150,518	15,347	945,538	1,340,982	26,158	11,953	1,379,093
1996	798,735	71,339	931,951	1,802,025	1,080,675	153,880	11,378	1,245,932	1,647,976	27,131	14,181	1,689,287
1997	801,583	86,428	914,941	1,802,951	888,848	166,617	11,397	1,066,862	1,651,899	18,447	18,036	1,688,382
1998	799,230	94,070	909,652	1,802,951	694,893	178,371	9,704	882,967	1,201,751	10,595	41,846	1,254,192
1999	803,474	85,993	913,484	1,802,951	929,262	166,608	11,406	1,107,275	1,426,302	25,916	12,051	1,464,270
2000	835,206	85,863	881,882	1,802,951	1,192,285	166,512	14,958	1,373,755	1,463,158	29,713	6,073	1,498,944
2001	799,553	84,609	918,789	1,802,951	1,466,045	176,849	191,841	1,834,735	963,498	27,451	11,359	1,002,308
2002	738,420	87,611	976,921	1,802,951	1,473,084	180,772	103,649	1,757,505	1,058,519	28,964	16,859	1,104,341
2003	757,372	92,311	953,269	1,802,951	1,200,365	180,388	110,568	1,491,321	1,202,558	30,901	15,075	1,248,534
2004	769,162	95,981	937,809	1,802,951	1,590,873	176,146	90,059	1,857,078	1,148,879	54,569	19,412	1,222,859
2005	766,330	101,332	935,290	1,802,951	856,825	158,215	92,005	1,107,044	1,337,381	41,964	18,466	1,397,811
2006	816,721	112,056	874,174	1,802,951	950,585	179,565	18,933	1,149,083	1,470,354	38,666	18,441	1,527,461
2007	792,925	106,463	903,563	1,802,951	1,592,711	189,287	313,101	2,095,098	1,118,253	53,104	17,009	1,188,366
2008	762,593	103,540	936,819	1,802,951	1,580,999	189,648	565,412	2,336,059	993,550	54,064	14,880	1,062,494
2009	763,660	103,826	935,466	1,802,953	1,546,574	180,147	469,225	2,195,945	992,759	56,466	16,276	1,065,502
2010	755,415	106,423	941,113	1,802,951	1,003,190	174,610	281,975	1,459,775	1,267,222	58,848	19,425	1,345,495
2011	782,699	107,810	912,442	1,802,951	761,163	188,255	34,393	983,811	1,491,540	61,797	20,310	1,573,648
2012	790,395	110,511	902,046	1,802,951	1,216,581	203,122	160,629	1,580,331	1,280,456	65,278	15,464	1,361,197
2013	759,168	104,354	939,430	1,802,951	1,936,008	179,416	325,749	2,441,173	923,115	64,303	20,333	1,007,751
2014	723,000	111,830	968,121	1,802,951	2,014,288	183,992	618,777	2,817,057	664,254	53,448	13,044	730,747
2015	765,851	111,658	925,424	1,802,933	1,989,237	166,575	567,417	2,723,229	606,865	43,170	7,816	657,851
2016	759,168	104,354	939,430	1,802,951	1,418,158	152,484	344,495	1,915,137	896,642	50,305	15,789	962,736
2017	759,168	104,354	939,430	1,802,951	1,118,615	160,601	59,478	1,338,694	1,492,979	50,166	19,755	1,562,900
2018	759,168	104,354	939,430	1,802,951	1,569,420	157,246	130,355	1,857,022	1,117,016	52,284	22,523	1,191,824
2019	759,168	104,354	939,430	1,802,951	1,095,966	150,892	46,650	1,293,508	1,348,900	49,085	19,114	1,417,099
2020	759,168	104,354	939,430	1,802,951	1,048,690	143,180	337,327	1,529,196	875,658	57,246	18,728	951,631

TABLE 14: Historical and Current Land Use and Water Use for WY1995 to WY2023

	Land Use Summary				Groundwater Pumping Summary				Surface Water Use Summary			
Water Year	Irrigated Agricultural Area	Urban Area	Native, Undeveloped or Fallow Area	Total Area	Agricultural Pumping	Urban Pumping	GW Banking, Exchanges and "Pump-Ins"	Total Pumping	Agricultural Surface Water Deliveries	Urban Surface Water Deliveries	Other Surface Water Deliveries	Total Surface Water Deliveries
Units	Acres	Acres	Acres	Acres	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft
2021	759,168	104,354	939,430	1,802,951	1,801,556	166,249	478,690	2,446,495	659,029	34,516	15,869	709,414
2022	759,168	104,354	939,430	1,802,951	1,542,728	163,032	626,422	2,332,183	706,200	33,942	13,279	753,422
2023	759,168	104,354	939,430	1,802,951	589,169	157,979	178,315	925,464	1,623,553	34,446	16,340	1,674,340

NOTES:

Land Use Summary	Total acreage assigned to irrigated agriculture, urban and native/riparian areas within the water budget area. Areas are based on Kern County land use data and mapped by DWR. Under future project scenarios, land use is modified to reflect demand reduction management actions.
Agricultural Pumping	Total agricultural pumping applied in C2VSim to meet irrigated agricultural demand
Urban Pumping	Total groundwater pumping applied to urban areas for municipal and industrial (M&I) use to meet the urban demand calculated by C2VSim
GW Banking, Exchanges and "Pump-Ins"	Total user-specified pumping for groundwater banking recovery operations, in-basin groundwater exchanges, aqueduct pump-ins, or specified urban pumping. A negative value represents an exchange where groundwater pumped from another area is applied within this area.
Agricultural Surface Water Deliveries	Amount of surface water delivered to meet crop water requirements for irrigated acreage after application of user-defined assumptions for canal seepage and evaporation loss
Urban Surface Water Deliveries	Amount of surface water delivered for urban (M&I) use after application of user-defined assumptions for canal seepage and evaporation loss
Other Surface Water Deliveries	Amount of surface water delivered for other uses (e.g. KNWR seasonal water supply) after application of user-defined assumptions for canal seepage and evaporation loss

TABLE 15: Historical and Current Agricultural Management Water Budget for WY1995 to WY2023

		Water Supply					Water Demand			
Water Year	Irrigated Ag. Area	Precipitation to ET	Ag. Pumping Applied Water	Ag. Surface Water Deliveries	Precipitation to ET per Acre	Total Applied Water Per Acre	Crop Water Requirement	Percolation to Groundwater	Crop Water Demand Per Acre	Percolation to Groundwater per Acre
Units	Acres	Acre-ft	Acre-ft	Acre-ft	ft/acre	ft/acre	Acre-ft	Acre-ft	ft/acre	ft/acre
SUMMARY: WY1995 to WY2022 Simulation Period										
Total	22,435,635	9,937,217	36,914,949	33,971,251			62,342,147	15,754,960		
Average	773,643	342,663	1,272,929	1,171,422	0.44	3.16	2,149,729	543,274	2.78	0.70
Percent		12%	46%	42%			80%	20%		
SUMMARY: WY1995 to WY2014 Historical Period										
Total	15,596,443	6,837,516	24,742,130	24,644,409			43,148,864	10,840,033		
Average	779,822	341,876	1,237,106	1,232,220	0.44	3.17	2,157,443	542,002	2.77	0.69
Percent		12%	44%	44%			80%	20%		
SUMMARY: WY2016 to WY2022 Annual Report Period										
Total	6,839,192	3,099,700	12,172,819	9,326,843			19,193,283	4,914,927		
Average	759,910	344,411	1,352,535	1,036,316	0.45	3.14	2,132,587	546,103	2.81	0.72
Percent		13%	49%	38%			80%	20%		
Annual Simulation Results for WY2022 to WY2070 Simulation Period										
1995	780,803	522,058	779,191	1,340,982	0.67	2.72	2,032,198	622,877	2.60	0.80
1996	798,735	351,541	1,079,730	1,647,976	0.44	3.42	2,333,516	572,216	2.92	0.72
1997	801,583	356,655	888,253	1,651,899	0.44	3.17	2,204,198	615,748	2.75	0.77
1998	799,230	663,771	694,449	1,201,751	0.83	2.37	2,019,673	675,008	2.53	0.84
1999	803,474	400,739	928,706	1,426,302	0.50	2.93	2,030,935	559,254	2.53	0.70
2000	835,206	357,513	1,191,773	1,463,158	0.43	3.18	2,307,050	516,121	2.76	0.62
2001	799,553	354,066	1,465,657	963,498	0.44	3.04	2,183,365	522,620	2.73	0.65
2002	738,420	227,944	1,472,518	1,058,519	0.31	3.43	2,167,372	450,599	2.94	0.61
2003	757,372	331,344	1,199,815	1,202,558	0.44	3.17	2,143,211	470,394	2.83	0.62
2004	769,162	275,311	1,590,290	1,148,879	0.36	3.56	2,336,680	484,857	3.04	0.63
2005	766,330	486,190	856,207	1,337,381	0.63	2.86	2,099,682	559,713	2.74	0.73
2006	816,721	447,335	949,943	1,470,354	0.55	2.96	2,155,061	541,188	2.64	0.66
2007	792,925	227,795	1,592,012	1,118,253	0.29	3.42	2,219,410	506,798	2.80	0.64
2008	762,593	170,753	1,580,341	993,550	0.22	3.38	2,099,516	497,075	2.75	0.65
2009	763,660	221,537	1,545,851	992,759	0.29	3.32	2,119,774	504,450	2.78	0.66
2010	755,415	346,164	1,002,454	1,267,222	0.46	3.00	2,030,802	525,792	2.69	0.70
2011	782,699	441,708	760,475	1,491,540	0.56	2.88	2,029,584	690,946	2.59	0.88
2012	790,395	299,286	1,215,834	1,280,456	0.38	3.16	2,054,929	562,482	2.60	0.71
2013	759,168	203,135	1,935,161	923,115	0.27	3.77	2,387,228	490,189	3.14	0.65
2014	723,000	152,673	2,013,469	664,254	0.21	3.70	2,194,681	471,707	3.04	0.65
2015	765,851	253,389	1,988,524	606,865	0.33	3.39	2,229,085	508,357	2.91	0.66
2016	759,168	367,342	1,418,151	896,642	0.48	3.05	2,155,481	487,538	2.84	0.64
2017	759,168	402,750	1,118,615	1,492,979	0.53	3.44	2,369,543	654,882	3.12	0.86
2018	759,168	241,214	1,569,420	1,117,016	0.32	3.54	2,305,588	461,003	3.04	0.61
2019	759,168	432,798	1,095,966	1,348,900	0.57	3.22	2,338,252	503,130	3.08	0.66
2020	759,168	435,183	1,048,690	875,658	0.57	2.53	1,821,644	563,821	2.40	0.74
2021	759,168	220,670	1,801,556	659,029	0.29	3.24	2,089,943	466,009	2.75	0.61
2022	759,168	235,251	1,542,728	706,200	0.31	2.96	1,895,235	535,494	2.50	0.71
2023	759,168	511,102	589,169	1,623,553	0.67	2.91	1,988,513	734,692	2.62	0.97

NOTES:

Irrigated Ag. Area	Total irrigated agricultural acreage within the water budget area input into C2VSim based on Kern County Agriculture Commission data and mapped by DWR
Precipitation to ET	Amount of precipitation that meets ET demand as calculated by C2VSim over the entire year. This includes ET losses that occur outside of normal growing season so differs from Effective Precipitation as commonly applied in Agriculture Management Plans.
Ag. Pumping Applied Water	Amount of pumped groundwater applied to total irrigated acreage to meet C2VSim calculated crop water and deep percolation demand after application of effective precipitation and surface water deliveries.
Ag. Surface Water Deliveries	Amount of surface water delivered to the total irrigated acreage to meet the C2VSim calculated crop water and deep percolation demand. Applied deliveries include recoverable loss (canal seepage) and non-recoverable loss (evaporation, other losses) factors, based on local conditions and applied consistently with DWR approach used in C2VSim, to the total surface water delivery input data.
Precipitation to ET per Acre	Ratio of precipitation to meet ET demand to the total irrigated agricultural area
Total Applied Water Per Acre	Ratio of applied pumped groundwater and surface water deliveries to the irrigated agricultural area

		Water Supply					Water Demand			
Water Year	Irrigated Ag. Area	Precipitation to ET	Ag. Pumping Applied Water	Ag. Surface Water Deliveries	Precipitation to ET per Acre	Total Applied Water Per Acre	Crop Water Requirement	Percolation to Groundwater	Crop Water Demand Per Acre	Percolation to Groundwater per Acre
Units	Acres	Acre-ft	Acre-ft	Acre-ft	ft/acre	ft/acre	Acre-ft	Acre-ft	ft/acre	ft/acre
Crop Water Requirement		Volume of water needed to meet the C2VSim calculated crop demand based on application of METRIC ET data over the irrigated agricultural area								
Percolation to Groundwater		Total volume of rainfall and applied water that percolates below the root zone based on C2VSim simulation. This water then enters the unsaturated zone where the time to reach the groundwater is calculated.								
Crop Water Demand Per Acre		Ratio of the crop water requirement to the total irrigated agricultural area								
Percolation to Groundwater per Acre		Ratio of percolation to groundwater to the total irrigated agricultural area								

TABLE 16: Historical and Current Urban Water Budget for WY1995 to WY2023

		Water Supply					Water Demand			
Water Year	Urban Area	Precipitation to ET	Urban Pumping	Urban Surface Water Deliveries	Precipitation to ET per Acre	Total Urban Water	Indoor Use	Outdoor Use	Runoff	Percolation to Groundwater per Acre
Units	Acres	Acre-ft	Acre-ft	Acre-ft	ft/acre	ft/acre	Acre-ft	Acre-ft	ft/acre	ft/acre
SUMMARY: WY1995 to WY2022 Simulation Period										
Total	2,857,232	1,664,480	4,941,154	1,232,941		7,838,575	2,963,593	4,168,464		
Average	98,525	57,396	170,385	42,515	0.59	270,296	102,193	143,740	24,362.71	270,295.71
Percent		21%	63%	16%			42%	58%		
SUMMARY: WY1995 to WY2014 Historical Period										
Total	1,910,744	1,067,687	3,522,916	827,781			2,088,556	2,875,610		
Average	95,537	53,384	176,146	41,389	0.57	270,919	104,428	143,780	22,710.92	270,919.21
Percent		20%	65%	15%			42%	58%		
SUMMARY: WY2016 to WY2022 Annual Report Period										
Total	946,488	596,793	1,418,239	405,160			875,037	1,292,854		
Average	105,165	66,310	157,582	45,018	0.63	268,910	97,226	143,650	28,033.34	268,910.15
Percent		25%	59%	17%			40%	60%		
Annual Simulation Results for WY2022 to WY2070 Simulation Period										
1995	58,394	55,288	150,518	26,158	0.95	231,964	84,694	122,429	24,840	231,964
1996	71,339	37,199	153,880	27,131	0.52	218,209	86,772	115,875	15,562	218,209
1997	86,428	54,682	166,617	18,447	0.63	239,746	88,716	127,843	23,188	239,746
1998	94,070	135,191	178,371	10,595	1.44	324,157	90,586	167,505	66,065	324,157
1999	85,993	49,179	166,608	25,916	0.57	241,703	92,291	128,353	21,059	241,703
2000	85,863	39,834	166,512	29,713	0.46	236,058	94,051	126,258	15,749	236,058
2001	84,609	46,629	176,849	27,451	0.55	250,929	99,017	132,780	19,133	250,929
2002	87,611	31,731	180,772	28,964	0.36	241,467	102,006	127,320	12,142	241,467
2003	92,311	47,646	180,388	30,901	0.52	258,936	101,561	138,871	18,504	258,936
2004	95,981	39,682	176,146	54,569	0.41	270,397	110,825	143,958	15,614	270,397
2005	101,332	88,860	158,215	41,964	0.88	289,038	95,953	156,283	36,802	289,038
2006	112,056	65,271	179,565	38,666	0.58	283,502	104,607	152,330	26,564	283,502
2007	106,463	30,955	189,287	53,104	0.29	273,346	116,192	145,343	11,810	273,346
2008	103,540	25,314	189,648	54,064	0.24	269,026	116,815	142,447	9,764	269,026
2009	103,826	38,910	180,147	56,466	0.37	275,523	113,421	147,203	14,899	275,523
2010	106,423	68,608	174,610	58,848	0.64	302,066	111,902	162,146	28,019	302,066
2011	107,810	104,506	188,255	61,797	0.97	354,559	119,859	181,928	52,772	354,559
2012	110,511	47,492	203,122	65,278	0.43	315,891	128,651	168,644	18,597	315,891
2013	104,354	32,230	179,416	64,303	0.31	275,948	116,820	146,849	12,279	275,948
2014	111,830	28,479	183,992	53,448	0.25	265,919	113,818	141,247	10,855	265,919
2015	111,658	51,792	166,575	43,170	0.46	261,537	100,535	140,445	20,556	261,537
2016	104,354	59,438	152,484	50,305	0.57	262,226	97,533	141,722	22,972	262,226
2017	104,354	86,197	160,601	50,166	0.83	296,965	101,073	157,367	38,525	296,965
2018	104,354	38,636	157,246	52,284	0.37	248,166	100,470	131,466	16,230	248,166
2019	104,354	77,523	150,892	49,085	0.74	277,500	95,855	149,894	31,751	277,500
2020	104,354	89,408	143,180	57,246	0.86	289,834	96,588	155,311	37,935	289,834
2021	104,354	29,391	166,249	34,516	0.28	230,155	96,328	122,623	11,204	230,155
2022	104,354	45,611	163,032	33,942	0.44	242,586	94,406	129,303	18,877	242,586
2023	104,354	118,797	157,979	34,446	1.14	311,223	92,249	164,724	54,250	311,223

NOTES:

Irrigated Ag. Area	Total irrigated agricultural acreage within the water budget area input into C2VSim based on Kern County Agriculture Commission data and mapped by DWR
Precipitation to ET	Amount of precipitation that meets ET demand as calculated by C2VSim over the entire year. This includes ET losses that occur outside of normal growing season so differs from Effective Precipitation as commonly applied in Agriculture Management Plans.
Ag. Pumping Applied Water	Amount of pumped groundwater applied to total irrigated acreage to meet C2VSim calculated crop water and deep percolation demand after application of effective precipitation and surface water deliveries.
Ag. Surface Water Deliveries	Amount of surface water delivered to the total irrigated acreage to meet the C2VSim calculated crop water and deep percolation demand. Applied deliveries include recoverable loss (canal seepage) and non-recoverable loss (evaporation, other losses) factors, based on local conditions and applied consistently with DWR approach used in C2VSim, to the total surface water delivery input data.
Precipitation to ET per Acre	Ratio of precipitation to meet ET demand to the total irrigated agricultural area

TABLE 16: Historical and Current Urban Water Budget for WY1995 to WY2023

		Water Supply					Water Demand			
Water Year	Urban Area	Precipitation to ET	Urban Pumping	Urban Surface Water Deliveries	Precipitation to ET per Acre	Total Urban Water	Indoor Use	Outdoor Use	Runoff	Percolation to Groundwater per Acre
Units	Acres	Acre-ft	Acre-ft	Acre-ft	ft/acre	ft/acre	Acre-ft	Acre-ft	ft/acre	ft/acre

Total Applied Water Per Acre	Ratio of applied pumped groundwater and surface water deliveries to the irrigated agricultural area
Crop Water Requirement	Volume of water needed to meet the C2VSim calculated crop demand based on application of METRIC ET data over the irrigated agricultural area
Percolation to Groundwater	Total volume of rainfall and applied water that percolates below the root zone based on C2VSim simulation. This water then enters the unsaturated zone where the time to reach the groundwater is calculated.
Crop Water Demand Per Acre	Ratio of the crop water requirement to the total irrigated agricultural area
Percolation to Groundwater per Acre	Ratio of percolation to groundwater to the total irrigated agricultural area

TABLE 17: Estimate of potential native yield for Kern County Subbasin for WY1995 to WY2023 based on C2VSimFG-Kern Historical Simulation

	Ag Precipitation Recharge			Other Area Precipitation Recharge			Small Watershed Inflows			Native Yield
Water Year Units	Precipitation in Agricultural Area	Precipitation to ET Demand	Precipitation to Groundwater in Agricultural Area	Precipitation in Other Areas	Precipitation to ET Demand	Precipitation to Groundwater in Other Areas	Small Watershed Subsurface Inflow	Small Watershed Runoff Percolation	Small Watershed Recharge to Groundwater	
	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	Acre-ft	
SUMMARY: WY1995 to WY2022 Simulation Period										
Total	12,462,979	9,937,217	2,525,762	18,250,074	13,437,807	4,812,267	515,294	1,017,859	1,533,153	
Average	429,758	342,663	87,095	629,313	463,373	165,940	17,769	35,099	52,867	305,903
Use (ft/acre)	0.56	0.44	0.11	0.61	0.45	0.16	0.01	0.02	0.03	0.170
SUMMARY: WY1995 to WY2014 Historical Period										
Total	8,391,861	6,837,516	1,554,344	12,161,462	9,075,923	3,085,539	354,429	620,769	975,198	
Average	419,593	341,876	77,717	608,073	453,796	154,277	17,721	31,038	48,760	280,754
Percent	0.54	0.44	0.10	0.59	0.44	0.15	0.01	0.02	0.03	0.156
SUMMARY: WY2016 to WY2022 Current Period										
Total	4,071,118	3,099,700	971,418	6,088,612	4,361,885	1,726,727	160,865	397,090	557,955	
Average	452,346	344,411	107,935	676,512	484,654	191,859	17,874	44,121	61,995	361,789
Percent	0.60	0.45	0.14	0.65	0.46	0.18	0.01	0.02	0.03	0.201
Annual Simulation Results for WY2022 to WY2070 Simulation Period										
1995	702,840	522,058	180,783	1,108,386	801,551	306,835	17,540	104,746	122,287	592,364
1996	381,509	351,541	29,968	526,809	406,953	119,856	17,512	23,679	41,190	173,502
1997	482,141	356,655	125,486	637,266	466,082	171,184	17,524	33,024	50,548	329,693
1998	966,577	663,771	302,806	1,492,576	981,363	511,212	17,840	137,472	155,312	951,491
1999	433,488	400,739	32,750	589,454	443,615	145,839	17,812	14,343	32,155	192,931
2000	384,165	357,513	26,653	476,308	379,027	97,281	17,757	8,200	25,956	132,133
2001	431,785	354,066	77,719	579,440	467,082	112,358	17,722	6,911	24,633	196,988
2002	255,112	227,944	27,168	382,463	302,828	79,635	17,679	1,203	18,882	108,006
2003	400,954	331,344	69,610	599,314	487,243	112,071	17,683	16,320	34,003	198,002
2004	301,026	275,311	25,715	422,514	323,616	98,898	17,661	10,298	27,959	134,911
2005	653,857	486,190	167,667	964,382	750,845	213,537	17,808	75,750	93,557	456,954
2006	499,759	447,335	52,424	657,647	520,211	137,436	17,783	23,063	40,846	212,923
2007	216,658	227,795	-11,137	292,814	227,713	65,101	17,725	157	17,882	54,121
2008	189,038	170,753	18,285	305,703	236,546	69,158	17,697	18,361	36,058	105,804
2009	268,030	221,537	46,493	405,160	319,141	86,019	17,674	3,913	21,586	136,425
2010	457,048	346,164	110,884	683,456	517,797	165,659	17,731	40,414	58,145	316,956
2011	649,894	441,708	208,186	1,023,701	657,443	366,257	17,932	100,370	118,303	674,814
2012	335,229	299,286	35,943	446,686	353,433	93,253	17,851	1,169	19,020	130,365
2013	214,952	203,135	11,818	303,560	232,284	71,276	17,787	1,257	19,043	84,351
2014	167,797	152,673	15,124	263,824	201,150	62,674	17,713	120	17,832	77,917
2015	322,064	253,389	68,675	475,114	362,579	112,535	17,681	3,657	21,338	184,867
2016	451,531	367,342	84,189	631,136	494,509	136,627	17,714	14,732	32,445	235,548
2017	581,280	402,750	178,530	901,917	627,000	274,917	17,850	68,000	85,850	521,447
2018	258,498	241,214	17,283	380,004	291,885	88,120	17,762	13,677	31,439	119,079
2019	555,843	432,798	123,045	823,825	640,893	182,932	17,799	49,653	67,452	355,630
2020	600,038	435,183	164,855	893,992	636,897	257,095	17,895	62,844	80,739	484,794
2021	219,631	220,670	-1,039	331,802	251,357	80,445	17,940	47,874	65,814	127,279
2022	322,956	235,251	87,704	477,061	345,192	131,869	17,949	19,478	37,427	239,051
2023	759,278	511,102	248,175	1,173,761	711,573	462,189	18,274	117,177	135,451	827,541

NOTES:

Simulation of Recharge	IWFM applies two processes to simulate the movement of water from the surface to the groundwater. The root zone simulates calculates the volume of water that will percolate below the root zone based on local soil properties. This water bases to the unsaturated zone that applies a 1-D vadose zone flow that simulates the rate that water will reach the groundwater based on subsurface properties and soil moisture content.
Percolation from Agricultural Area	Total volume of rainfall and applied water calculated to meet the total agricultural demand that percolates below the root zone in irrigated agricultural areas based on C2VSim simulation.
Percolation from Urban Area	Total volume of rainfall and applied water calculated to meet urban outdoor use that percolates below the root zone in urban areas based on C2VSim simulation.
Percolation from Native, Undeveloped or Fallow Areas	Total volume of rainfall and applied water that percolates below the root zone in native, undeveloped and fallow areas based on C2VSim simulation.
Percolation to Unsaturated Zone	Total volume of rainfall and applied water that percolates below the root zone from all areas based on C2VSim simulation.
GW Recharge from Unsaturated Zone	Volume of water going from the unsaturated zone to groundwater
GW Banking, Managed Recharge and Canal Seepage	Managed aquifer recharge and groundwater banking is simulated in C2VSim by applying a high recoverable loss factor for surface water diversions. For Kern County, these operations generally assumes that 88% to 94% of surface water deliveries physically recharge groundwater. This recharge is applied directly to the groundwater without passing through the unsaturated zone.
Net GW/SW Interactions	Net volumetric exchange between surface water in Kern River or Poso Creek and the groundwater. A positive number is surface water to groundwater, and a negative is groundwater discharge to the stream. This recharge is applied directly to the groundwater without passing through the unsaturated zone.
Total GW Recharge	Total volume to water reaching the groundwater as recharge

**Table 18 - Hydrologic year correlation with relevant river indices
for projected-future simulation period**

Project Year	Hydrology Year	Annual Kern River Index	San Joaquin River Index
2021	2003	71	Below Normal
2022	2004	56	Dry
2023	2005	159	Wet
2024	2006	147	Wet
2025	2007	35	Critical
2026	2008	71	Critical
2027	2009	65	Below Normal
2028	2010	126	Above Normal
2029	2011	201	Wet
2030	2012	45	Dry
2031	2013	28	Critical
2032	2014	24	Critical
2033	1995	191	Wet
2034	1996	136	Wet
2035	1997	162	Wet
2036	1998	236	Wet
2037	1999	60	Above Normal
2038	2000	66	Above Normal
2039	2001	54	Dry
2040	2002	58	Dry
2041	2003	71	Below Normal
2042	2004	56	Dry
2043	2005	159	Wet
2044	2006	147	Wet
2045	2007	35	Critical
2046	2008	71	Critical
2047	2009	65	Below Normal
2048	2010	126	Above Normal
2049	2011	201	Wet
2050	2012	45	Dry
2051	2013	28	Critical
2052	2014	24	Critical
2053	1995	191	Wet
2054	1996	136	Wet
2055	1997	162	Wet
2056	1998	236	Wet
2057	1999	60	Above Normal
2058	2000	66	Above Normal
2059	2001	54	Dry
2060	2002	58	Dry
2061	2003	71	Below Normal
2062	2004	56	Dry
2063	2005	159	Wet
2064	2006	147	Wet
2065	2007	35	Critical
2066	2008	71	Critical
2067	2009	65	Below Normal
2068	2010	126	Above Normal
2069	2011	201	Wet
2070	2012	45	Dry

Table 19 - Projected Future Groundwater Budget for Kern County Subbasin under Baseline Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net Stream GW/SW Interaction Acre-ft	Net Small Watershed Recharge Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	31,276,668	27,591,218	6,284,636	2,457,805	-80,359,227	-3,647,996	-16,396,918
Average	625,533	551,824	125,693	49,156	-1,607,185	-72,960	-327,938
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	12,059,157	10,900,930	2,570,048	948,239	-31,618,403	-1,527,102	-6,667,151
Average	602,958	545,046	128,502	47,412	-1,580,920	-76,355	-333,358
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	19,217,510	16,690,288	3,714,588	1,509,566	-48,740,823	-2,120,894	-9,729,767
Average	640,584	556,343	123,820	50,319	-1,624,694	-70,696	-324,326
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	421,248	253,922	124,080	38,770	-1,605,058	-83,845	-850,883
2022	466,065	311,661	80,807	28,596	-1,881,001	-79,540	-1,073,415
2023	670,267	894,337	186,631	97,803	-1,082,942	-77,289	688,801
2024	782,933	971,636	250,700	67,141	-1,004,008	-81,747	986,650
2025	487,829	334,264	74,696	18,060	-1,956,094	-78,483	-1,119,730
2026	440,342	154,936	78,551	36,473	-2,258,997	-69,511	-1,618,207
2027	522,430	255,426	73,629	21,942	-1,995,091	-69,397	-1,191,063
2028	569,509	496,227	141,957	35,496	-1,490,383	-70,383	-317,575
2029	1,025,597	1,528,921	110,823	119,558	-891,968	-80,187	1,812,744
2030	692,430	587,522	63,468	19,157	-1,382,783	-79,634	-99,841
2031	550,146	164,041	109,295	19,161	-2,366,434	-73,780	-1,597,574
2032	459,496	111,528	66,581	18,134	-2,763,485	-65,268	-2,173,015
2033	742,600	875,129	188,075	126,420	-1,059,514	-71,675	801,034
2034	617,059	786,754	201,477	42,156	-1,422,316	-78,762	146,370
2035	691,055	727,363	294,732	52,652	-1,120,121	-82,586	563,094
2036	848,018	1,151,100	175,108	103,683	-890,760	-84,597	1,302,552
2037	617,636	539,499	102,463	32,114	-1,230,808	-82,549	-21,645
2038	517,060	379,550	106,226	26,241	-1,390,747	-77,398	-439,070
2039	495,144	190,829	65,868	25,370	-1,883,912	-72,405	-1,179,106
2040	442,293	186,285	74,884	19,311	-1,941,979	-68,067	-1,287,273
2041	466,980	254,002	124,912	34,980	-1,621,935	-66,834	-807,894
2042	519,154	311,722	81,095	28,467	-1,928,066	-66,378	-1,054,007
2043	723,193	894,377	183,602	100,835	-1,131,893	-66,724	703,389
2044	829,429	971,656	217,998	68,630	-1,055,212	-73,234	959,267
2045	520,072	334,263	67,722	18,136	-2,005,971	-71,742	-1,137,519
2046	465,742	154,936	78,954	36,599	-2,308,492	-64,094	-1,636,355
2047	542,433	255,426	73,991	22,117	-2,044,767	-65,020	-1,215,821
2048	587,534	496,227	142,442	35,645	-1,539,937	-66,665	-344,754
2049	1,038,285	1,528,924	111,871	121,871	-940,873	-77,190	1,782,886
2050	704,906	587,522	63,577	19,216	-1,430,758	-77,175	-132,713
2051	567,160	164,041	109,977	19,218	-2,411,967	-71,447	-1,623,019
2052	480,958	111,528	66,775	18,007	-2,776,754	-63,069	-2,162,556
2053	756,460	875,129	189,903	127,393	-1,105,182	-69,591	774,112
2054	629,422	786,754	203,667	42,236	-1,466,597	-76,937	118,546
2055	697,412	727,363	297,238	52,738	-1,163,909	-81,081	529,760
2056	955,260	1,151,202	186,248	169,221	-887,932	-83,323	1,490,676
2057	663,489	539,499	104,143	33,376	-1,272,005	-81,579	-13,077
2058	543,714	379,550	107,428	26,454	-1,432,264	-76,504	-451,623
2059	516,904	190,829	65,982	25,586	-1,924,204	-71,122	-1,196,025
2060	461,832	186,285	75,033	19,353	-1,923,734	-66,838	-1,248,069
2061	483,873	254,002	125,183	34,990	-1,662,322	-65,509	-829,782
2062	535,495	311,722	81,199	28,658	-1,968,451	-64,883	-1,076,261
2063	747,374	894,377	185,862	103,344	-1,173,248	-65,287	692,423
2064	797,596	971,656	227,478	42,092	-1,131,322	-72,135	835,365
2065	518,644	334,263	69,814	18,276	-2,046,917	-70,907	-1,176,825
2066	472,700	154,936	79,262	36,483	-2,350,004	-63,321	-1,669,944
2067	550,095	255,426	74,266	22,151	-2,087,215	-64,426	-1,249,703
2068	654,126	496,227	142,653	60,396	-1,488,744	-65,173	-200,515
2069	1,067,944	1,528,924	112,385	123,705	-984,856	-76,302	1,771,799
2070	719,324	587,522	63,930	19,394	-1,475,294	-76,404	-161,529

Table 20 - Projected Future Groundwater Budget for Kern County Subbasin under Baseline Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net GW/SW Interactions Acre-ft	Small Watershed Inflow Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	33,771,527	32,630,931	5,233,643	2,457,805	-69,157,708	-5,025,601	-89,422
Average	675,431	652,619	104,673	49,156	-1,383,154	-100,512	-1,788
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	13,100,548	12,612,730	2,239,160	948,239	-28,535,055	-1,719,340	-1,353,732
Average	655,027	630,637	111,958	47,412	-1,426,753	-85,967	-67,687
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	20,670,979	20,018,200	2,994,483	1,509,566	-40,622,653	-3,306,261	1,264,311
Average	689,033	667,273	99,816	50,319	-1,354,088	-110,209	42,144
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	430,153	302,373	123,650	38,770	-1,594,606	-83,189	-782,849
2022	475,303	349,553	80,614	28,596	-1,862,120	-78,565	-1,006,617
2023	770,374	1,002,929	168,647	97,803	-1,009,264	-78,404	952,085
2024	855,058	1,086,448	198,849	67,141	-944,665	-84,319	1,178,512
2025	503,643	350,298	70,663	18,060	-1,861,303	-81,925	-1,000,565
2026	440,243	214,542	77,894	36,473	-2,187,564	-73,190	-1,491,603
2027	518,989	316,584	73,092	21,942	-1,919,158	-73,183	-1,061,733
2028	578,749	623,230	137,529	35,496	-1,407,567	-75,335	-107,901
2029	1,194,895	1,696,947	83,255	119,558	-744,743	-87,273	2,262,638
2030	750,668	608,048	58,365	19,157	-1,257,759	-87,531	90,947
2031	555,404	180,833	107,613	19,161	-2,187,295	-83,584	-1,407,869
2032	453,293	125,476	66,634	18,134	-2,567,449	-76,460	-1,980,378
2033	824,902	1,059,059	172,274	126,420	-840,738	-84,135	1,257,782
2034	653,828	917,135	178,991	42,156	-1,197,621	-93,181	501,309
2035	827,370	931,556	238,868	52,652	-872,560	-98,679	1,079,205
2036	1,116,969	1,381,739	113,563	103,683	-633,072	-102,650	1,980,231
2037	725,584	594,384	63,749	32,114	-1,023,020	-100,141	292,669
2038	511,919	433,966	84,887	26,241	-1,154,051	-95,834	-192,873
2039	489,540	224,450	65,153	25,370	-1,627,860	-92,035	-915,382
2040	423,665	213,184	74,871	19,311	-1,642,642	-89,729	-1,001,340
2041	445,485	305,376	122,807	34,980	-1,354,885	-89,185	-535,423
2042	498,858	354,364	80,832	28,467	-1,639,112	-89,772	-766,363
2043	812,155	1,090,304	140,266	100,835	-882,848	-92,437	1,168,274
2044	892,628	1,153,766	138,151	68,630	-836,920	-100,949	1,315,306
2045	524,833	355,672	49,525	18,136	-1,730,147	-100,070	-882,051
2046	454,216	218,616	78,021	36,599	-2,055,875	-92,126	-1,360,549
2047	532,454	320,562	73,425	22,117	-1,809,154	-93,438	-954,033
2048	593,653	668,774	137,874	35,645	-1,324,186	-97,255	14,505
2049	1,234,198	1,750,812	79,492	121,871	-710,054	-110,080	2,366,239
2050	768,780	619,092	54,500	19,216	-1,197,582	-110,438	153,567
2051	578,825	192,400	107,098	19,218	-2,110,155	-106,461	-1,319,074
2052	479,637	135,929	66,695	18,007	-2,470,952	-99,536	-1,870,221
2053	850,038	1,095,469	170,484	127,393	-813,603	-107,867	1,321,915
2054	682,383	948,274	168,655	42,236	-1,143,633	-117,748	580,168
2055	858,469	966,141	223,989	52,738	-849,900	-123,451	1,127,986
2056	1,291,577	1,415,721	105,108	169,221	-638,704	-126,824	2,216,098
2057	807,949	600,599	52,465	33,376	-1,027,113	-123,865	343,411
2058	541,774	439,164	78,391	26,454	-1,146,168	-119,115	-179,499
2059	503,264	229,194	64,724	25,586	-1,627,673	-114,273	-919,179
2060	435,869	217,320	75,042	19,353	-1,597,610	-111,590	-961,617
2061	449,783	308,906	122,761	34,990	-1,363,117	-110,530	-557,207
2062	501,922	357,723	80,757	28,658	-1,643,414	-110,538	-784,892
2063	820,754	1,111,099	135,039	103,344	-898,437	-113,406	1,158,393
2064	871,279	1,174,447	124,818	42,092	-868,913	-122,551	1,221,172
2065	511,277	358,753	43,942	18,276	-1,750,481	-120,972	-939,204
2066	454,845	222,078	77,969	36,483	-2,077,330	-112,479	-1,398,433
2067	531,138	323,961	73,264	22,151	-1,832,363	-113,339	-995,189
2068	672,372	689,792	138,150	60,396	-1,265,870	-116,258	178,583
2069	1,286,647	1,771,462	77,455	123,705	-733,283	-129,909	2,396,076
2070	783,917	622,428	52,784	19,394	-1,223,170	-129,799	125,553

Table 21 - Projected Future Groundwater Budget for Kern County Subbasin under 2030 Climate Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net GW/SW Interactions Acre-ft	Small Watershed Inflow Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	30,885,159	30,404,998	6,083,382	2,517,393	-85,792,996	-3,318,618	-19,220,714
Average	617,703	608,100	121,668	50,348	-1,715,860	-66,372	-384,414
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	11,956,360	12,006,382	2,488,942	967,011	-33,772,959	-1,439,420	-7,793,706
Average	597,818	600,319	124,447	48,351	-1,688,648	-71,971	-389,685
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	18,928,799	18,398,617	3,594,440	1,550,382	-52,020,037	-1,879,198	-11,427,008
Average	630,960	613,287	119,815	51,679	-1,734,001	-62,640	-380,900
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	422,205	264,773	147,393	42,134	-1,686,375	-82,161	-892,031
2022	486,382	352,708	97,994	31,229	-1,966,104	-77,718	-1,075,519
2023	670,731	968,807	192,300	100,122	-1,194,263	-75,163	662,531
2024	724,438	1,015,022	177,313	64,551	-1,153,552	-78,823	748,944
2025	451,579	327,176	67,822	18,068	-2,002,002	-75,206	-1,212,569
2026	443,127	213,524	132,483	37,800	-2,325,127	-67,041	-1,565,234
2027	508,495	246,268	115,977	23,732	-2,151,549	-65,434	-1,322,507
2028	572,490	566,005	191,408	39,445	-1,651,430	-65,956	-348,038
2029	1,218,648	1,901,727	112,842	122,295	-1,104,305	-76,600	2,174,607
2030	553,673	532,639	51,185	19,641	-1,476,524	-74,857	-394,243
2031	521,194	199,452	76,829	18,143	-2,339,207	-68,717	-1,592,305
2032	453,699	143,631	46,557	17,968	-2,788,464	-60,558	-2,187,167
2033	743,629	915,198	182,822	122,210	-1,190,116	-67,058	706,686
2034	615,276	872,000	147,377	45,764	-1,543,359	-73,439	63,619
2035	736,533	843,258	281,587	55,297	-1,297,450	-77,197	542,029
2036	863,933	1,264,065	123,884	102,926	-1,044,324	-79,069	1,231,416
2037	542,139	510,531	72,919	32,384	-1,342,279	-75,848	-260,154
2038	507,189	428,732	81,591	27,413	-1,503,202	-70,781	-529,059
2039	482,914	213,280	87,387	26,084	-2,017,703	-65,709	-1,273,748
2040	438,087	227,586	101,273	19,804	-1,995,626	-62,086	-1,270,964
2041	462,417	263,946	147,623	39,151	-1,702,404	-60,765	-850,032
2042	532,326	354,460	98,221	31,228	-2,012,621	-59,960	-1,056,345
2043	717,292	967,381	179,212	103,193	-1,243,088	-59,869	664,119
2044	766,402	1,015,346	117,742	65,724	-1,204,632	-65,643	694,939
2045	477,463	326,770	51,863	18,138	-2,051,621	-63,896	-1,241,282
2046	465,642	213,337	132,843	37,870	-2,374,509	-57,074	-1,581,891
2047	526,192	246,482	116,132	23,946	-2,201,023	-56,606	-1,344,877
2048	584,963	564,936	191,656	39,636	-1,700,745	-57,895	-377,449
2049	1,218,687	1,904,385	99,805	124,949	-1,152,654	-69,447	2,125,726
2050	560,761	533,577	47,140	19,693	-1,524,426	-68,362	-431,617
2051	531,733	199,452	76,920	18,193	-2,385,216	-62,565	-1,621,483
2052	469,853	139,904	46,651	17,931	-2,807,543	-54,827	-2,188,030
2053	748,982	916,702	183,503	123,682	-1,235,658	-61,582	675,628
2054	618,472	870,588	145,806	45,880	-1,587,472	-68,329	24,946
2055	736,517	843,485	279,382	55,392	-1,341,090	-72,519	501,167
2056	954,438	1,263,249	134,078	169,164	-1,037,331	-74,710	1,408,888
2057	579,927	508,121	73,014	33,640	-1,384,414	-71,487	-261,199
2058	532,403	431,547	81,726	27,628	-1,544,662	-66,368	-537,727
2059	503,820	214,669	87,386	26,299	-2,057,978	-61,126	-1,286,930
2060	456,299	228,154	101,178	19,792	-1,984,645	-57,872	-1,237,094
2061	478,968	264,126	147,695	39,158	-1,742,970	-56,708	-869,739
2062	546,856	353,554	98,263	31,426	-2,052,889	-55,984	-1,078,775
2063	740,448	969,075	181,599	104,939	-1,284,313	-56,141	655,606
2064	735,683	1,013,851	124,774	41,649	-1,277,235	-62,203	576,518
2065	478,349	327,088	54,630	18,289	-2,092,701	-60,730	-1,275,076
2066	473,836	213,074	132,845	37,782	-2,406,519	-57,164	-1,606,144
2067	537,374	246,454	116,277	23,923	-2,231,035	-58,641	-1,365,648
2068	660,267	565,258	192,661	65,542	-1,647,974	-59,014	-223,263
2069	1,254,195	1,903,367	104,892	126,664	-1,191,285	-71,013	2,126,821
2070	578,235	536,275	48,924	19,883	-1,559,383	-70,699	-446,765

Table 22 - Projected Future Groundwater Budget for Kern County Subbasin under 2030 Climate Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net GW/SW Interactions Acre-ft	Small Watershed Inflow Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	32,838,979	35,447,299	4,941,607	2,517,393	-73,869,518	-4,735,936	-2,860,202
Average	656,780	708,946	98,832	50,348	-1,477,390	-94,719	-57,204
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	12,873,160	13,719,306	2,153,021	967,011	-30,545,188	-1,641,666	-2,474,378
Average	643,658	685,965	107,651	48,351	-1,527,259	-82,083	-123,719
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	19,965,818	21,727,994	2,788,586	1,550,382	-43,324,331	-3,094,271	-385,823
Average	665,527	724,266	92,953	51,679	-1,444,144	-103,142	-12,861
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	436,607	313,191	146,335	42,134	-1,676,044	-81,420	-819,196
2022	495,680	391,450	97,863	31,229	-1,947,388	-76,701	-1,007,874
2023	777,040	1,077,709	179,601	100,122	-1,117,722	-76,444	940,302
2024	808,215	1,130,101	141,980	64,551	-1,088,738	-81,861	974,238
2025	462,701	343,315	61,517	18,068	-1,906,220	-78,953	-1,099,574
2026	439,400	273,084	131,767	37,800	-2,253,887	-70,713	-1,442,550
2027	504,308	306,757	115,891	23,732	-2,068,551	-69,760	-1,187,619
2028	576,402	692,833	189,187	39,445	-1,565,005	-71,313	-138,447
2029	1,371,389	2,070,178	67,647	122,295	-932,879	-84,094	2,614,536
2030	584,511	553,212	37,888	19,641	-1,345,295	-83,321	-233,371
2031	528,715	216,234	76,879	18,143	-2,159,236	-78,674	-1,397,939
2032	447,278	157,578	46,694	17,968	-2,586,970	-72,132	-1,989,585
2033	822,633	1,099,092	179,078	122,210	-954,120	-79,949	1,188,943
2034	642,235	1,002,883	120,224	45,764	-1,314,339	-88,379	408,386
2035	882,067	1,046,864	225,239	55,297	-1,036,291	-94,244	1,078,932
2036	1,079,981	1,496,375	67,732	102,926	-748,234	-98,400	1,900,379
2037	618,298	565,459	31,639	32,384	-1,137,009	-94,427	16,344
2038	503,029	481,733	53,082	27,413	-1,262,856	-89,986	-287,584
2039	473,864	246,867	81,296	26,084	-1,751,020	-86,330	-1,009,239
2040	418,807	254,393	101,481	19,804	-1,693,383	-84,564	-983,462
2041	444,811	315,197	147,563	39,151	-1,429,438	-83,810	-566,526
2042	514,255	397,576	97,317	31,228	-1,723,016	-83,907	-766,546
2043	816,698	1,163,940	134,478	103,193	-969,015	-86,356	1,162,938
2044	847,571	1,197,675	50,668	65,724	-949,162	-94,611	1,117,864
2045	471,125	348,281	32,446	18,138	-1,769,470	-93,309	-992,789
2046	446,314	276,979	132,424	37,870	-2,116,321	-86,037	-1,308,771
2047	507,943	310,952	116,190	23,946	-1,951,408	-86,246	-1,078,625
2048	570,746	737,315	190,434	39,636	-1,454,664	-89,846	-6,380
2049	1,365,299	2,126,760	34,358	124,949	-846,645	-103,976	2,700,745
2050	579,883	565,192	23,802	19,693	-1,287,166	-103,007	-201,604
2051	538,250	227,799	76,822	18,193	-2,083,539	-98,472	-1,320,948
2052	464,011	164,305	46,977	17,931	-2,493,990	-92,183	-1,892,949
2053	839,476	1,136,728	177,834	123,682	-921,588	-100,638	1,255,494
2054	659,537	1,032,674	98,253	45,880	-1,258,249	-110,065	468,030
2055	903,882	1,081,677	208,421	55,392	-1,002,340	-116,311	1,130,721
2056	1,216,310	1,529,332	56,914	169,164	-718,274	-120,237	2,133,209
2057	673,501	569,268	16,245	33,640	-1,122,622	-115,686	54,346
2058	522,020	489,739	44,186	27,628	-1,253,276	-110,474	-280,179
2059	481,112	252,996	77,161	26,299	-1,749,204	-105,946	-1,017,581
2060	429,670	259,054	101,488	19,792	-1,652,713	-103,828	-946,537
2061	447,419	318,905	147,790	39,158	-1,437,034	-102,731	-586,494
2062	515,397	400,090	96,110	31,426	-1,726,653	-102,439	-786,068
2063	822,203	1,186,122	125,545	104,939	-982,407	-105,263	1,151,138
2064	812,383	1,217,000	39,194	41,649	-986,296	-114,017	1,009,913
2065	461,447	351,690	27,964	18,289	-1,789,318	-112,105	-1,042,033
2066	449,867	280,211	132,607	37,782	-2,125,316	-106,826	-1,331,675
2067	511,035	314,307	116,486	23,923	-1,960,796	-107,878	-1,102,923
2068	651,081	758,626	191,836	65,542	-1,393,447	-109,878	163,759
2069	1,417,188	2,146,388	28,009	126,664	-861,456	-124,760	2,732,032
2070	585,382	571,217	19,064	19,883	-1,309,505	-123,427	-237,386

Table 23 - Projected Future Groundwater Budget for Kern County Subbasin under 2070 Climate Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net GW/SW Interactions Acre-ft	Small Watershed Inflow Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	30,266,907	32,824,218	5,541,096	2,495,122	-92,372,522	-3,271,463	-24,516,680
Average	605,338	656,484	110,822	49,902	-1,847,450	-65,429	-490,334
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	11,792,918	12,994,527	2,263,192	960,586	-36,385,358	-1,447,672	-9,821,843
Average	589,646	649,726	113,160	48,029	-1,819,268	-72,384	-491,092
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	18,473,988	19,829,691	3,277,904	1,534,536	-55,987,164	-1,823,791	-14,694,837
Average	615,800	660,990	109,263	51,151	-1,866,239	-60,793	-489,828
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	408,652	250,550	140,163	38,275	-1,842,475	-83,663	-1,088,499
2022	472,102	369,832	95,673	30,903	-2,096,387	-78,608	-1,206,496
2023	673,989	1,058,910	189,890	97,206	-1,367,109	-76,560	576,325
2024	744,177	1,122,749	154,523	64,640	-1,269,966	-81,123	734,995
2025	434,940	339,216	62,383	18,095	-2,093,637	-77,242	-1,316,253
2026	469,752	316,670	142,130	42,165	-2,392,400	-68,542	-1,490,227
2027	468,805	219,342	111,136	22,713	-2,302,101	-66,245	-1,546,351
2028	565,266	622,490	194,932	37,491	-1,777,664	-66,172	-423,661
2029	1,232,895	2,021,954	94,628	120,391	-1,272,882	-75,969	2,121,016
2030	512,383	510,545	46,067	18,406	-1,606,048	-73,952	-592,602
2031	514,885	217,243	80,080	18,510	-2,404,879	-69,108	-1,643,271
2032	420,919	109,243	41,157	17,864	-2,961,316	-59,737	-2,431,871
2033	717,704	983,283	185,465	124,666	-1,366,638	-66,770	577,711
2034	636,472	1,011,310	124,135	48,403	-1,629,020	-73,691	117,609
2035	742,442	926,830	240,059	52,829	-1,506,120	-76,785	379,255
2036	840,589	1,369,821	66,325	95,355	-1,236,377	-78,889	1,056,824
2037	511,349	550,855	51,377	33,462	-1,460,435	-75,693	-389,084
2038	525,422	516,749	68,512	30,839	-1,615,455	-70,944	-544,878
2039	486,185	261,453	84,925	29,526	-2,078,540	-66,064	-1,282,515
2040	413,990	215,482	89,632	18,846	-2,105,907	-61,915	-1,429,871
2041	434,872	249,759	141,456	34,801	-1,861,023	-59,685	-1,059,819
2042	506,082	371,490	95,431	30,811	-2,143,228	-58,424	-1,197,837
2043	701,042	1,057,536	164,332	99,819	-1,415,545	-58,898	548,287
2044	765,882	1,123,035	84,872	65,709	-1,321,033	-65,596	652,868
2045	457,199	338,796	43,022	18,140	-2,143,265	-63,760	-1,349,868
2046	491,322	316,422	142,576	42,210	-2,441,728	-56,475	-1,505,673
2047	486,516	219,663	111,300	22,758	-2,350,989	-55,383	-1,566,136
2048	575,922	621,390	195,292	37,553	-1,826,869	-56,367	-453,078
2049	1,207,108	2,024,646	76,576	122,702	-1,321,171	-67,189	2,042,673
2050	516,604	511,479	41,647	18,437	-1,653,603	-66,049	-631,485
2051	524,249	217,243	80,184	18,541	-2,450,881	-61,709	-1,672,374
2052	436,390	105,521	41,256	17,846	-2,980,914	-52,973	-2,432,875
2053	721,385	984,833	185,983	125,947	-1,412,037	-60,560	545,551
2054	637,035	1,010,015	122,314	48,546	-1,673,215	-67,888	76,808
2055	739,029	926,775	240,837	53,236	-1,549,608	-71,550	338,718
2056	916,865	1,369,239	78,789	163,750	-1,223,884	-73,970	1,230,789
2057	542,683	548,446	53,332	34,610	-1,503,509	-70,686	-395,124
2058	550,193	519,512	70,081	31,051	-1,656,729	-65,944	-551,837
2059	506,313	262,783	85,481	29,722	-2,118,584	-60,956	-1,295,243
2060	434,143	216,084	89,721	18,987	-2,098,596	-57,233	-1,396,893
2061	453,048	249,994	141,478	34,761	-1,901,319	-55,229	-1,077,267
2062	522,814	370,621	95,685	30,984	-2,183,537	-54,157	-1,217,590
2063	725,002	1,059,135	169,499	100,139	-1,456,460	-54,936	542,379
2064	737,845	1,121,596	96,738	41,720	-1,390,161	-62,039	545,700
2065	456,525	339,078	47,370	18,277	-2,183,880	-60,597	-1,383,226
2066	498,361	316,005	142,585	41,907	-2,483,011	-53,520	-1,537,673
2067	496,804	219,419	111,431	22,808	-2,393,461	-52,693	-1,595,690
2068	655,939	621,712	196,418	66,128	-1,787,044	-52,309	-299,157
2069	1,243,827	2,023,476	87,110	124,017	-1,364,360	-64,030	2,050,039
2070	532,988	513,990	45,107	18,619	-1,697,522	-62,987	-649,805

Table 24 - Projected Future Groundwater Budget for Kern County Subbasin under 2070 Climate Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation

Water Year Units	Deep Percolation Acre-ft	Managed Recharge and Canal Seepage Acre-ft	Net GW/SW Interactions Acre-ft	Small Watershed Inflow Acre-ft	GW Pumping Acre-ft	Subsurface Flow with Adjacent GW Basins Acre-ft	Change in Groundwater Storage Acre-ft
SUMMARY: WY2021 to WY2070 Simulation Period							
Total	31,799,129	37,863,262	4,293,932	2,495,122	-79,755,674	-4,729,641	-8,033,910
Average	635,983	757,265	85,879	49,902	-1,595,113	-94,593	-160,678
SUMMARY: WY2021 to WY2040 Implementation Period							
Total	12,589,633	14,705,737	1,891,043	960,586	-32,975,395	-1,657,287	-4,485,720
Average	629,482	735,287	94,552	48,029	-1,648,770	-82,864	-224,286
SUMMARY: WY2041 to WY2070 Sustainability Period							
Total	19,209,496	23,157,525	2,402,889	1,534,536	-46,780,279	-3,072,354	-3,548,190
Average	640,317	771,917	80,096	51,151	-1,559,343	-102,412	-118,273
Annual Simulation Results for WY2021 to WY2070 Simulation Period							
2021	416,859	299,174	140,033	38,275	-1,829,917	-83,068	-1,018,646
2022	482,771	408,716	95,545	30,903	-2,075,055	-77,724	-1,134,857
2023	778,119	1,167,829	176,974	97,206	-1,283,726	-78,065	858,337
2024	824,224	1,237,834	116,452	64,640	-1,201,267	-84,296	957,582
2025	444,081	355,471	55,004	18,095	-1,995,258	-81,218	-1,203,834
2026	466,475	376,346	141,087	42,165	-2,313,156	-72,774	-1,359,861
2027	464,976	279,425	111,024	22,713	-2,213,764	-70,681	-1,406,307
2028	569,538	749,332	192,740	37,491	-1,685,558	-71,949	-208,410
2029	1,366,993	2,190,420	41,284	120,391	-1,077,423	-84,620	2,557,045
2030	534,178	531,150	29,555	18,406	-1,464,690	-82,917	-434,320
2031	519,704	234,003	79,675	18,510	-2,224,205	-79,250	-1,451,562
2032	415,122	123,188	41,020	17,864	-2,750,519	-71,829	-2,225,156
2033	783,412	1,166,531	179,799	124,666	-1,109,329	-80,416	1,064,663
2034	658,731	1,142,196	88,031	48,403	-1,395,221	-89,128	453,011
2035	863,103	1,130,070	184,994	52,829	-1,232,204	-94,328	904,464
2036	1,029,800	1,602,138	12,470	95,355	-917,373	-98,485	1,723,905
2037	570,198	605,678	8,505	33,462	-1,243,785	-94,402	-120,345
2038	523,835	569,446	34,689	30,839	-1,363,512	-90,407	-295,110
2039	479,164	294,676	72,792	29,526	-1,805,973	-86,949	-1,016,764
2040	398,352	242,115	89,372	18,846	-1,793,459	-84,780	-1,129,554
2041	414,818	301,192	141,646	34,801	-1,568,913	-83,592	-760,049
2042	491,990	414,742	93,845	30,811	-1,840,528	-83,323	-892,462
2043	790,613	1,254,107	115,429	99,819	-1,116,588	-86,323	1,057,057
2044	836,403	1,305,369	17,905	65,709	-1,045,824	-95,401	1,084,162
2045	449,154	360,429	22,817	18,140	-1,852,116	-93,998	-1,095,574
2046	471,989	380,169	142,402	42,210	-2,176,184	-86,568	-1,225,983
2047	471,984	283,737	111,550	22,758	-2,085,163	-85,737	-1,280,870
2048	554,428	793,776	194,145	37,553	-1,568,985	-88,857	-77,939
2049	1,321,092	2,246,987	3,572	122,702	-987,606	-102,881	2,603,867
2050	524,857	543,145	12,030	18,437	-1,398,511	-101,367	-401,409
2051	526,155	245,563	79,307	18,541	-2,147,741	-98,008	-1,376,184
2052	430,658	129,919	41,236	17,846	-2,649,533	-91,211	-2,121,085
2053	792,109	1,204,216	177,747	125,947	-1,064,253	-100,431	1,135,335
2054	668,348	1,172,104	66,220	48,546	-1,336,993	-110,282	507,943
2055	860,469	1,164,599	170,576	53,236	-1,194,626	-115,992	938,261
2056	1,144,616	1,635,346	2,390	163,750	-873,811	-120,178	1,952,112
2057	610,598	609,490	-6,003	34,610	-1,226,393	-115,425	-93,124
2058	546,965	577,365	26,400	31,051	-1,353,145	-110,712	-282,076
2059	486,798	300,706	68,354	29,722	-1,802,615	-106,347	-1,023,382
2060	409,456	246,809	89,277	18,987	-1,751,495	-103,792	-1,090,757
2061	418,628	304,951	141,821	34,761	-1,574,579	-102,407	-776,824
2062	495,173	417,295	92,534	30,984	-1,842,095	-101,824	-907,934
2063	793,354	1,276,196	108,214	100,139	-1,128,328	-105,241	1,044,334
2064	805,281	1,324,749	9,903	41,720	-1,082,528	-114,909	984,217
2065	440,536	363,793	19,730	18,277	-1,870,357	-113,021	-1,141,042
2066	471,618	383,251	141,837	41,907	-2,193,139	-104,993	-1,259,519
2067	473,770	286,942	111,773	22,808	-2,105,041	-103,867	-1,313,616
2068	625,100	815,113	195,615	66,128	-1,516,065	-105,894	79,999
2069	1,353,276	2,266,438	1,701	124,017	-1,005,088	-121,015	2,619,328
2070	529,258	549,028	8,916	18,619	-1,422,036	-118,758	-434,973

TABLE 25: Assessment of change in groundwater storage from C2VSimFG-Kern model results for historical and future scenarios for the Kern County Subbasin

Scenario	Model Results 2041-2070 Sustainability Period		Adjustments to GW Storage Change 2041-2070 Sustainability Period		
	Change in Groundwater Storage	Change in Net Operational Budget	Adjustment for Excess Basin Outflows	Adjustment for Excess Kern River Outflow	Adjusted Change in GW Storage
units	AFY	AFY	AFY	AFY	AFY
Historic	-274,200	-187,118	0	0	-274,200
Current	-344,019	-276,317	0	0	-344,019
Baseline	-324,326	-253,629	0	0	-324,326
Base Projects	42,144	152,353	26,327	17,108	85,578
2030 Climate	-380,900	-318,260	0	8,780	-372,120
2030 Projects	-12,861	90,282	27,056	32,634	46,829
2070 Climate	-489,828	-429,035	0	17,492	-472,336
2070 Projects	-118,273	-15,861	28,077	44,227	-45,969

NOTE:

"Change in Groundwater Storage " DOES include subsurface flow with adjacent basins

"Operational Storage " DOES NOT include subsurface flow with adjacent basins

"Adjustment for Excess Basin Outflows " is the difference in simulated basin outflow that is attributed to addition of SGMA projects in Kern County without comparable SGMA projects added to adjacent basins. Adjustment assumes that this difference is due to limitation of simulation, and that this difference would remain in Kern County when SGMA projects from adjacent basin are included in simulation.

"Adjustment for Excess Kern River Outflow " is the increase in simulated groundwater outflows to Kern River relative to Baseline condition that are attributed to SGMA Projects and Climate Change. Model is not optimized for river management. Since the Kern River is a highly managed system, the assumption is that in practice this water would be recovered for beneficial use rather than be a loss of water from the basin.

"Adjusted Change in GW Storage " Change in GW Storage plus modifications listed as adjustments to provide a more realistic Change in GW Storage estimate for the simulation.

**TABLE 26: Evaluation of Sustainable Yield for Projected-Future scenarios based on C2VSimFG-Kern
Model Results for Kern County Subbasin**

Scenario	C2VSimFG-Kern Model Results 2041-2070 Sustainability Period					
	Groundwater Pumping	Change in Groundwater in Storage	GW Storage Adjustments	Sustainable Yield	Average Annual Difference of Pumping to Yield	Percent Difference of Pumping to Sustainable Yield
units	AFY	AFY	AFY	AFY	AFY	AFY
Historic	1,586,417	-274,200	0	1,312,218	-274,200	-21%
Baseline	1,624,694	-324,326	0	1,300,369	-324,326	-25%
Baseline Projects	1,354,088	42,144	43,434	1,439,666	85,578	6%
2030 Climate	1,734,001	-380,900	8,780	1,361,881	-372,120	-27%
2030 Projects	1,444,144	-12,861	59,690	1,490,974	46,829	3%
2070 Climate	1,866,239	-489,828	17,492	1,393,902	-472,336	-34%
2070 Projects	1,559,343	-118,273	72,304	1,513,373	-45,969	-3%

NOTES:

Current period is not considered to be hydrologically balanced, so it is not included in the sustainable yield analysis

Groundwater Pumping	Total groundwater pumping by wells. Groundwater banking recovery pumping is specified input whereas agricultural and municipal pumping is calculated by C2VSim based on demand
Change in Groundwater in Storage	Sum of the inflow components (positive numbers) plus the outflow components (negative numbers); positive is an increase in storage typified by a rise in GW levels whereas a negative is a decrease in storage typified by a decline in GW levels
Adjusted Banking	Adjustment that assumes that recharge operations are affected by reductions in imported water sources, but
GW Storage Adjustments	Adjustment to GW Storage that reflect artifacts of the simulation. For Kern County, adjustments made to reflect no SGMA projects simulated north of Kern County, and that Kern River operations are not optimized to
Sustainable Yield	Sustainable yield is defined as the amount of pumping that can be sustained in the groundwater basin without the undesirable effect of a decline in groundwater storage that serves as a proxy for other undesirable effects
Average Annual Difference	The difference between the sustainable yield and the simulated groundwater pumping. A negative value is pumping in excess of the sustainable yield
Percent Difference	The percentage of the Average Annual Difference to the total groundwater pumping to provide context and a method to compare the significance of the difference in the pumping compared to the sustainable yield.

**TABLE 27: Summary of Statistical Analysis for Validation of
C2VSimFG-Kern Historical Simulation**

Validation Measure	C2VSimFG-Kern	C2VSimFG-Beta	Percent Change
Units	Feet	Feet	Percent
Residual Mean	17.3 ft	32.6 ft	47%
Residual Standard Deviation	45.5 ft	54.0 ft	16%
Absolute Residual Mean	37.4 ft	56.8 ft	34%
Root Mean Square (RMS) Error	50 ft	73.5 ft	32%
Scaled Absolute Residual Mean	0.061	0.092	34%
Correlation Coefficient	0.76	0.52	47%
Number of Monitor Wells	558	558	same
Number of Observations	42,075	42,075	same

Notes

Observation Point	Location in the model where measured data from well is compared to simulated model results
Residual	Difference between measured and simulated groundwater elevations at an observation point
Residual Mean	Statistical measure of fit of simulated to measured data using sum of the residuals divided by the number of residual data values
Residual Standard Deviation	Statistical evaluation of the scatter of the data by calculating standard deviation of residuals
Absolute Residual Mean	Statistical measure of fit of simulated to measured data using sum of the absolute value residuals divided by the number of residual data values
Root Mean Square (RMS) Error	Statistical measure of fit of simulated to measured data using square root of the quotient of sum of squares of residuals by the number of observations
Scaled Absolute Residual Mean	Statistical measure to provide scale of validation using ratio of the absolute residual mean divided by the range of observed groundwater elevations
Correlation Coefficient	Scaled measure of the closeness of fit of simulated to measured data from -1 to 1 correlation with 1.0 a perfect correlation
Number of Monitor Wells	Number of wells where measured groundwater level data was compared to C2VSimFG-Kern simulation results for model validation
Number of Observations	Number of groundwater level measurements that were compared to C2VSimFG-Kern simulation results for model validation

Appendix H-2: Validation and Performance Assessment C2VSimFG-Kern Model

Validation of C2VSimFG-Kern Performance

The C2VSimFG-Kern performs well within the central portion of the Subbasin. The model does not perform as well east of the Friant-Kern Canal or west of the California Aqueduct. The geologic and hydrogeologic conceptual models within the central portion of the Subbasin appear to be generally realistic. The geologic and hydrogeologic conceptual models appear to be very poor in the areas where the model does not perform well.

C2VSimFG-Kern Validation

One of the concerns for the modeling is the overall calibration of C2VSimFG--Beta in Kern County. As discussed above, the assumption is that C2VSimFG--Beta was developed using reasonable care in developing the geologic framework and developing a consistent regional methodology for determining aquifer properties. An identified weakness of the C2VSimFG--Beta is the quality of data used in developing the overall water balance such as the extent of the water banking operations in Kern County. The issues with the water balance are considered the primary contributing factor affecting the calibration of the C2VSimFG--Beta; the hydrogeologic conceptualization is reasonably accurate for a regional planning analysis.

To address these concerns, a validation analysis was performed for C2VSimFG-Kern by comparing simulation results to field measured groundwater level data collected during the Study Period and comparing those to a similar set of residuals from the C2VSimFG--Beta model. The statistical results of this analysis should be comparable, if not better, for C2VSimFG-Kern compared to the C2VSimFG-Beta results.

The analysis used 42,058 groundwater levels measurements collected from 558 monitoring wells in the Subbasin. The data were collected by Kern County Water Agency, the Kern Fan Monitoring Committee, the DWR Water Data Library, and local agencies. For each location, the residual was calculated as the simulated groundwater level minus the measured groundwater level based on the well measurement data. A brief summary of the statistical measures used to evaluate the calibration results is provided below:

- The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The closer this value is to zero, the better the calibration especially as related to the water balance and estimating the change in aquifer storage. The residual mean of 17.3 feet for C2VSimFG-Kern is an improvement of 47 percent over the 32.6 feet from C2VSimFG-Beta.
- The absolute residual mean is the arithmetic average for the absolute value of the residual, so it provides a measure of the overall error in the model. The absolute residual mean of 37.4 feet for C2VSimFG-Kern is an improvement of 34 percent over the 56.8 feet from C2VSimFG-Beta.

- The residual standard deviation evaluates the scatter of the data. A lower standard deviation indicates a closer fit between the simulated and observed data. The standard deviation is 45.5 feet for C2VSimFG-Kern, which is an improvement of 16 percent over the 54.0 feet from C2VSimFG-Beta.
- The Root Mean Square (RMS) Error is the square root of the arithmetic mean of the squares of the residuals and provides another measure of the overall error in the model. The RMS Error is 50.0 feet for C2VSimFG-Kern, which is an improvement of 32 percent over the 73.5 feet from C2VSimFG-Beta.
- The correlation coefficient ranges from 0 to 1 and is a measure of the closeness of fit of the data to a 1 to 1 correlation. A correlation of 1 is a perfect correlation. The correlation coefficient of 0.76 for C2VSimFG-Kern is an improvement of 47 percent over the 0.52 from C2VSimFG-Beta.
- Another statistical measure is the ratio of the standard deviation of the mean error divided by the range of observed groundwater elevations. This ratio shows how the model error relates to the overall hydraulic gradient across the model. The ratio for C2VSimFG-Kern is 0.061 feet, which is an improvement of 34 percent over the 0.092 from C2VSimFG-Beta.

Considering these results in context with the overall range of measurements of 616 feet, the residual mean of 17.3 feet represents a relative percentage difference of less than 3 percent for the absolute residual mean of 37.4 feet, the relative percentage difference is about 6 percent. Despite this improvement in model performance, the model is not considered fully calibrated. However, C2VSimFG-Kern is reasonably validated for assessing groundwater level changes on the Subbasin scale for the purposes of SGMA planning.

Table 1. Summary of Statistical Analysis for Validation of C2VSimFG-Kern Historical Simulation

Validation Measure	C2VSimFG-Kern	C2VSimFG-Beta	Percent Change
Units	Feet	Feet	Percent
Residual Mean	17.3 ft	32.6 ft	47%
Residual Standard Deviation	45.5 ft	54.0 ft	16%
Absolute Residual Mean	37.4 ft	56.8 ft	34%
Root Mean Square (RMS) Error	50 ft	73.5 ft	32%
Scaled Absolute Residual Mean	0.061	0.092	34%
Correlation Coefficient	0.76	0.52	47%
Number of Monitor Wells	558	558	same
Number of Observations	42,075	42,075	same

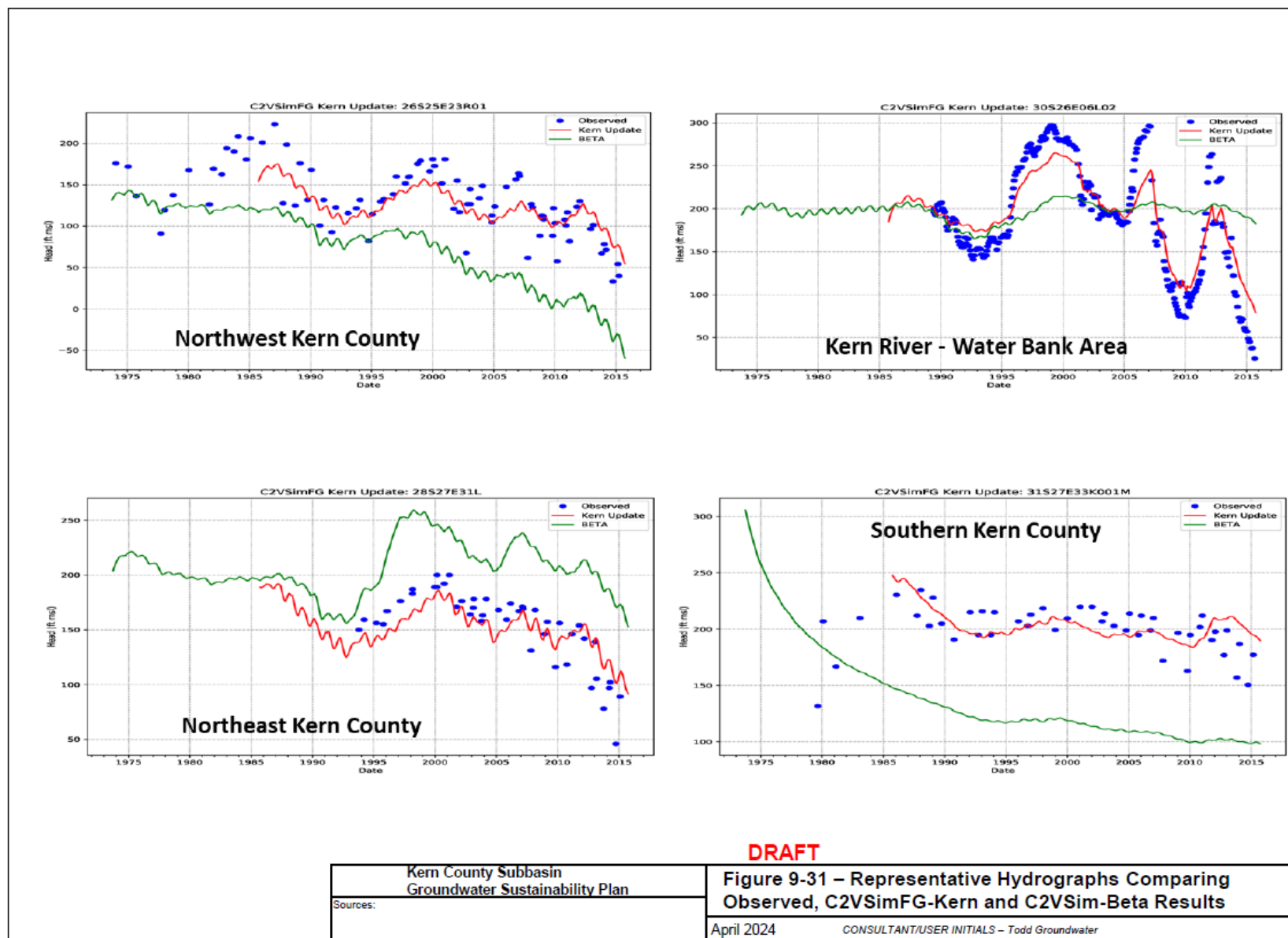


Figure 9-1. Representative Hydrographs Comparing Observed, C2VSimFG-Kern and C2VSim-Beta Results

Sensitivity Analysis

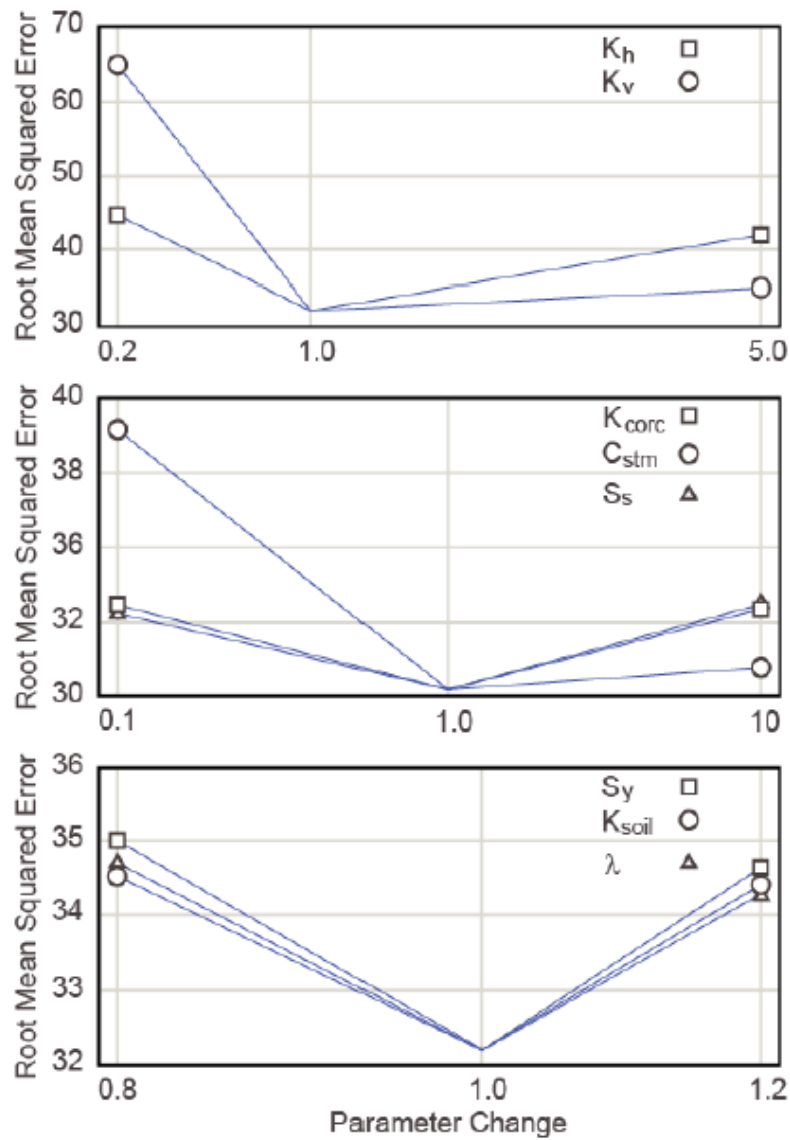
The C2VSimFG-Kern model was not formally calibrated. Some physical parameters were adjusted to improve model performance in specific areas. A sensitivity analysis was conducted on the adjusted model to understand how variations in model parameters affect model results. Eight physical parameter sets were systematically varied, and model results compared to the base model for a selected group of groundwater hydrographs. C2VSimFG-Kern parameter sensitivities evaluated for Subbasin include:

- Horizontal hydraulic conductivity of aquifer (Kh)
- Vertical hydraulic conductivity of aquifer (Kv)
- Vertical hydraulic conductivity of Corcoran Clay aquitard (Kcorc)
- Streambed conductance of Kern River (Cstm)
- Specific storage of aquifer (Ss)
- Specific yield of aquifer (Sy)
- Soil hydraulic conductivity in root zone (Ksoil)
- Soil pore size distribution index in root zone (

The Root Mean Squared Error between observed and simulated values was calculated for the original parameter set and after varying each parameter set upward and downward by a set factor. Results are shown in **Figure 9-32**. This sensitivity analysis shows that the hydrologic parameter values in the C2VSimFG-Kern model are generally within an acceptable range. A full model calibration would likely improve model performance.

Peer Review Process

Todd Groundwater worked with Woodard and Curran (W&C) throughout the model development process as W&C conducted an on-going peer review of model input files. W&C staff have developed several IWFM-based models and worked with DWR to develop C2VSimFG-Beta. Their reviews helped ensure that the model update used best practices when incorporating new data. The peer review process was documented in a series of meeting summaries to the KGA and KRGSA. The updated C2VSimFG-Kern input files for the Subbasin were shared with DWR for incorporation into future C2VSim public releases.



Notes:

Sensitivity parameters modified and evaluated for Kern County Subbasin

K_h – horizontal hydraulic conductivity of aquifer

K_v – vertical hydraulic conductivity of aquifer

K_{corc} - horizontal hydraulic conductivity of Corcoran Clay aquitard or equivalent

C_{stm} – streambed conductance of Kern River and Poso Creek

S_s – specific storage of aquifer

S_y – specific yield of aquifer

K_{soil} – soil hydraulic conductivity in root zone

λ – soil pore size distribution index in root zone

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Kern County Subbasin Groundwater Sustainability Plan	Figure 9-32 C2VSimFG-Kern Sensitivity Analysis Results	
	April 2024	CONSULTANT/USER INITIALS – Todd Groundwater

Figure 9-2. C2VSimFG-Kern Sensitivity Analysis Results

In addition, Dr. Charles Brush of Hydrolytics LLC was added to the modeling team. As an early developer of C2VSim for DWR, Dr. Brush provided his experience and expertise with the C2VSim to support the development of C2VSimFG-Kern. This collaborative effort provided further assurance that the model updates and revisions were conducted in an appropriate manner for water budget development consistent with DWR model update practices.

The more general assumptions in C2VSimFG--Beta were replaced with local data and knowledge that are regionally or locally significant for WY1995 to WY2015. This update employed a phased approach with regular peer reviews.

- 1) Phase 1 revisions address components of Regional Significance that require significant changes to the overall model input file structure. These include:
 - a) Surface water delivery volumes, application areas and use by water district.
 - b) Water banking recharge, recovery, and application of recovered water.
 - c) Evapotranspiration rates and irrigation demand based on ITRC METRIC data (ITRC 2017).
 - d) Urban population and per capita demand, including addition of an urban zone for Metropolitan Bakersfield.
 - e) Addition of groundwater extraction wells for water banking projects.
- 2) Interim Review
 - a) The Woodard & Curran Peer Review Team.
 - b) Subbasin water districts and purveyor's local data review.
 - c) Stakeholder input.
- 3) Phase 2 revisions address components of Local Significance that generally require modifications of input data and parameters within the existing C2VSim model input file structure. These include:
 - a) Local water sources and demands of significance to individual Districts/GSAs.
 - b) District pumping for in-district delivery via surface water canals where significant.
 - c) District recharge operations utilizing canals, stream channels, and basins.
 - d) Wastewater disposal and land application.
 - e) Review and limited adjustment of model parameters.
- 4) Interim Review by same reviewers listed in item 2.

- 5) Phase 3 revisions include addressing comments and incorporating new data from the Interim Reviews.
- 6) Interim Review by same reviewers listed in item 2.
- 7) Tabulate model-derived water budgets for Peer-Review and GSP Use.

In each update phase, historical and current water budgets for zones representing water agency service areas were produced with the revised C2VSimFG-Kern model incorporating corrected local data. These water budgets were shared with participating agencies for review, to ensure that C2VSimFG-Kern correctly represented local water balances. Where necessary, participating agencies provided additional data which was incorporated into C2VSimFG-Kern.

Internal Review Process

Todd Groundwater and Hydrolytics LLC worked collaboratively on this model revision, water budget development and the projected future scenarios. Throughout this work, efforts were applied to improve data management to develop a systematic process for generating model input files. Using this approach, internal review could be conducted with each firm reviewing the contributions from the other. The goal was to accurately represent the data provided by the Kern County agencies in the model.

Due to schedule constraints, a thorough internal review of the projected future model scenarios was not completed prior to the submission of the Public Review Draft of the model results on August 30, 2019. A thorough review of all input for the projected future scenarios was conducted in September and October 2019. During this review, several issues were identified and corrected. As a result, the results in this report vary from those provided in the August 2019 Public Review Draft. Although the numbers changed, the overall conclusions from the C2VSimFG-Kern simulations remained essentially the same.

Model Modifications

☒ 23 CCR § 354.18(f)

In general, the C2VSimFG-Kern was revised to better represent the managed water supply and demand for the Subbasin. During the course of this revision, several issues were identified with the hydrogeological conceptual model and simulation parameters that affected the historical water budget. The following sections summarizes modifications made in C2VSimFG-Kern to improve the model performance. Other issues identified regarding the hydrogeological conceptual model, model setup and simulation parameters that were not addressed in C2VSimFG-Kern but are recommended to be modified for future model updates, are listed in **Section 9.7.5**. A summary of the changes that were made in C2VSimFG-Kern are provided below.

Streambed Parameters

In the Subbasin, the Kern River and Poso Creek are the two largest streams. Both have multiple stream gauges along their courses including ones near where they enter the Subbasin from the Sierra Nevada. These are the only streams that are simulated in the model using the IWFM stream module. Both are losing streams where surface water recharges groundwater but due to the great depth to groundwater in the principal aquifers they are not considered interconnected with the principal aquifer groundwater system, except during limited periods near the major water banking operations west of Bakersfield when multi-year periods of recharge operations produce high groundwater levels.

As a part of the C2VSimFG-Kern update, the simulated recharge from the Kern River and Poso Creek were compared to changes in stream gauge measurements and estimated streambed losses to evaluate how well the model was simulating streambed seepage. For much of the Kern River, the amount of streambed seepage is estimated based on daily weir information and is documented in the annual Kern River Hydrographic Reports. The streambed parameters used in C2VSimFG Beta do not provide a comparable volume and distribution of seepage along the Kern River streambed. In dry years, streamflow was not reaching far enough downstream whereas in wet years the seepage was too low. Similarly, the Poso Creek streambed seepage showed similar issues based on comparisons to differences in stream gauge data along its course.

To address this, the Kern River and Poso Creek streambed parameters were manually modified until a reasonable approximation of the measured streambed seepage was achieved by C2VSimFG-Kern. In general, the streambed conductance was lowered whereas the stream wetted perimeter was increased. This provides the best balance in matching the measured dry, average, and wet years flows in both streams.

Part of this issue is that C2VSimFG--Beta uses a simple form of the stream module in the simulation. This approach appears to work sufficiently well for the continuously flowing streams in the northern parts of the Central Valley but is not sufficient for simulating the highly variable flows that occur on the Kern River and Poso Creek. It is recommended that future revisions to C2VSimFG-Kern further evaluate issues in simulating streamflow and seepage in the Kern River and Poso Creek (see **Section 8.5**). This may include incorporating more advanced streamflow simulation features that are available in IWFM but that have not been utilized in C2VSimFG-Kern.

Small Watershed Runoff

In reviewing the small watershed contributions, it was determined that the runoff does not represent the variable nature of runoff in an arid region. Although this was not part of the originally planned model revisions, it affected the model results. Todd

Groundwater revised the corresponding model parameters to be more representative of the local arid conditions in Kern County.

Runoff of precipitation from the surrounding small watersheds is calculated within C2VSimFG-Kern using methodology included in IWFm that is based on the SCS Curve Number Method (NRCS, 2004). The C2VSimFG-Beta results showed a steady baseflow that contributed water to the Subbasin continuously and did not show the appropriate variation in runoff expected between wet, average, and dry years in the arid environment.

Two major issues were identified and revised. First, the SCS curve number was changed to allow a higher percentage of runoff in wet years to capture the flashy nature of runoff from these watersheds during differing climatic conditions. Second, IWFm uses a localized soil moisture water budget; however, soil, ET, and other parameters are set that allow for the continuous outflow from the basins. These were changed to more appropriate values that limit baseflow from the very small watersheds while allowing baseflow from the larger watersheds. Parameters were varied to better match estimated watershed runoff from a local USGS study (Nady and Larragueta, 1983).

Root Zone Parameters

Areas with low permeability soils, such as lake beds and shallow clay areas, were found to have overly high volumes of deep percolation that required additional groundwater pumping to meet the overall water demand for irrigation. This issue was noted by Subbasin GSAs who recognized that the groundwater pumping and deep percolation from preliminary model results were significantly higher than what was found in practice. A review found areas of overlying hydraulic conductivity and other hydraulic parameters that caused this high percolation rate. Two types of issues were found. First, very high root zone parameters are present in parts of the Subbasin that are not consistent with local soil data. Second, the root zone hydraulic parameters for lakebed and other heavy clay soil areas are too high. These areas were manually adjusted to be more in line with observed conditions. A more rigorous development of root zone parameters should be considered in the future as this issue demonstrates that it is a sensitive parameter.

Land Use Modifications

The agricultural land use and crop type distribution in the model for early period (1974 to 1990 and 1992 to 1996) from C2VSimFG-Beta uses a regional distribution and does not accurately represent historical practices. This results in agricultural water use being distributed across the entire Subbasin including areas that do not have irrigated agriculture. To correct for this, land use and crop type data are modified to conform with irrigated agricultural areas in the early 1990s. The crop types are adjusted to be consistent with the Kern County Agricultural Commissioner reports for these years. This included capturing the appropriate crop types present in the Subbasin in the periods from 1974 through 1996. For example, there was a higher percentage of cotton

produced during that period and a lower percentage of nut trees, which became one of the major crop types in the 2010s.

Westside Pumping Limits

Western Kern County contains large areas with poor groundwater quality. As a result, little or no agricultural or urban groundwater pumping occurs in this area. To simulate this, groundwater pumping was turned off in C2VSim-Kern in most of the areas with poor groundwater quality. However, in the Westside District Water Authority GSA, limited groundwater pumping does occur during critically dry years. To protect crop health, the poor-quality water must be blended with surface water to supplement the imported water supply. To simulate this condition, the groundwater pumping rate in the Westside District Water Authority GSA is estimated to be 10 percent of the surface water deliveries, and the automated groundwater pumping adjustment in C2VSimFG-Kern was turned off for these areas.

Subsequent to the completion of the historical model, GSP developers in the WDWA GSA refined their estimate of groundwater pumping used to blend with delivered surface water to about 3,000 AFY on average, which is considerably lower than that used in the historical model. The Westside GSA GSP developers included a management action to further refine the estimated groundwater use in the WDWA GSA. Therefore, the original assumption was left in this version of the historical model. The results of WDWA GSA's pumping evaluation will be included in future model updates.

Kern Wildlife Refuge Pumping

C2VSimFG-Beta enabled groundwater pumping in the model elements representing the Kern National Wildlife Refuge (Refuge). The Kern National Wildlife Refuge Water Management Plan (USBR, 2011) indicates that during the simulation time period, the Refuge was sustained entirely on imported surface water and occasional diversions of Poso Creek flood waters. No groundwater was pumped at the Refuge during the simulation period 1985 to 2015. Groundwater pumping was used at some time in the past. Groundwater pumping and automated groundwater pumping adjustment are turned off for all model elements in the Refuge.

In addition to the Refuge, former rice fields and other areas are currently used for sustaining ponds at private duck hunting clubs in the northwestern portion of the Subbasin. Water use data for these operations were not available during the development of the historical model. This water includes a combination of surface water and groundwater, and this volume is considered to be very small relative to the overall Subbasin water use. GSP developers included a management action to further refine the estimated water use for these facilities that will be addressed in future updates.

Recommendations for Future Improvements to C2VSimFG-Kern

The C2VSimFG-Kern model performs well in most parts of the Subbasin, producing simulated water budget components that generally match historical values compiled by local agencies. C2VSimFG-Kern simulated groundwater levels provide a reasonable approximation of observed groundwater levels in the central part of the Subbasin. The model is well suited in most parts of the Subbasin for estimating the impacts of management actions on Subbasin groundwater storage and is also well suited as a planning tool in meeting SGMA compliance.

During the model update, several outstanding issues were identified that are currently being addressed in future updates to C2VSimFG-Kern. These data gaps are being addressed under the grant funded Basin Study and Evapotranspiration Analysis & Study grant components (Section 9.1.5). This grant period is October 2022 to October 2025.

- **Improve streamflow simulations of the Kern River and Poso Creek.** Flows in the Kern River channel, including local stream-groundwater interactions, are not well replicated and surface water diversions are not dynamically simulated. Some rejected recharge occurs in the Kern Fan area in very wet years, with significant outflow of groundwater to the Kern River especially in the Kern Fan banking area (i.e., rejected recharge). This has been an ongoing issue and needs to be addressed for the projected future water budgets so that banking recharge volumes can be better matched in the model. It is recommended that future revisions to C2VSimFG-Kern further evaluate issues in simulating streamflow and seepage in the Kern River and Poso Creek (see **Section 8.5**). This may include incorporating more advanced streamflow simulation features that are available in IWFEM but that have not been previously utilized in developing C2VSim models by DWR. Changing the stream simulation feature may require development of a local Subbasin model.
- **Improve the geologic and hydrogeologic conceptual model of the Kern County portion of the Central Valley.** A hydrogeologic conceptual model is a framework for understanding where groundwater exists, where it flows, and how groundwater interacts with surface water bodies and the land surface. A geologic conceptual model provides a framework for understanding the geologic features that control groundwater movement. Quantitative analysis of Subbasin groundwater flow is severely hampered by the lack of detailed geologic and hydrogeologic conceptual models of the areas outside the central alluvial basin. Geologic and hydrogeologic conceptual models will provide a foundation for the quantitative analysis of the groundwater flow system, and the framework for modeling the system. Key steps are:

- Develop detailed geologic and hydrogeologic conceptual models of the Subbasin.
- Identify the locations and characteristics of natural features that affect groundwater recharge and movement (faults, ridges, clays).
- Understand water occurrence and movement in areas outside the central Subbasin.
- Develop water quality maps (natural constituents and anthropogenic constituents).
- Modify the Subbasin model to conform to the updated conceptual models.
- **Simulation of deep percolation and small watersheds.** Unreasonably high deep percolation (return flows) of the applied water in some areas has led to unreasonably elevated pumping rates to compensate. One problem is high root zone hydraulic parameter values in certain areas that were identified and corrected to better reflect local soil conditions. Because the excess pumping was returning to groundwater, the change has little effect on the Subbasin change in storage, but the pumping and deep percolation are now more in line with local estimates. Root zone hydraulic parameters should be redeveloped throughout the Subbasin to assure model values are representative of actual values.
- **Root Zone Parameters,** Areas of overly high root zone hydraulic parameters led to high volumes of deep percolation that required additional groundwater pumping to meet the overall water demand for irrigation. A review found areas of overlying high soil hydraulic conductivity and other soil parameters produced percolation rate that were too high. These areas were manually adjusted to be more in line with observed conditions. A more rigorous development of root zone parameters should be considered in the future as this issue demonstrates that it is a sensitive parameter.
- **Investigate development of a stand-alone Subbasin model.** The C2VSim model provided by DWR and updated with local data is adequate for GSP preparation. However, this model may not meet all the groundwater modeling needs of Subbasin stakeholders. In addition, running a full Central Valley simulation model imposes longer model run times and reduces model flexibility. Stakeholders should undertake a comprehensive study to develop a list of their integrated (groundwater and surface water) modeling needs, and then decide whether further improving C2VSimFG-Kern or developing a new integrated hydrologic model is the best way to address the Subbasin modeling needs.
- **Adjust the finite element grid to honor water management boundaries.** The C2VSimFG-Kern model grid is a randomly generated grid that does not conform to any local features other than natural surface water channels. This

limits the spatial accuracy of model inputs and the precision and flexibility of water budget outputs. Adjusting the grid to match district and agency boundaries, historical delivery areas, water management units within districts, and geologic and hydrologic features would greatly enhance model capabilities.

- **Quantify boundary flows.** Significant uncertainty exists regarding the rates and timing of groundwater flows into the Subbasin from surrounding watersheds, and groundwater flows from the Subbasin to Kings and Tulare counties to the north. Reliable estimates of boundary flows will improve model performance in boundary areas.
- **Kern County Subbasin Boundary.** The GSAs in the Subbasin should consider when DWR updates the Bulletin 118 to investigate the “actual” Subbasin and to remove those peripheral lands where aquifer connectivity does not exist.
- **Utilize more complex water management features of IWFM.** The Kern Update process modified information within the existing C2VSimFG--Beta model structure to improve model performance within the Subbasin. The IWFM application has several features that could be further utilized to improve model performance.
 - Adjust the agricultural crops to better match the Kern County crop mix (for example, create separate crop categories for carrots, young and mature almonds, young and mature pistachios, etc.).
 - Implement multi-cropping with semiannual or quarterly land use.
 - Some C2VSim data are organized by DWR subregions, which represent heterogeneous areas with homogeneous data. Developing Subbasin subregions and organizing model input data by these subregions may provide a better representation of local hydrologic conditions.
- **Calibrate the improved model for the Kern County Subbasin.** DWR did not fully calibrate the Kern County portion of the C2VSim model, owing to both poor historical input data and a lack of calibration data sets. The Kern Update process significantly improved the historical data in the model, developed some calibration data sets, and included limited adjustment of model parameters. The updated model performs adequately in the central part of the Subbasin and poorly in areas outside the central part of the Subbasin. Once the above improvements are completed, the Kern County portion of the resulting model should be fully calibrated to ensure that it performs well throughout the Subbasin.

Future Work to Address Data Gaps

The Kern County Subbasin received a Round 1 sustainable groundwater management (SGM) grant for critically overdrafted basin under the Sustainable Groundwater

Management (SGM) Grant Program SGMA Implementation grant authorized by the California Budget Act of 2021 and Proposition 68 for projects that encourage sustainable management of groundwater resources that support SGMA. The contract between DWR and the representative for the Kern County Subbasin GSAs was signed on August 8, 2022. **Section 9.1.5** provides a summary of the grant components associated with addressing data gaps related to the water budget.

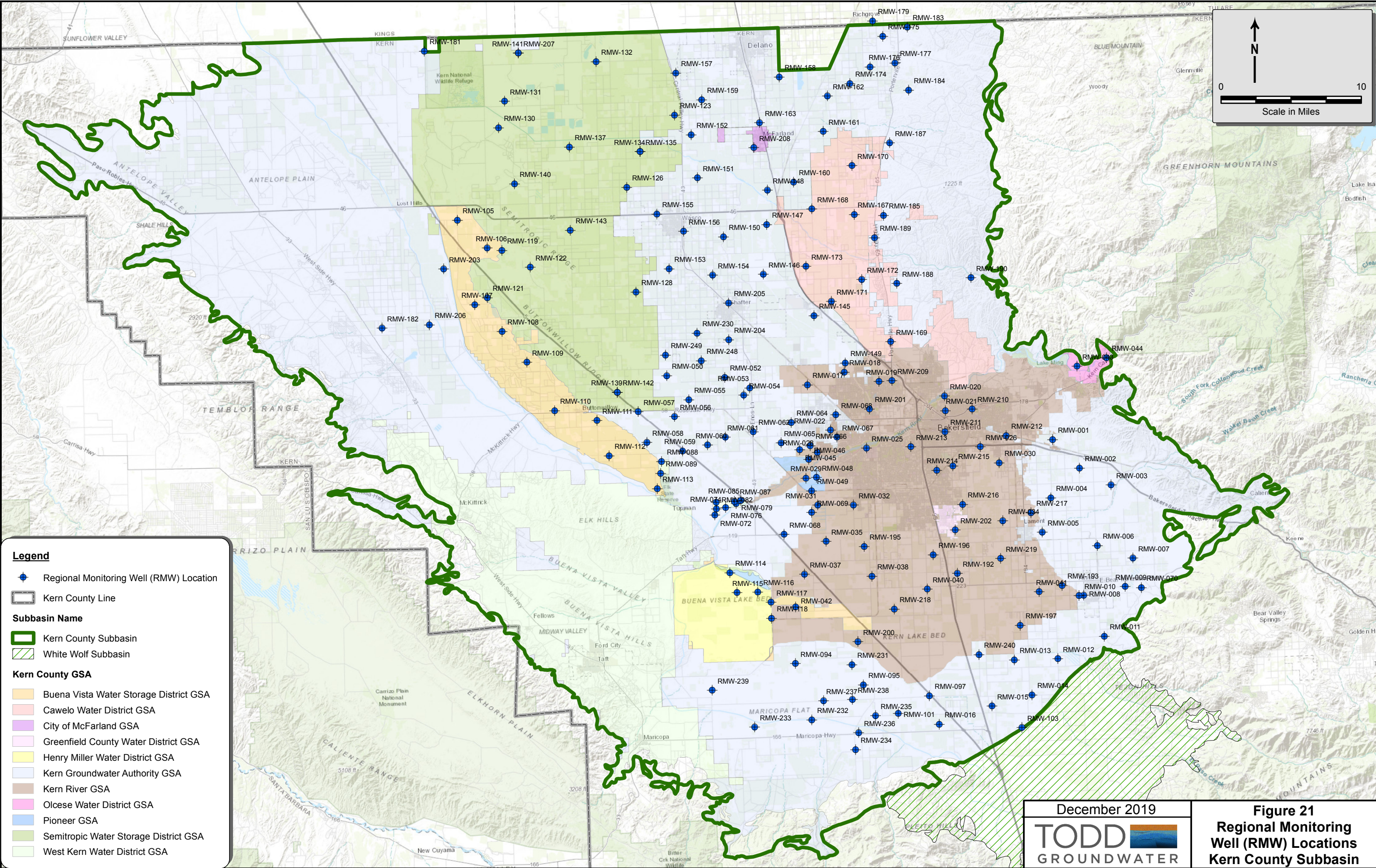
Appendix H-3: Hydrographs of Groundwater Elevations Projected- Future Kern County Subbasin

Projected-Future Scenario Hydrographs

The C2VSimFG-Kern results were used to assess whether the simulated groundwater levels would meet the minimum threshold and measurable objective for each monitoring well. Because C2VSimFG-Kern is not fully calibrated, the results are presented as relative change (which does not require calibration) instead of simulated groundwater levels using the superposition method. Future change in groundwater levels have been determined for each of the 186 locations for each of the six projected future scenarios. The change is calculated starting with the simulated March 2015 groundwater levels from the model. The change in groundwater level is then applied to the measured March 2015 groundwater level at the monitoring location. The result was to superimpose the simulated change in groundwater levels from the projected future C2VSimFG-Kern scenarios relative to the measured March 2015 groundwater level.

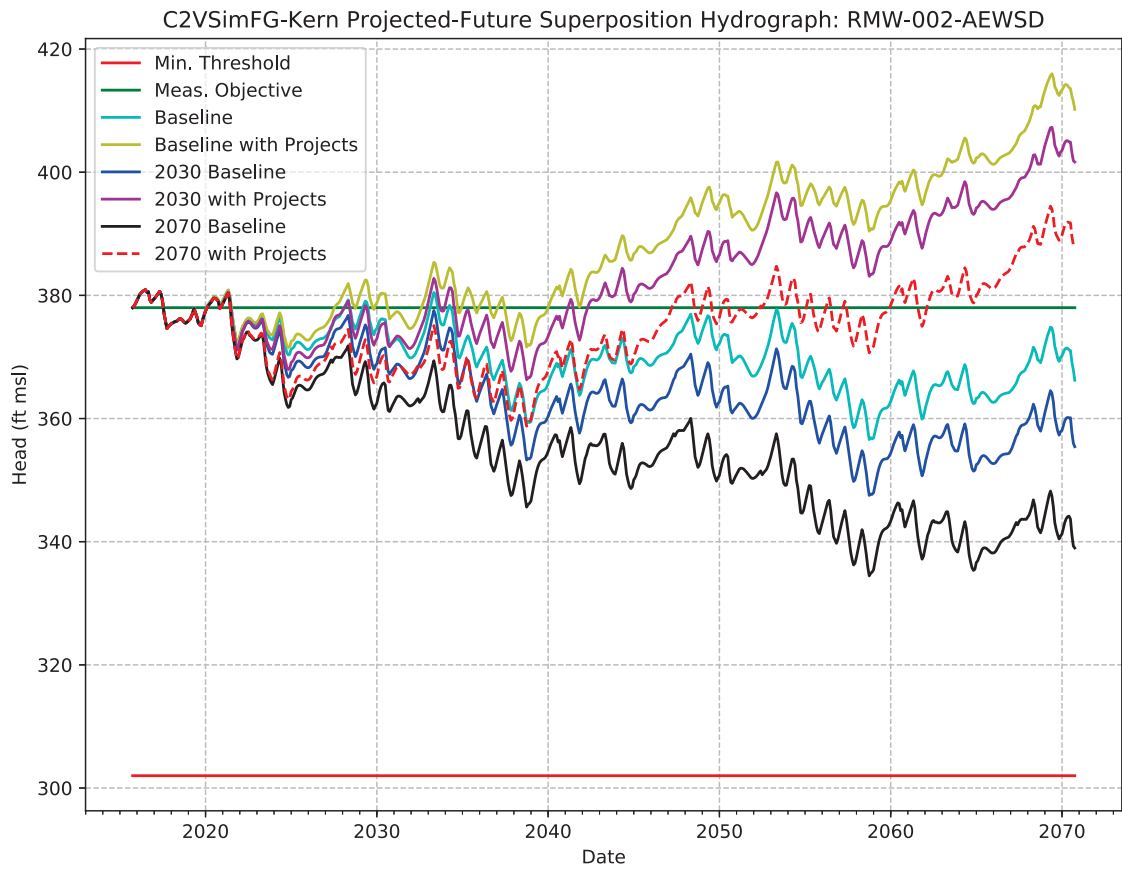
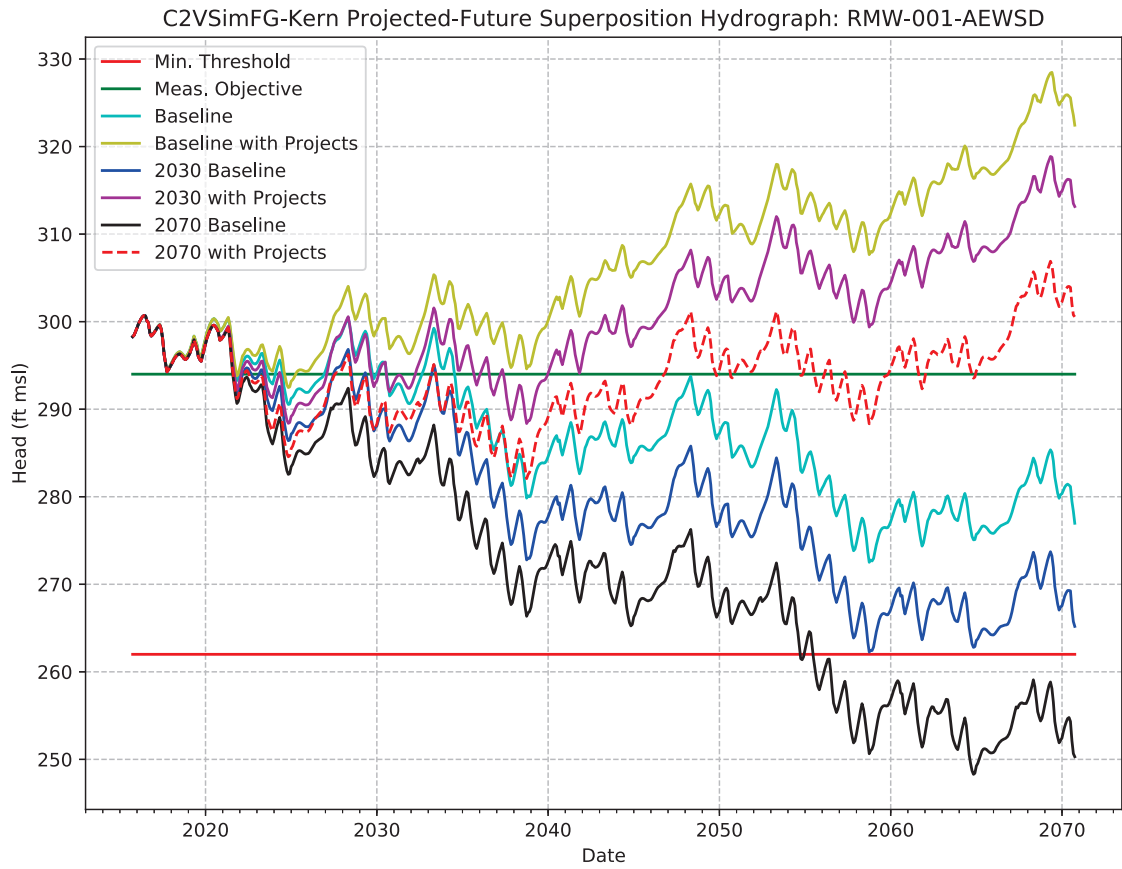
In general, across most areas of the Subbasin, groundwater levels fall near or below the minimum thresholds without the SGMA projects and management actions but are typically above the minimum threshold for the scenarios that include the SGMA projects and management actions. The groundwater hydrographs for some locations, especially along the eastern and western Subbasin margins, show an unusual pattern that is likely influenced by issues with the hydrogeological conceptual model incorporated into C2VSimFG-Kern for these locations. The hydrographs for these areas are not considered to be representative of actual conditions that would physically occur. This is a limitation to the model. The model is currently undergoing a rigorous model update be conducted to revise the hydrogeological conceptual model to be consistent with that presented in the Subbasin GSPs. In addition, further calibration of C2VSimFG-Kern is recommended to update aquifer parameters in the Subbasin.

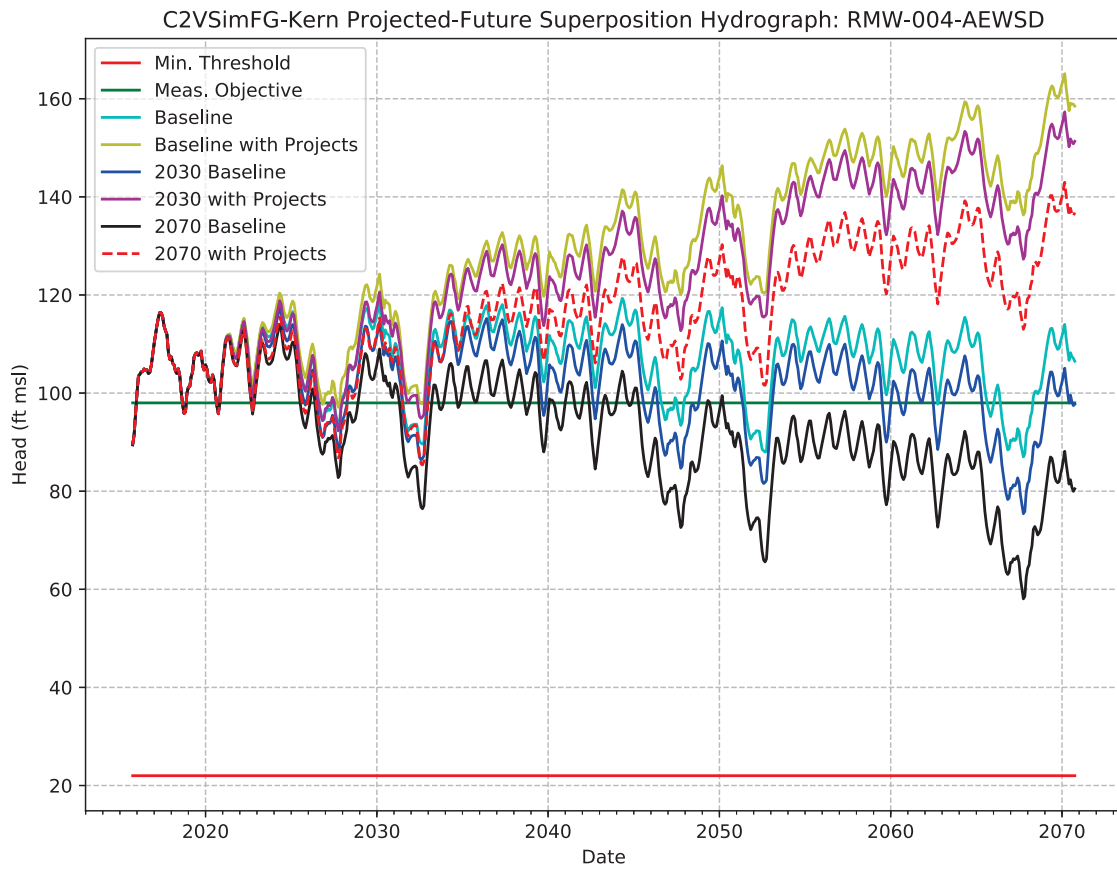
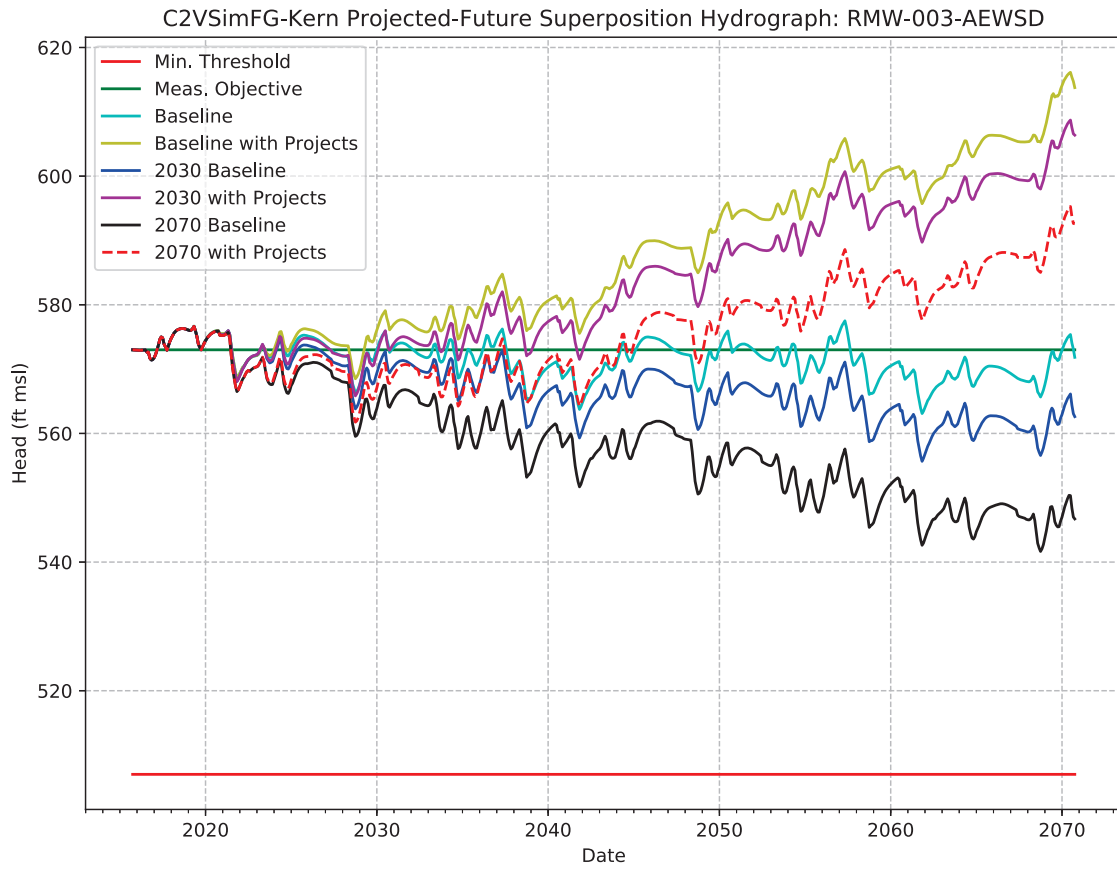
The Subbasin GSAs have defined 186 locations spread across the Subbasin. Minimum thresholds and measurable objectives have been assigned at each of these locations, and the hydrographs for all locations are provided following this text.



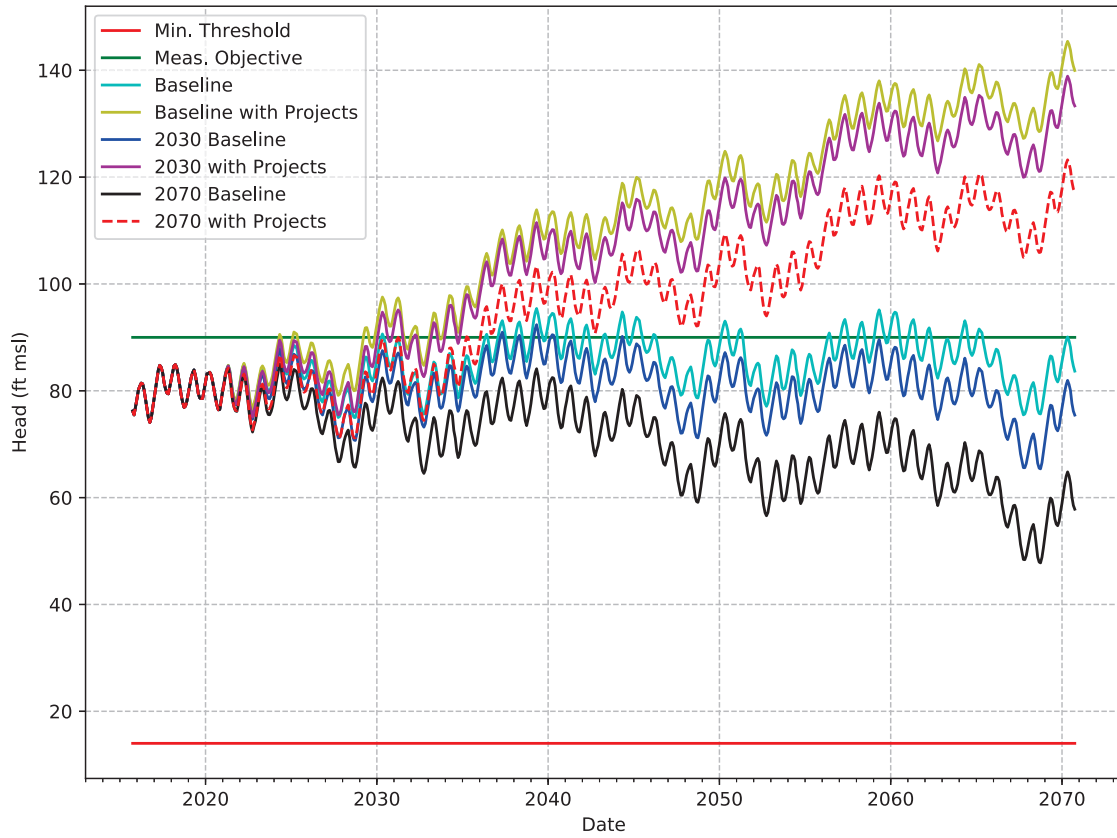
Projected-Future Scenario Hydrographs

C2VSimFG-Kern Model

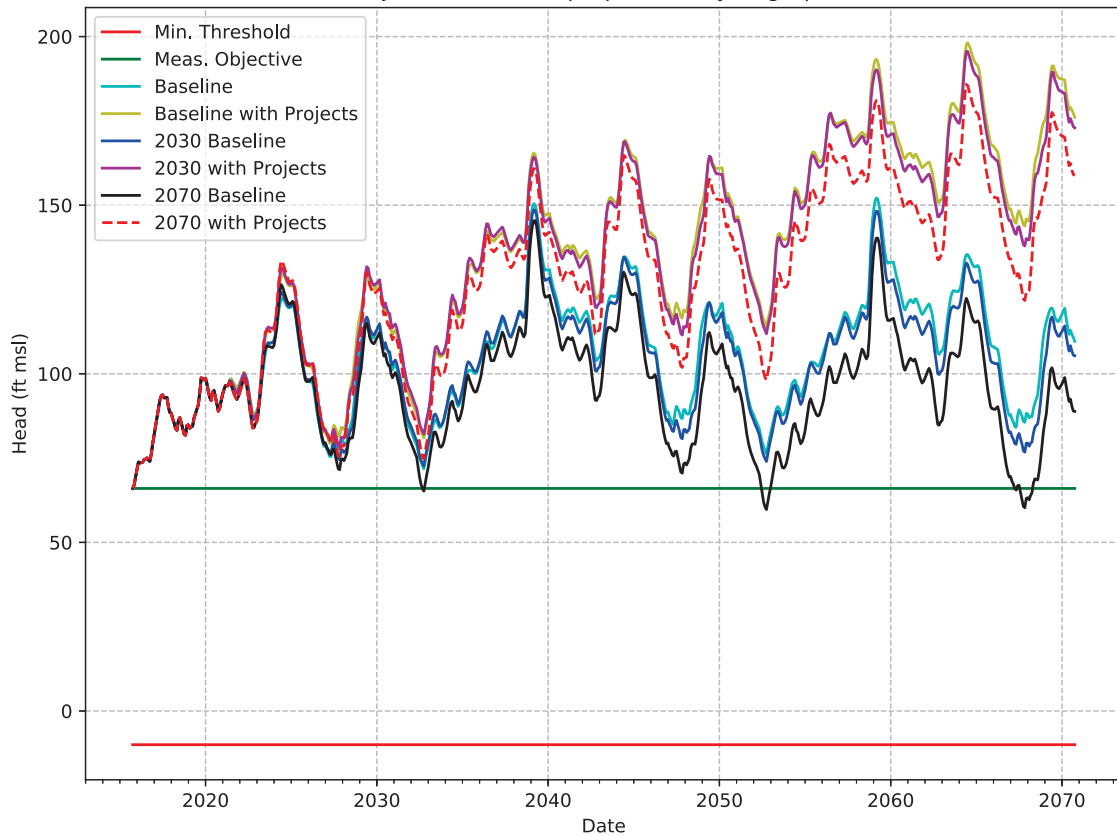




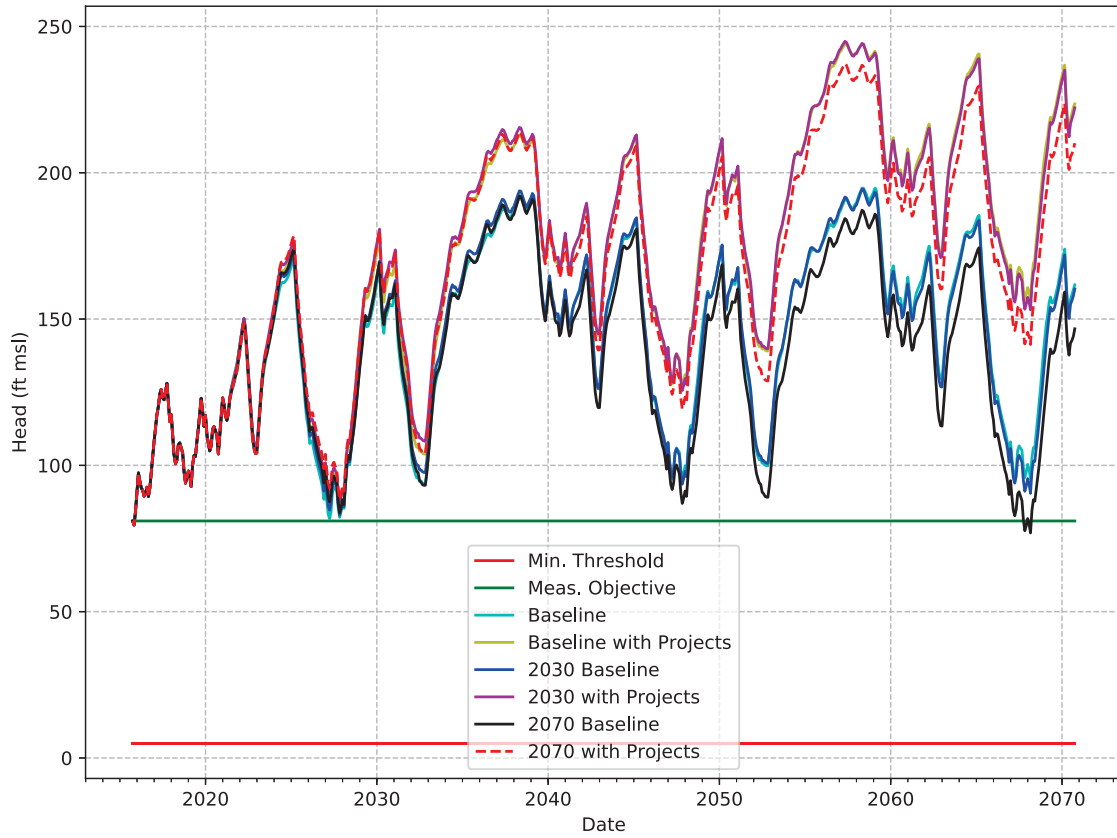
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-005-AEWSD



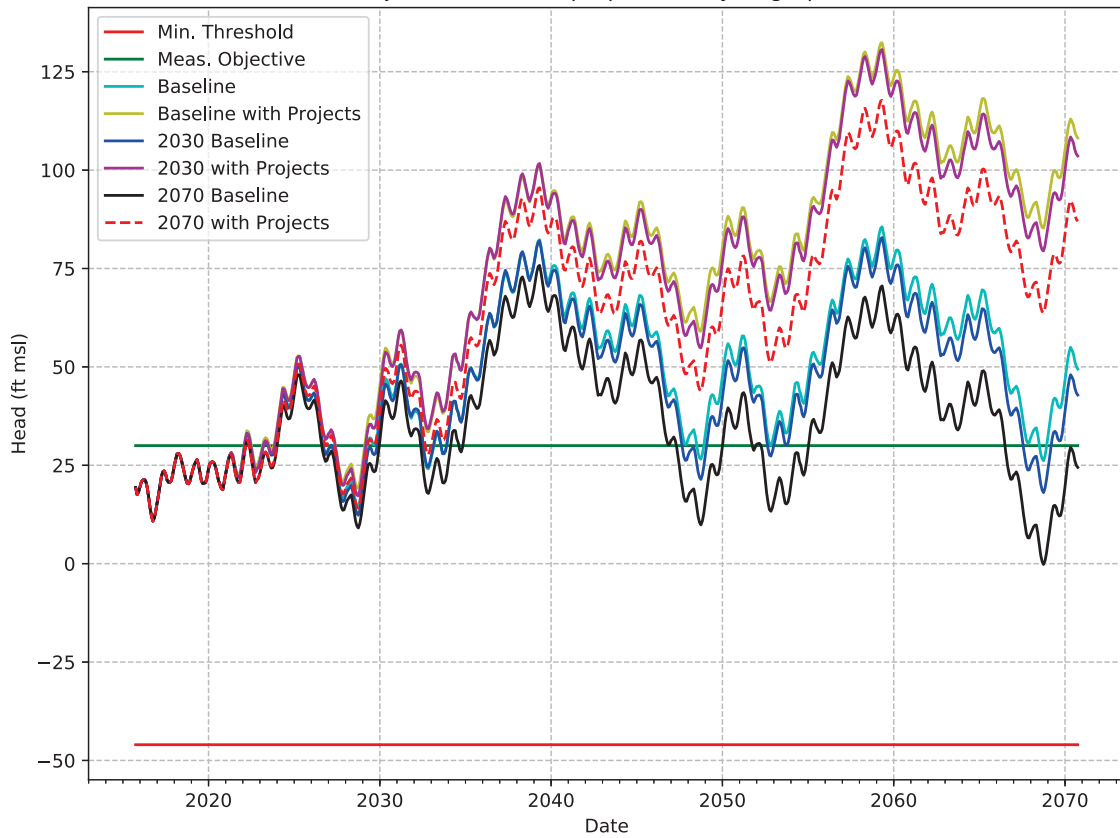
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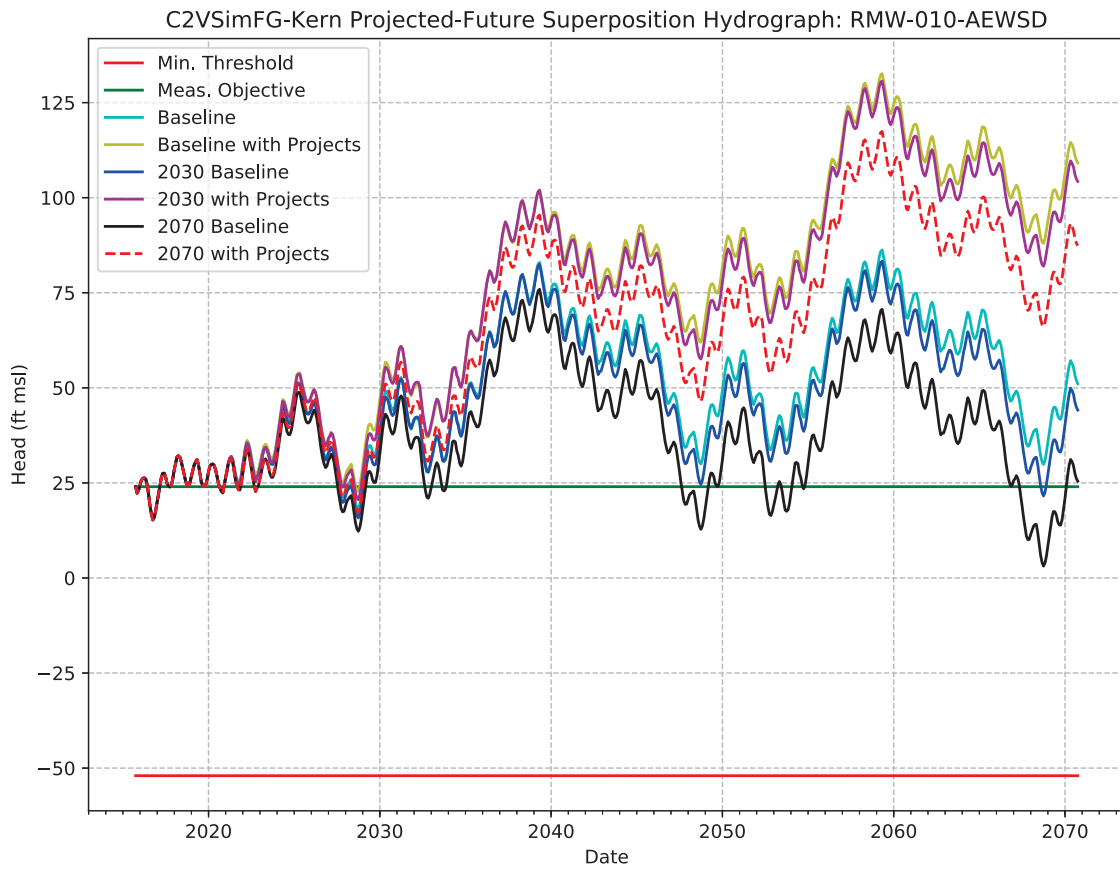
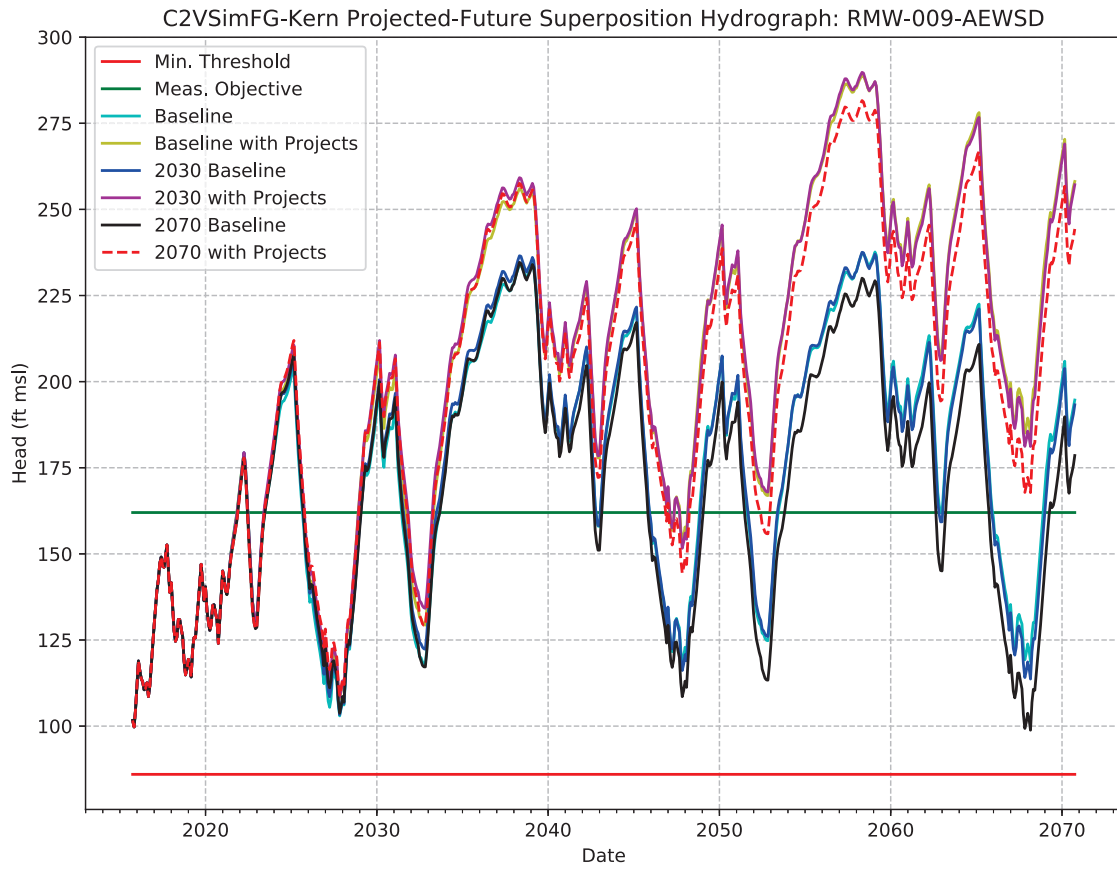


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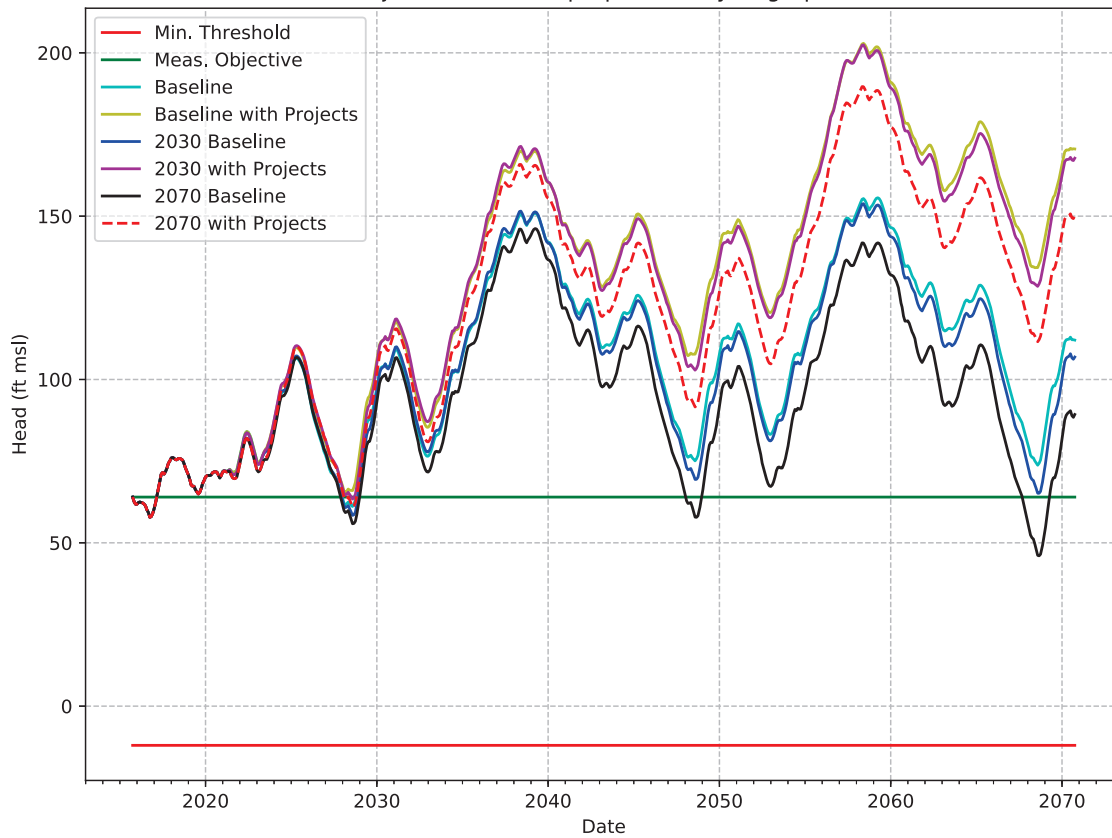


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-008-AEWSD

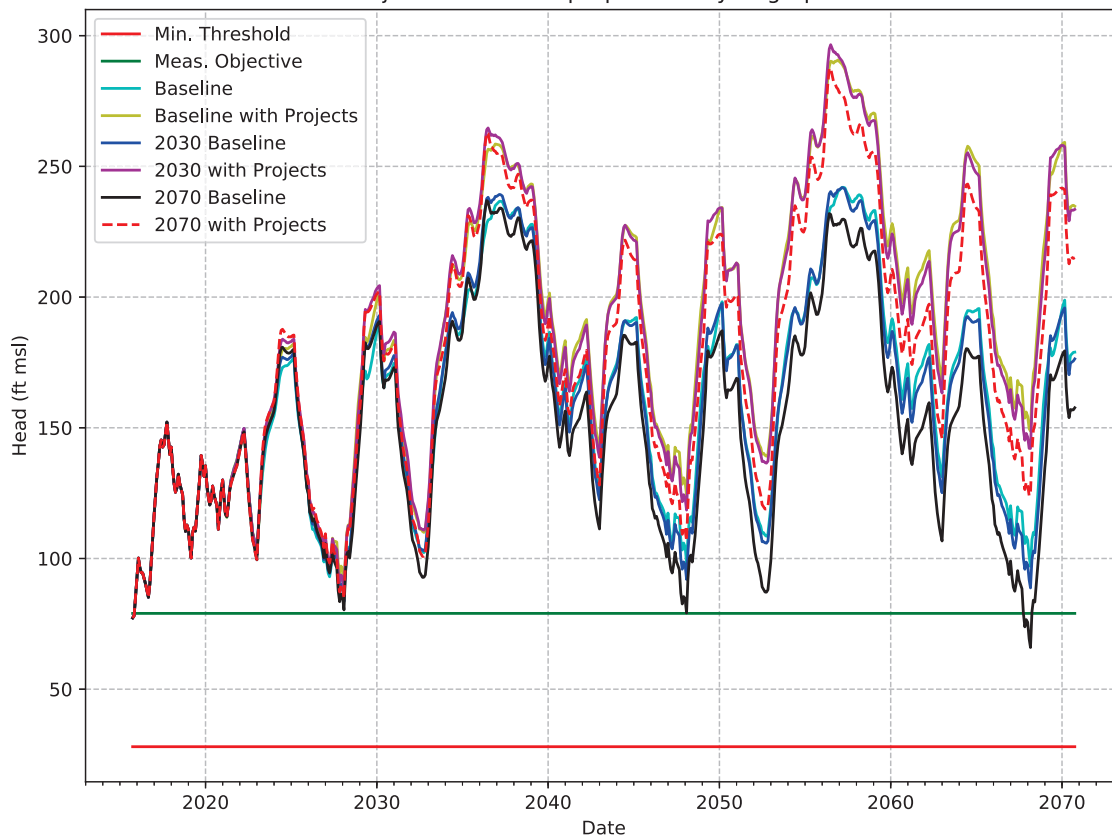


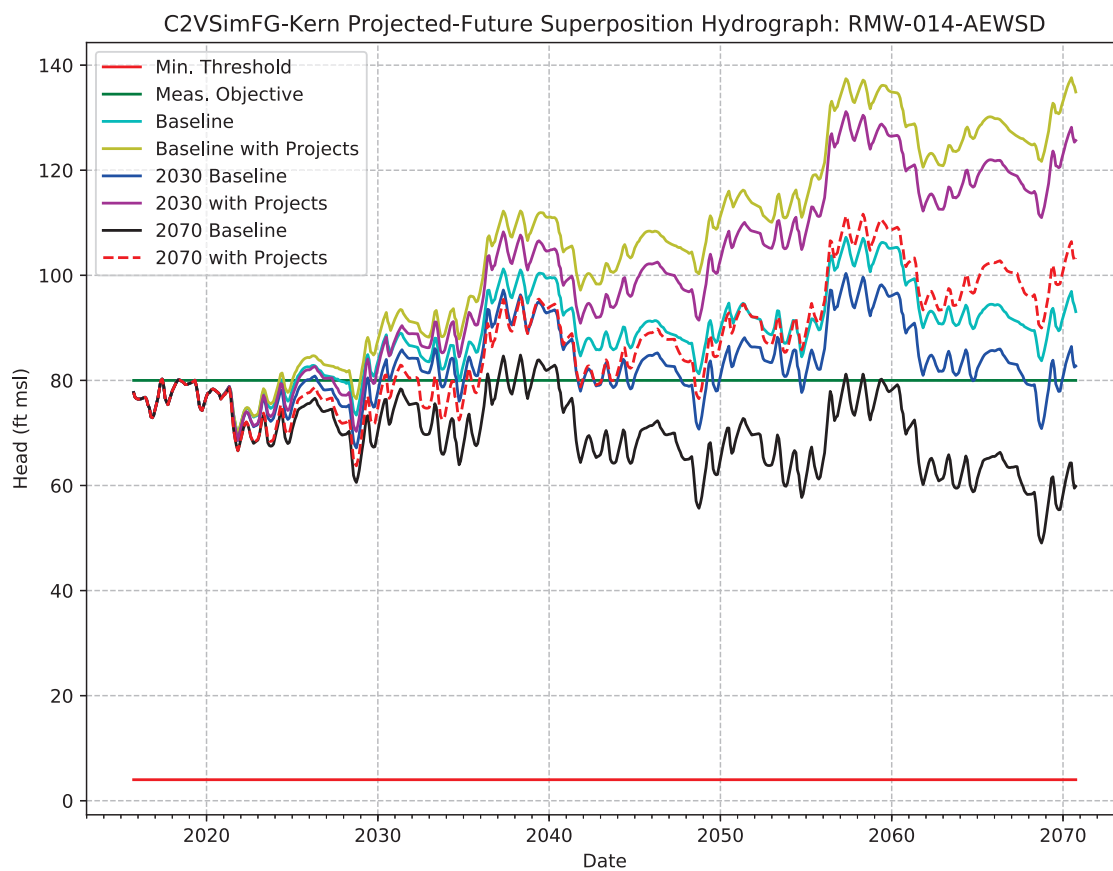
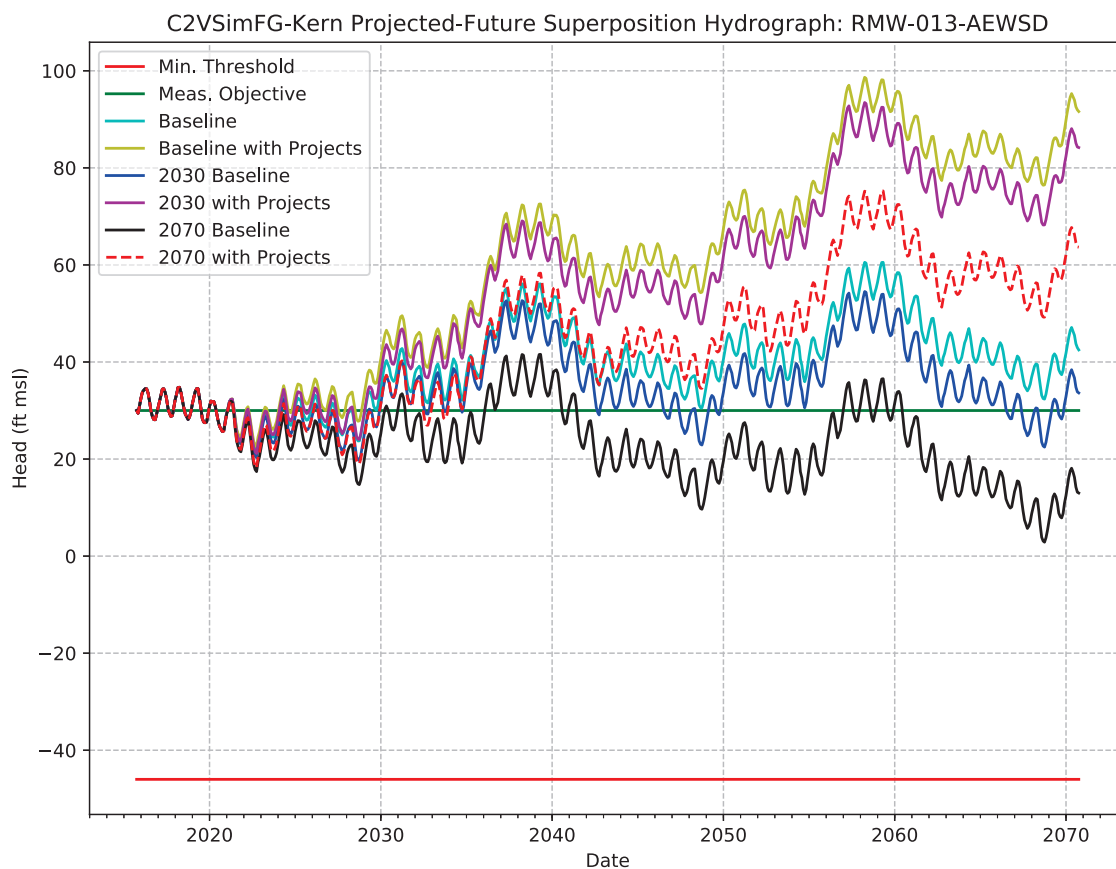


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-011-AEWSD

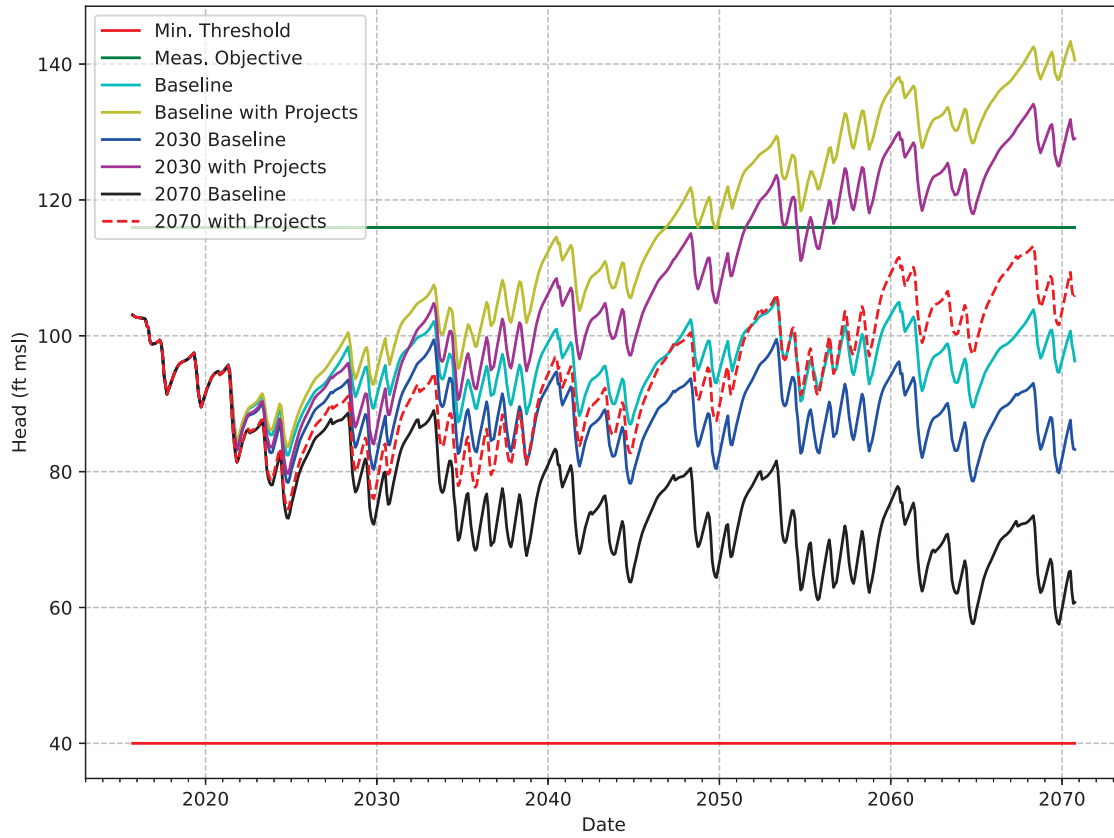


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-012-AEWSD

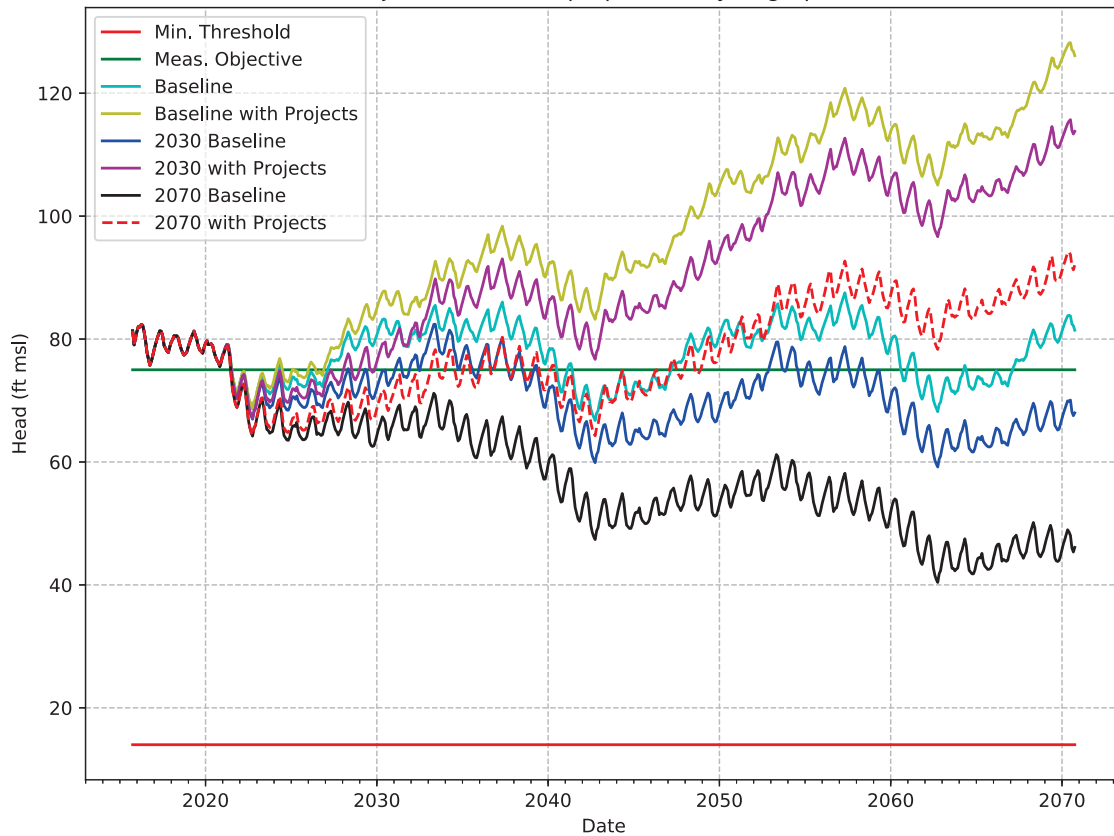




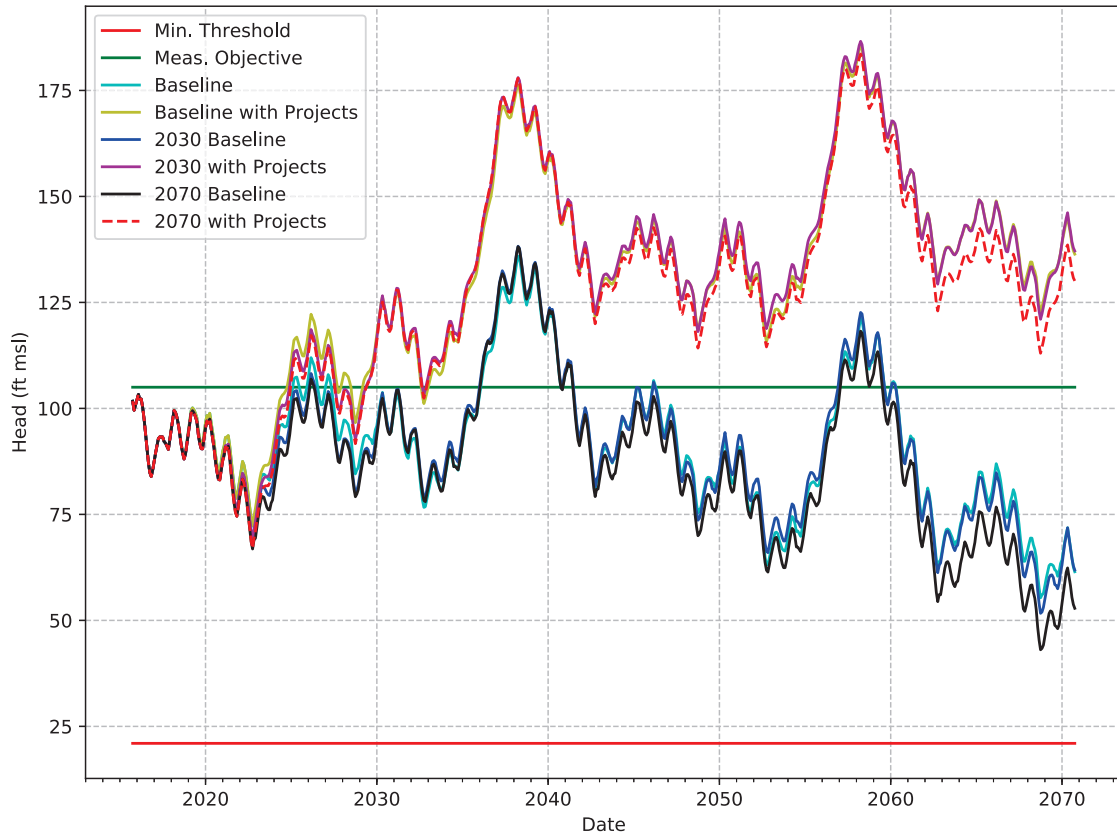
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-015-AEWSD



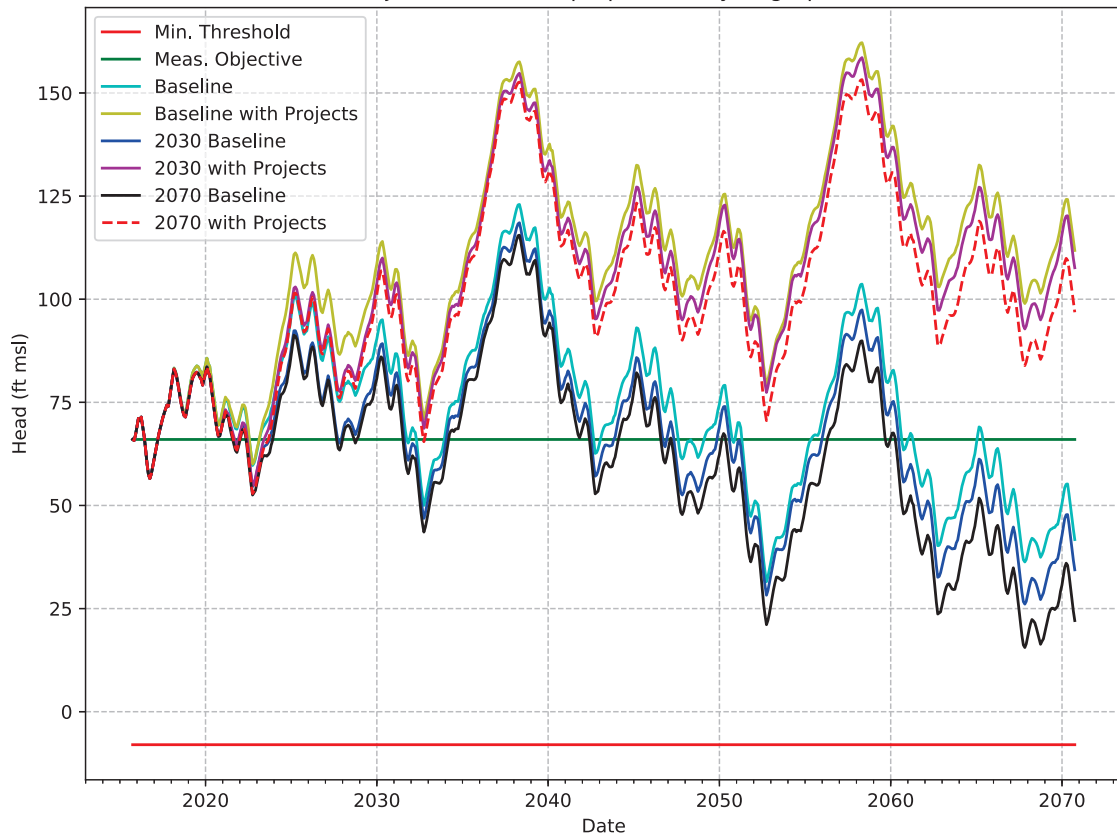
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-016-AEWSD

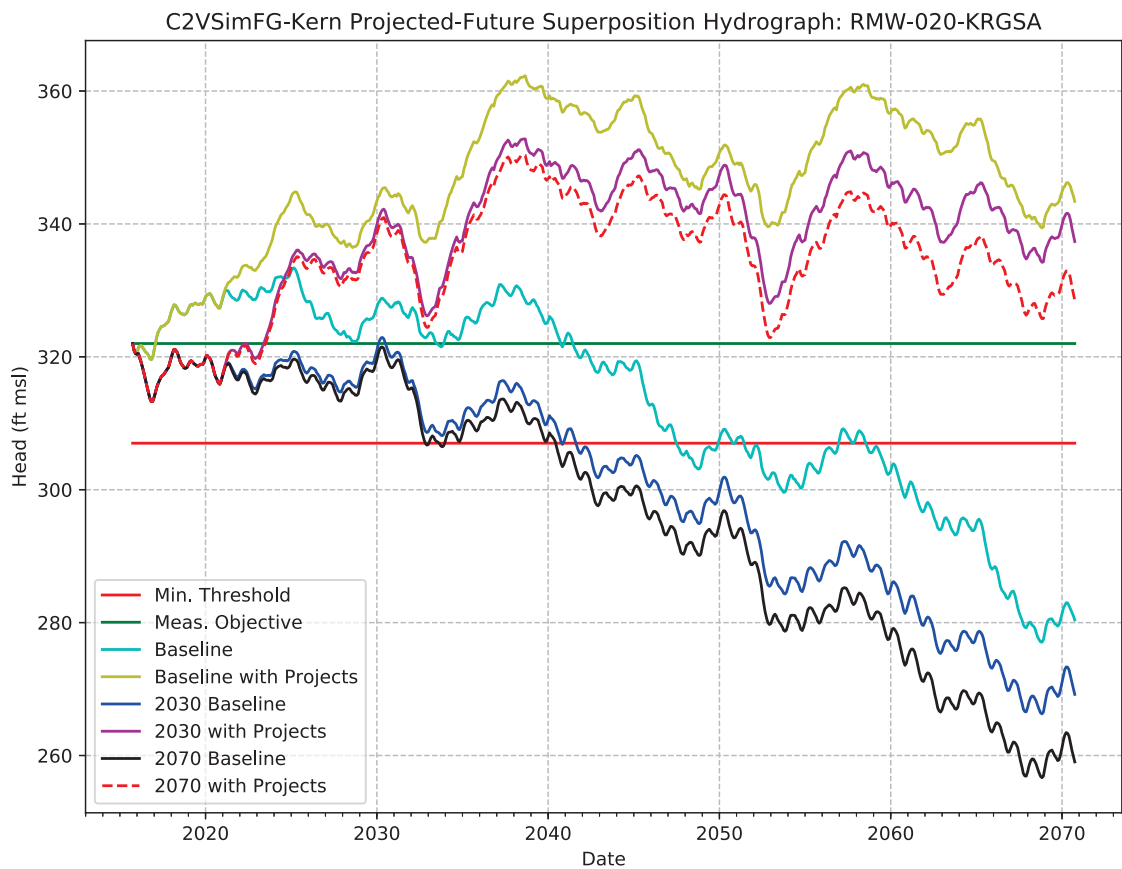
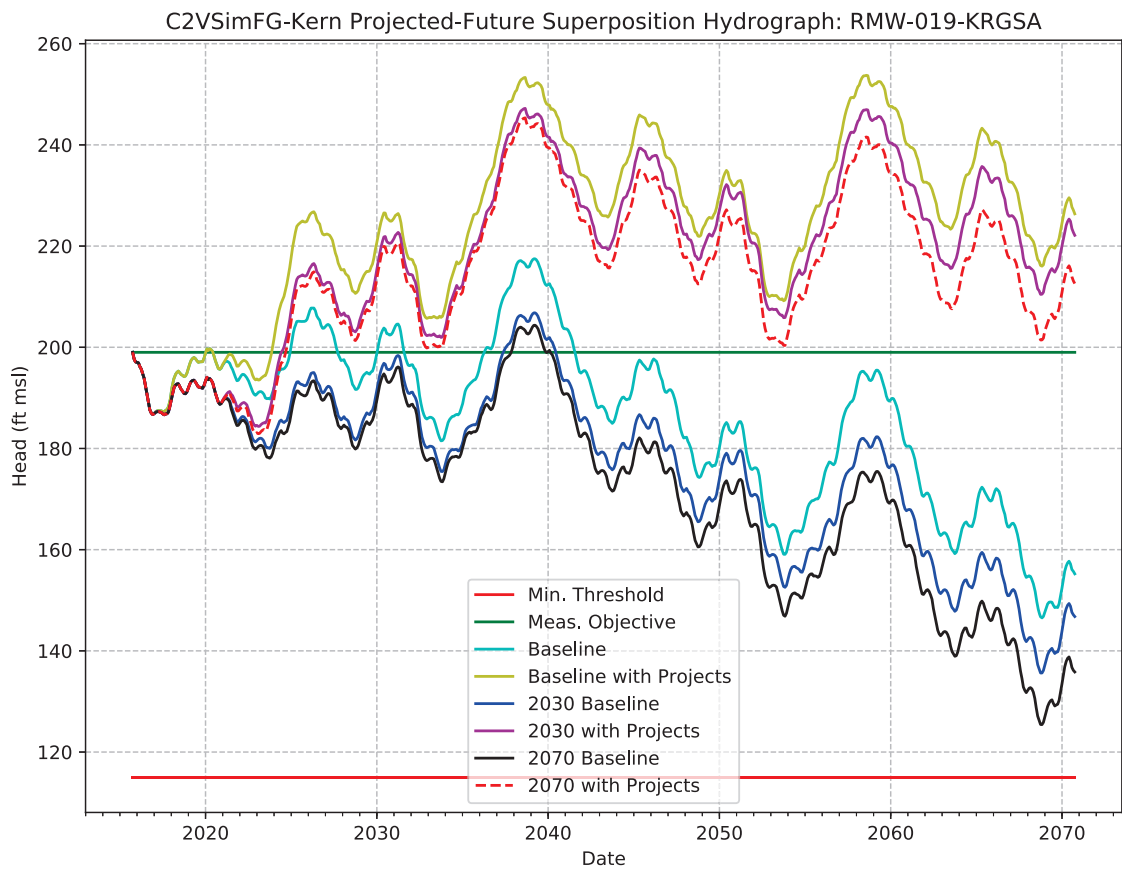


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-017-KRGSA

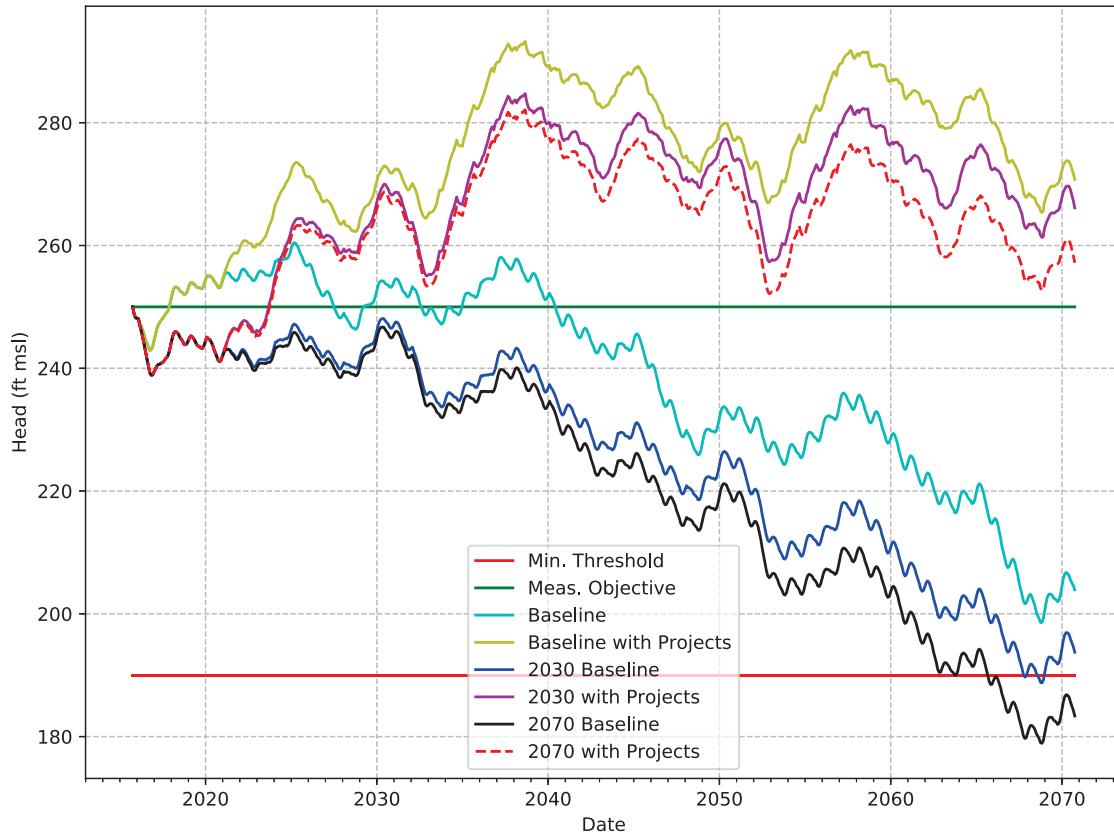


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-018-KRGSA

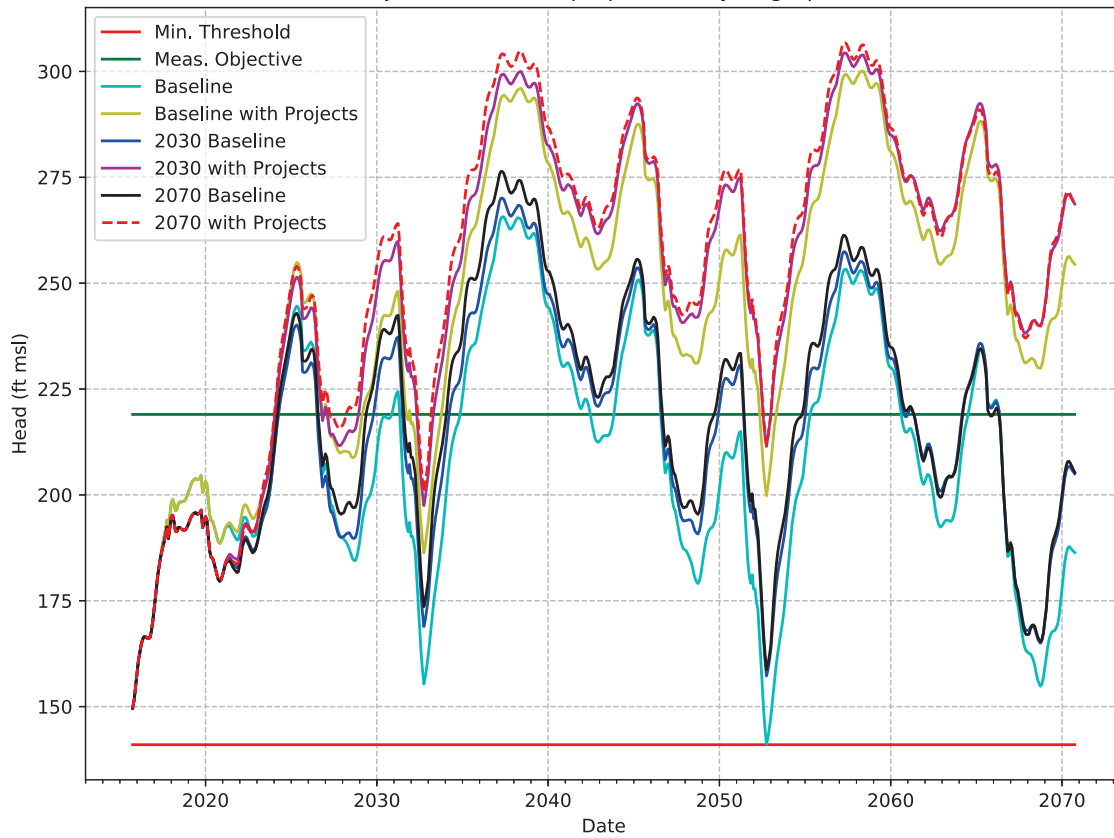




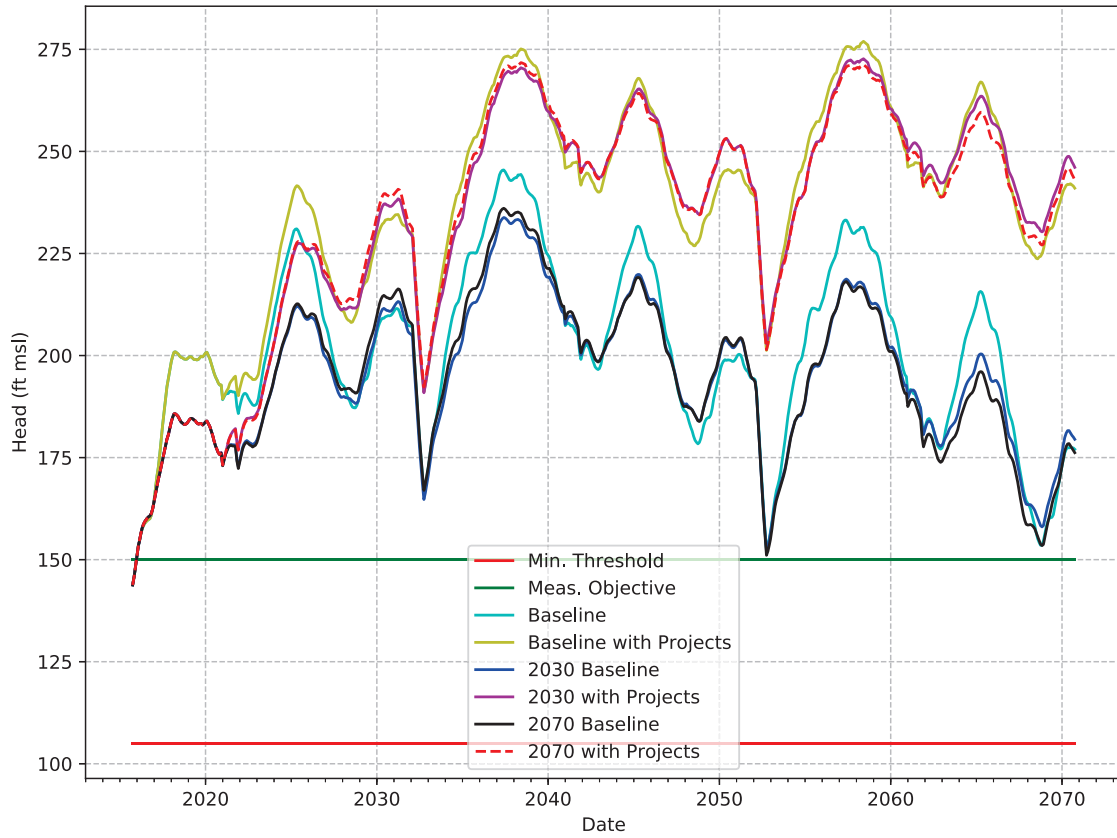
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-021-KRGSA



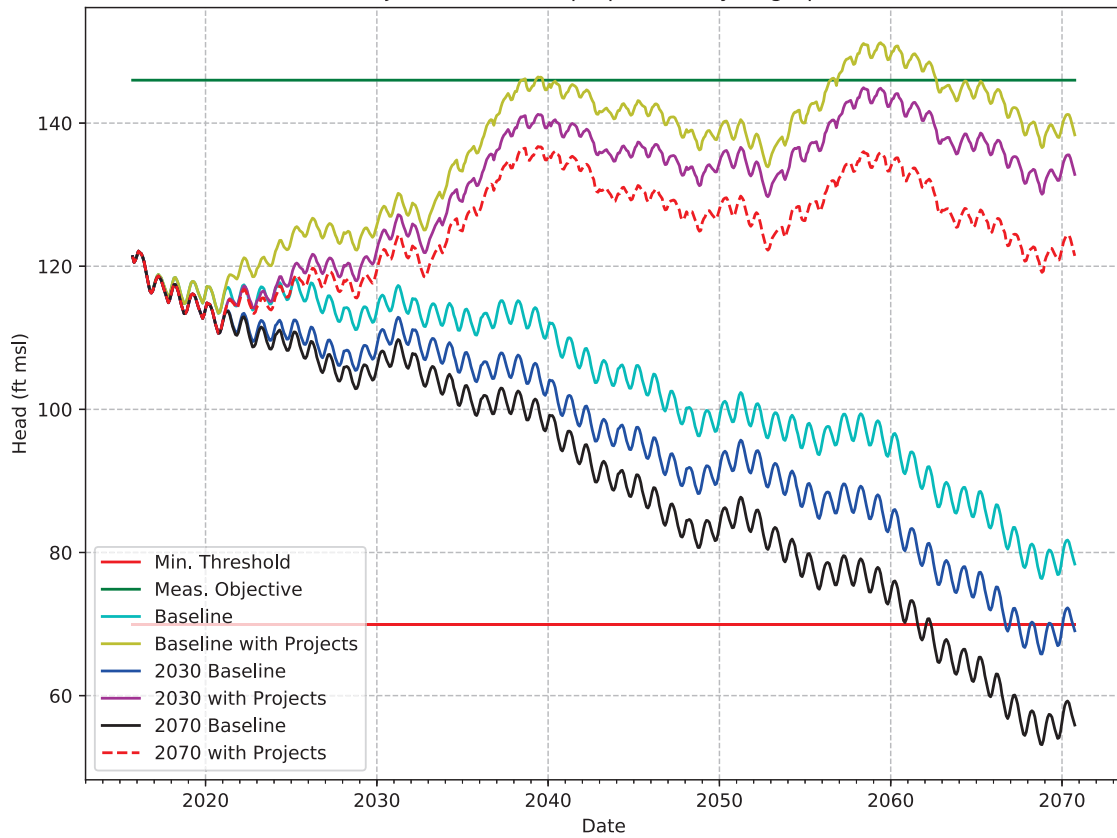
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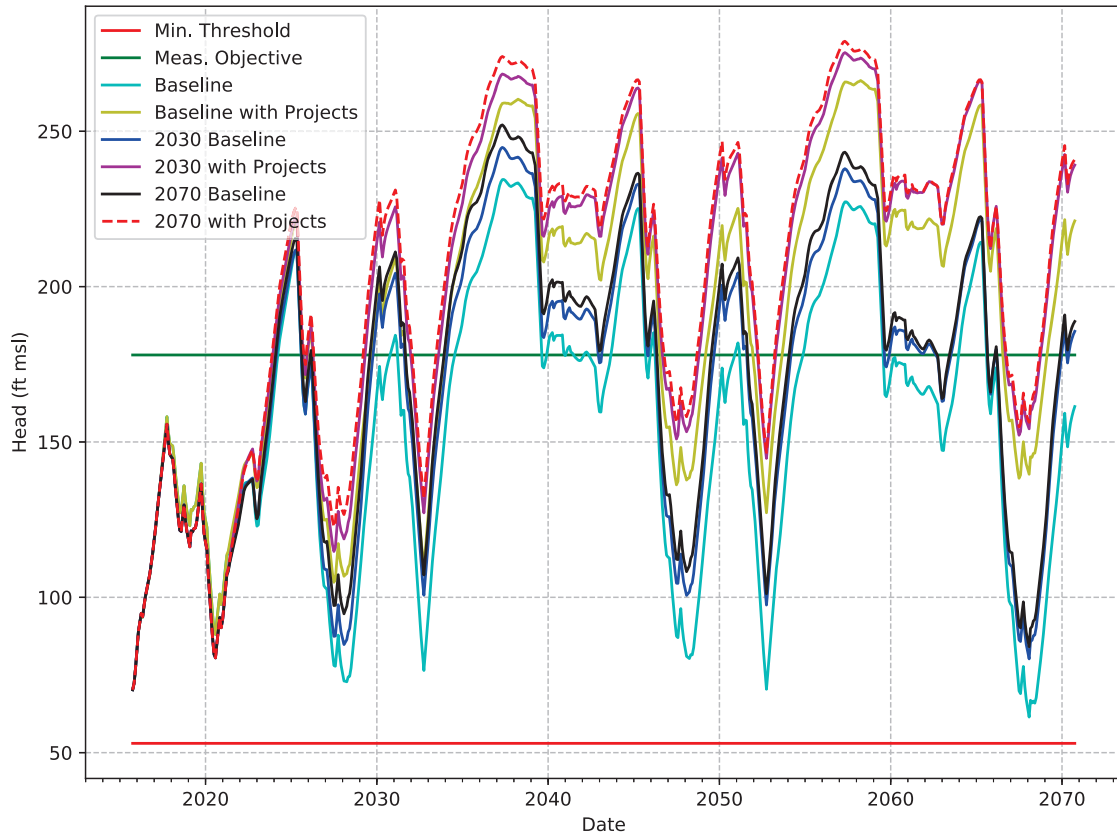
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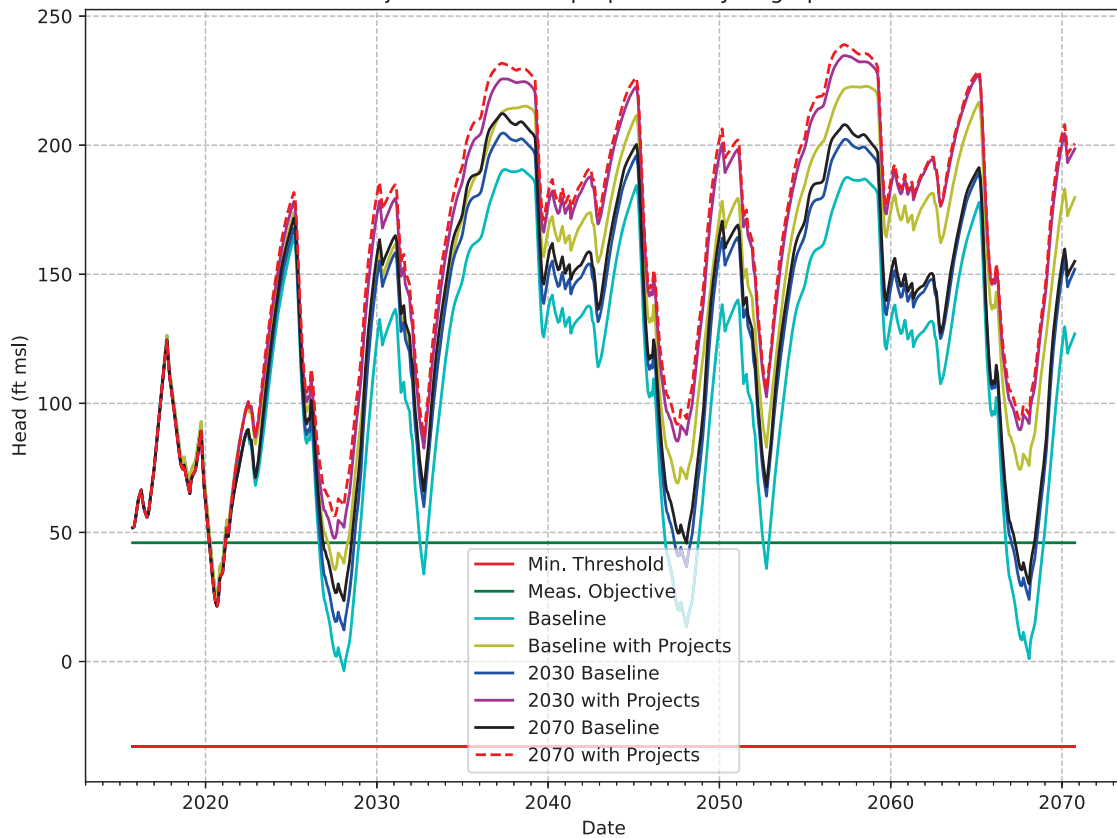
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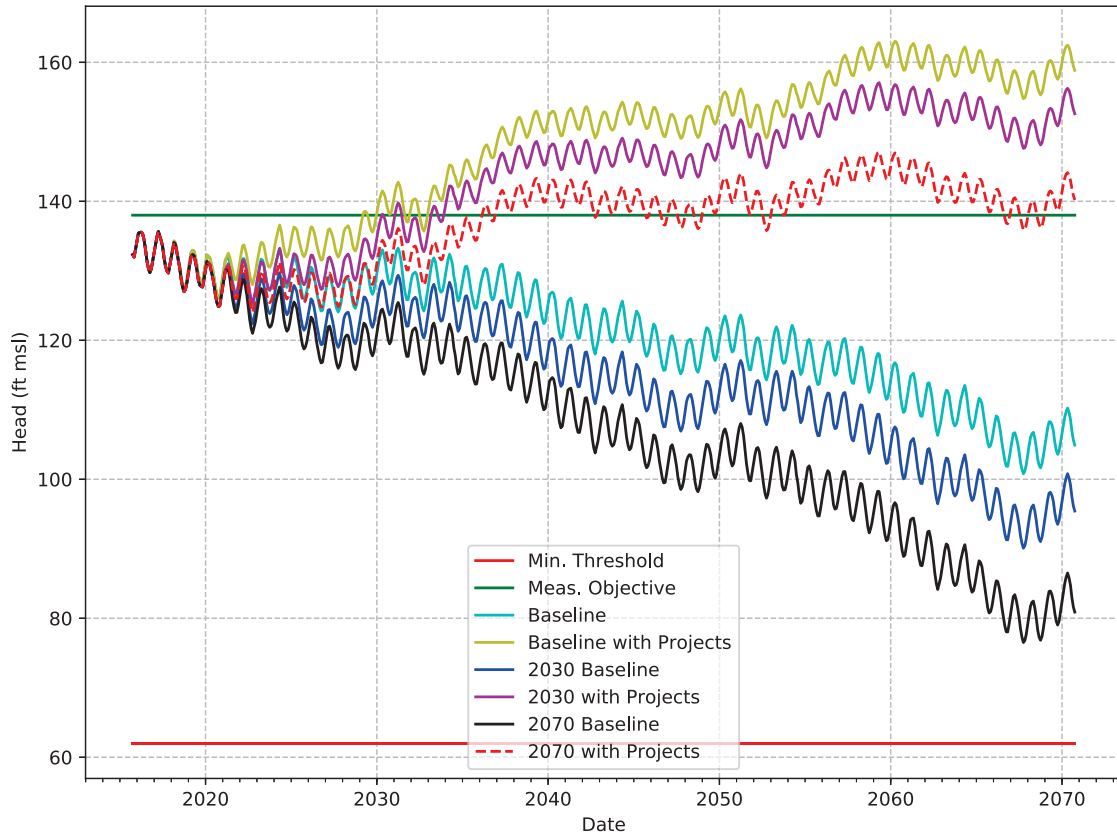
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-028-KRGSA



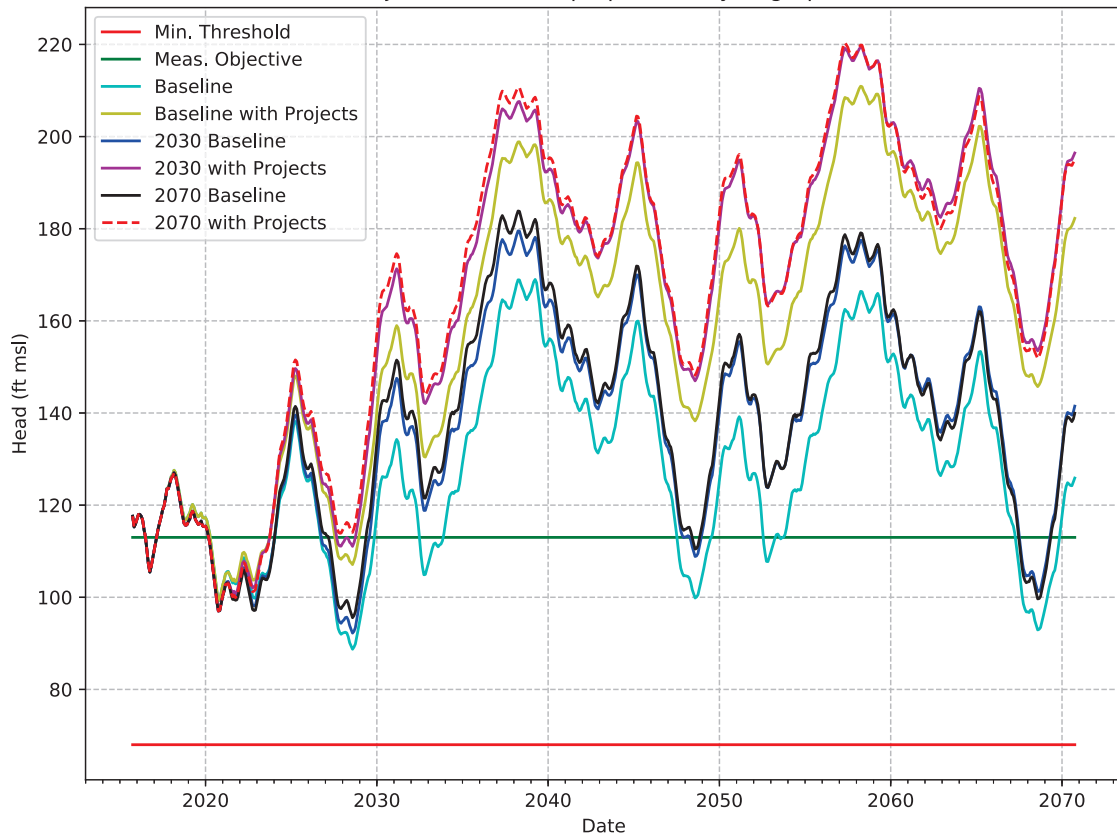
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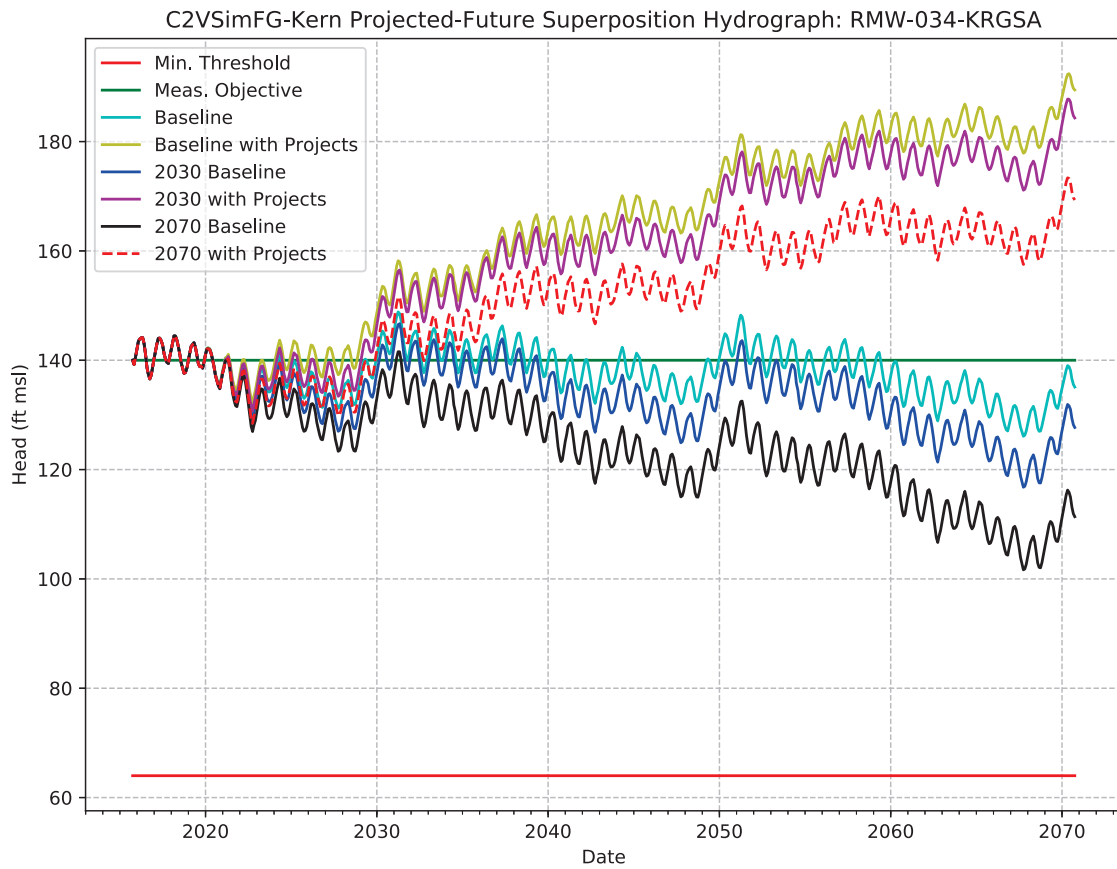
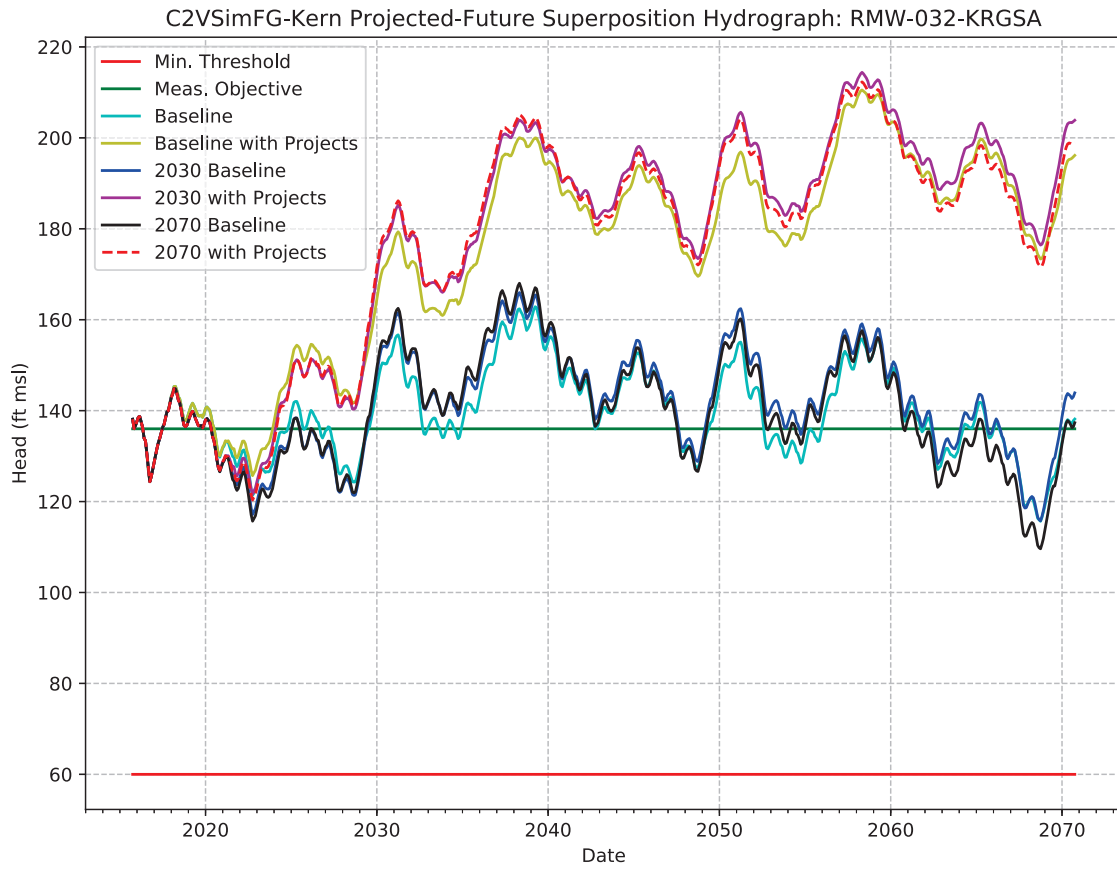


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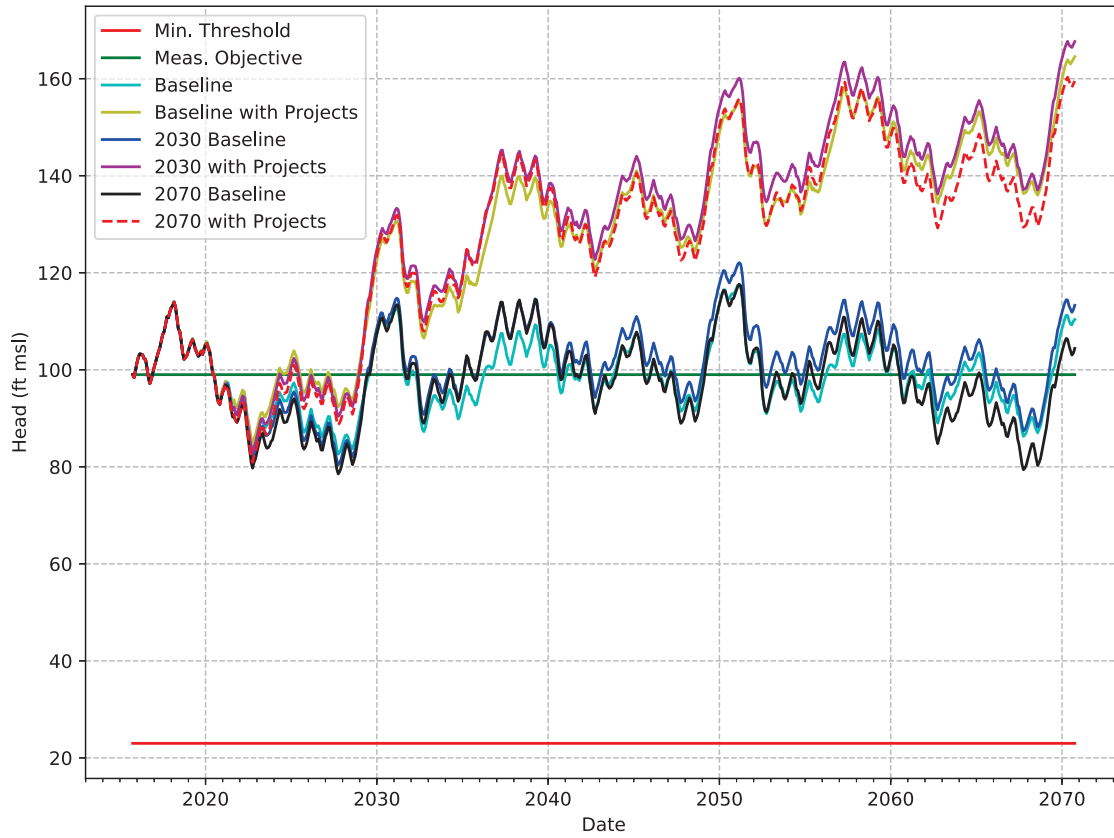


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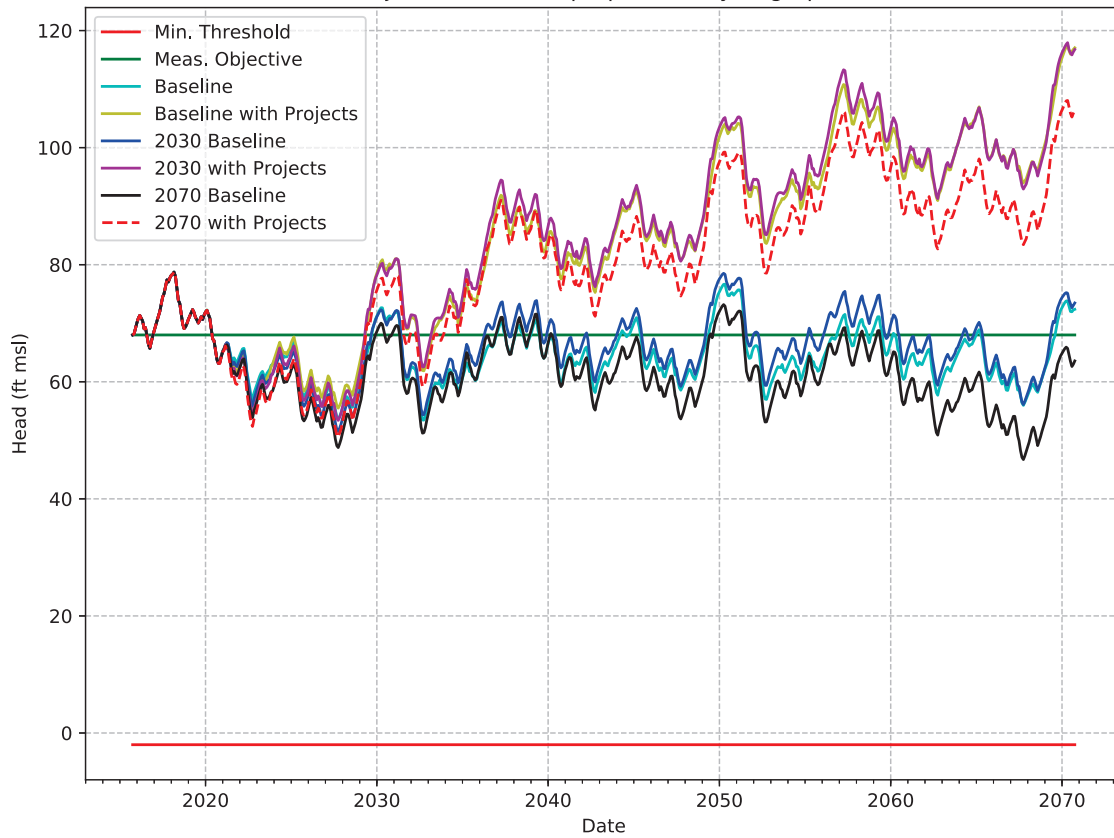


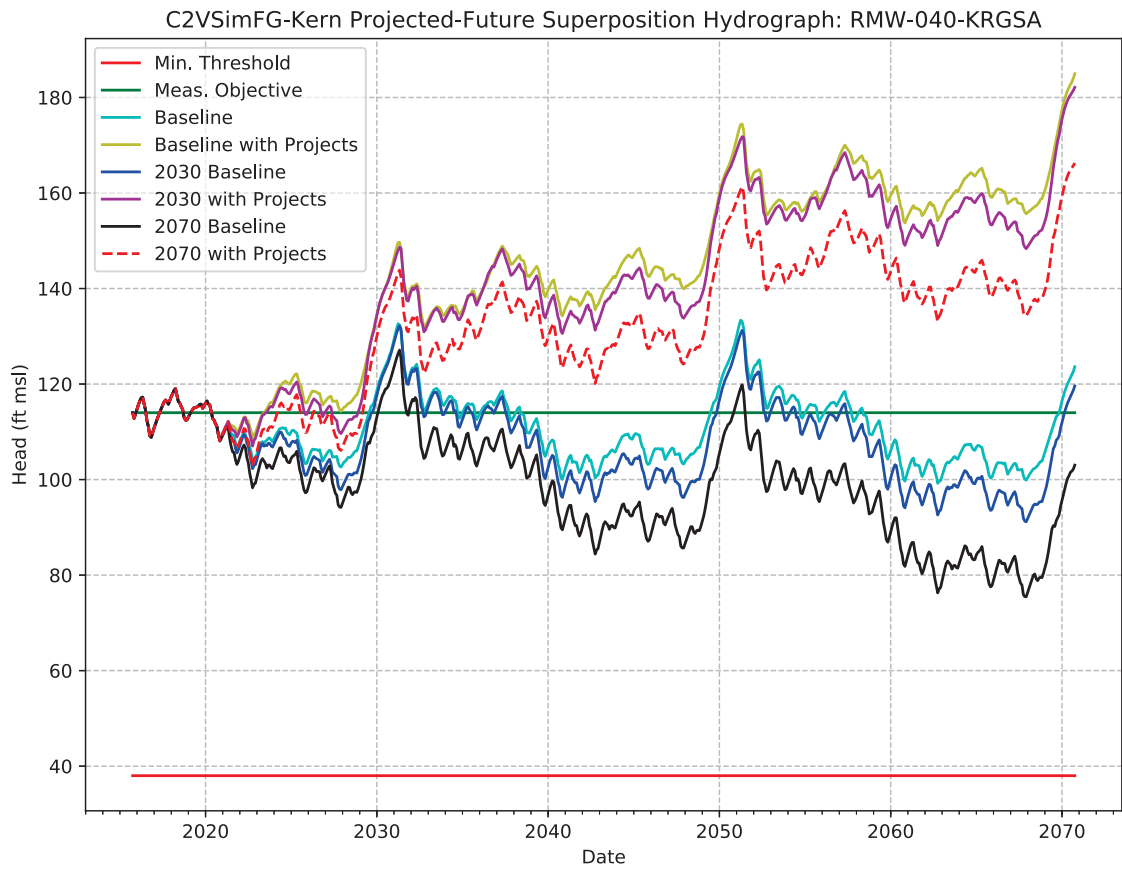
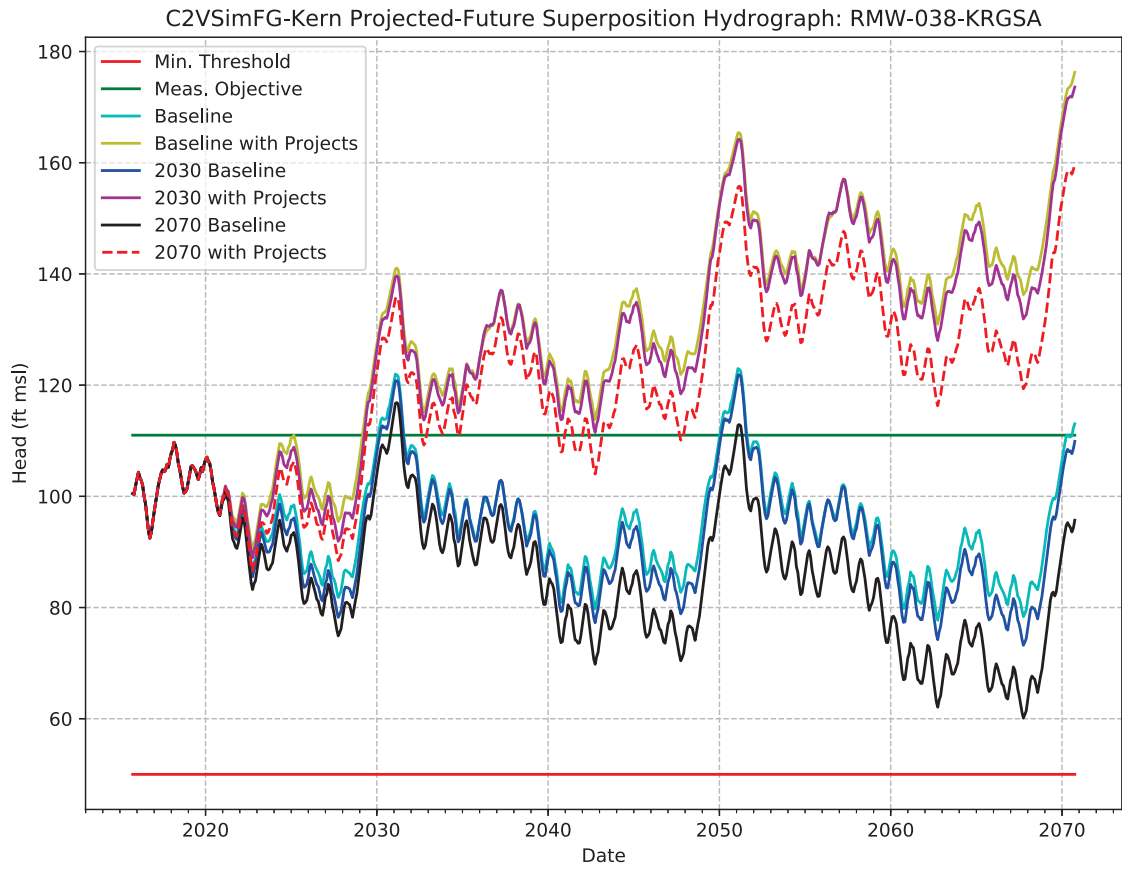


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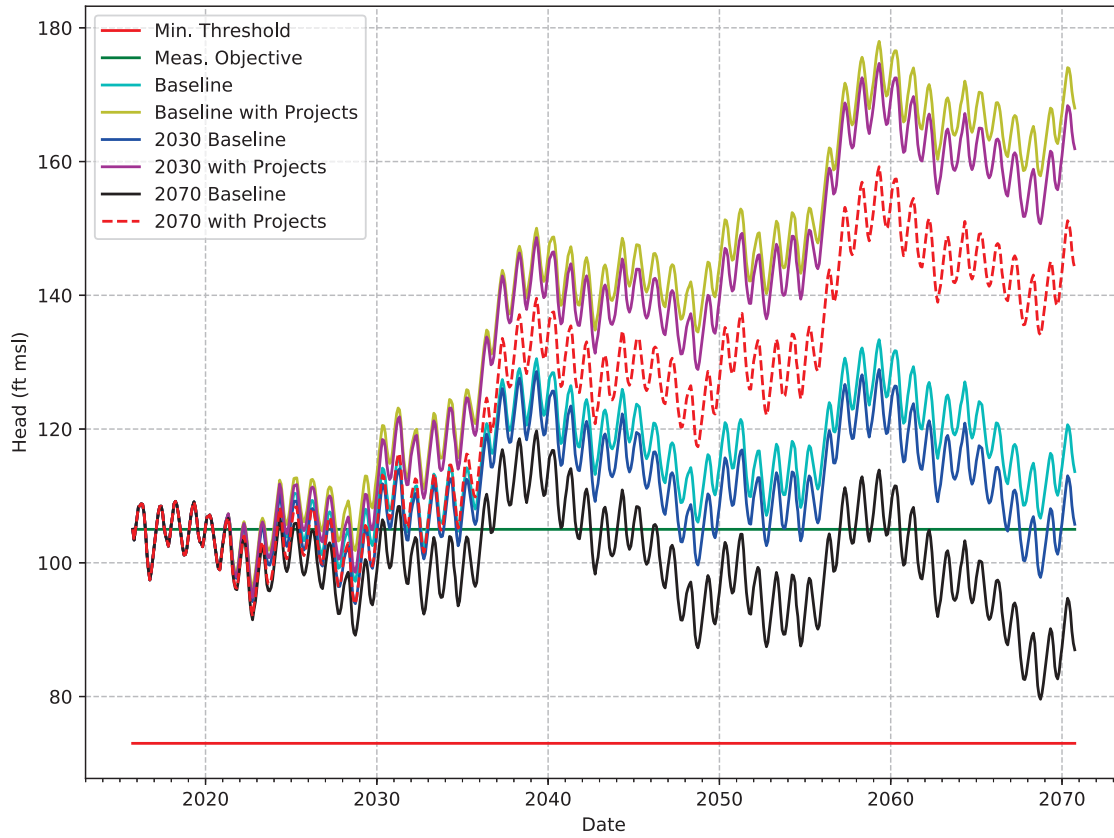


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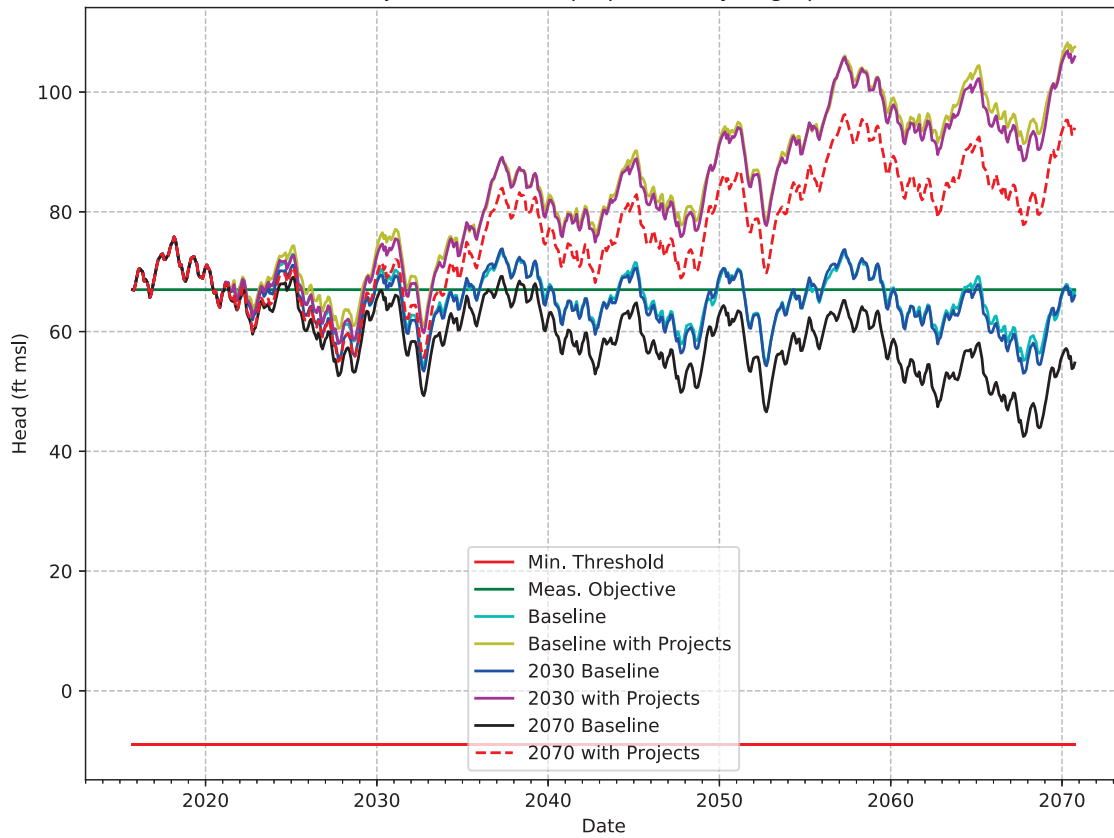




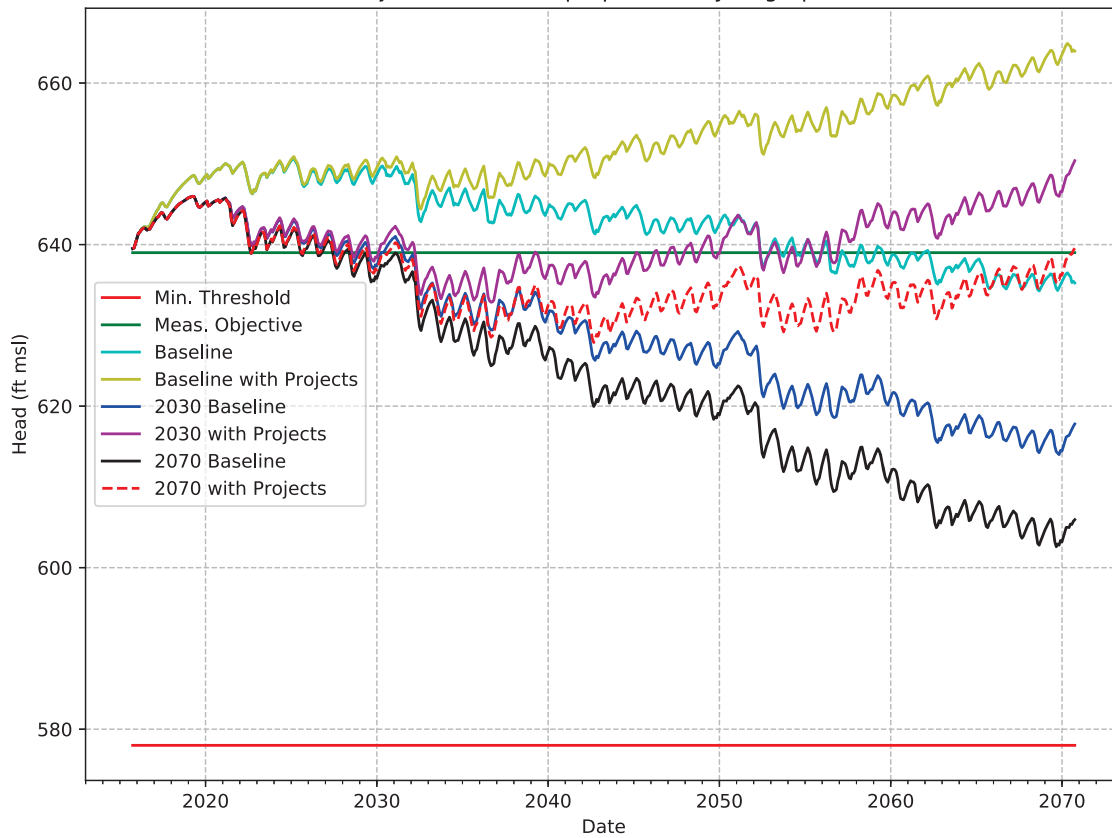
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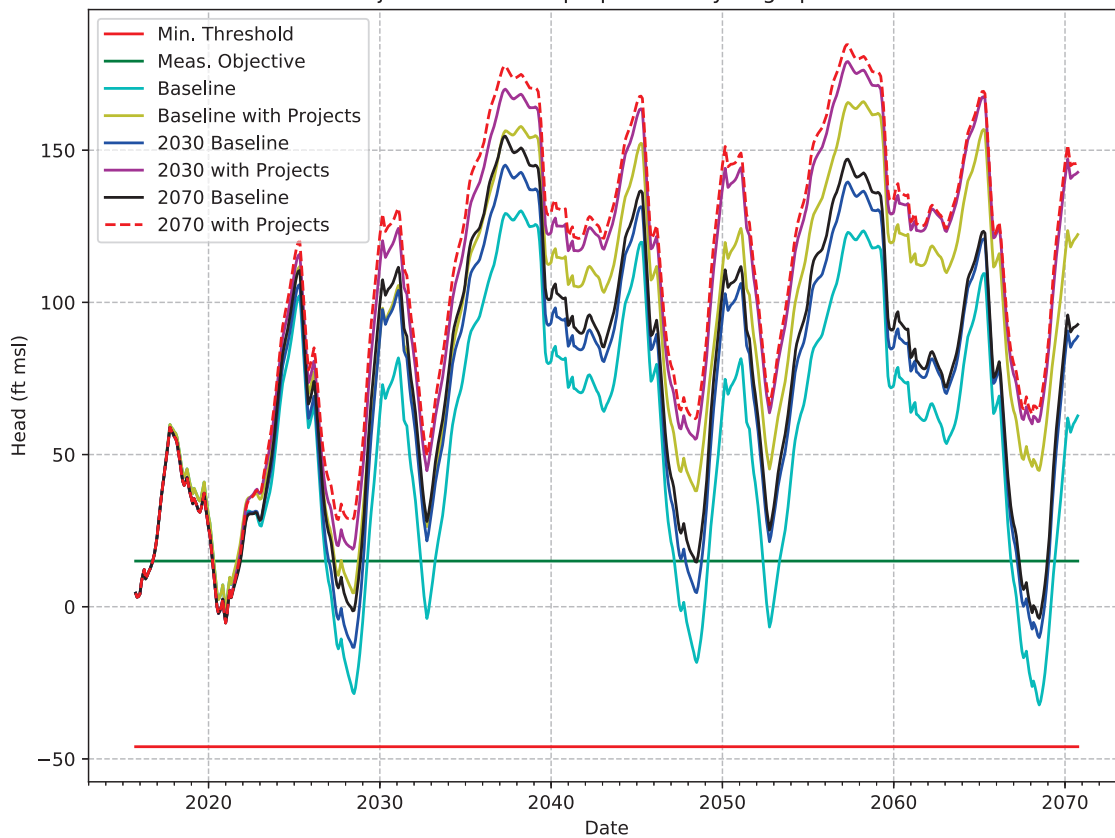
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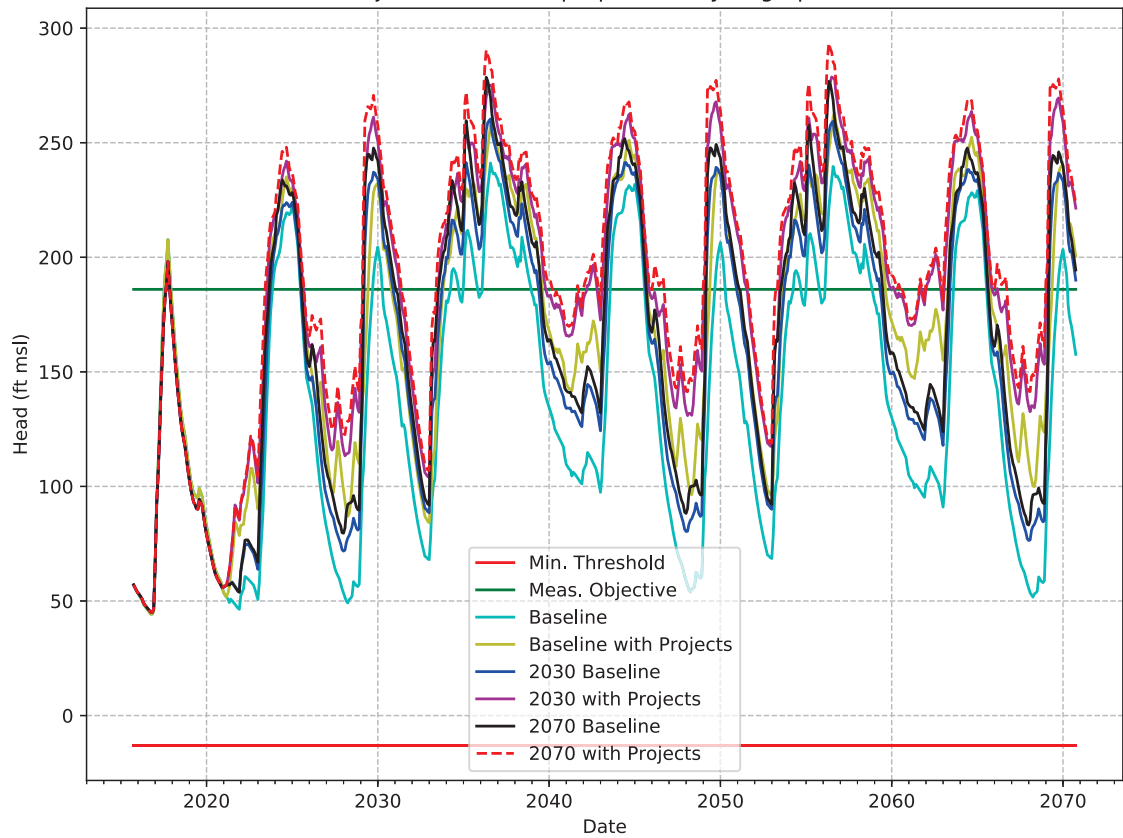
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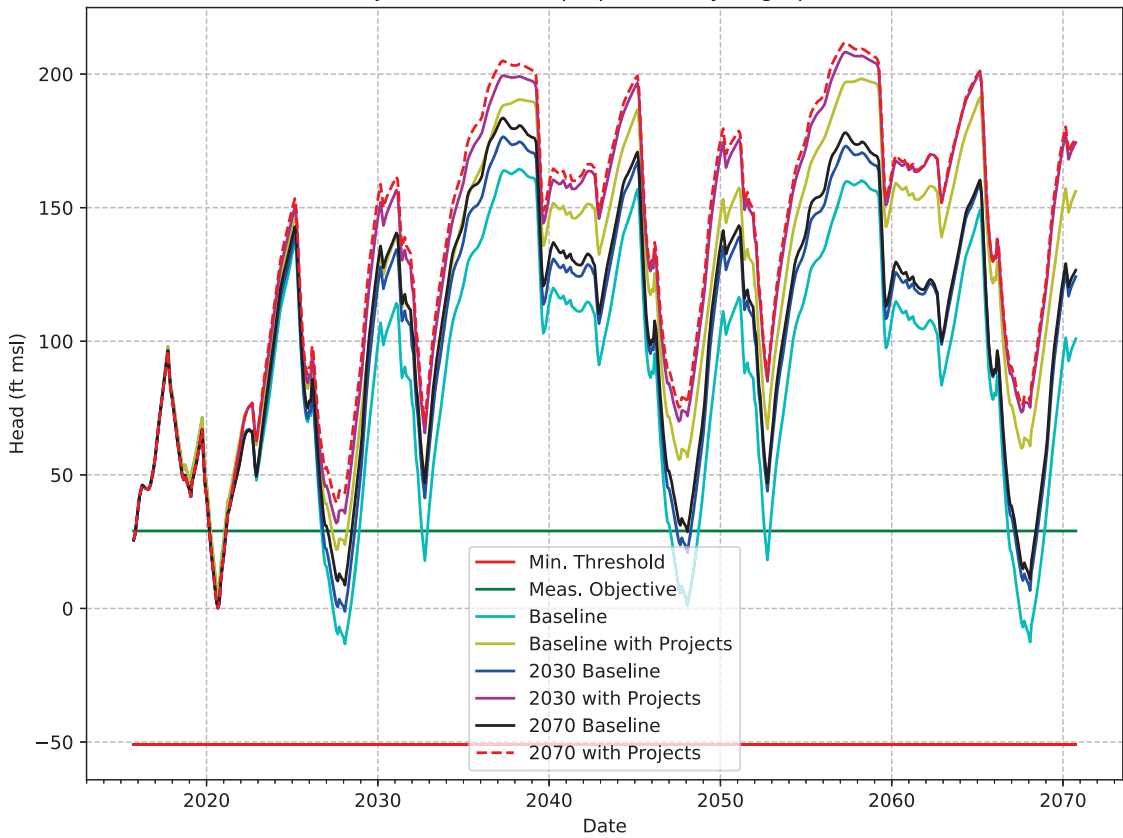
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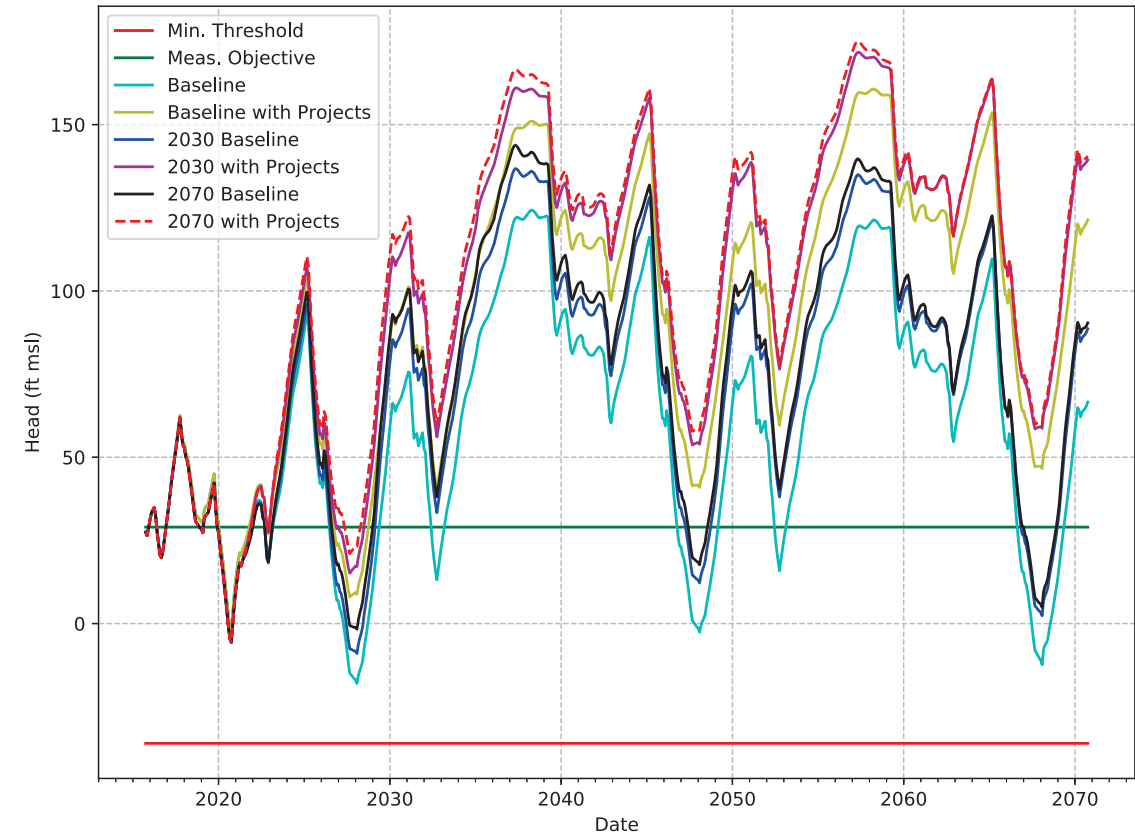
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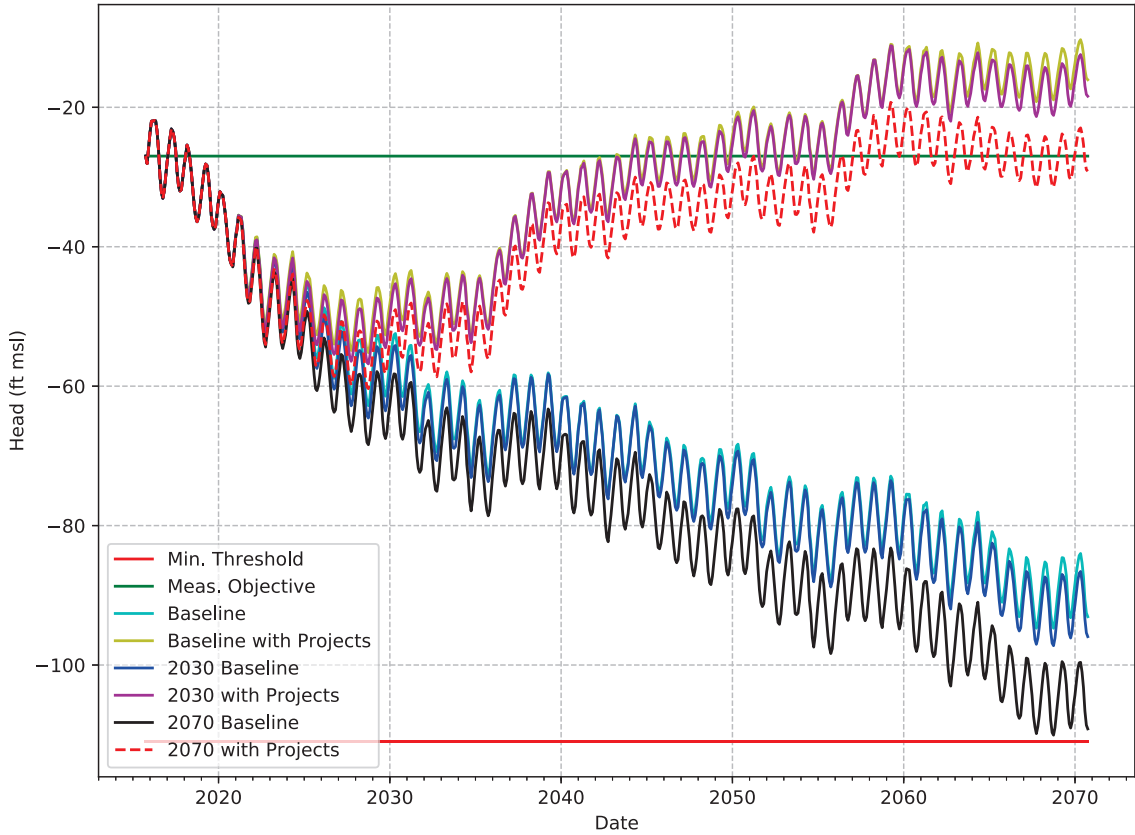
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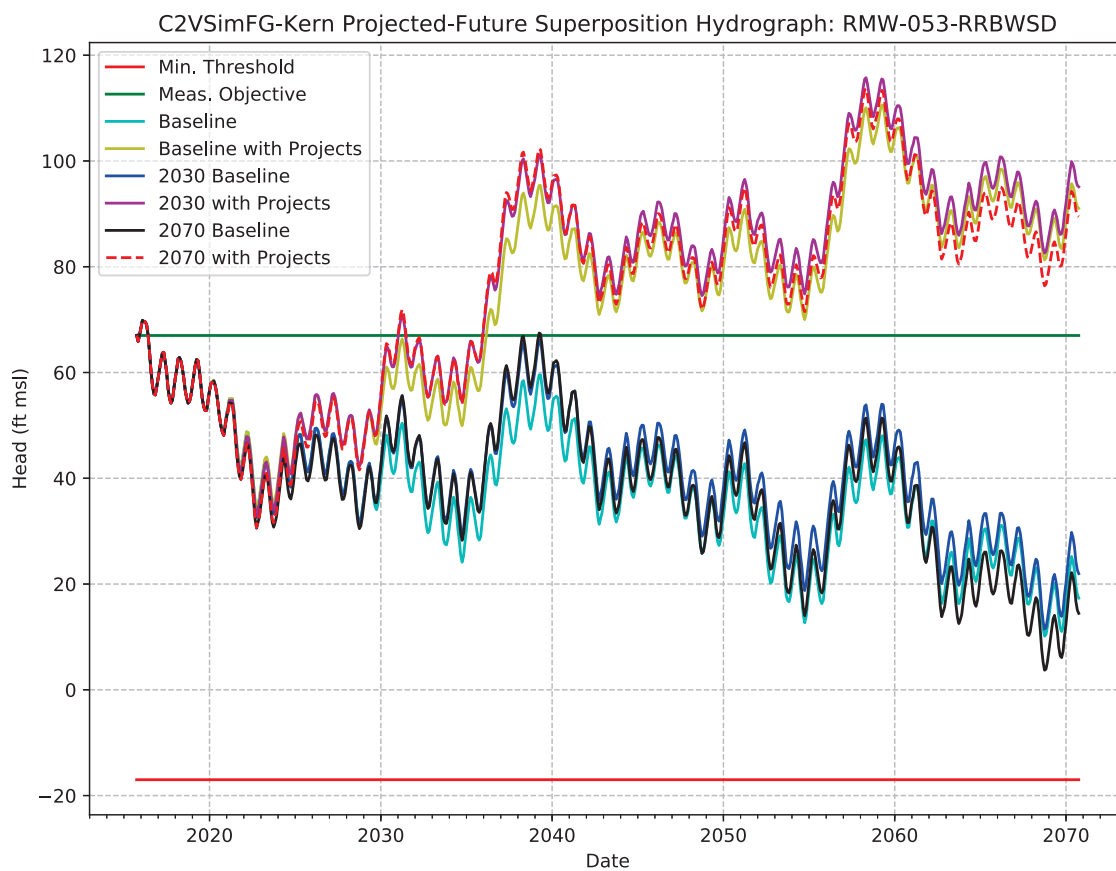
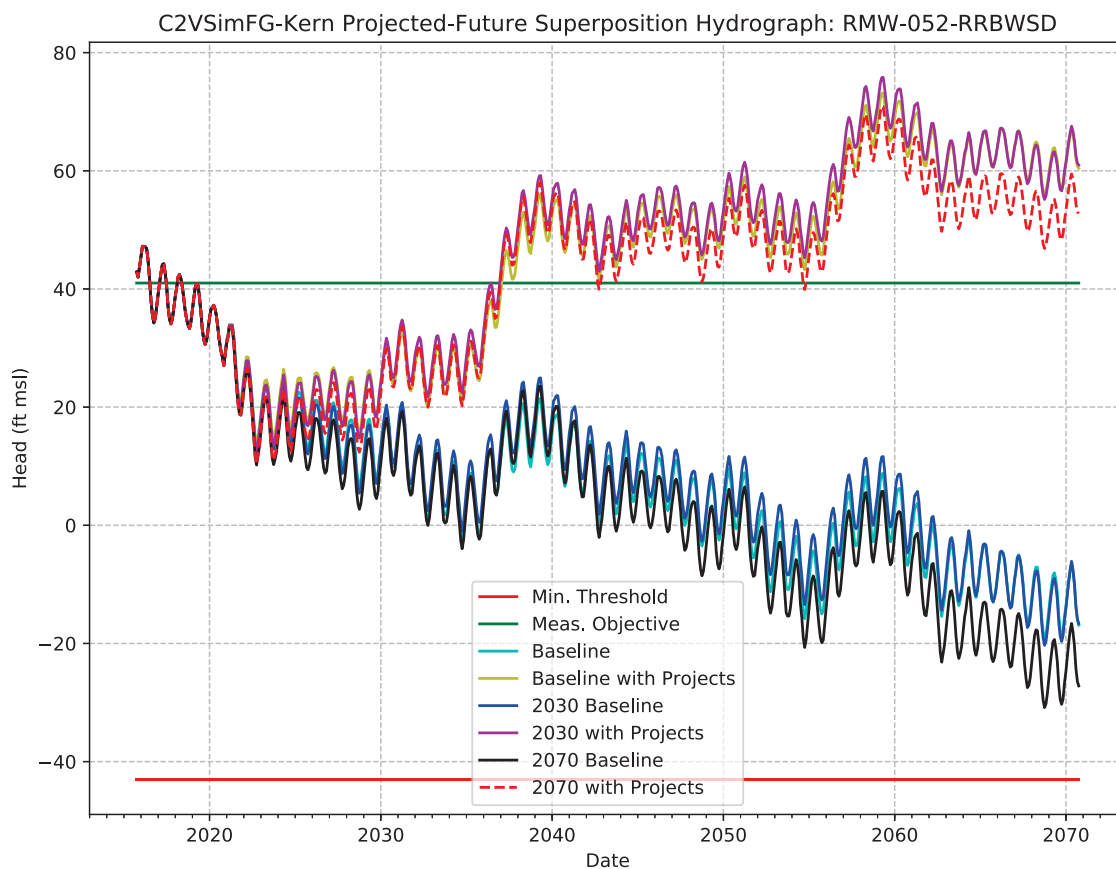


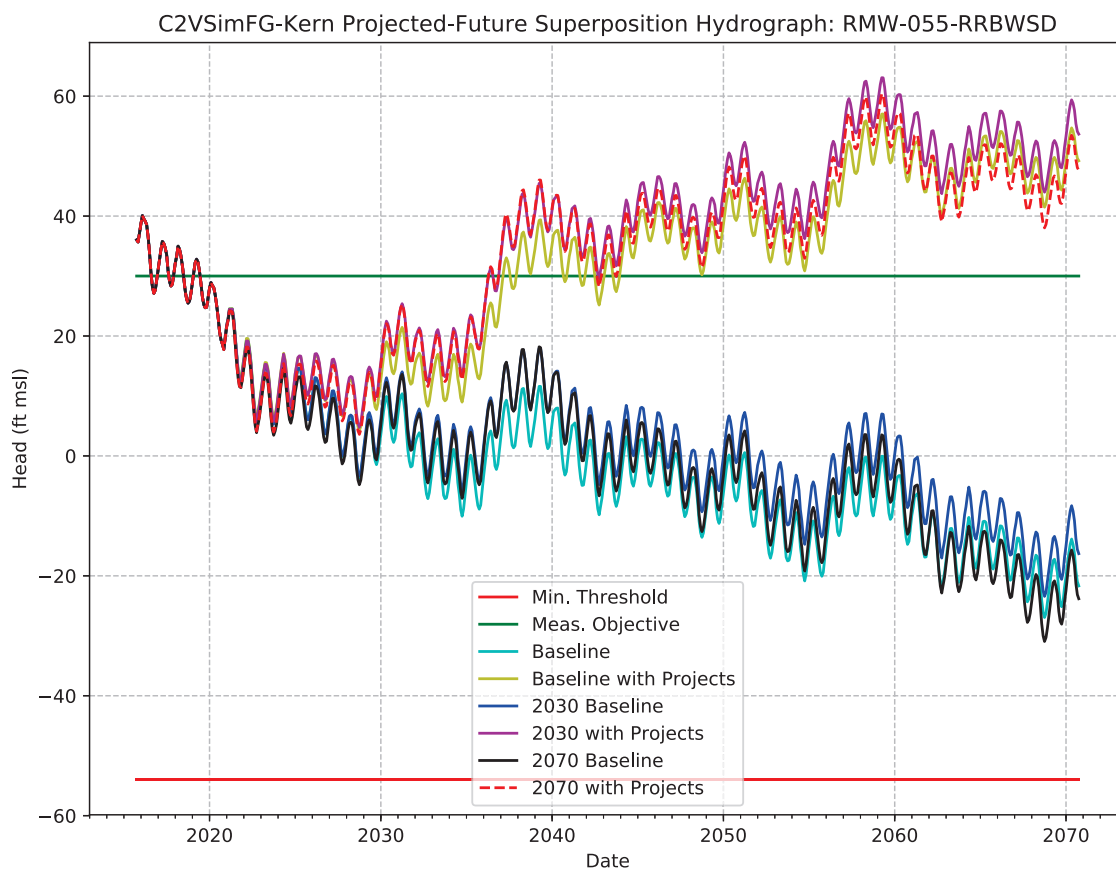
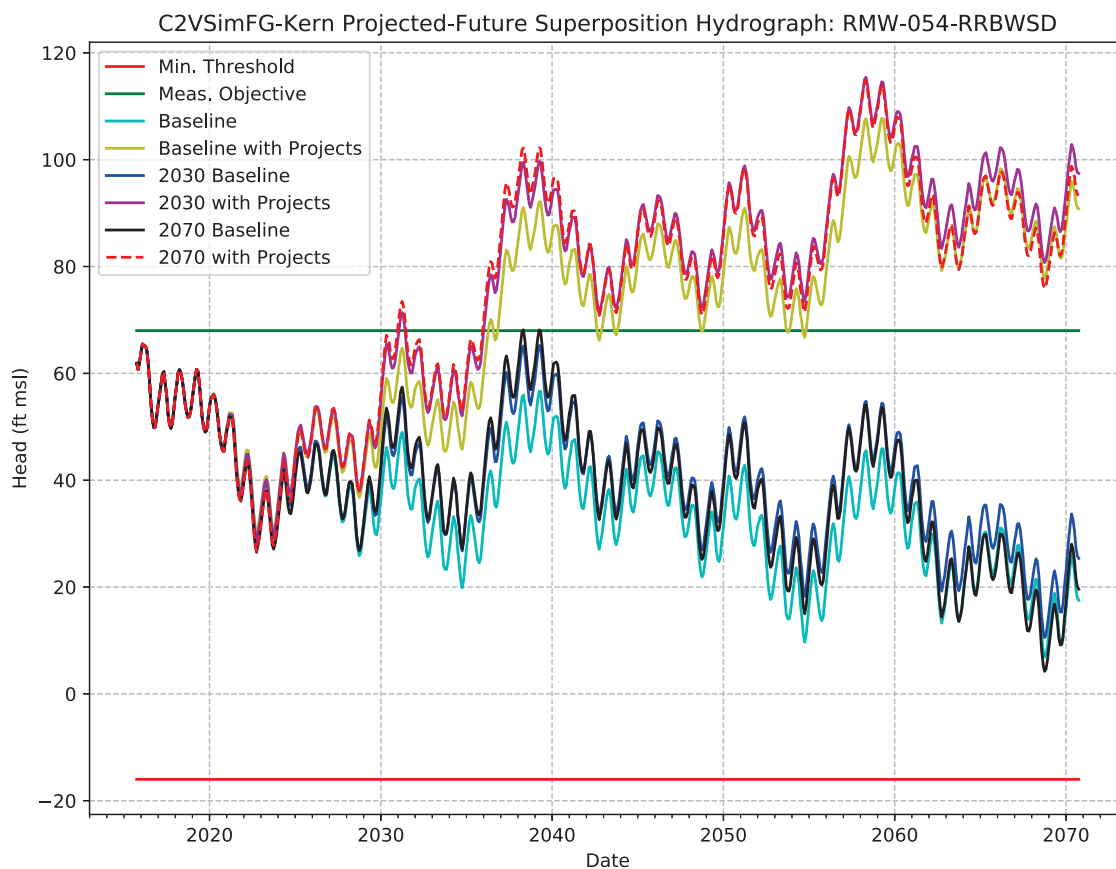
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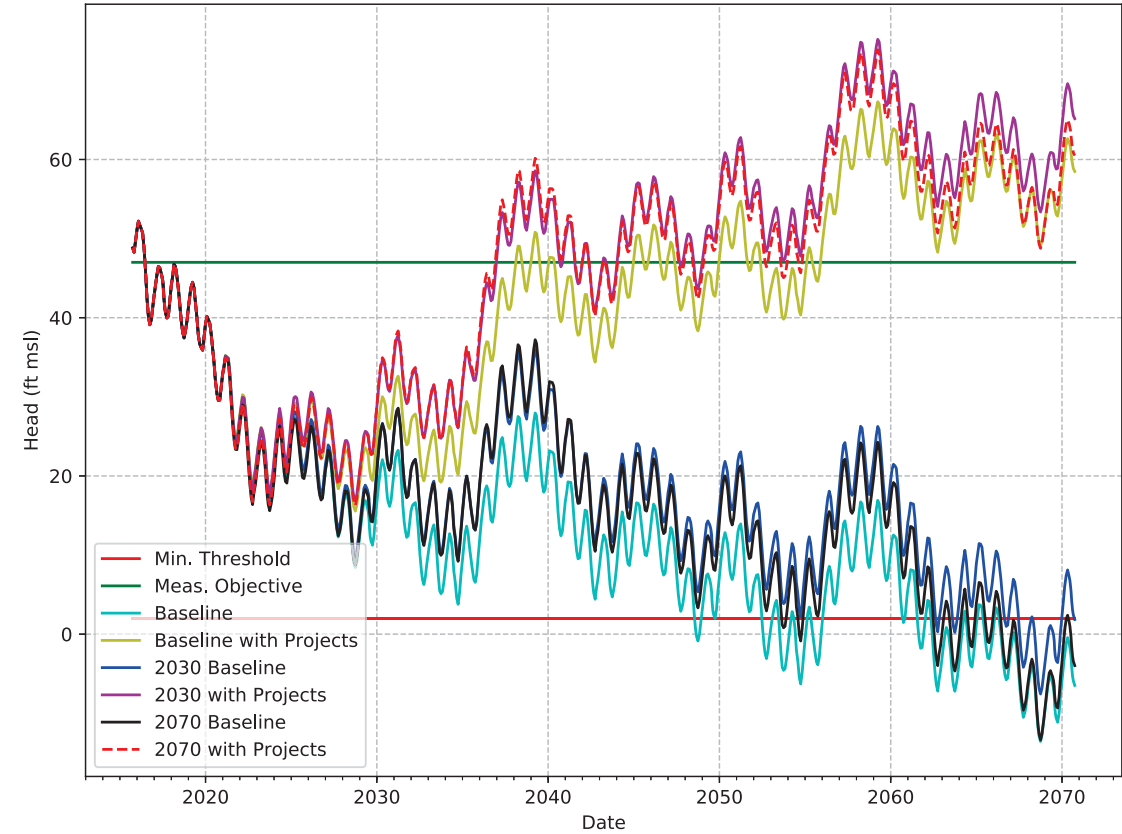
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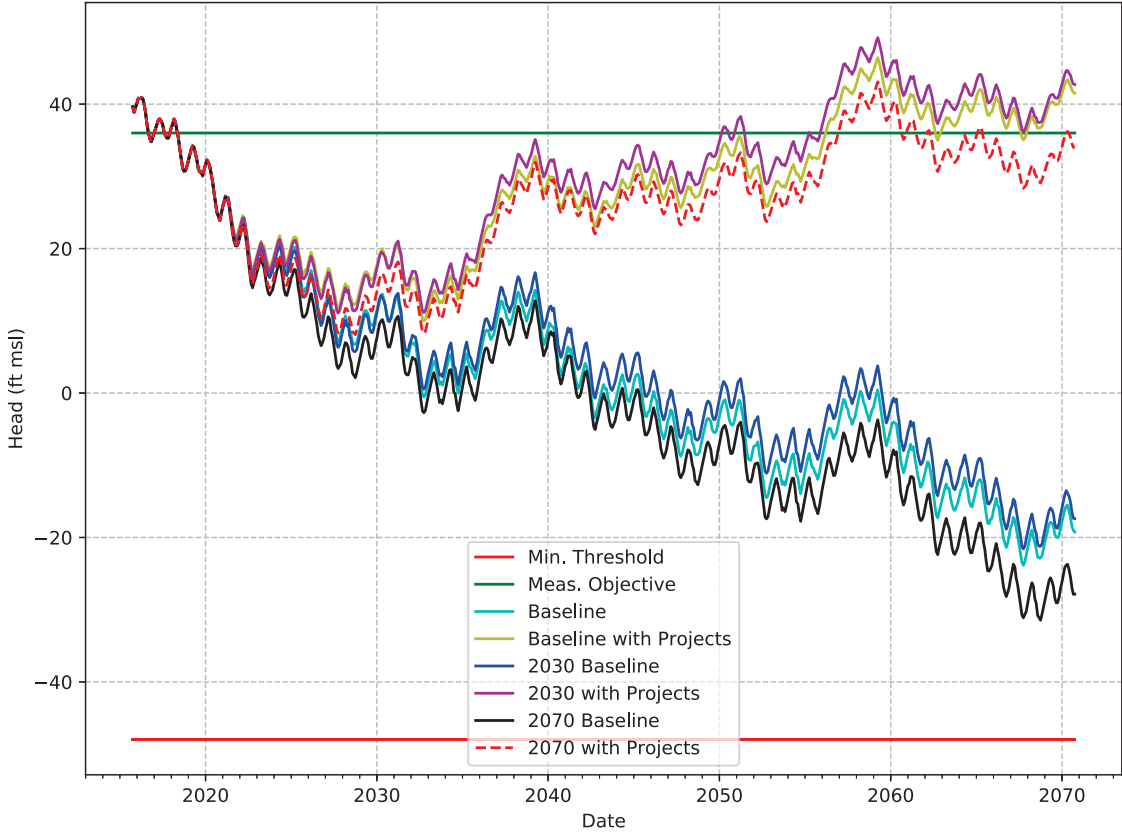


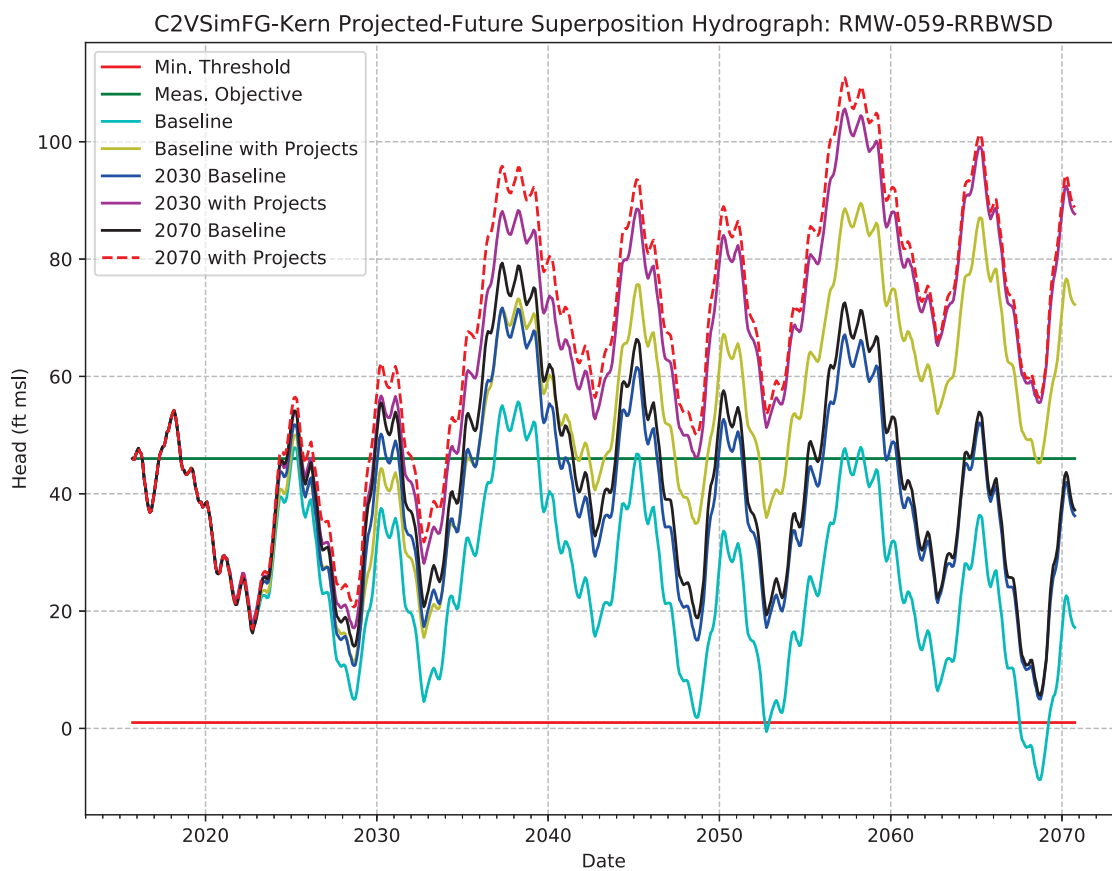
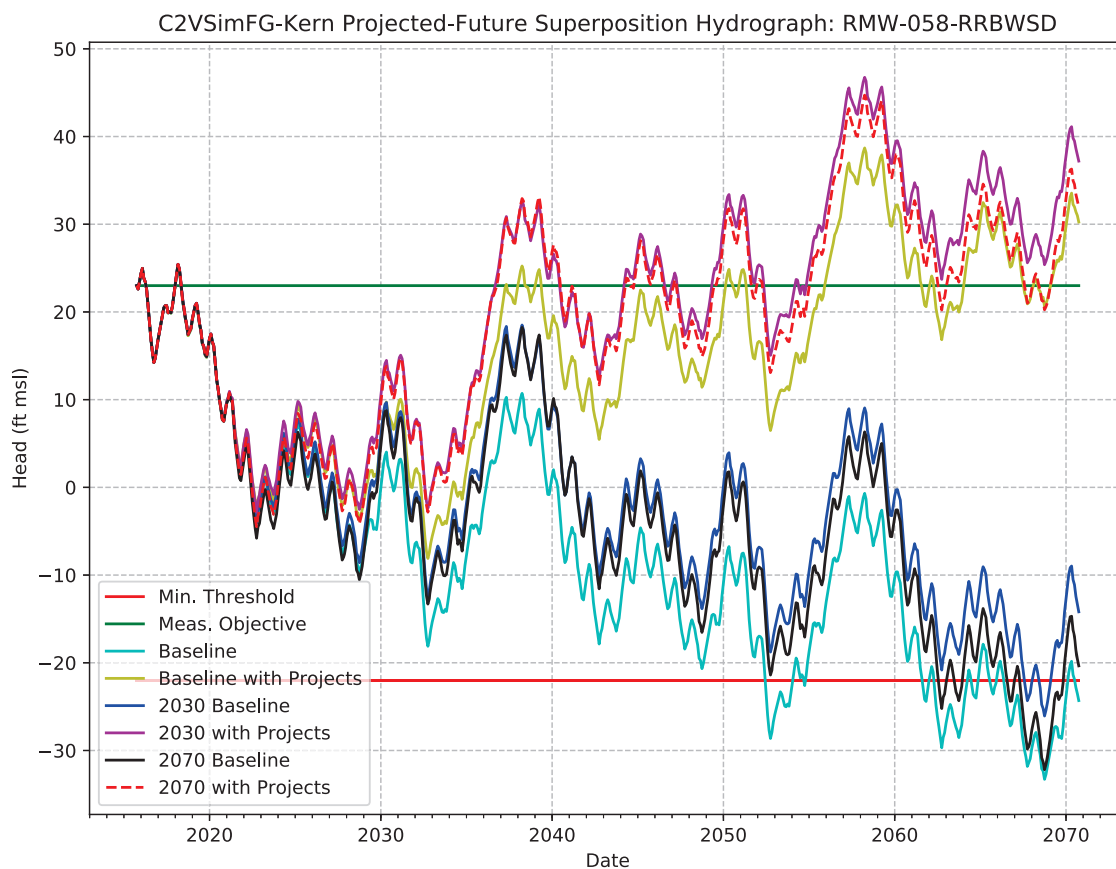


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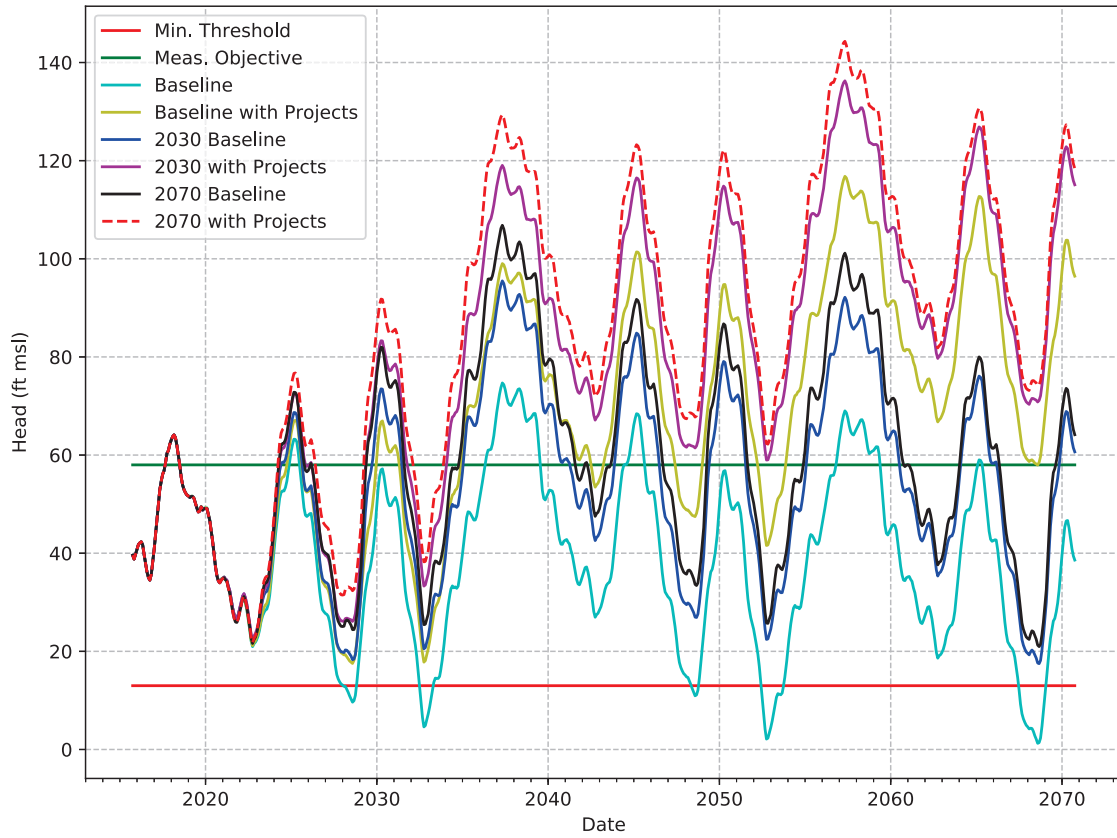


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-057-RRBWSD

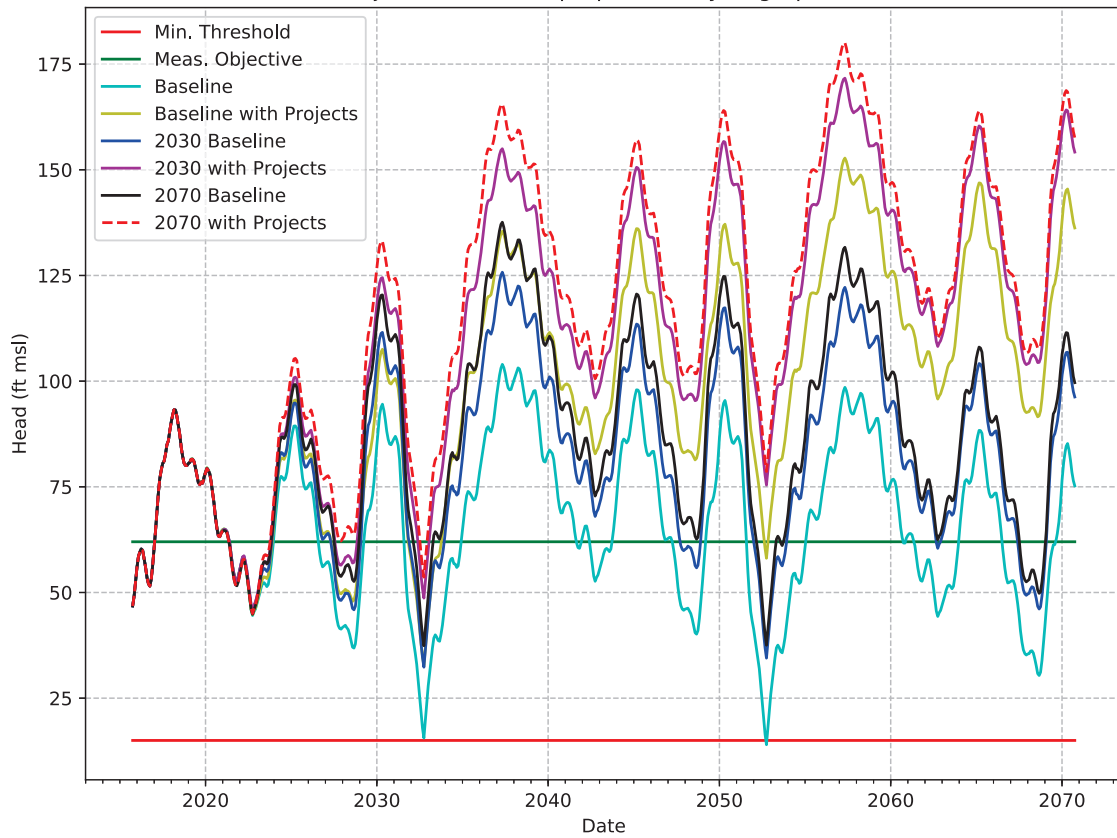




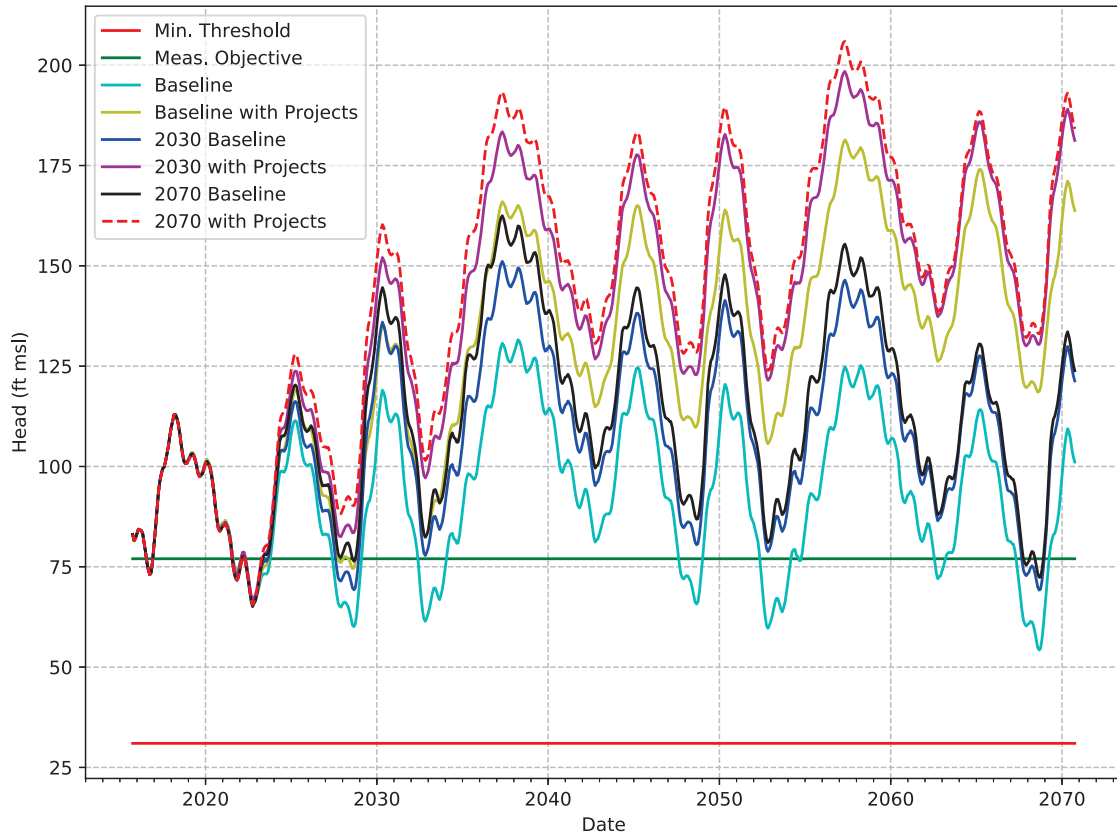
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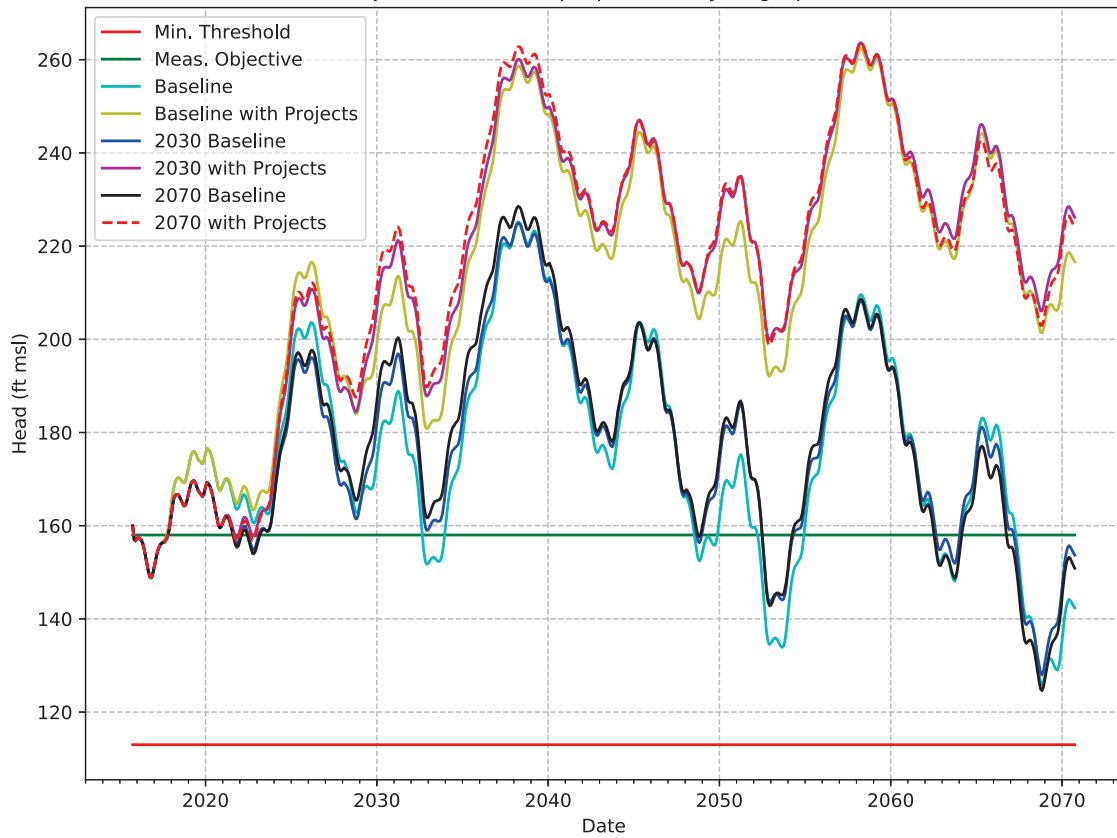
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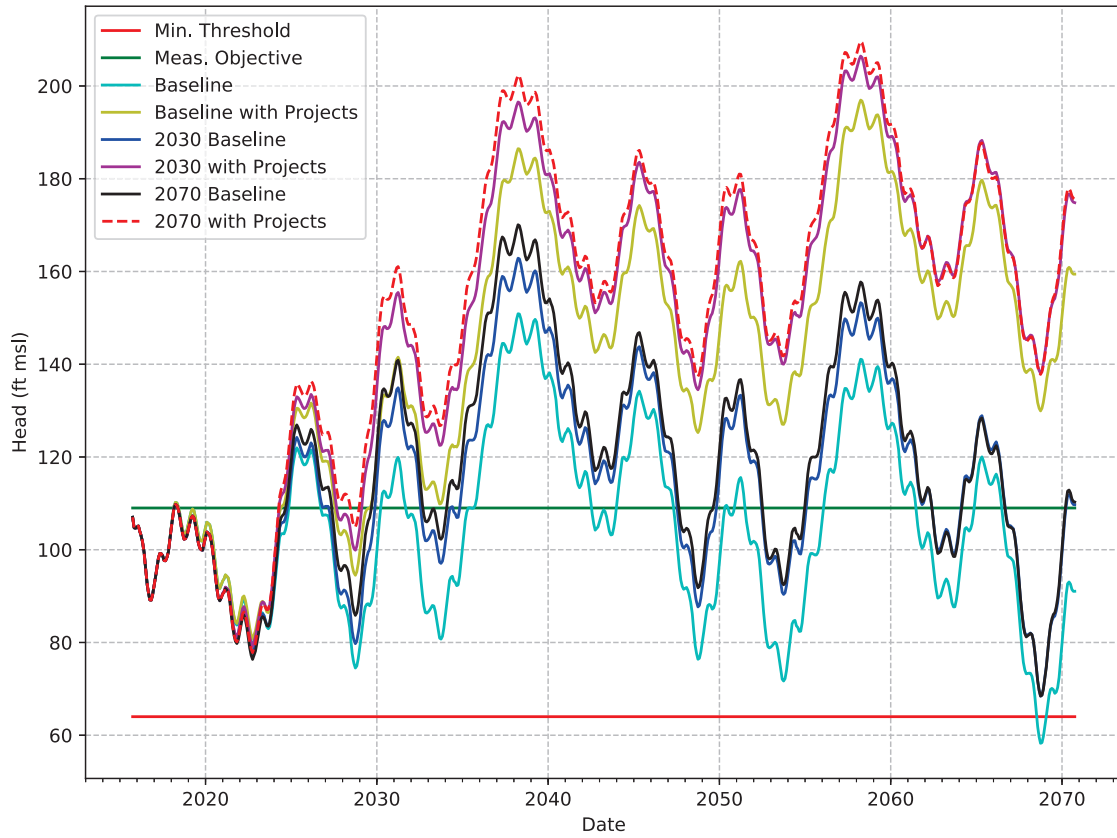
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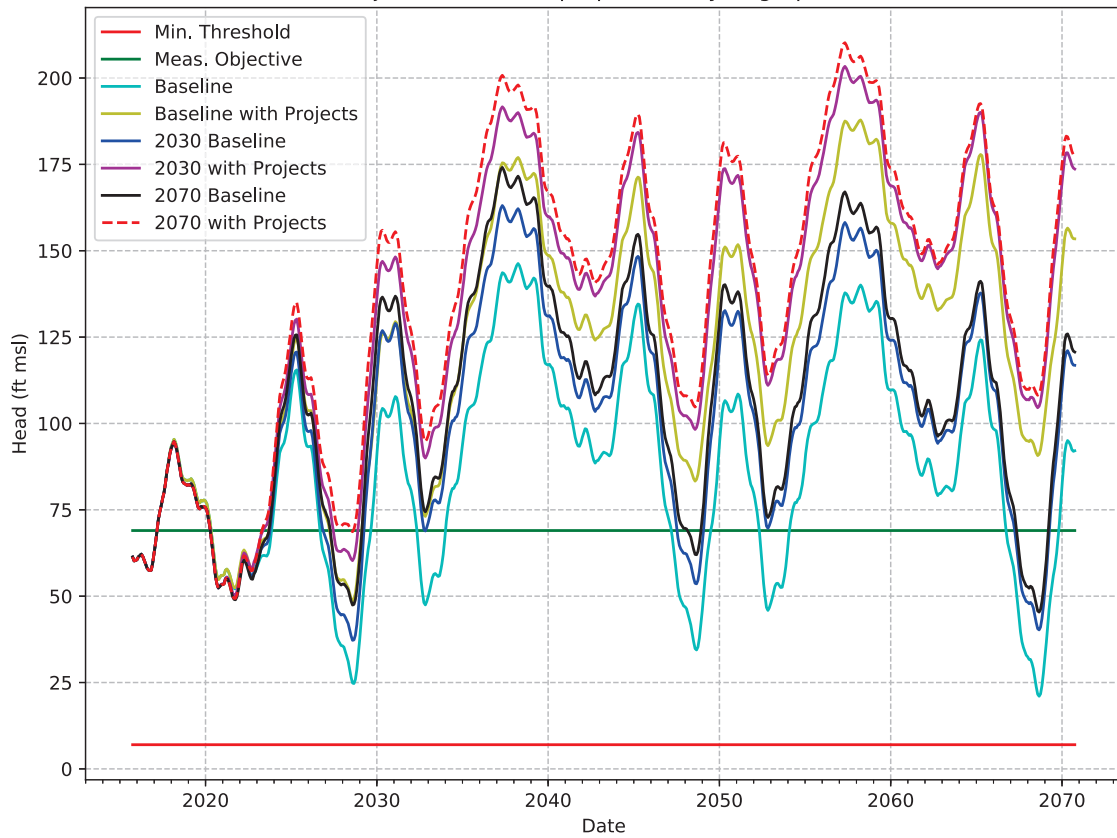
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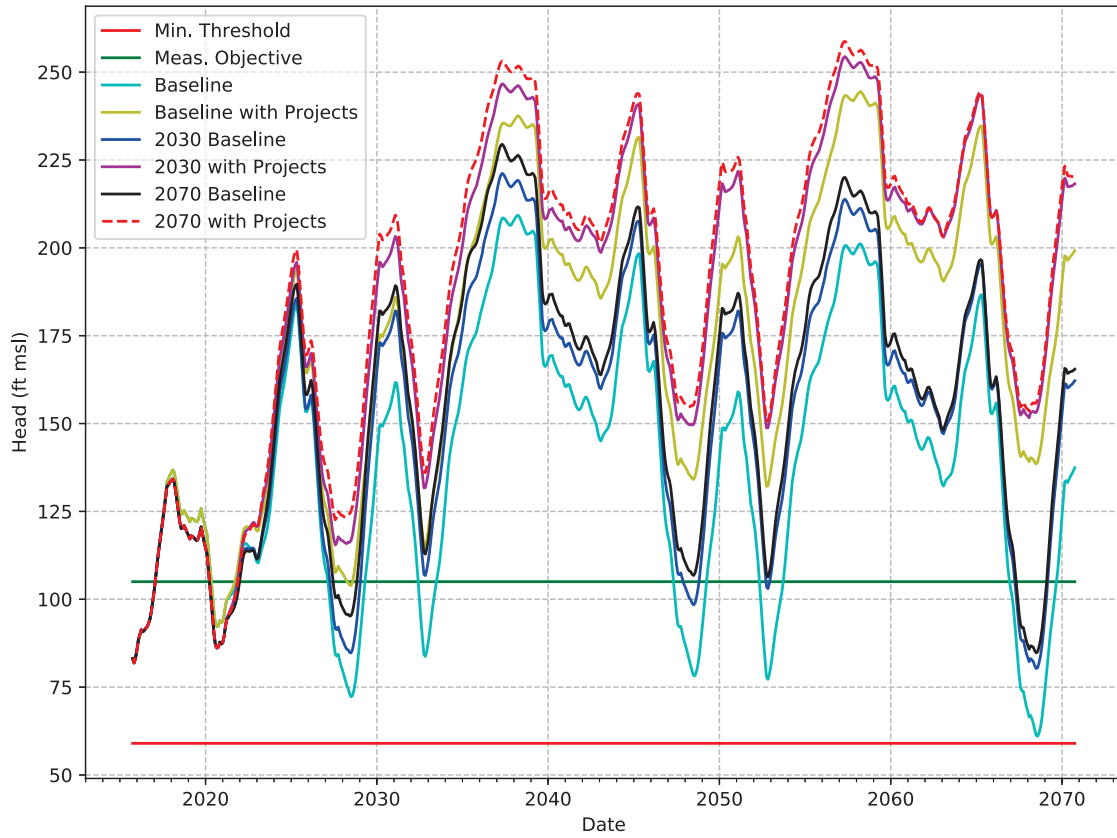
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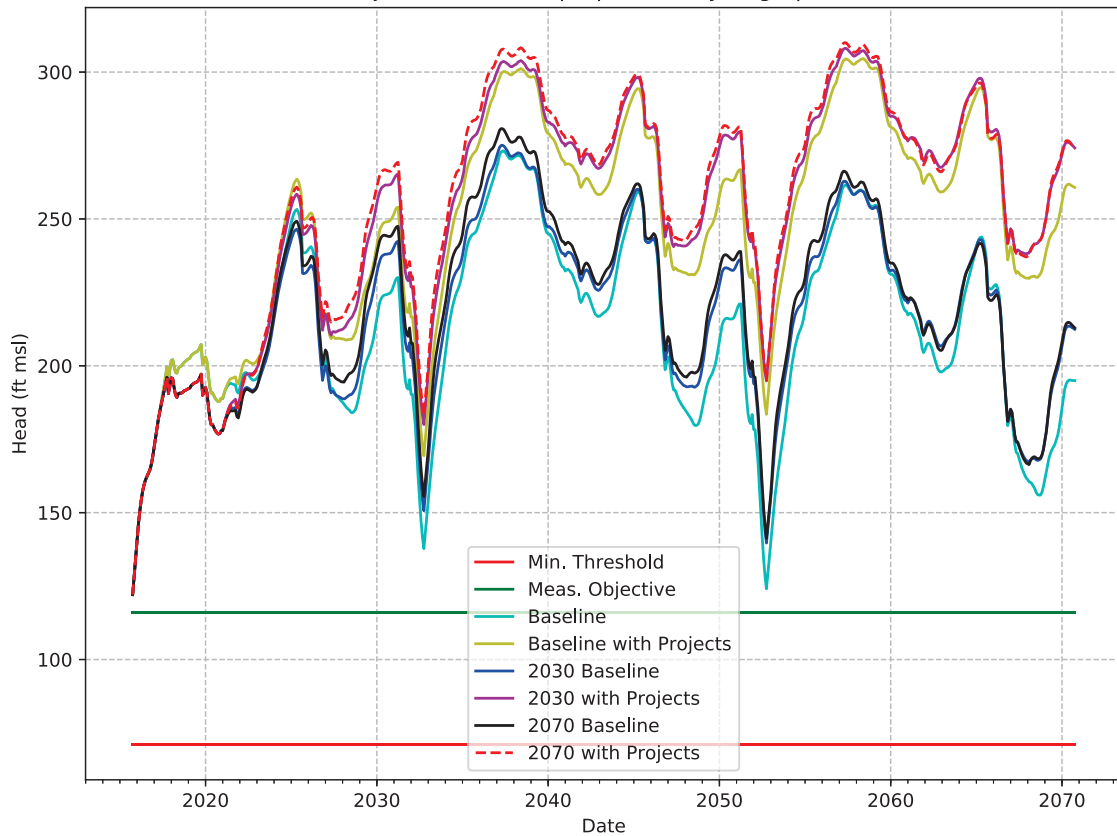
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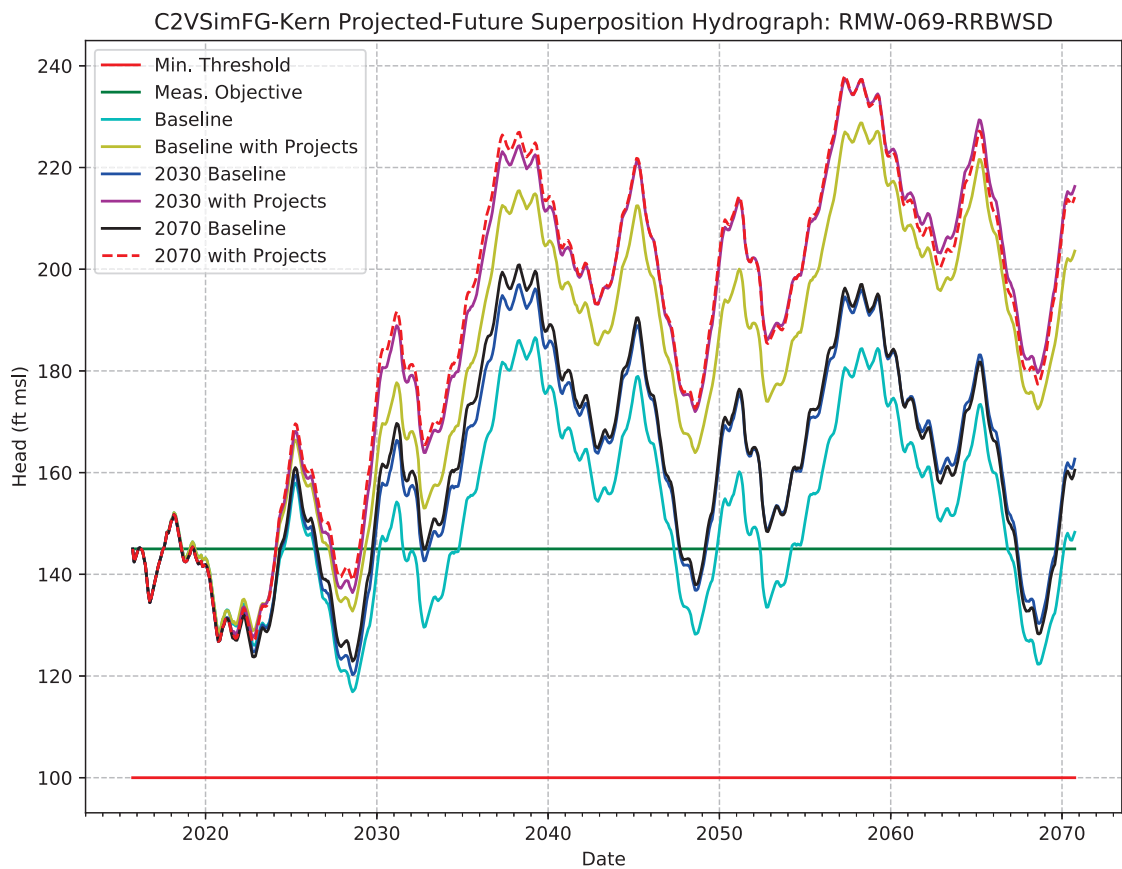
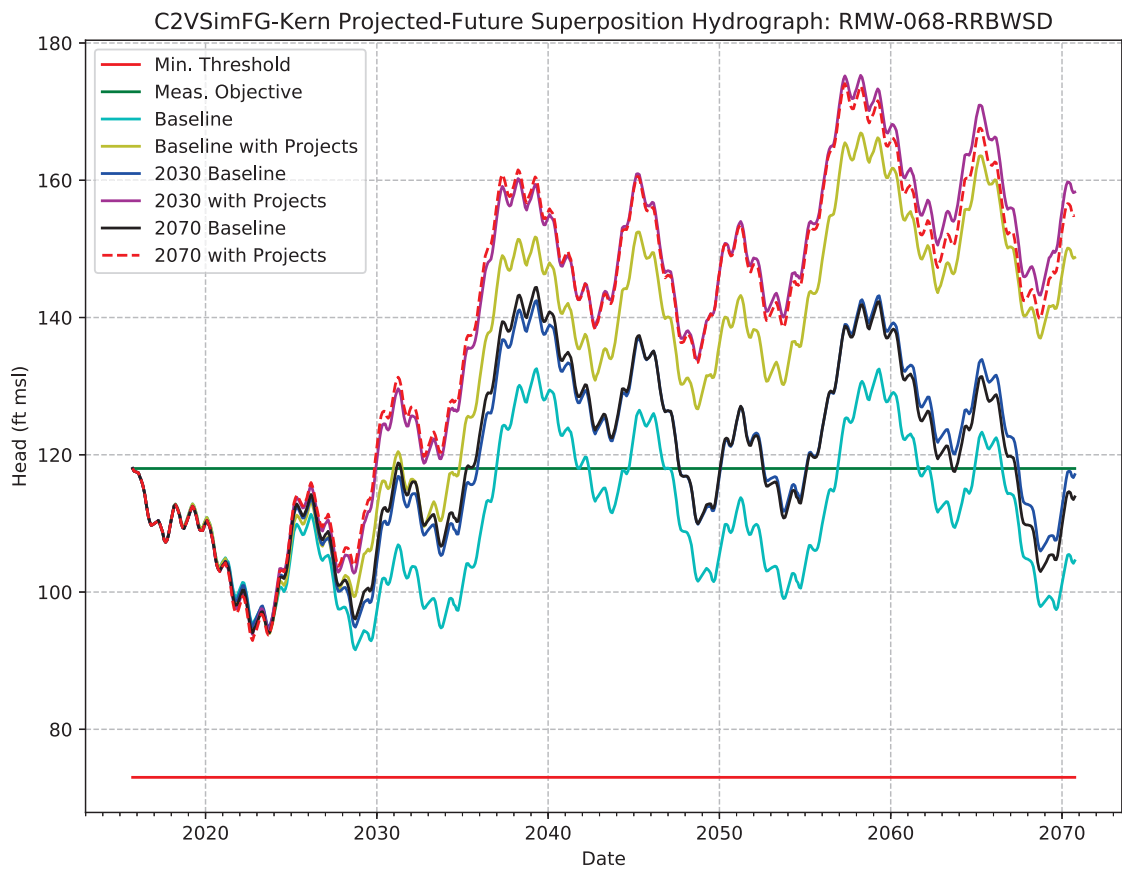


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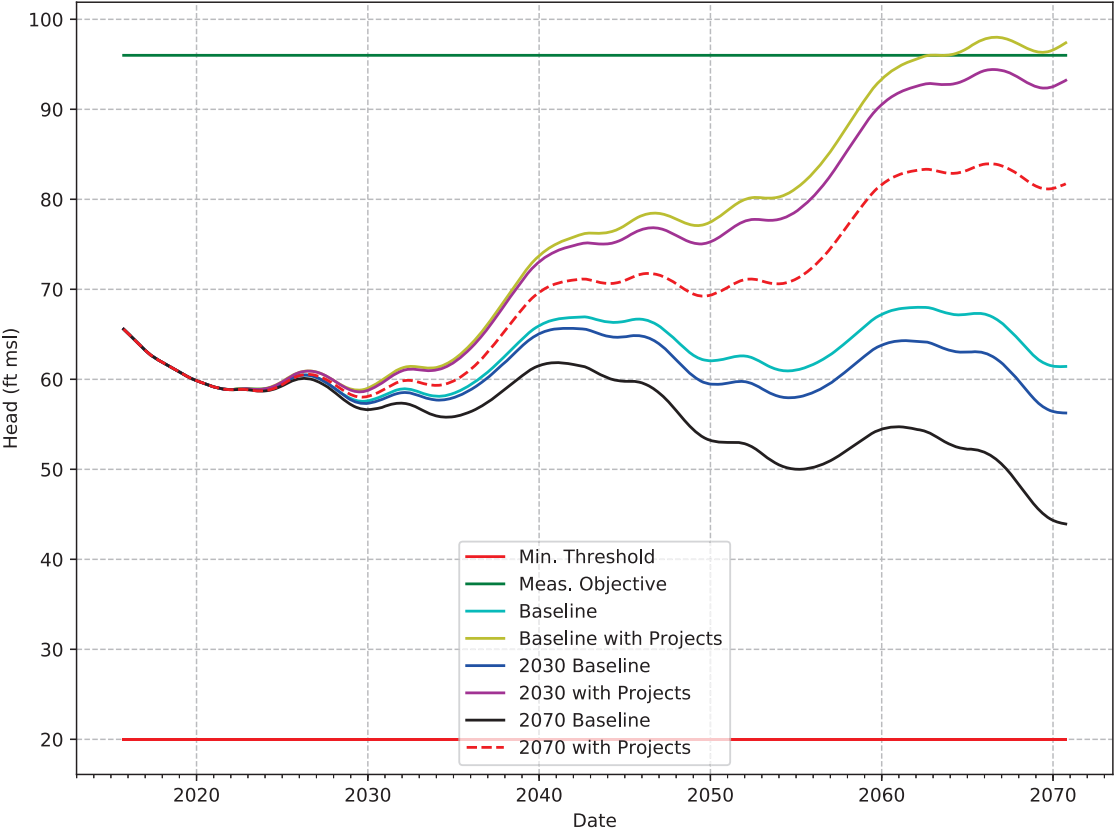


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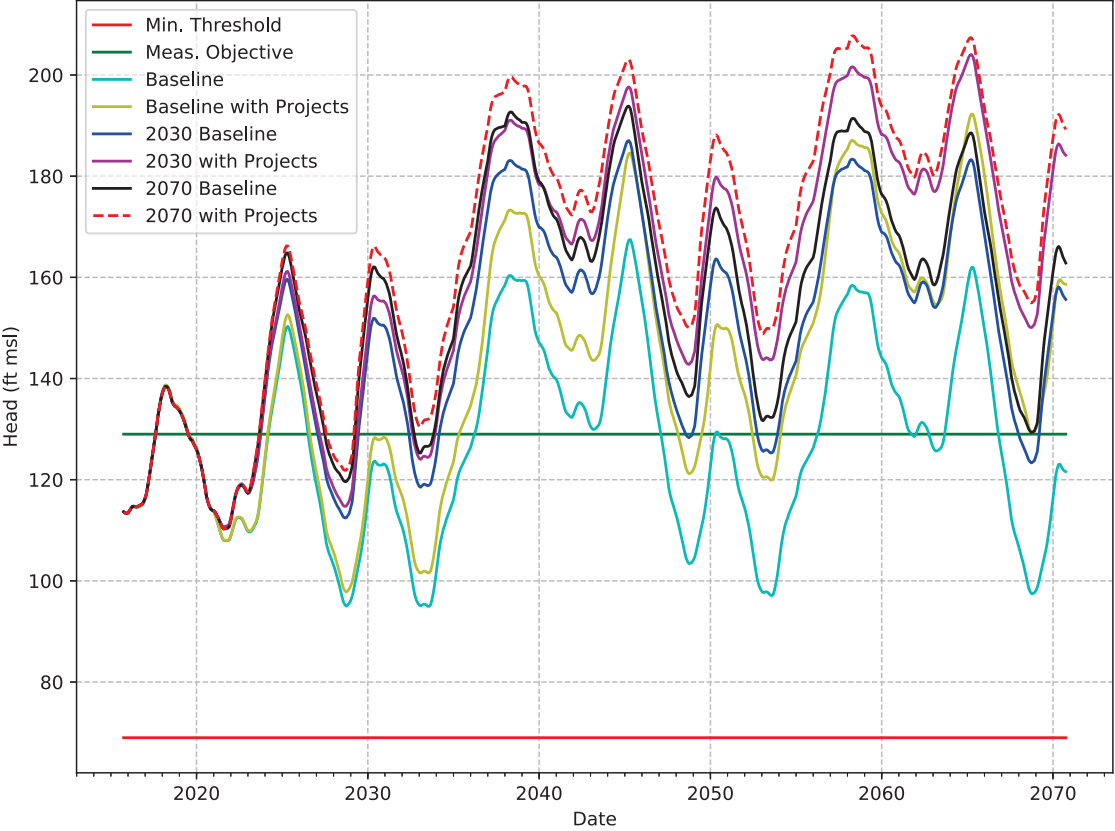




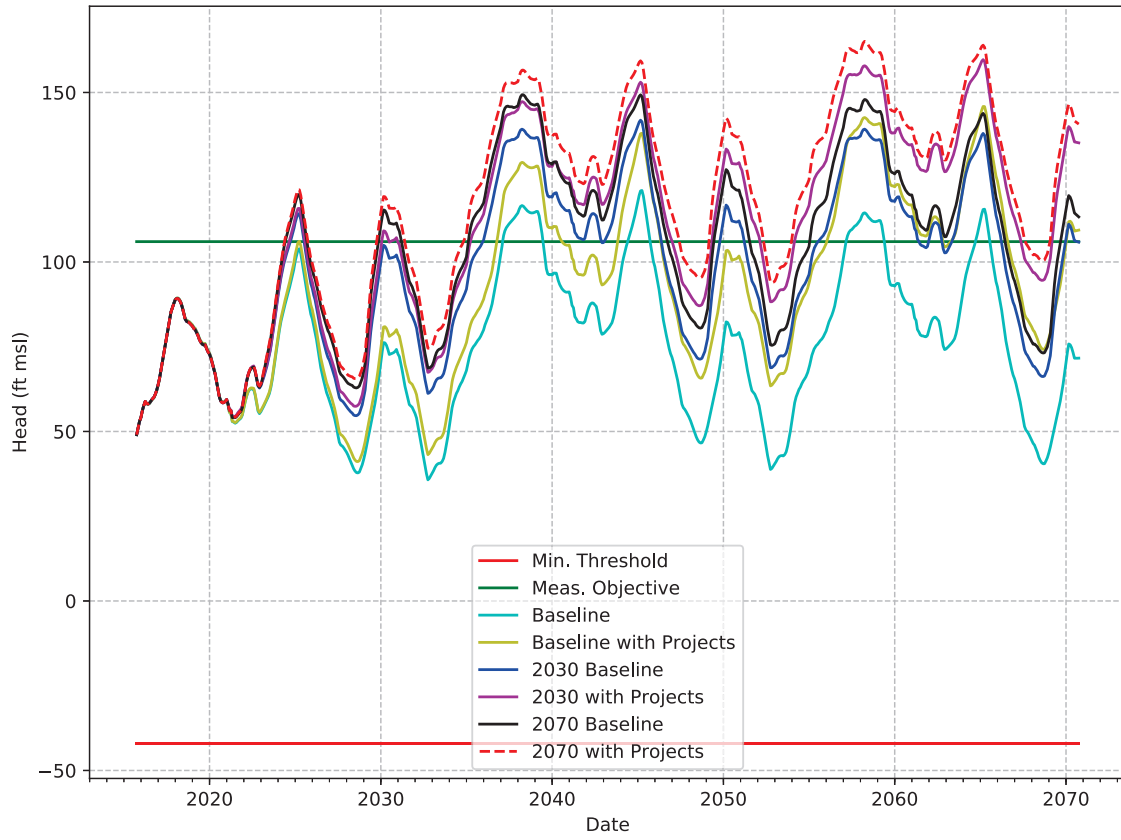
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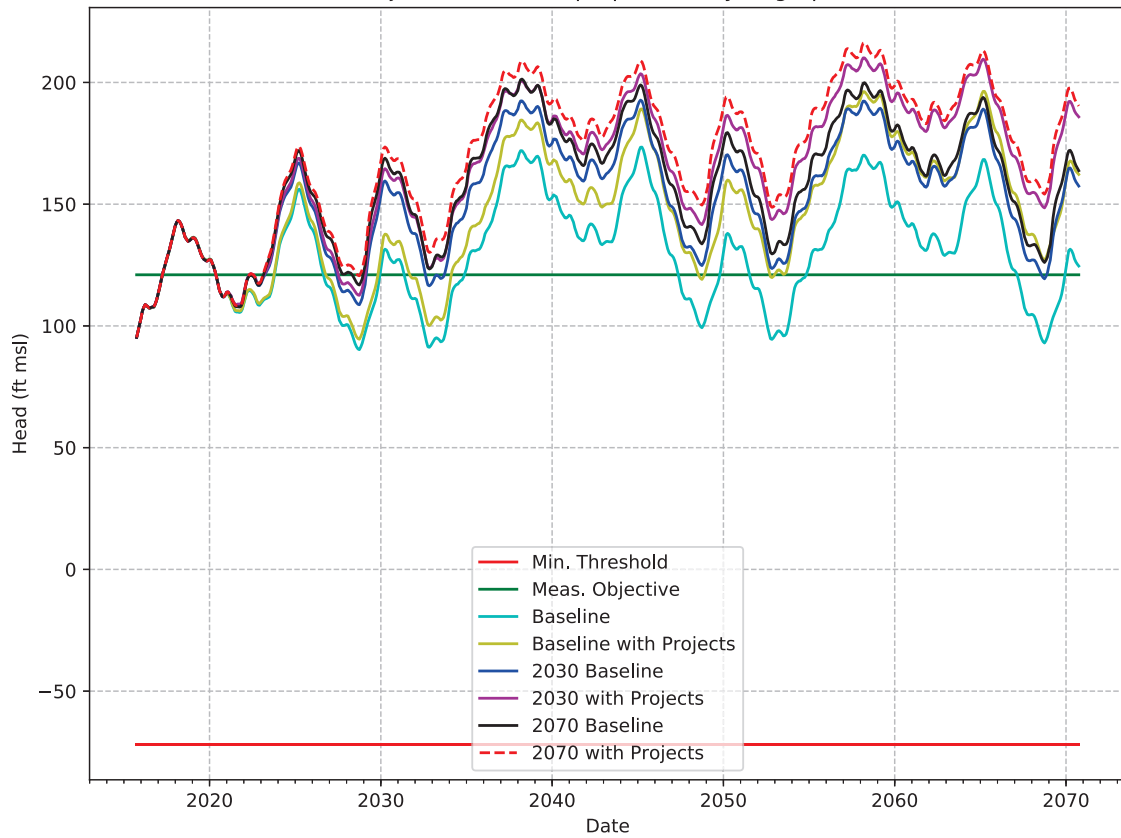
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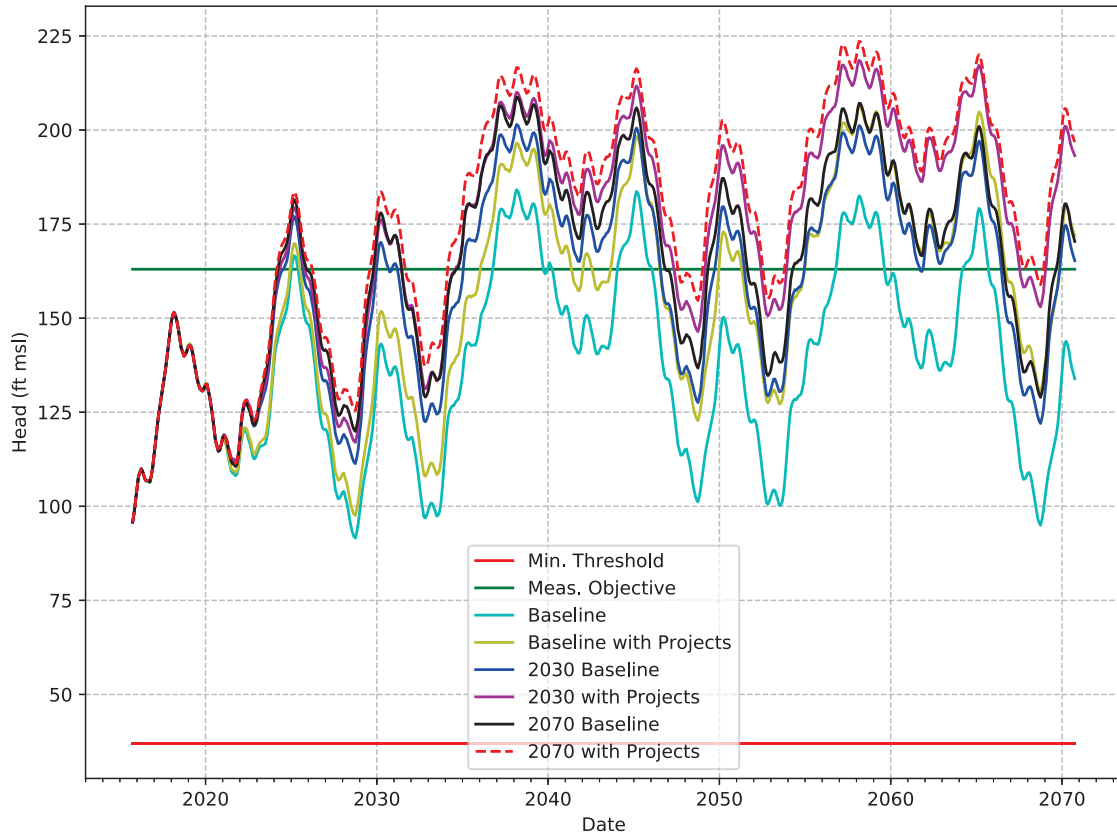
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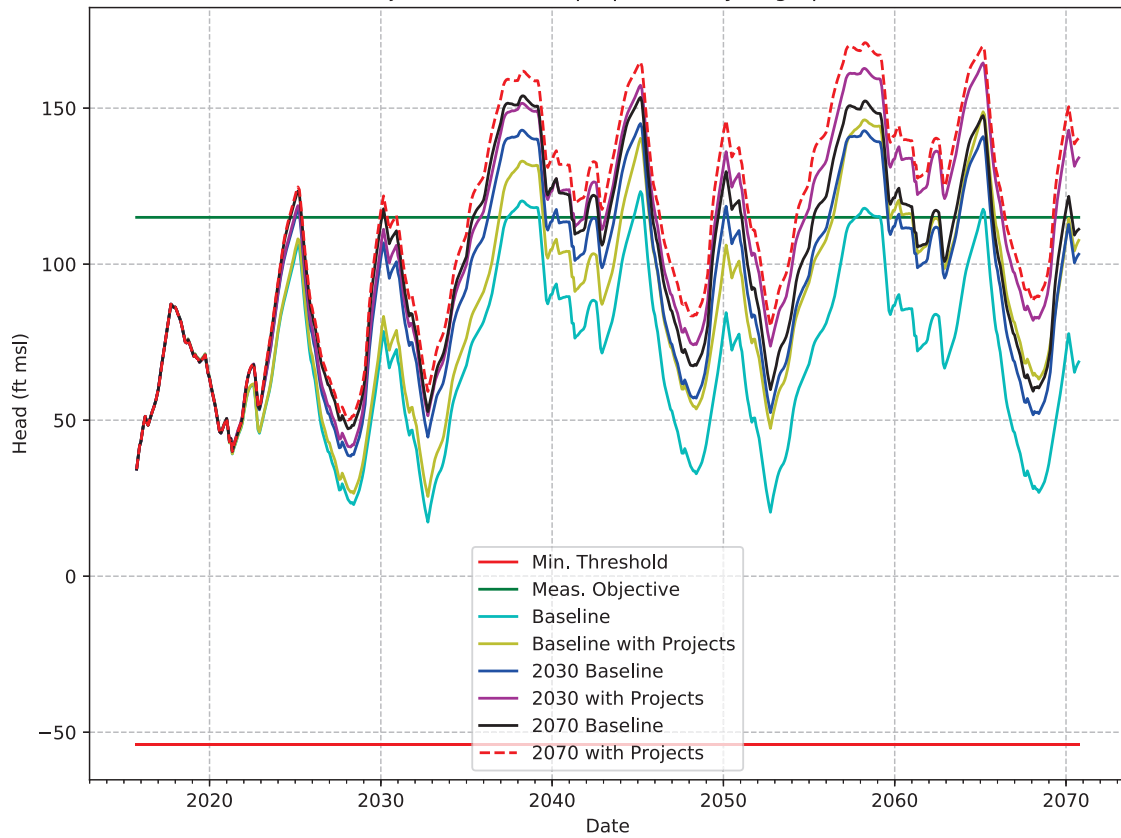
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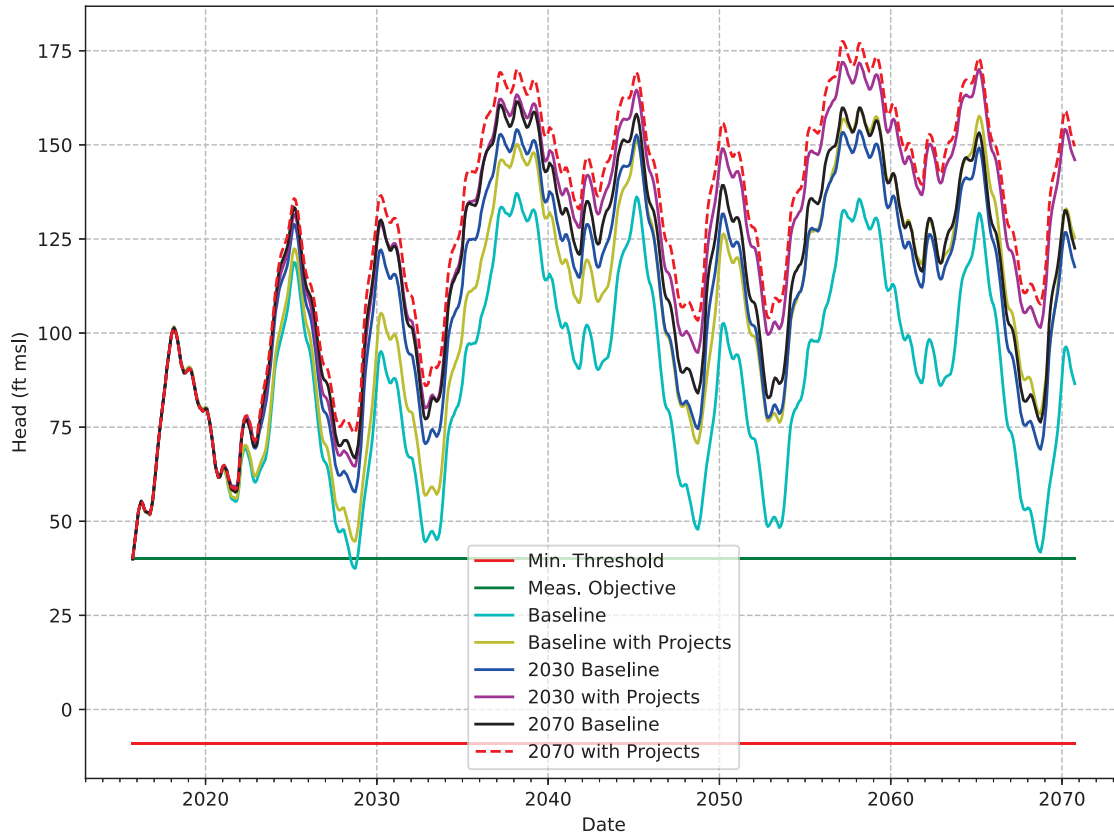
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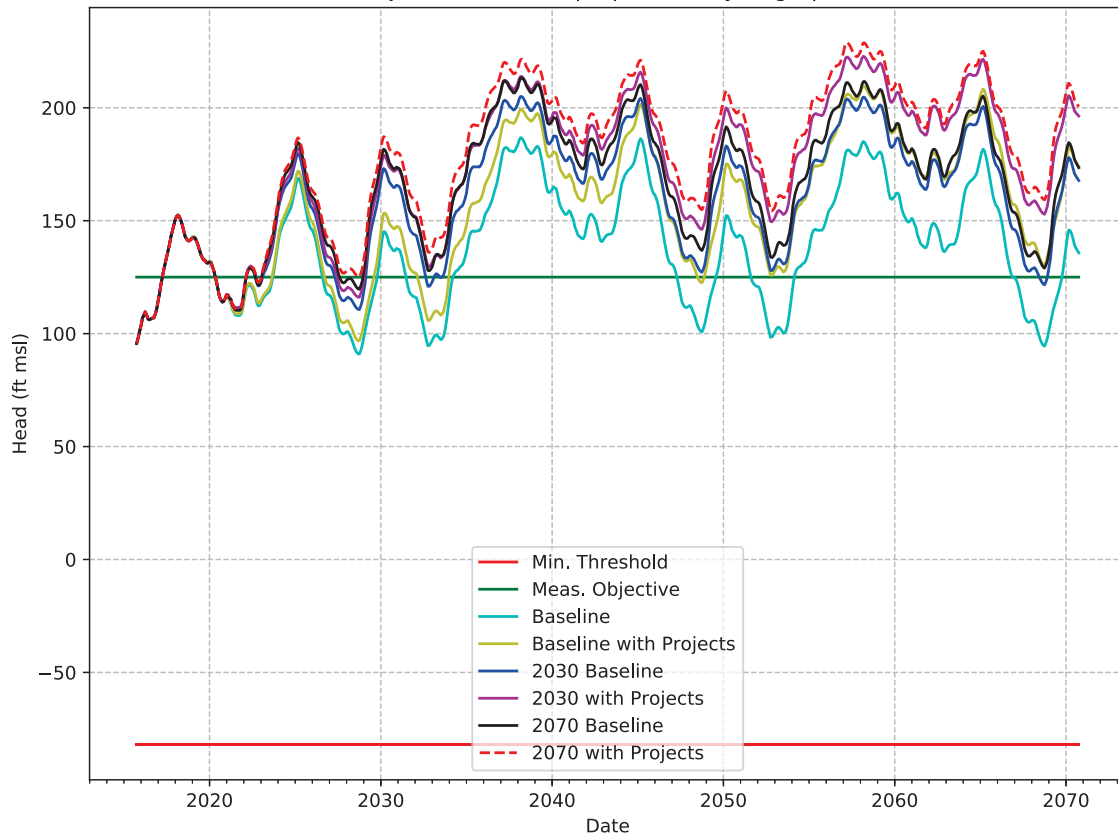
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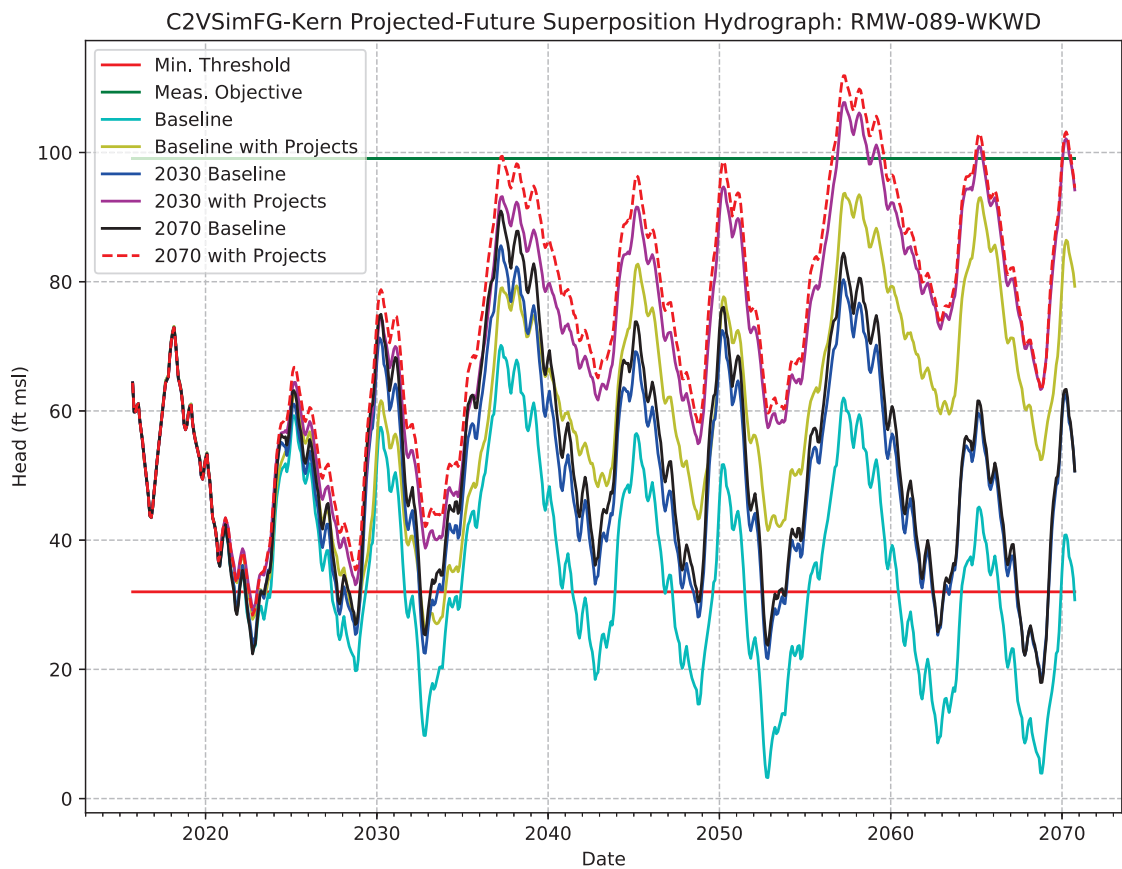
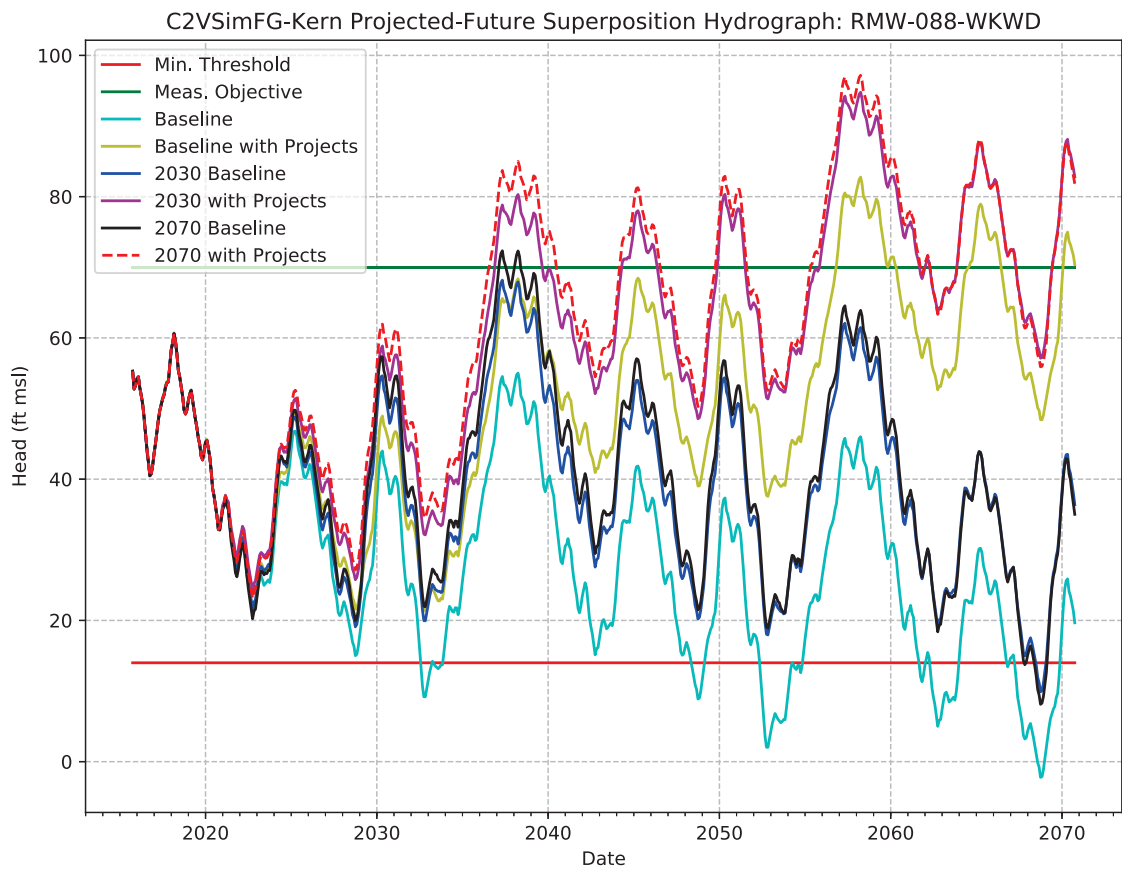


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-085-WKWD

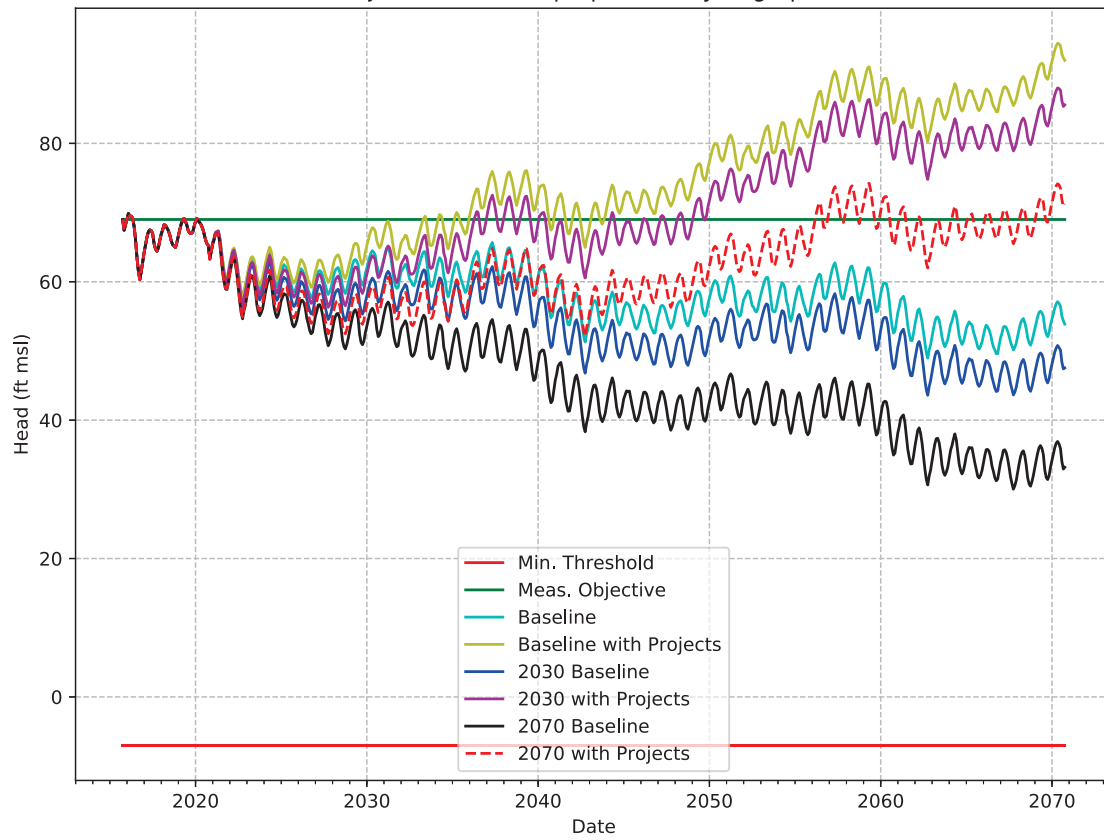


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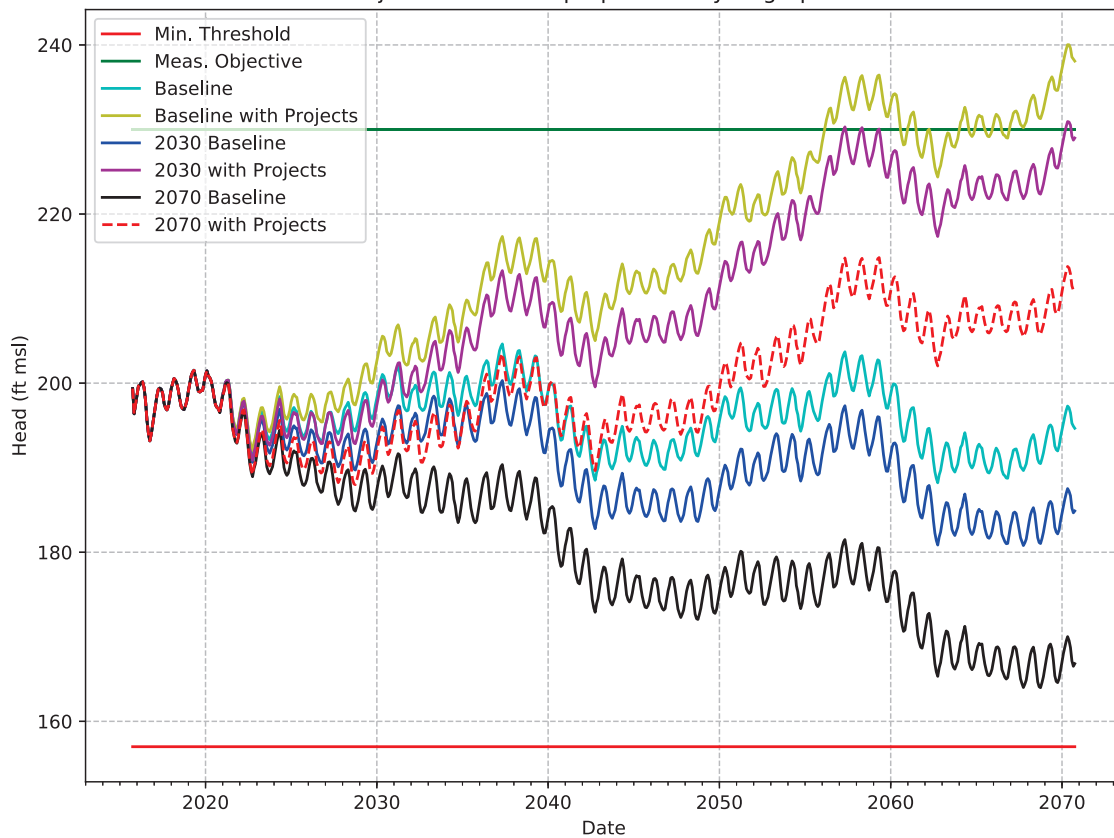




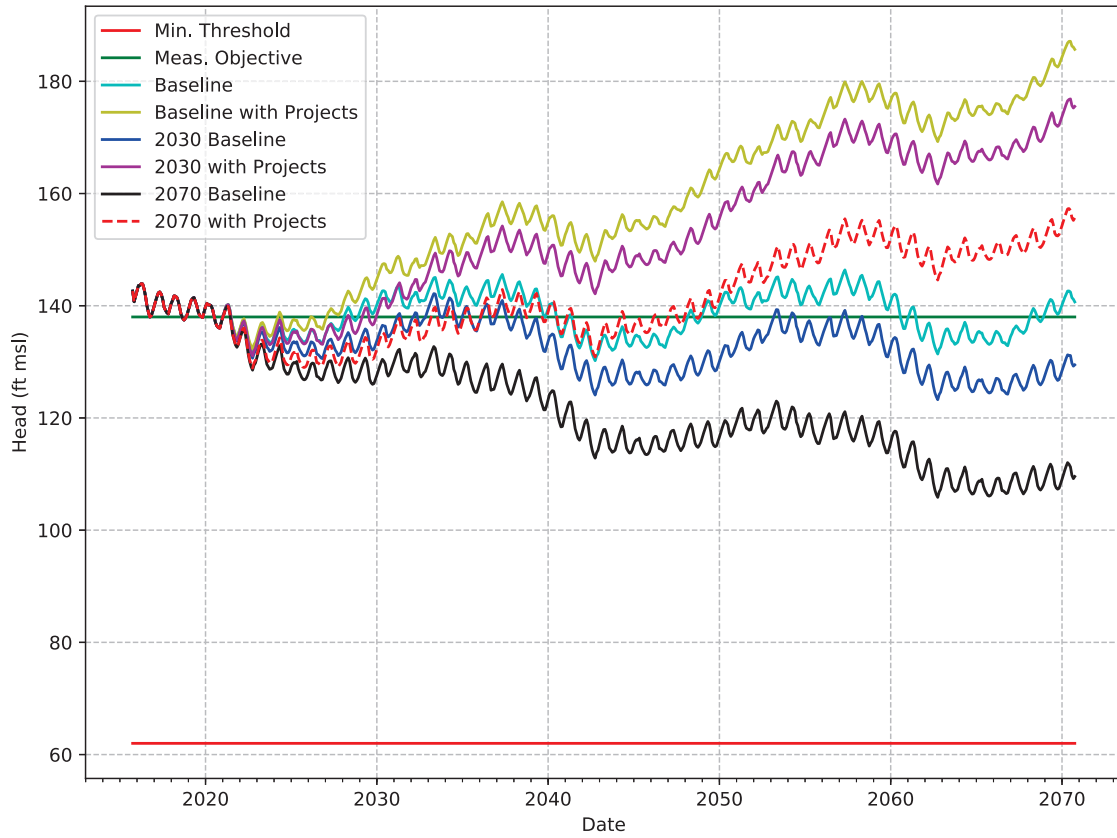
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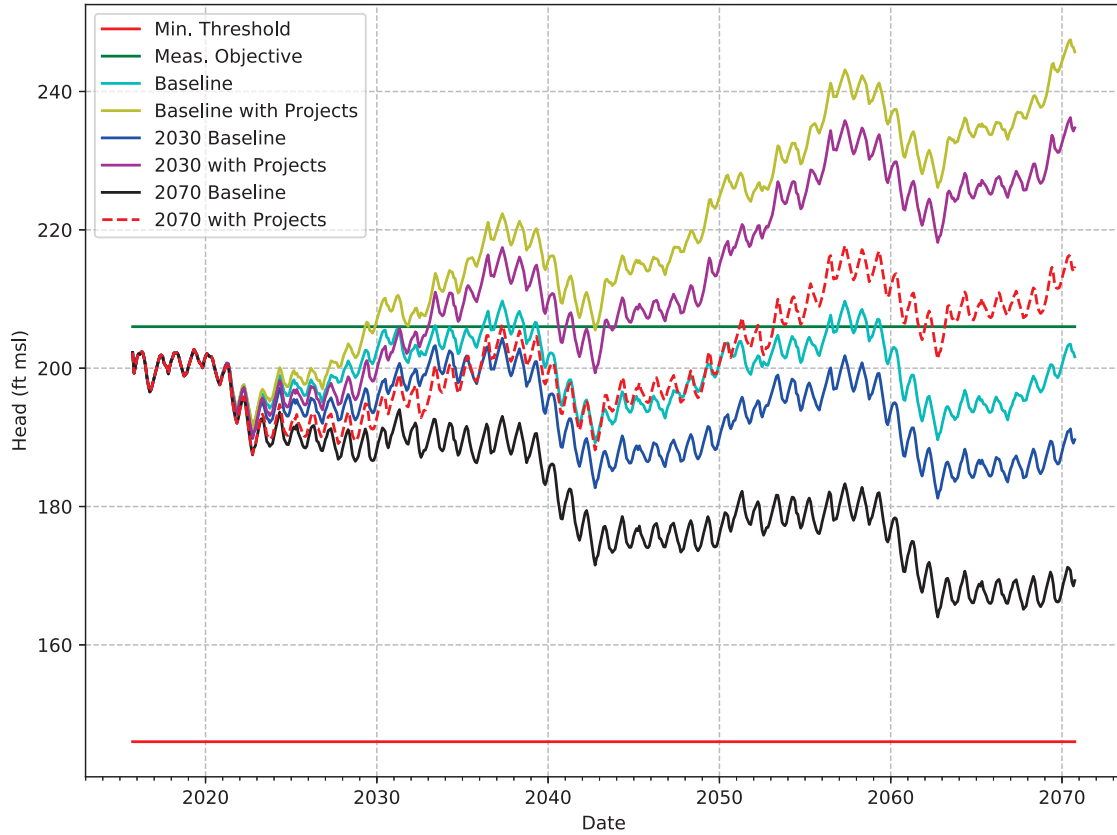
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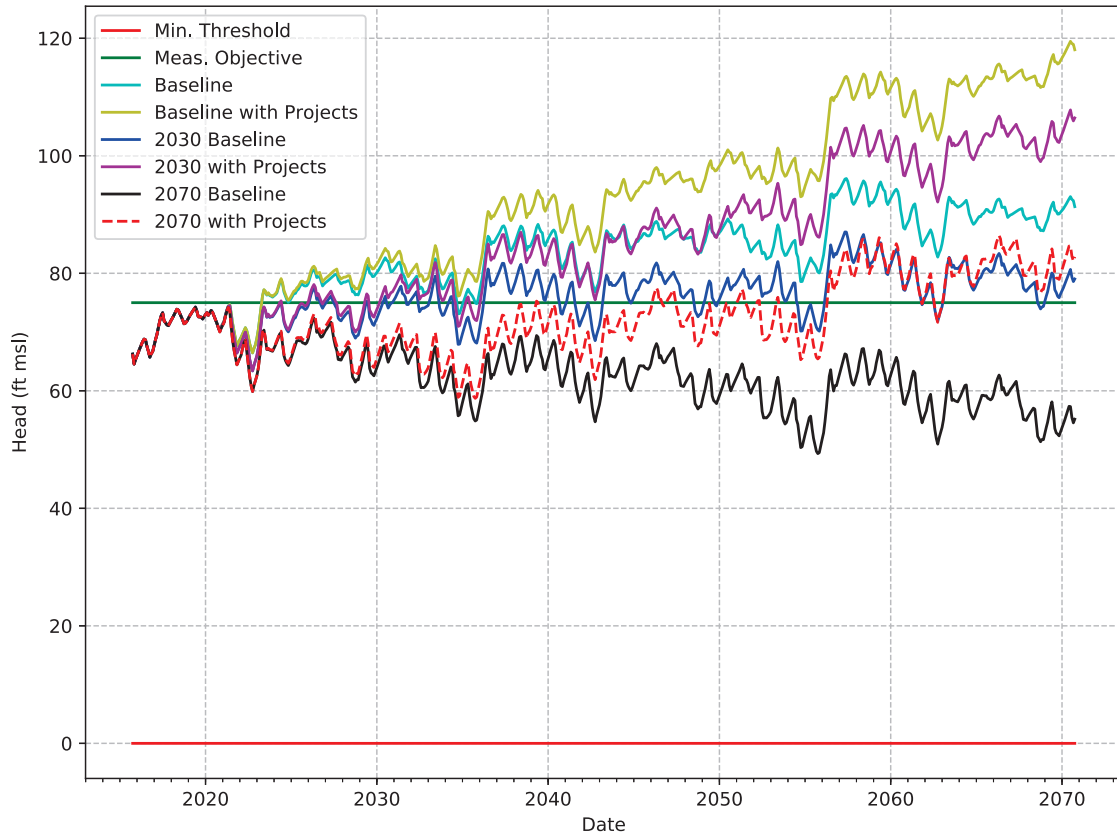
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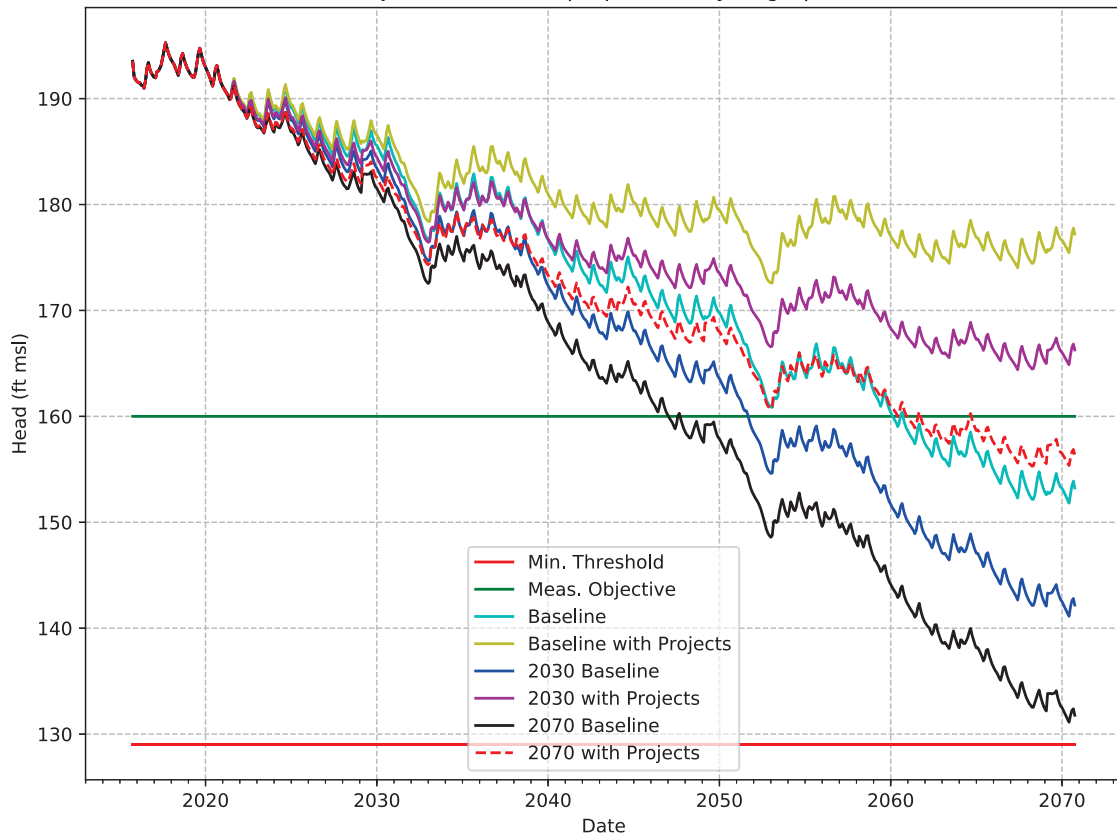
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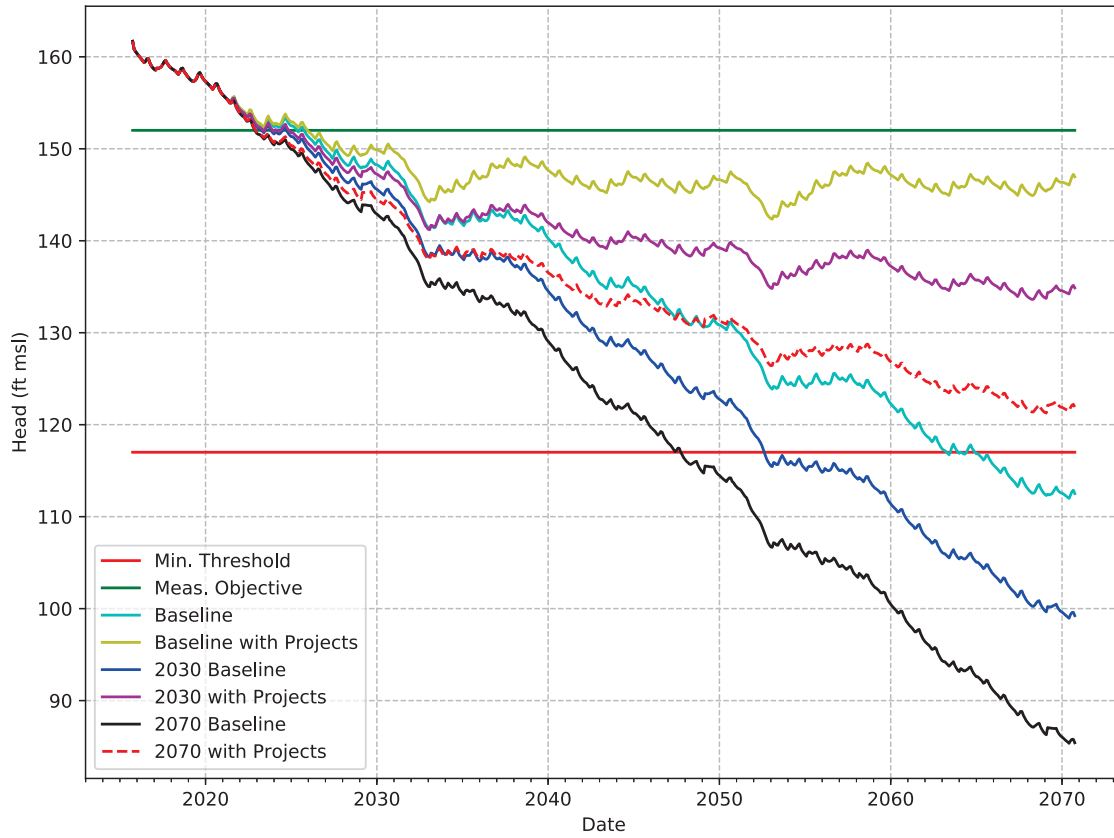
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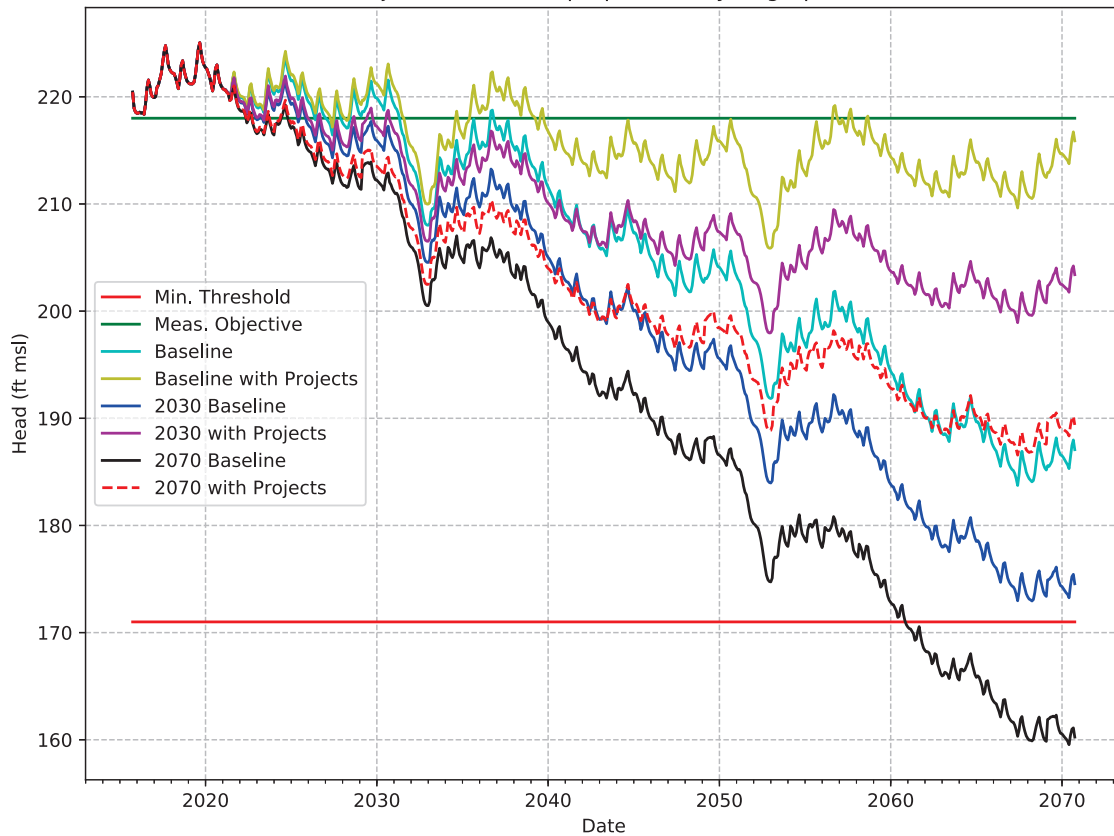
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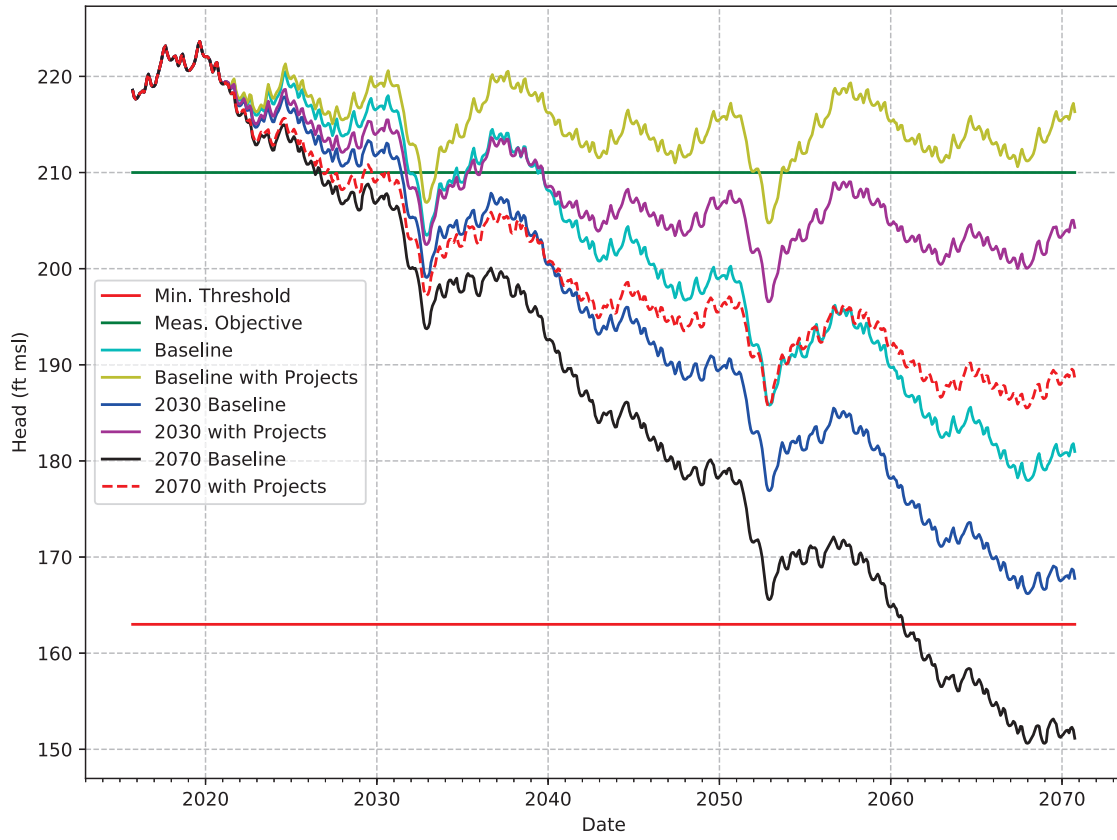
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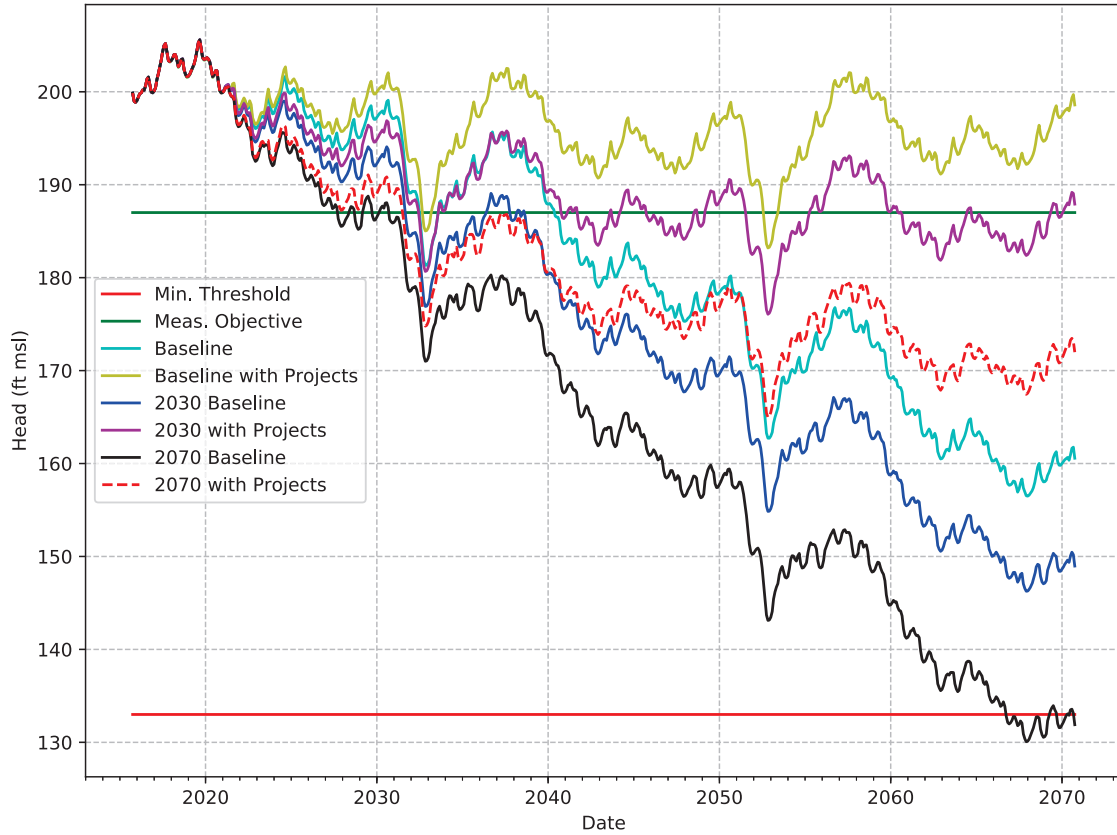
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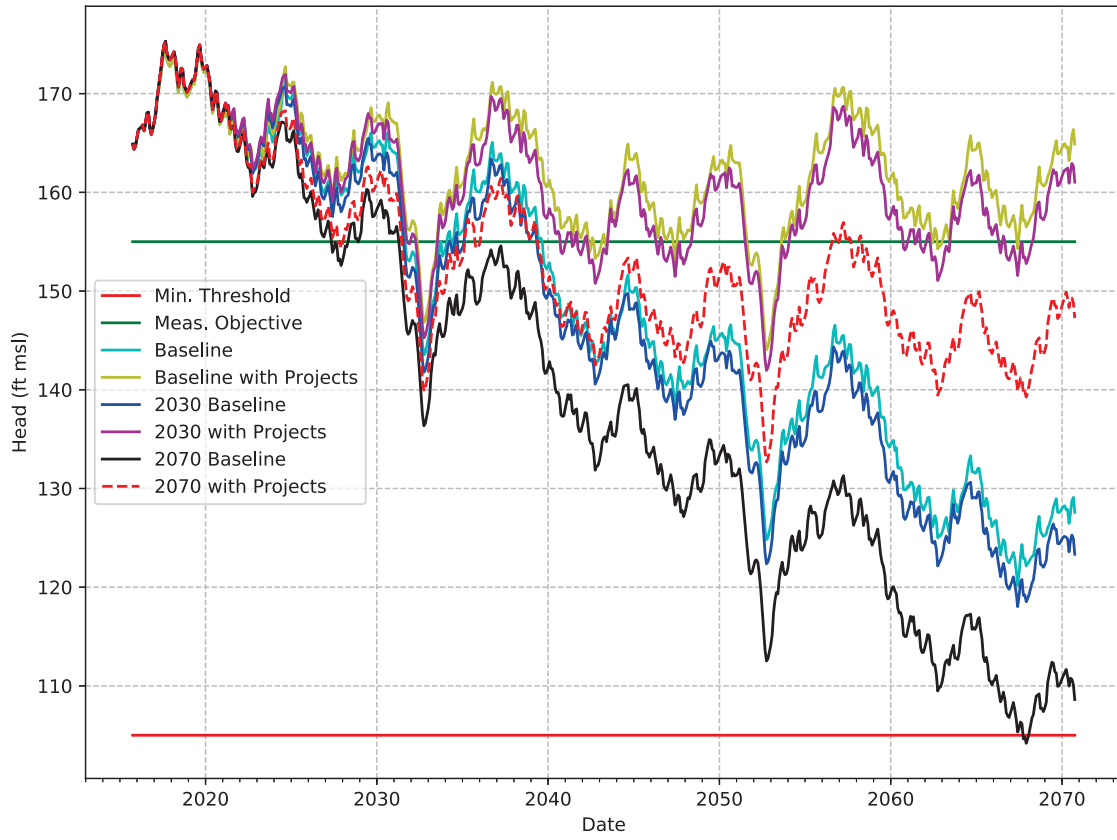
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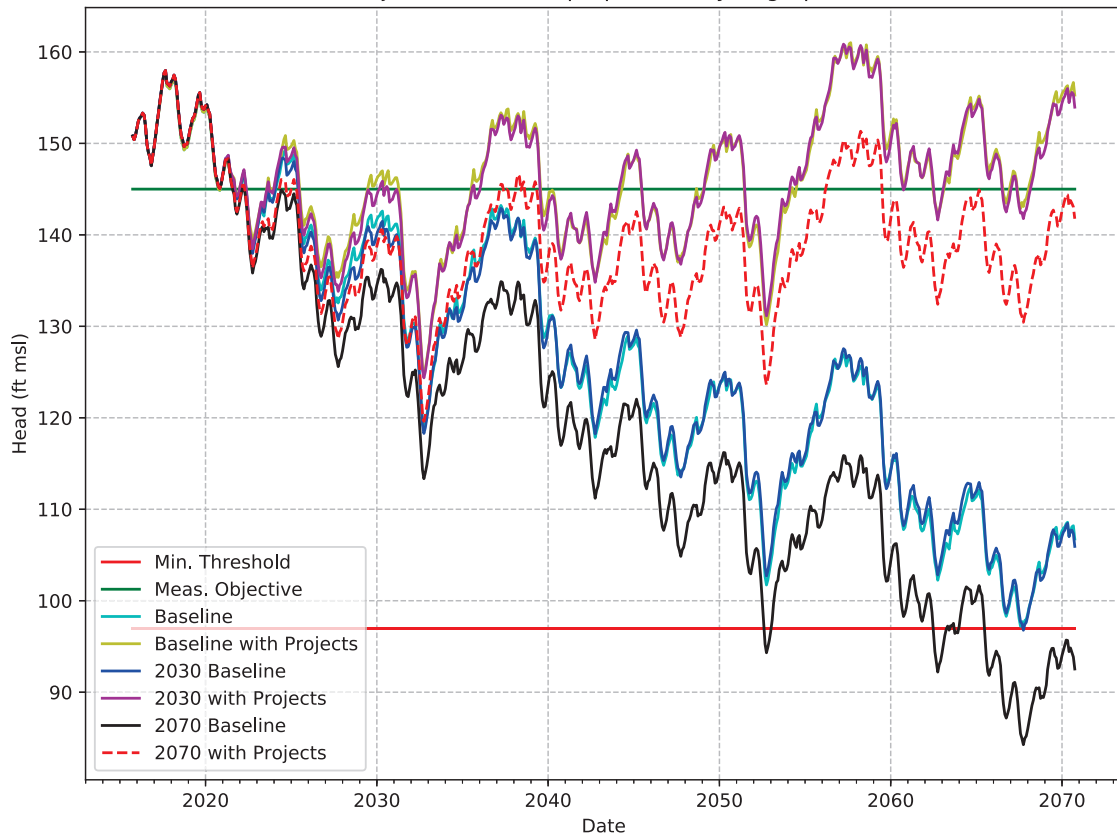
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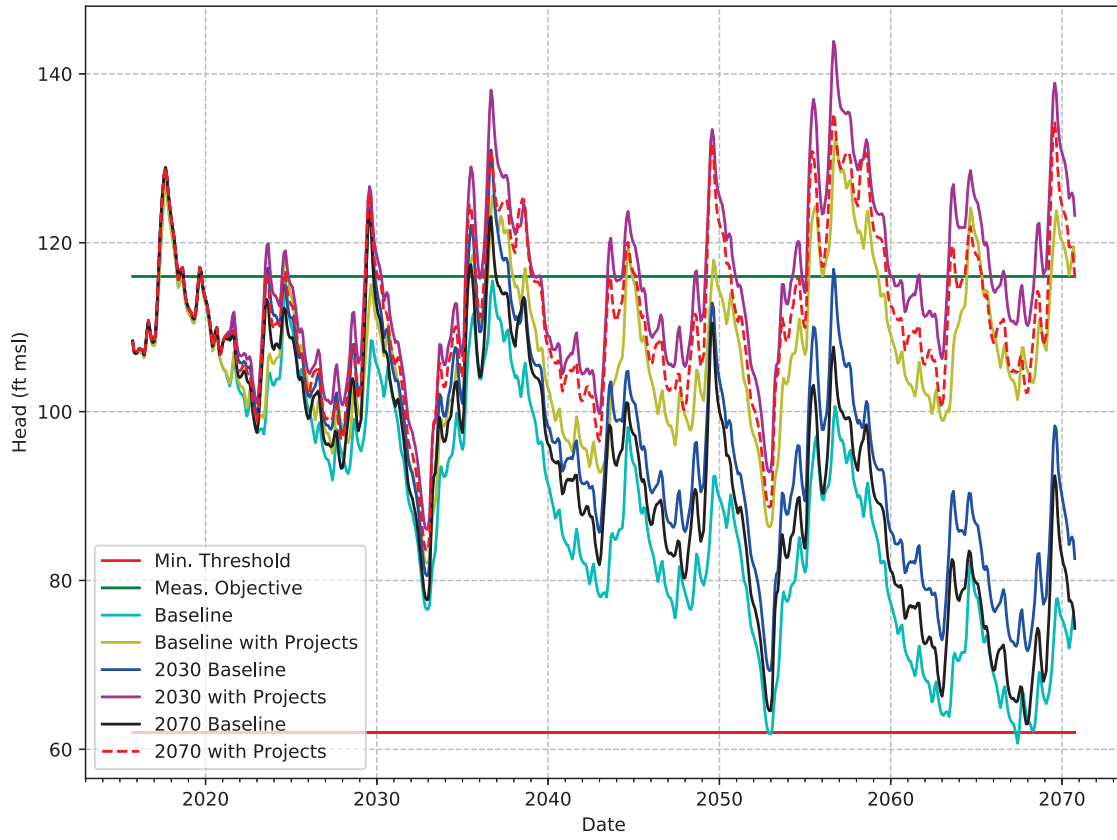
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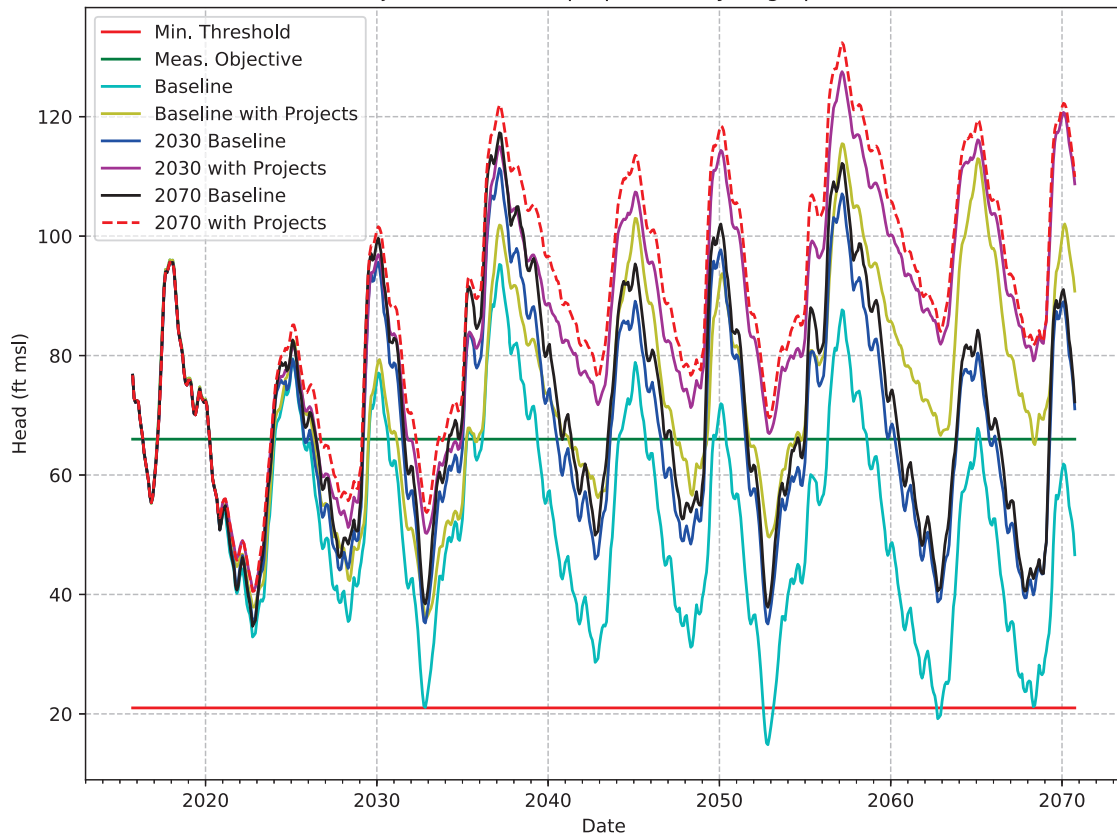
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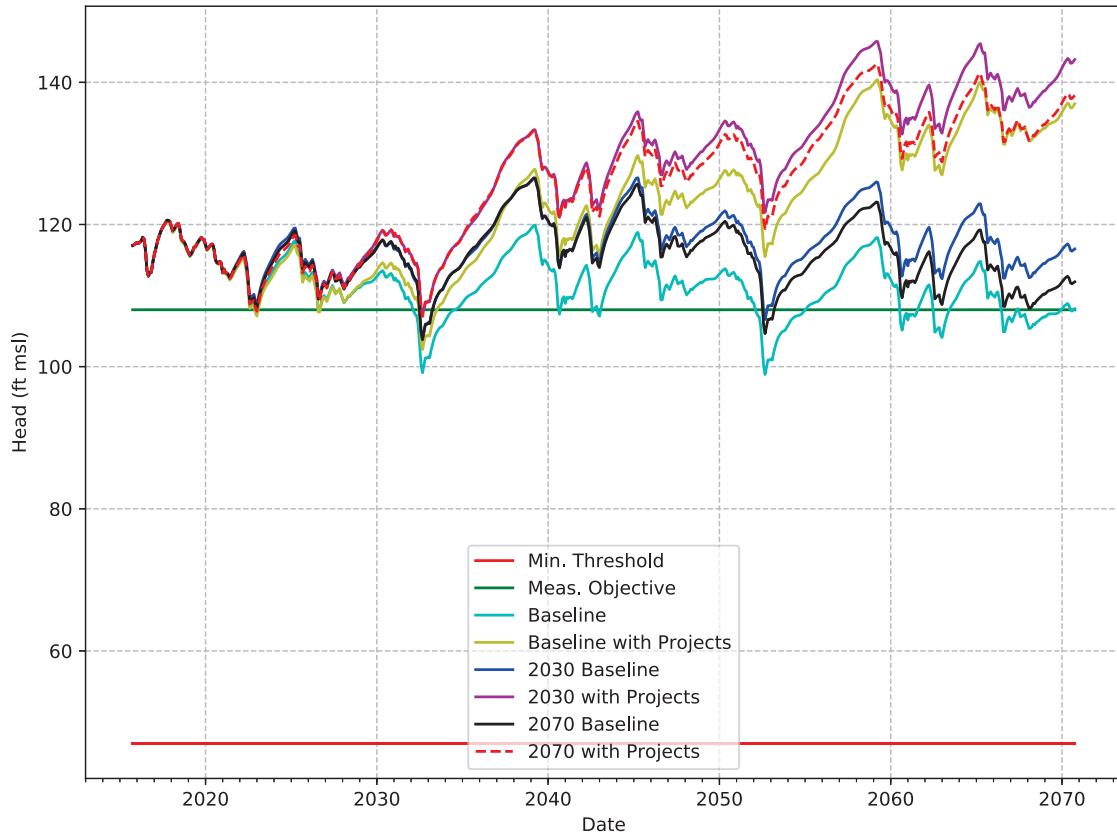
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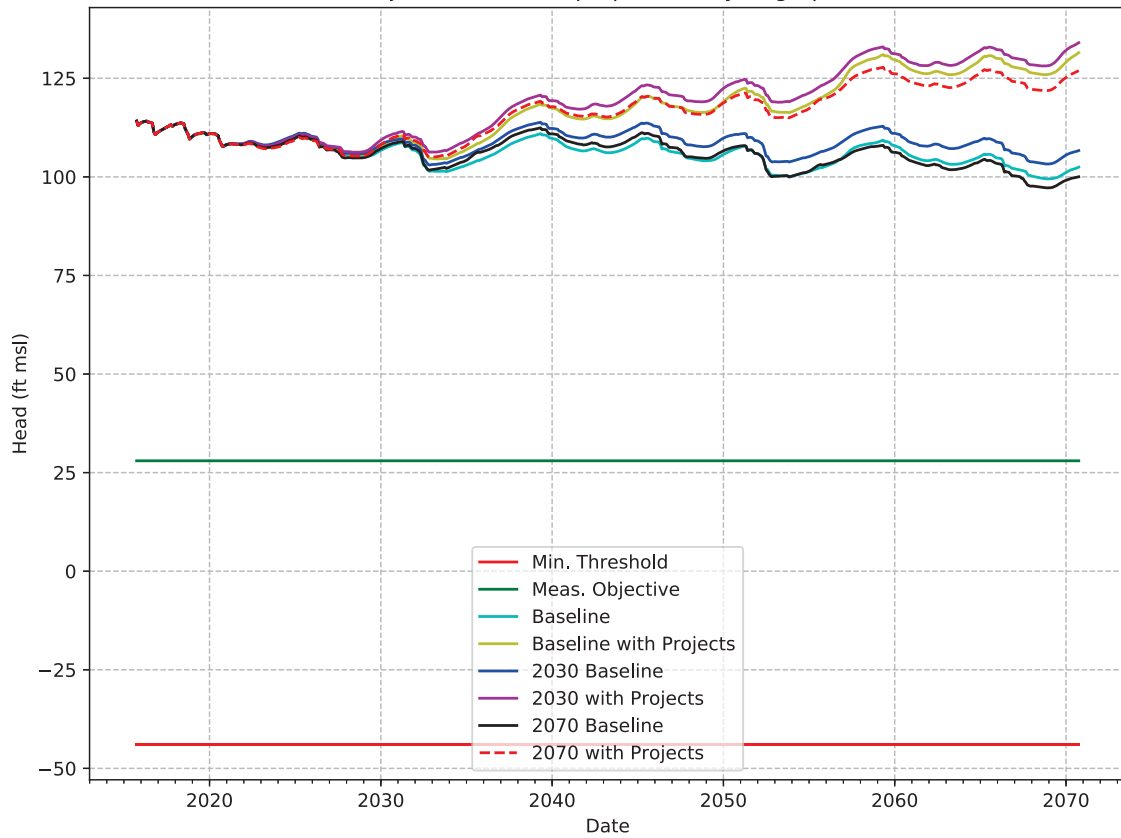
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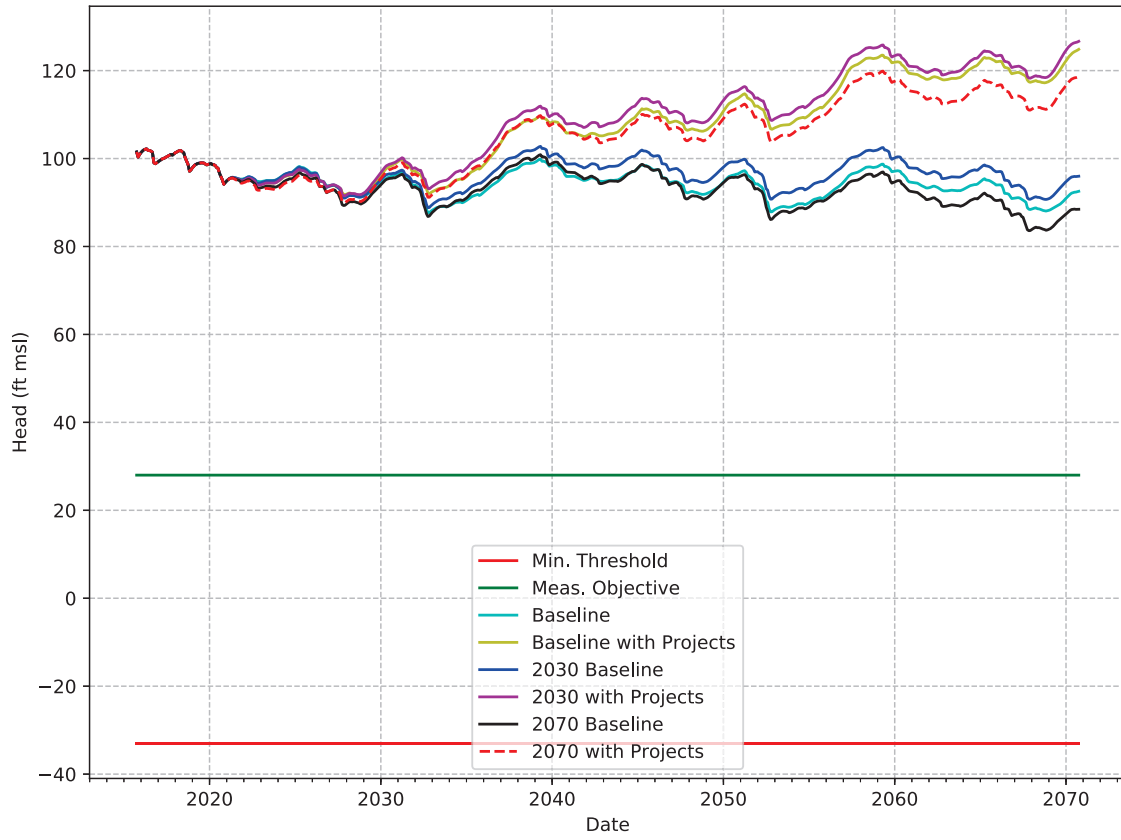
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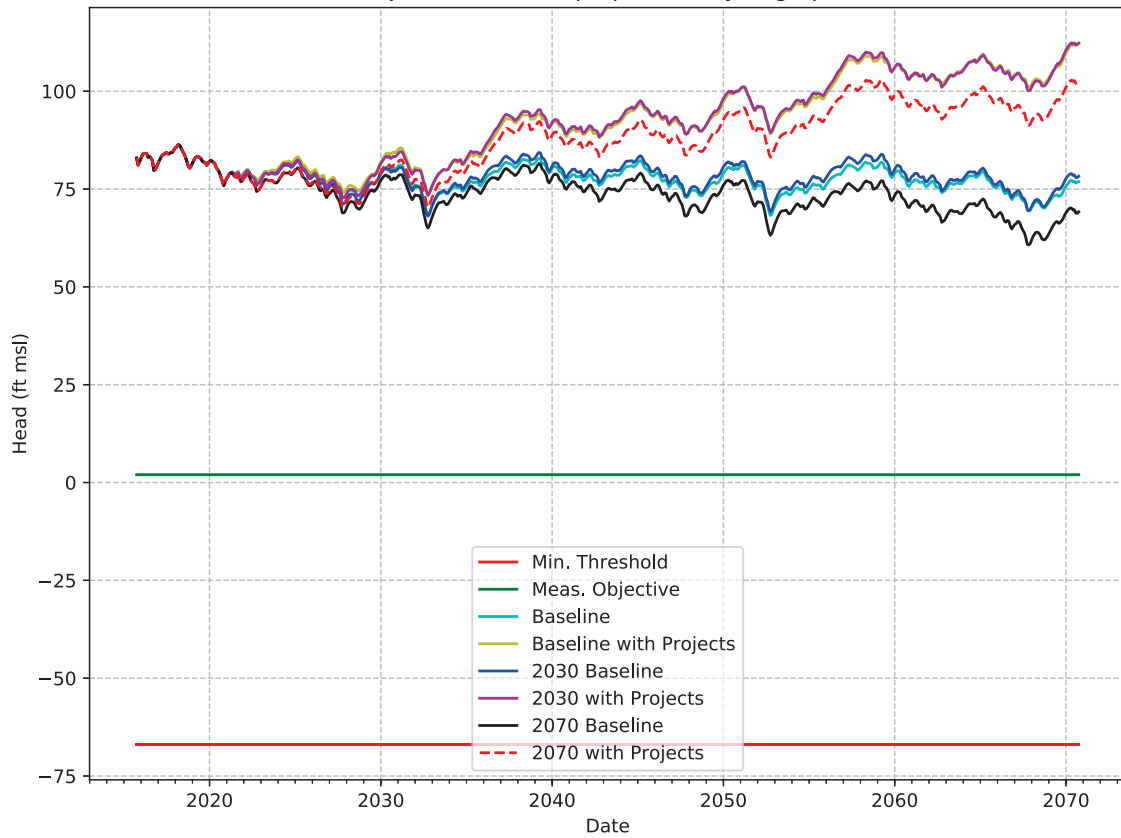
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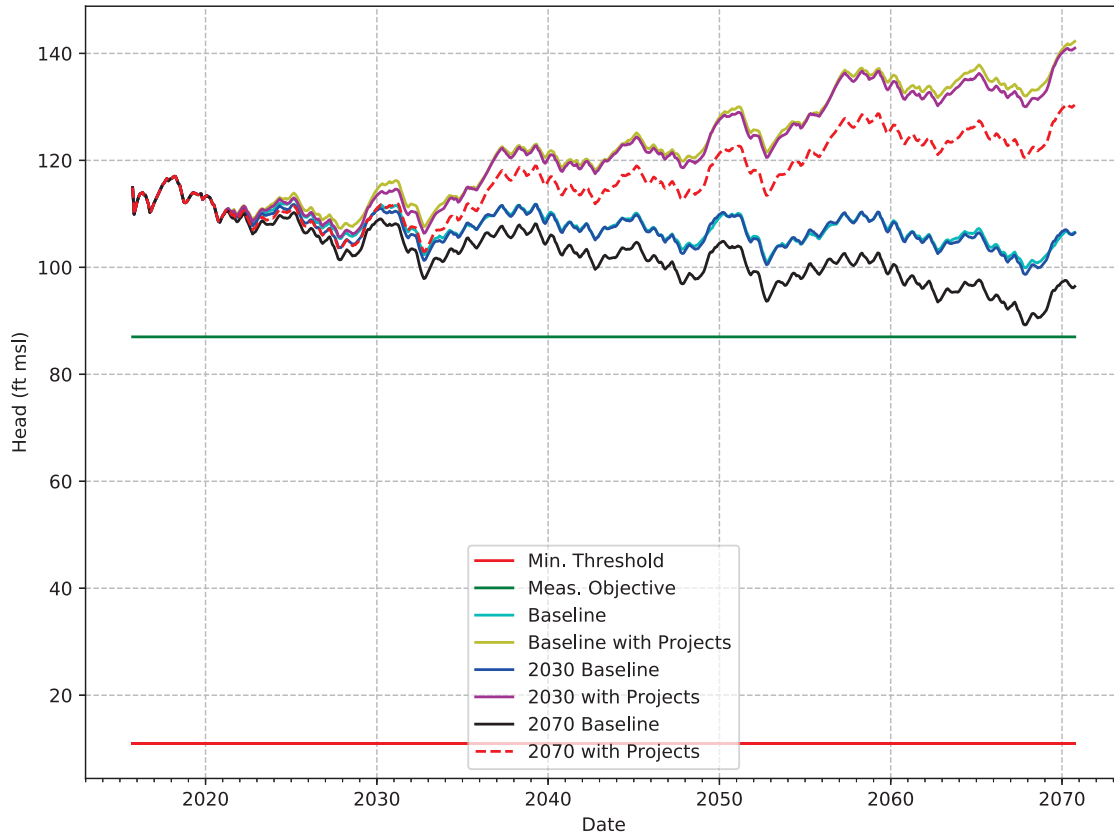
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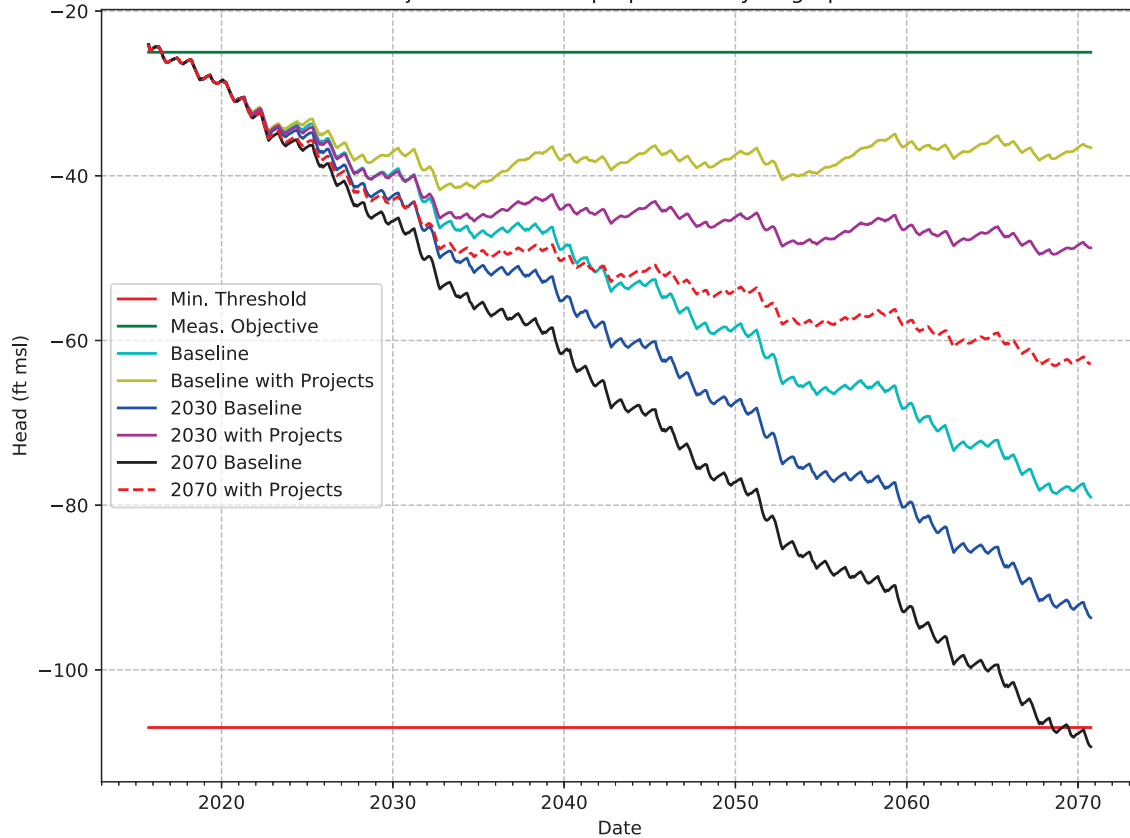
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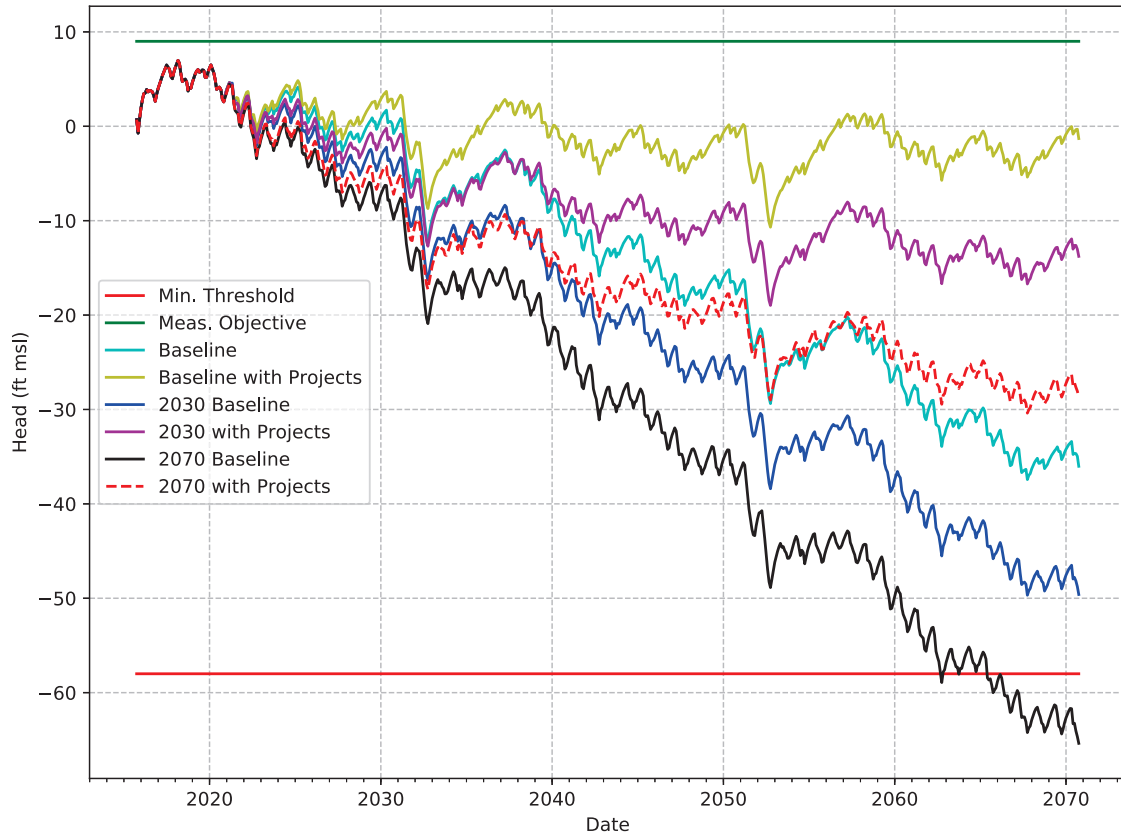
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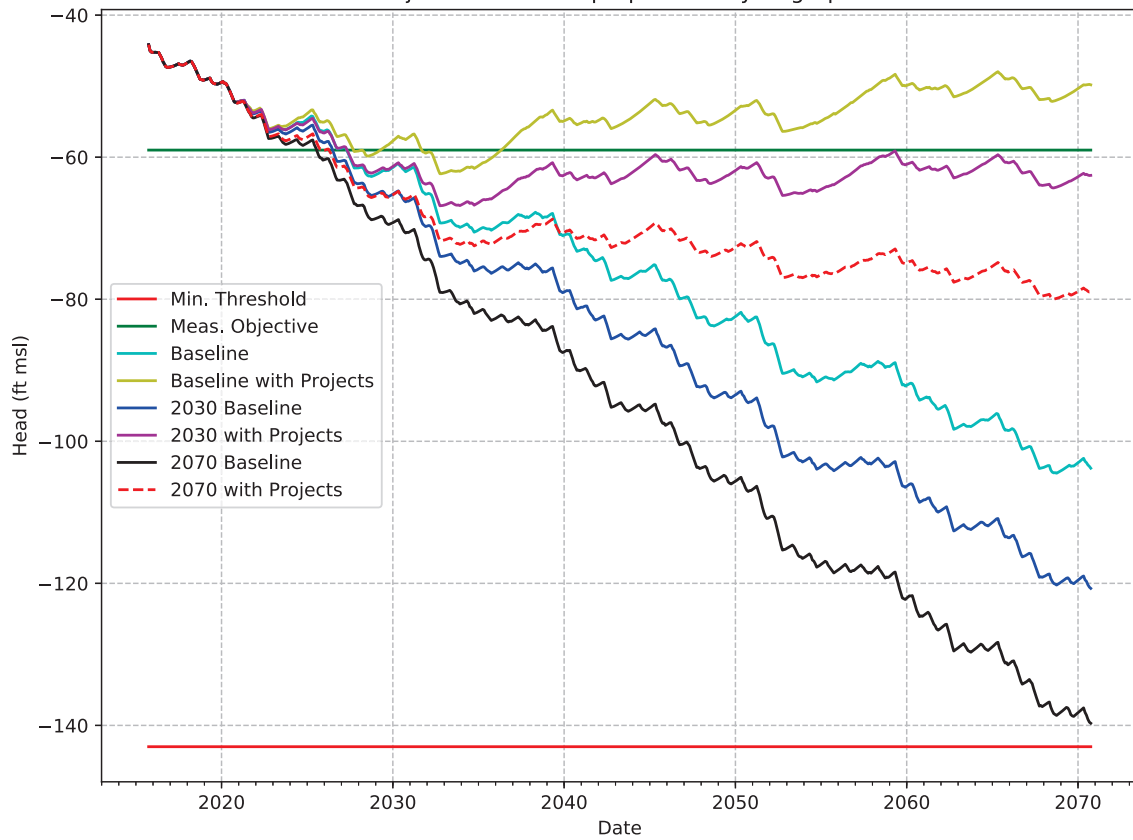
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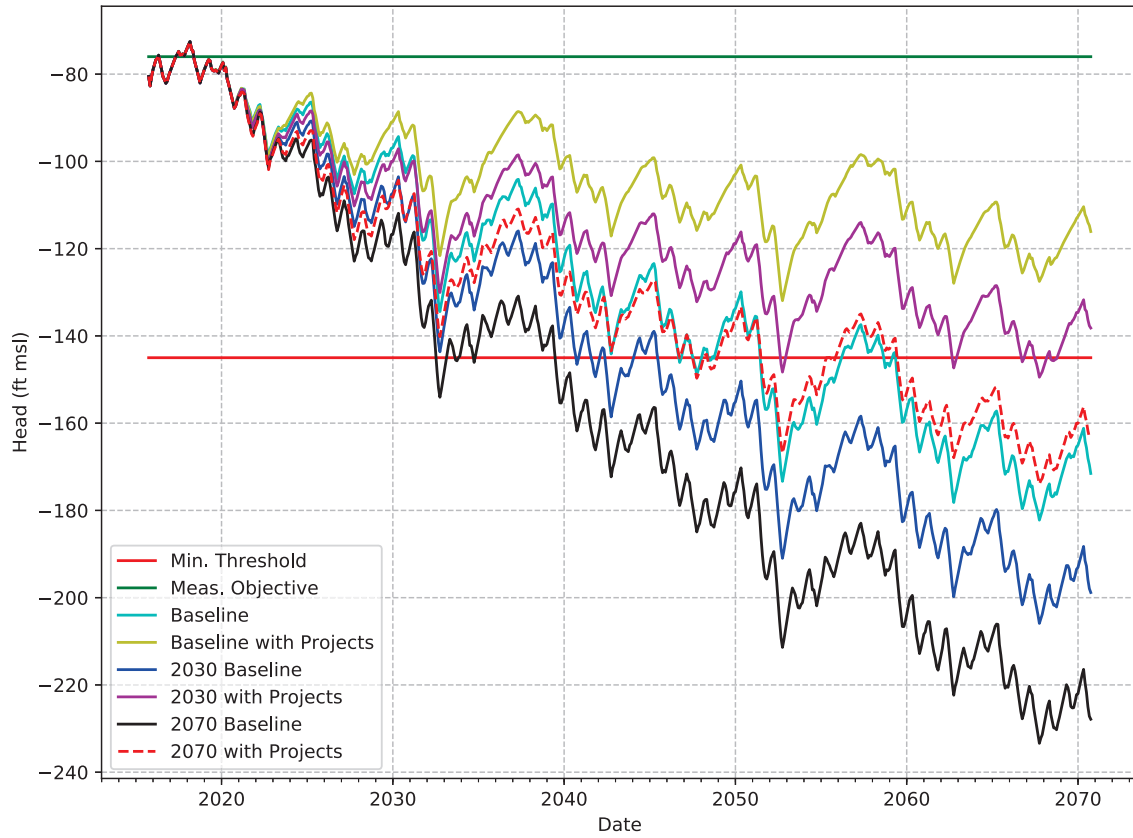
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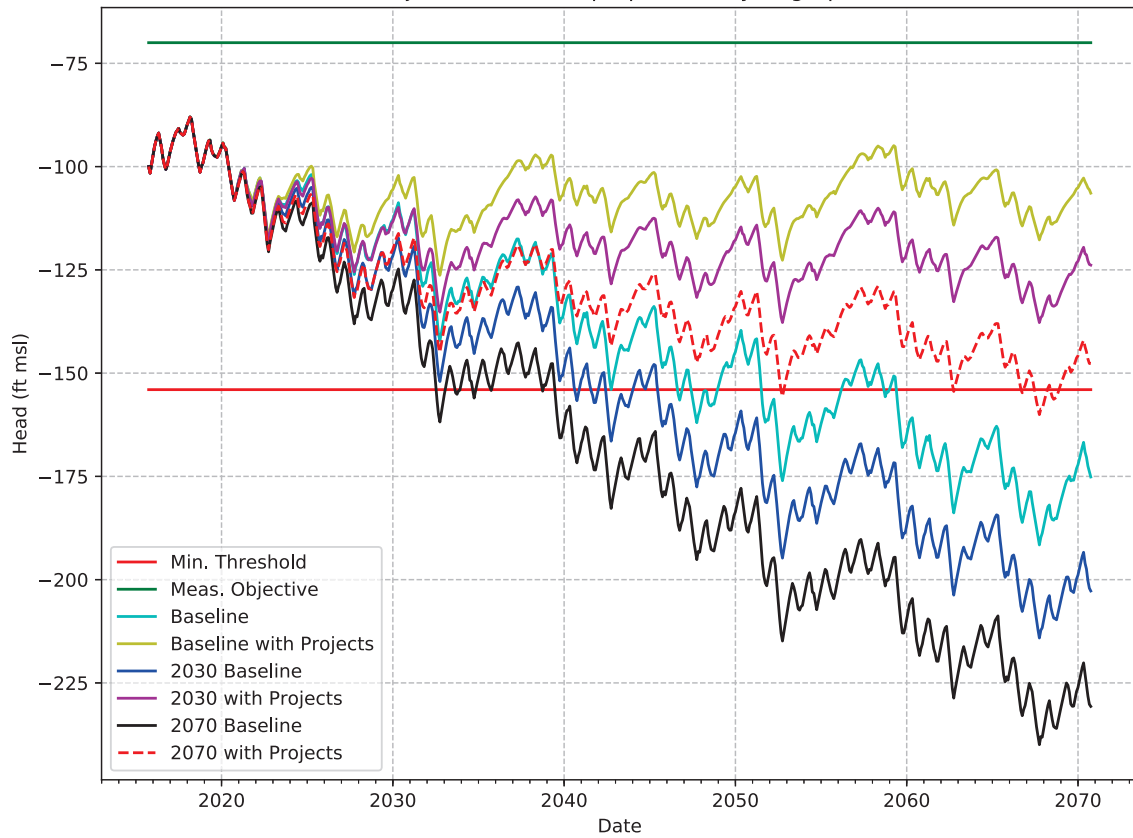
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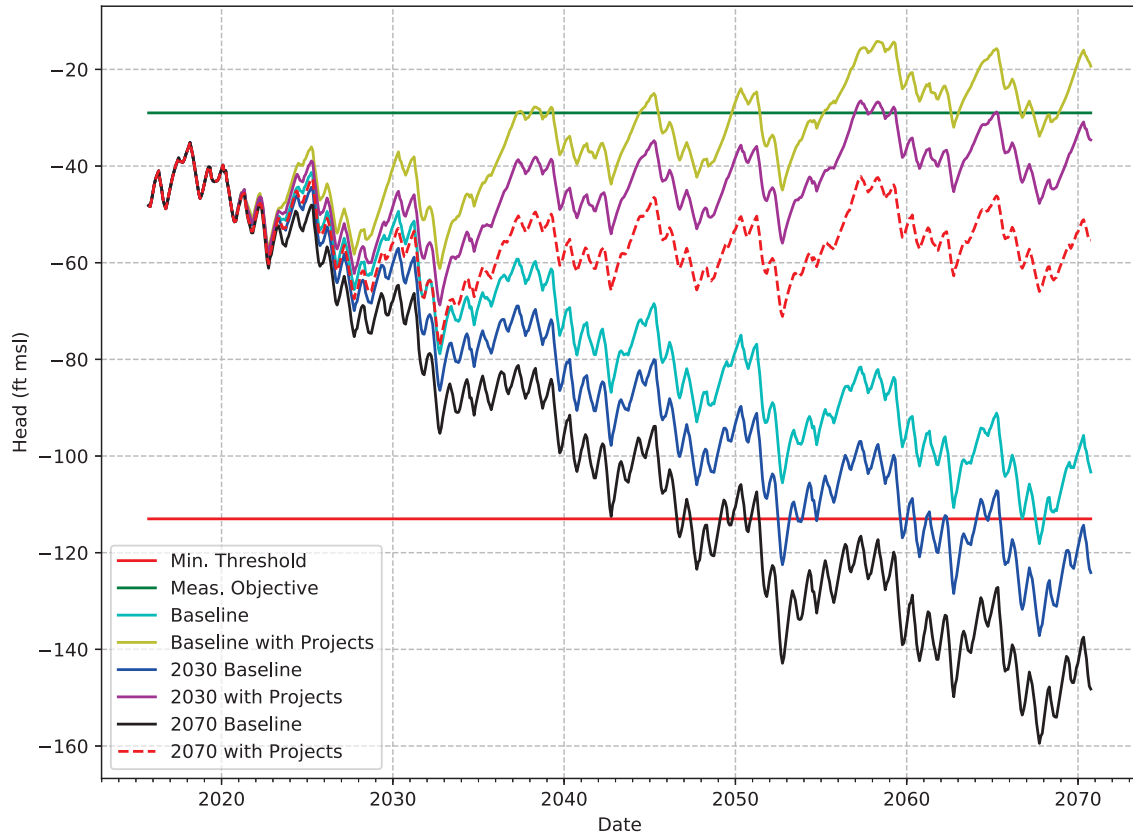
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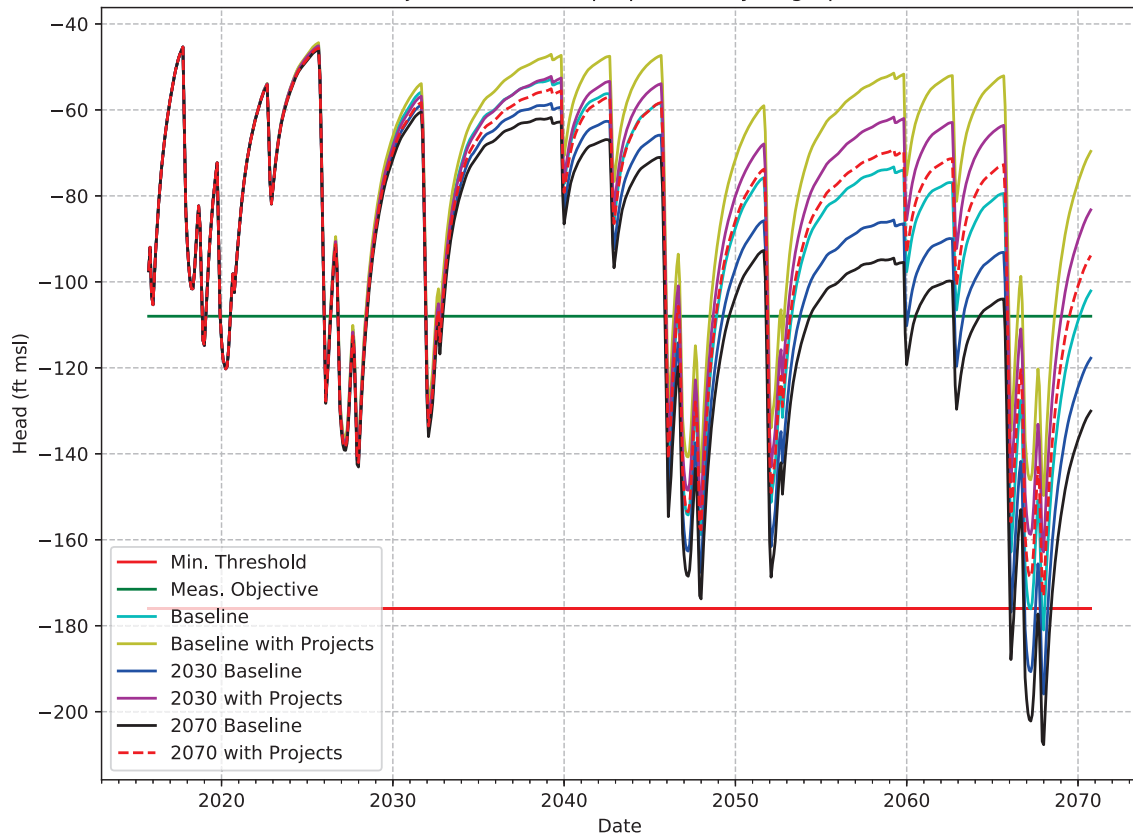
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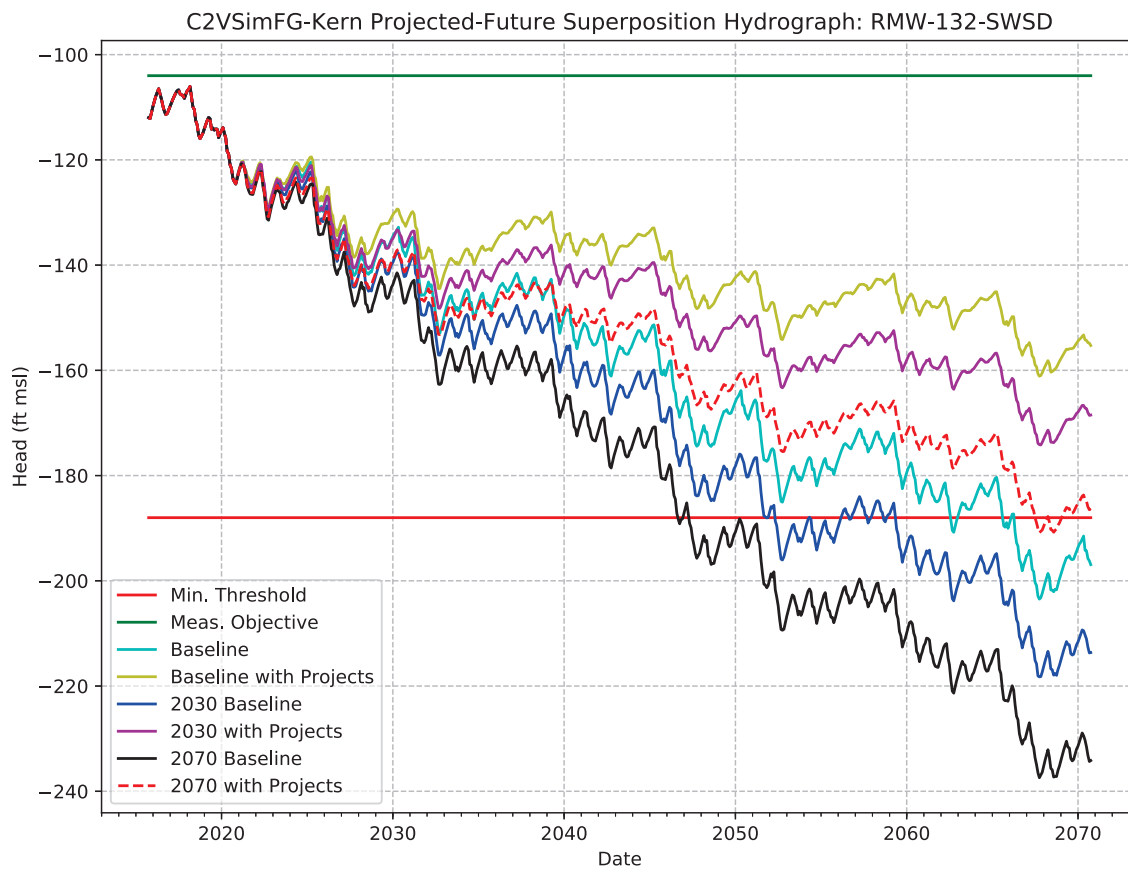
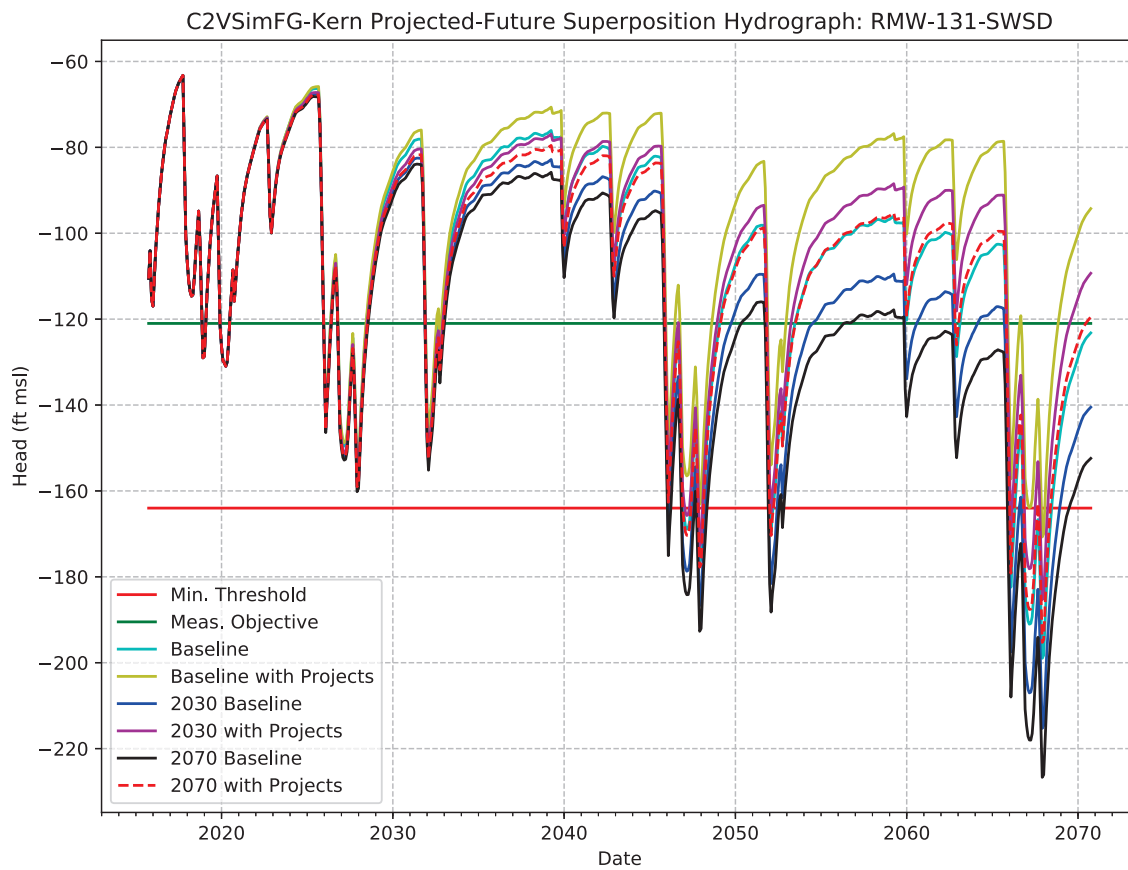


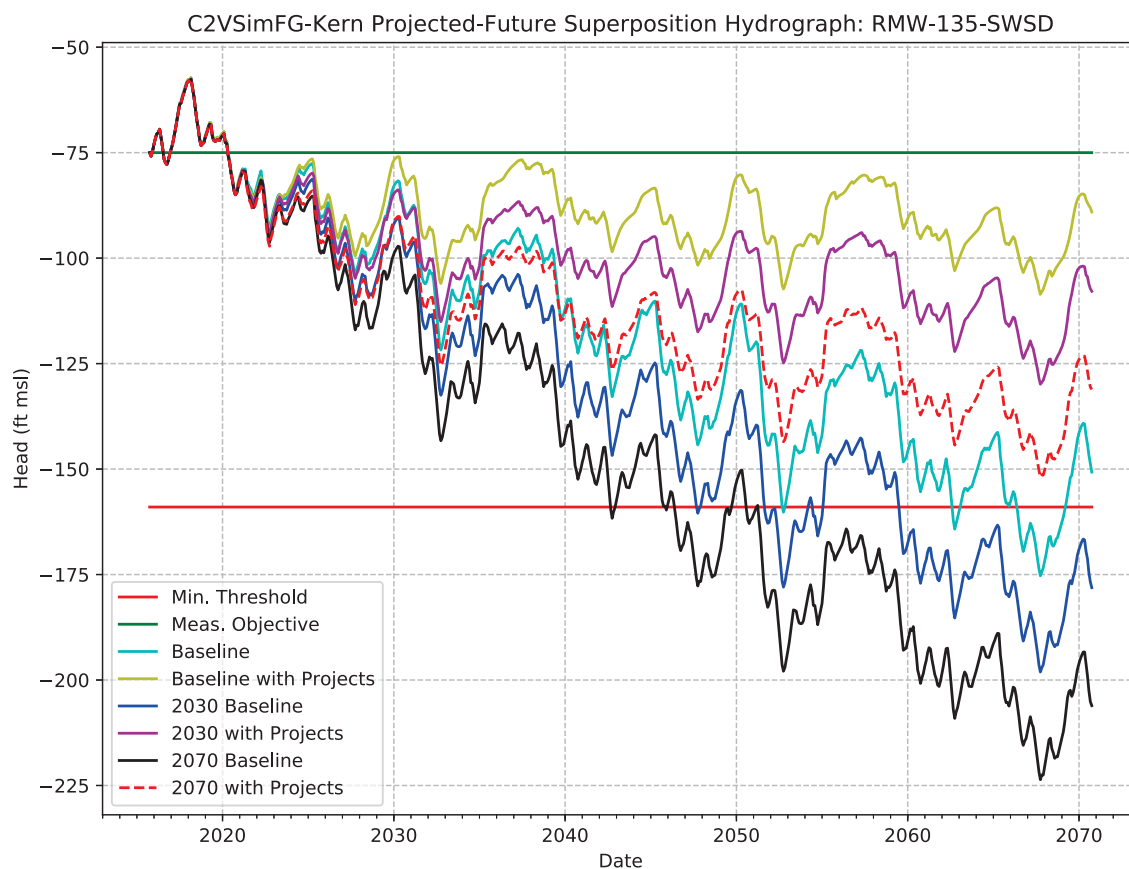
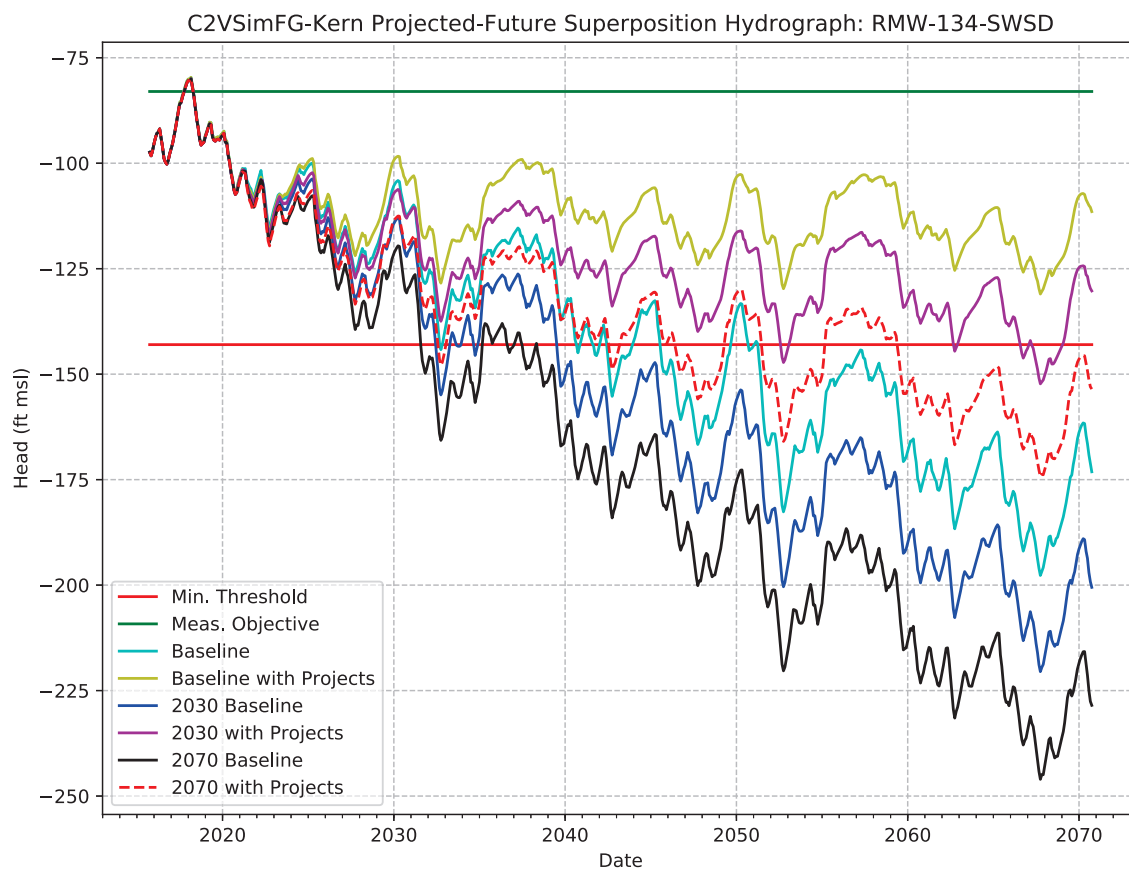
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-128-SWSD



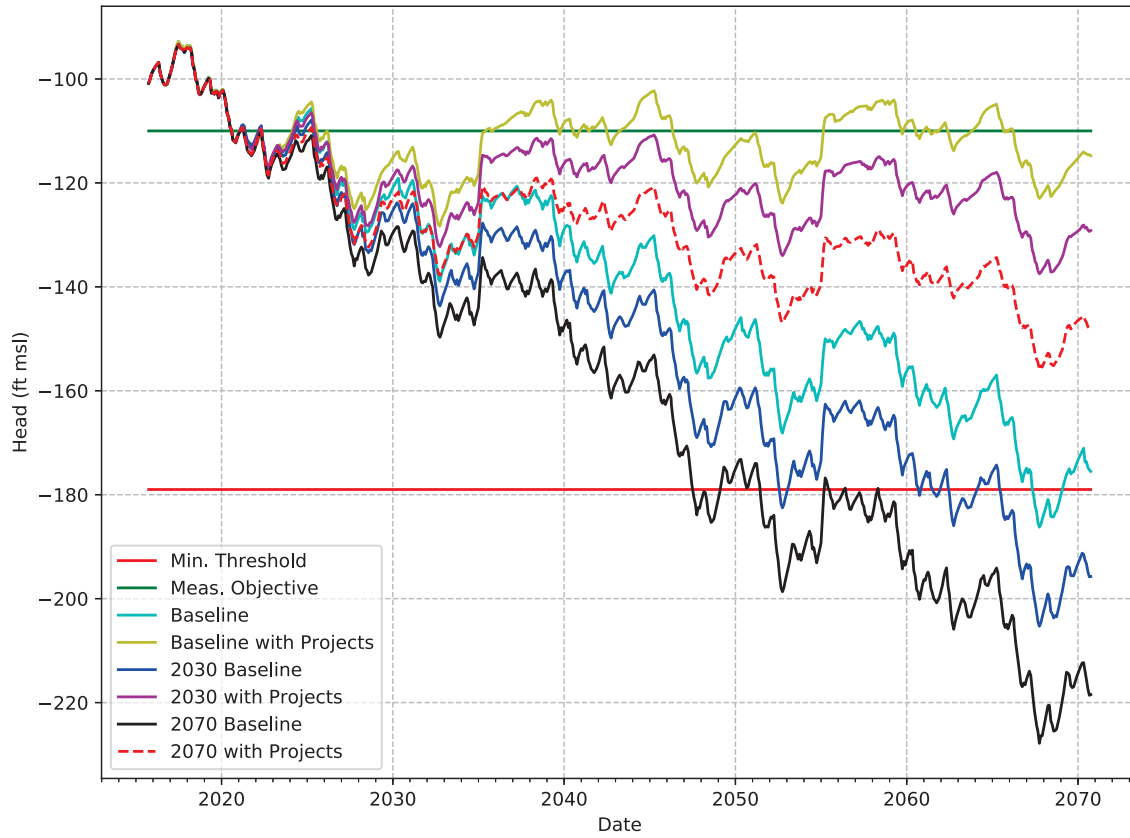
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-130-SWSD



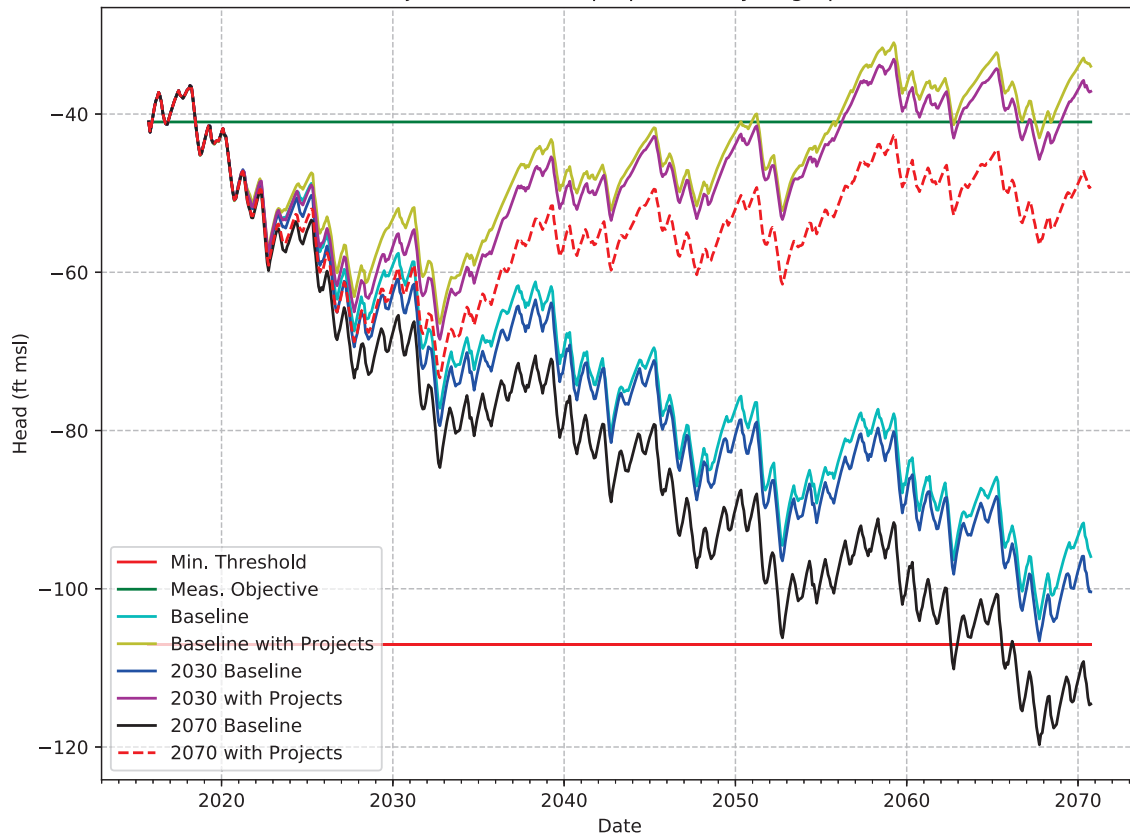




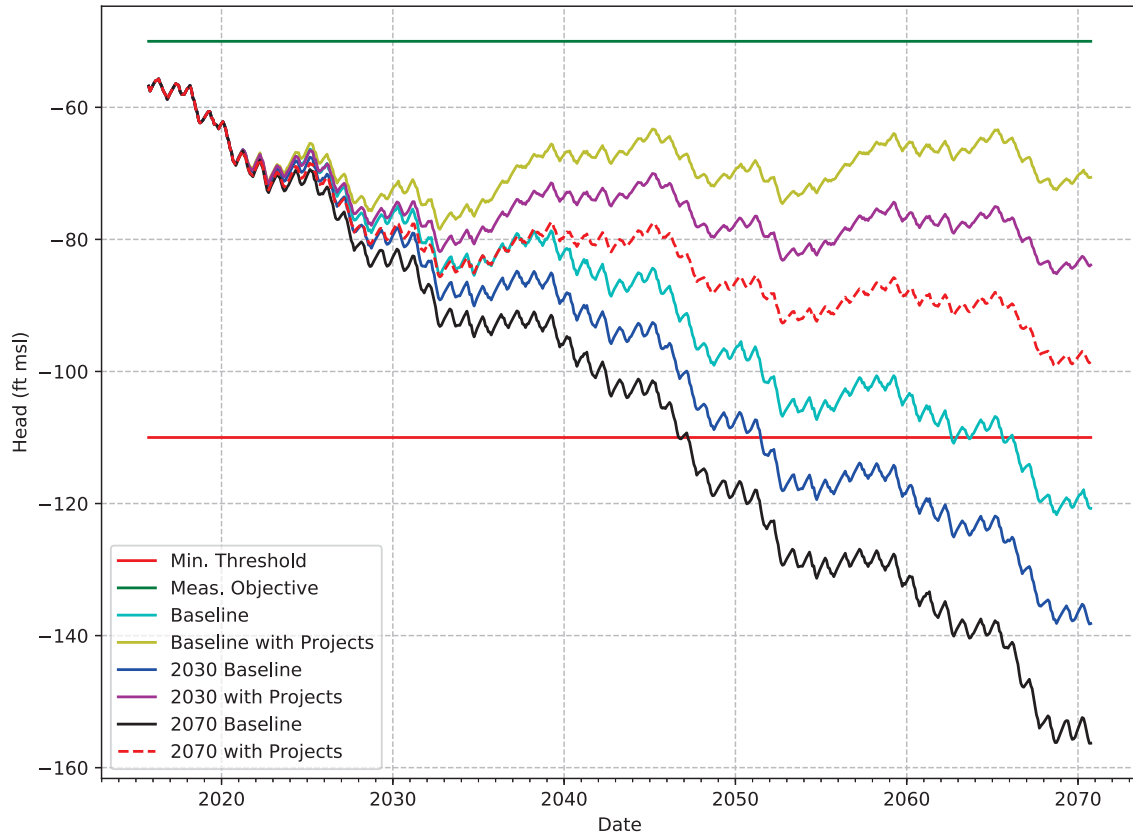
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-137-SWSD



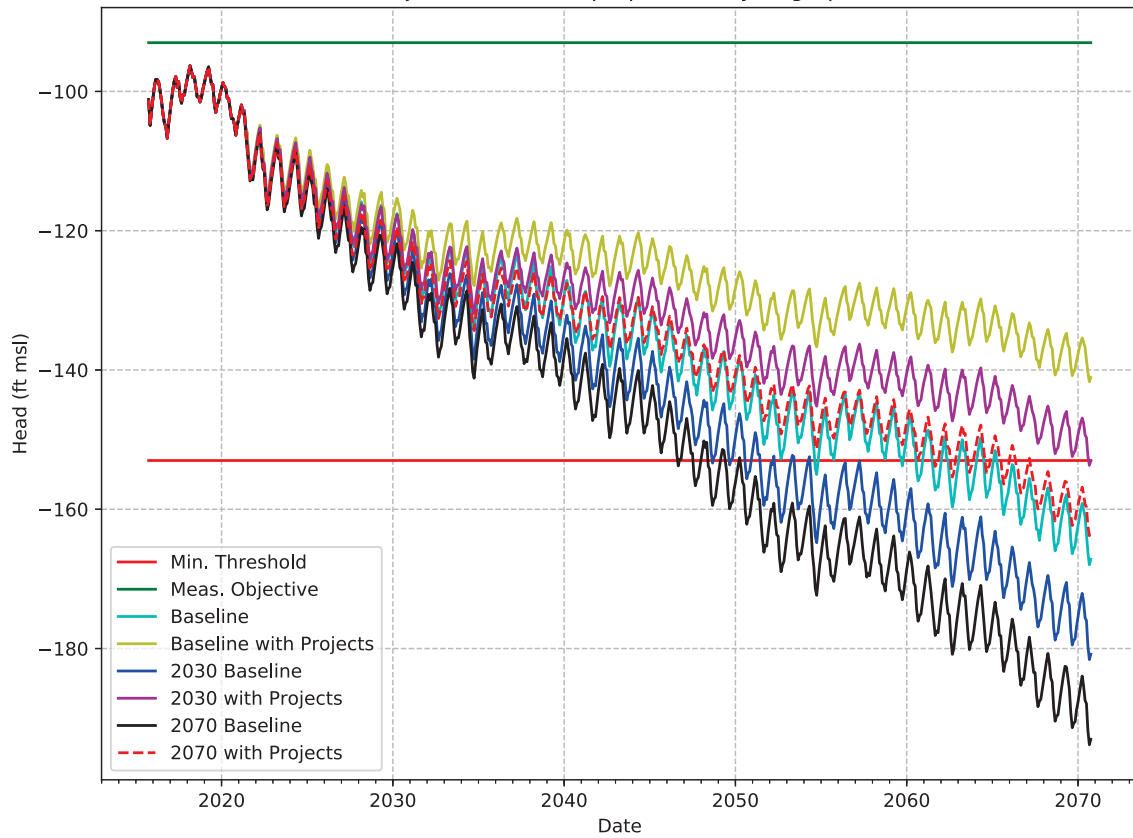
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-139-SWSD



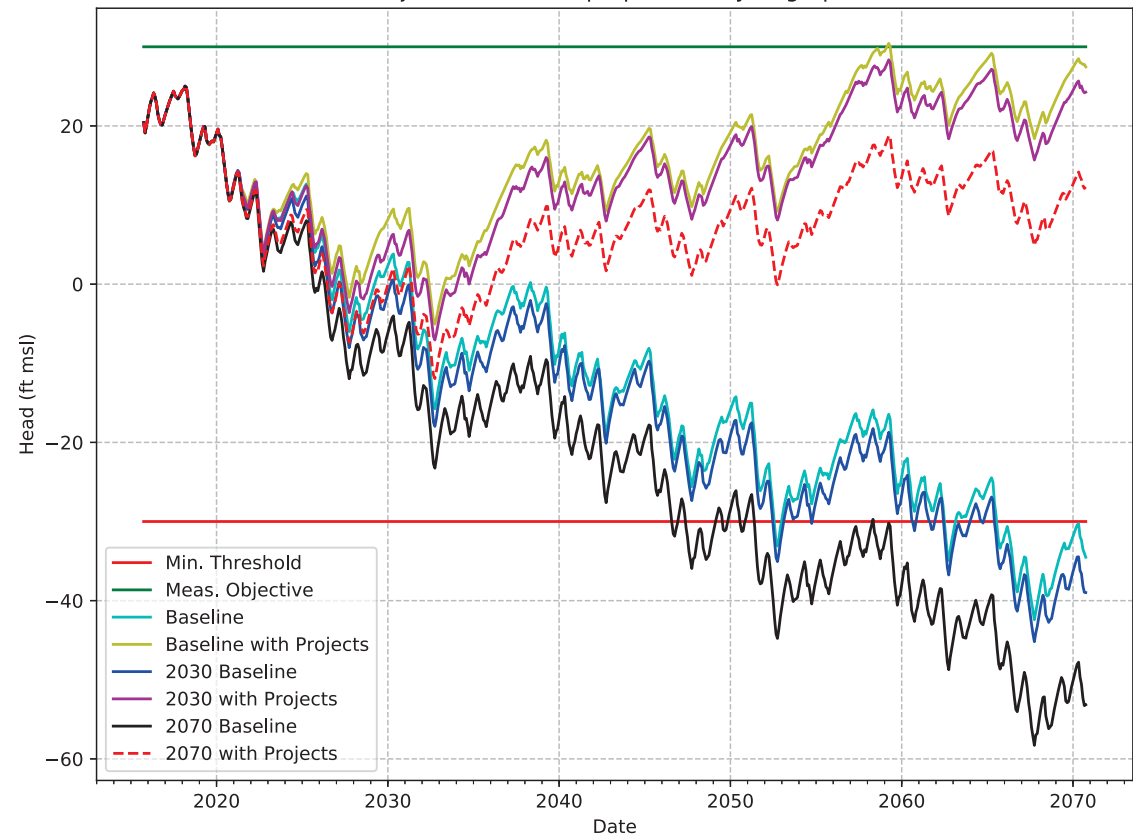
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-140-SWSD



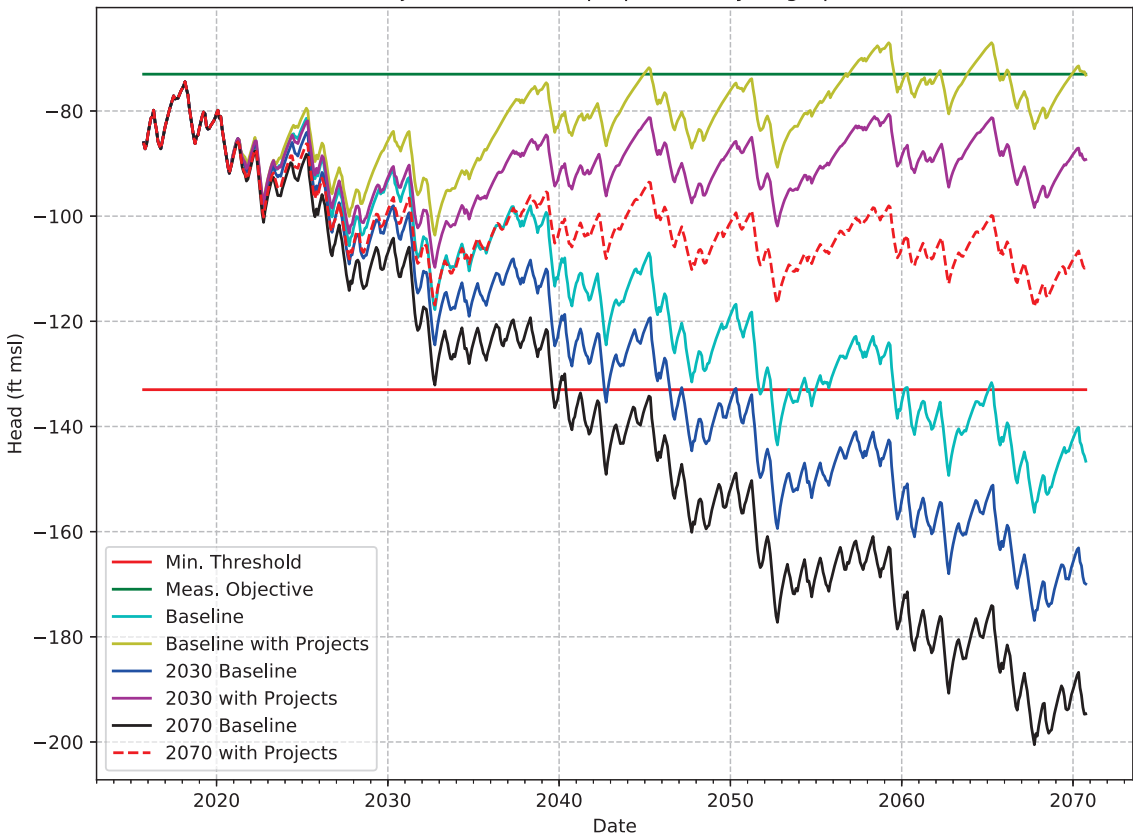
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-141-SWSD



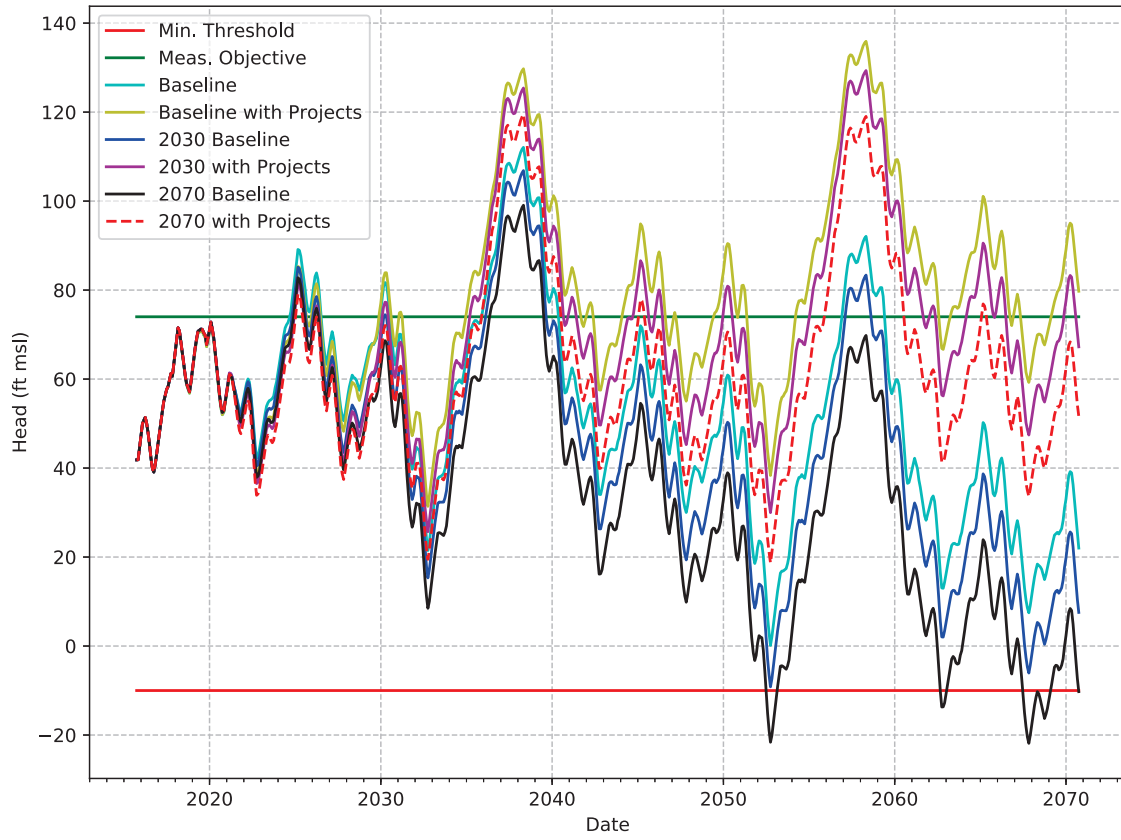
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-142-SWSD



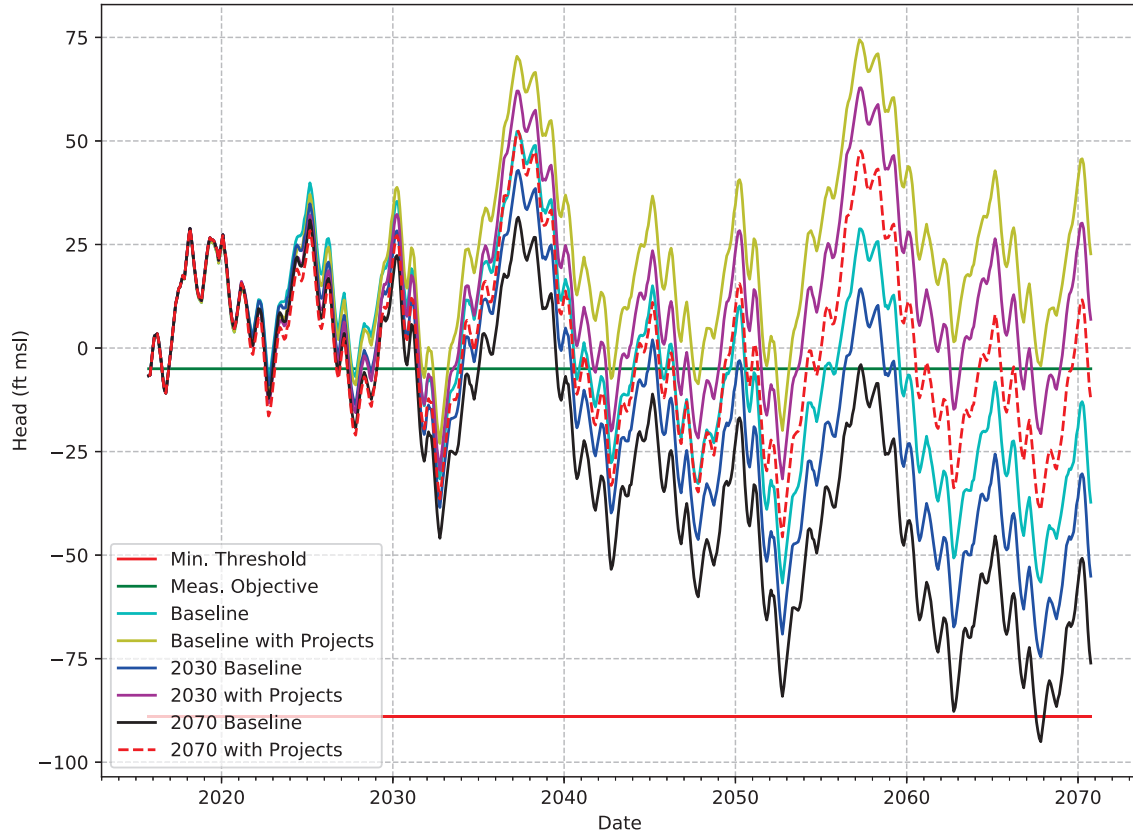
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-143-SWSD



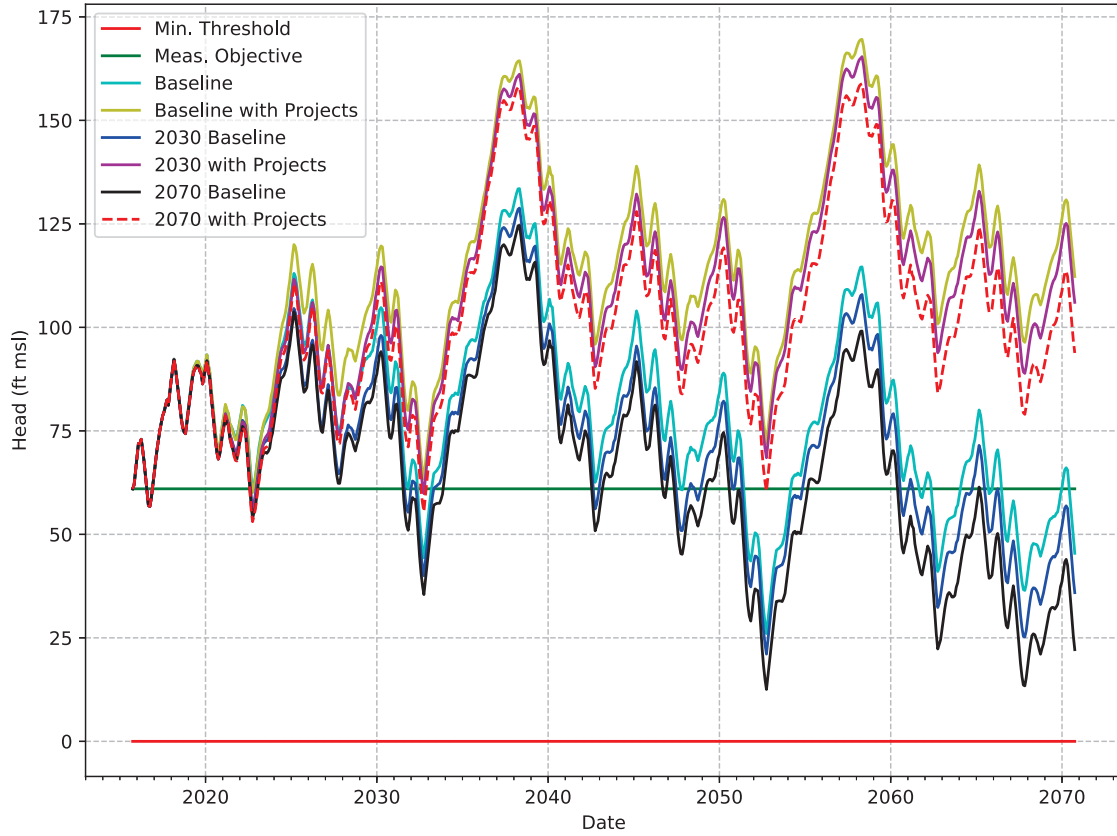
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-145-NKWSD



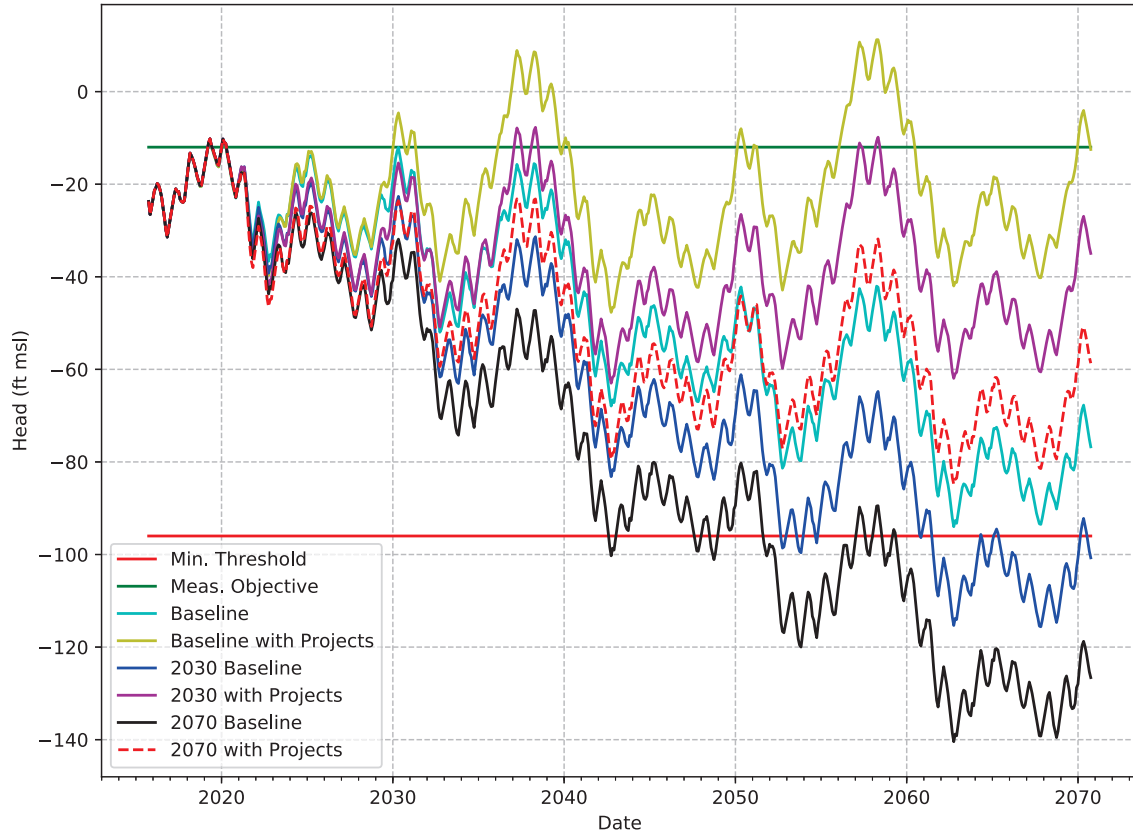
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-146-NKWSD



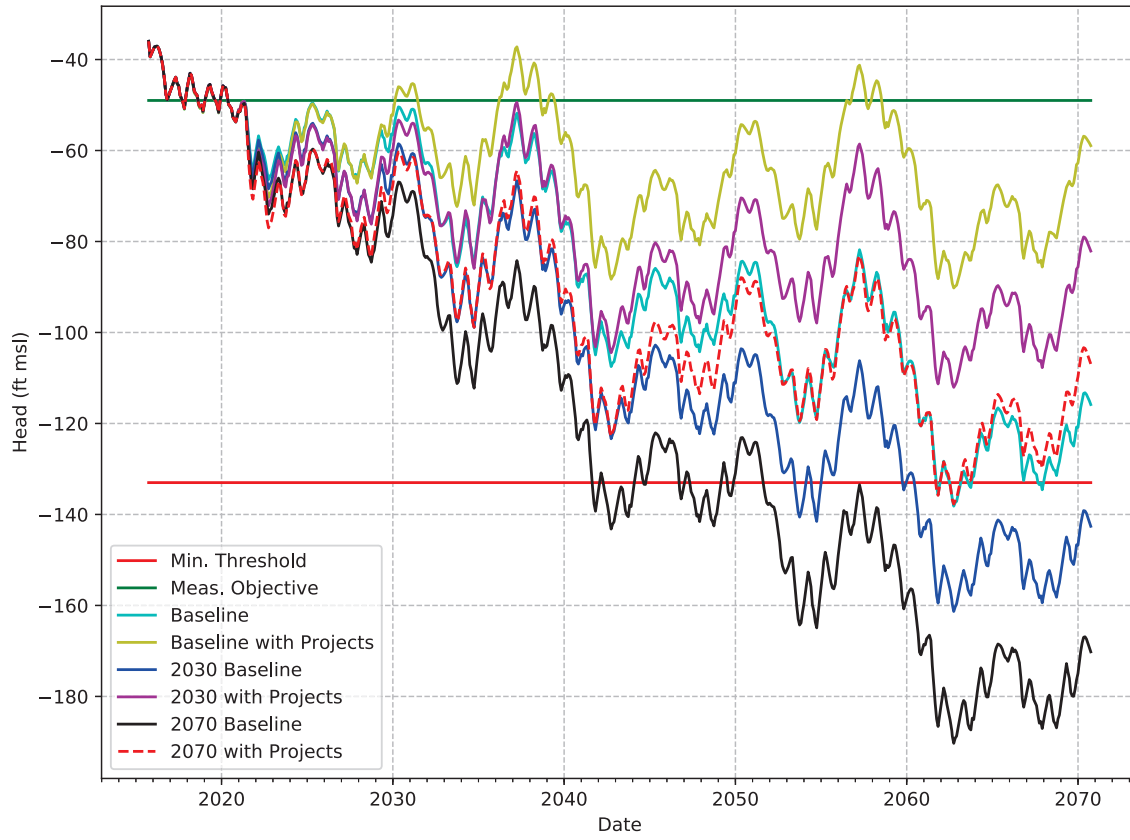
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-149-NKWSD



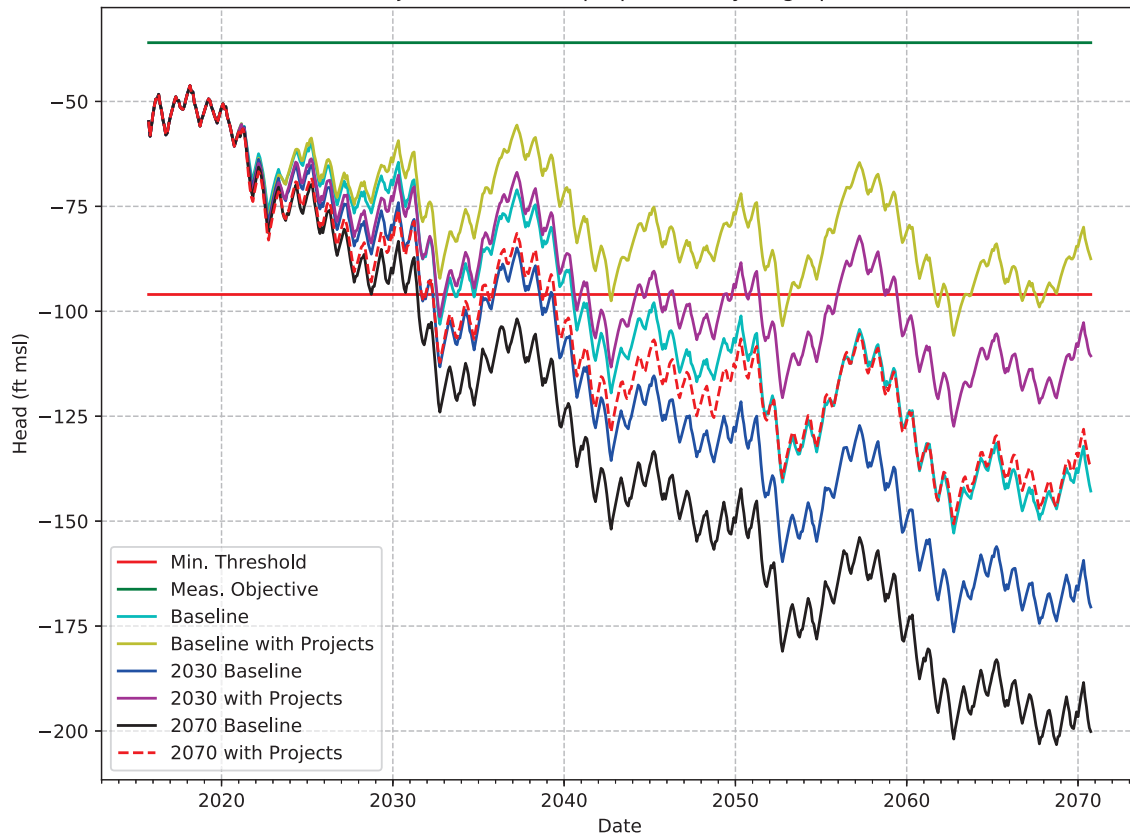
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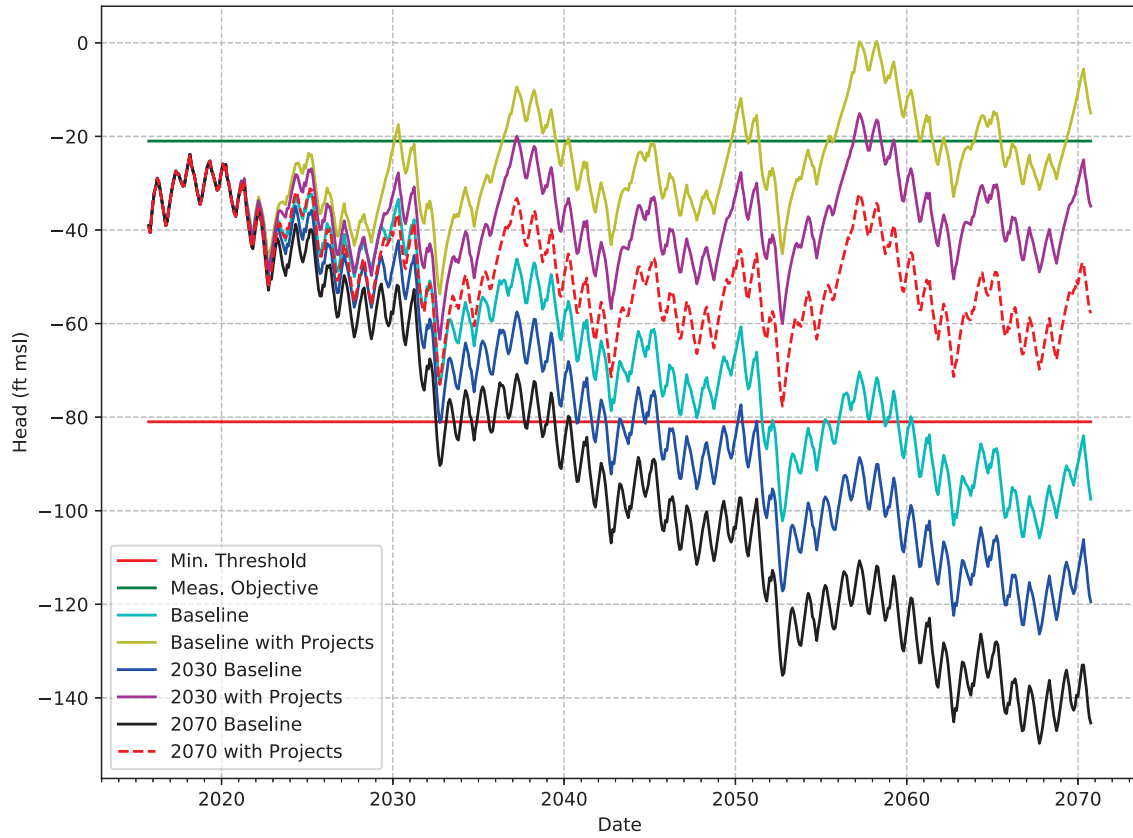
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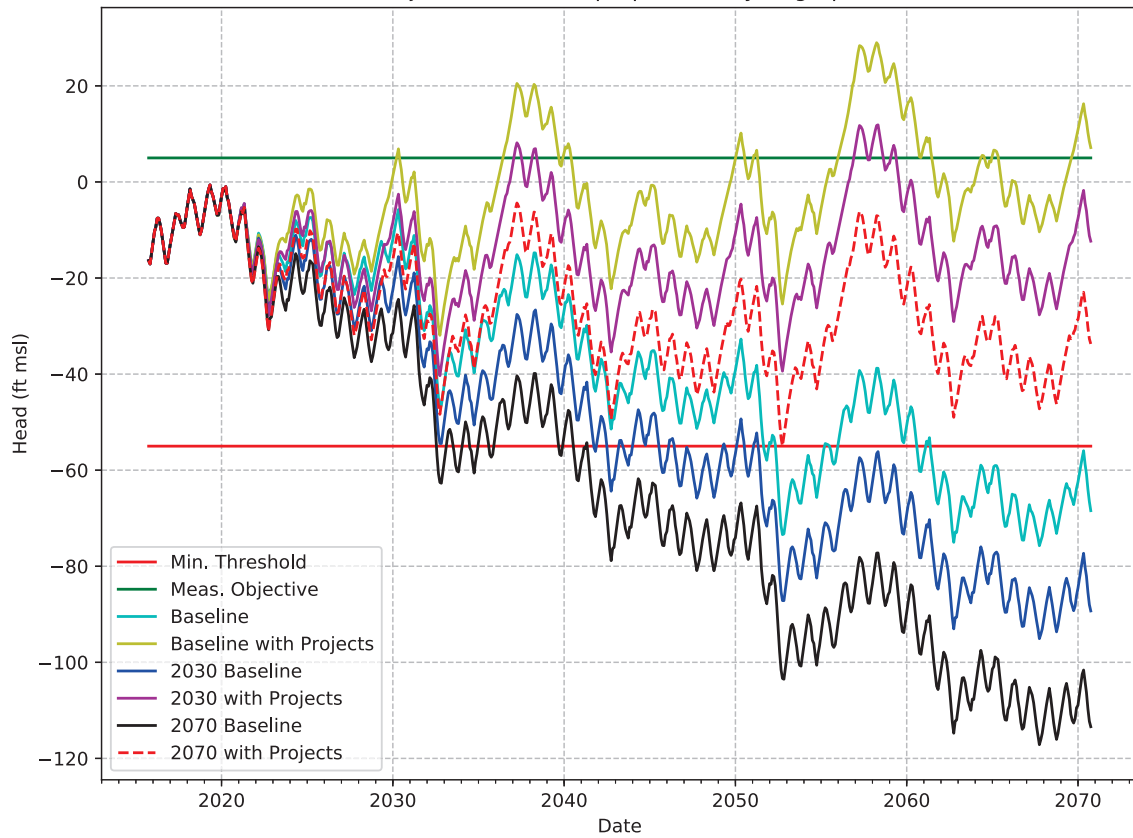
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-152-NKWSD

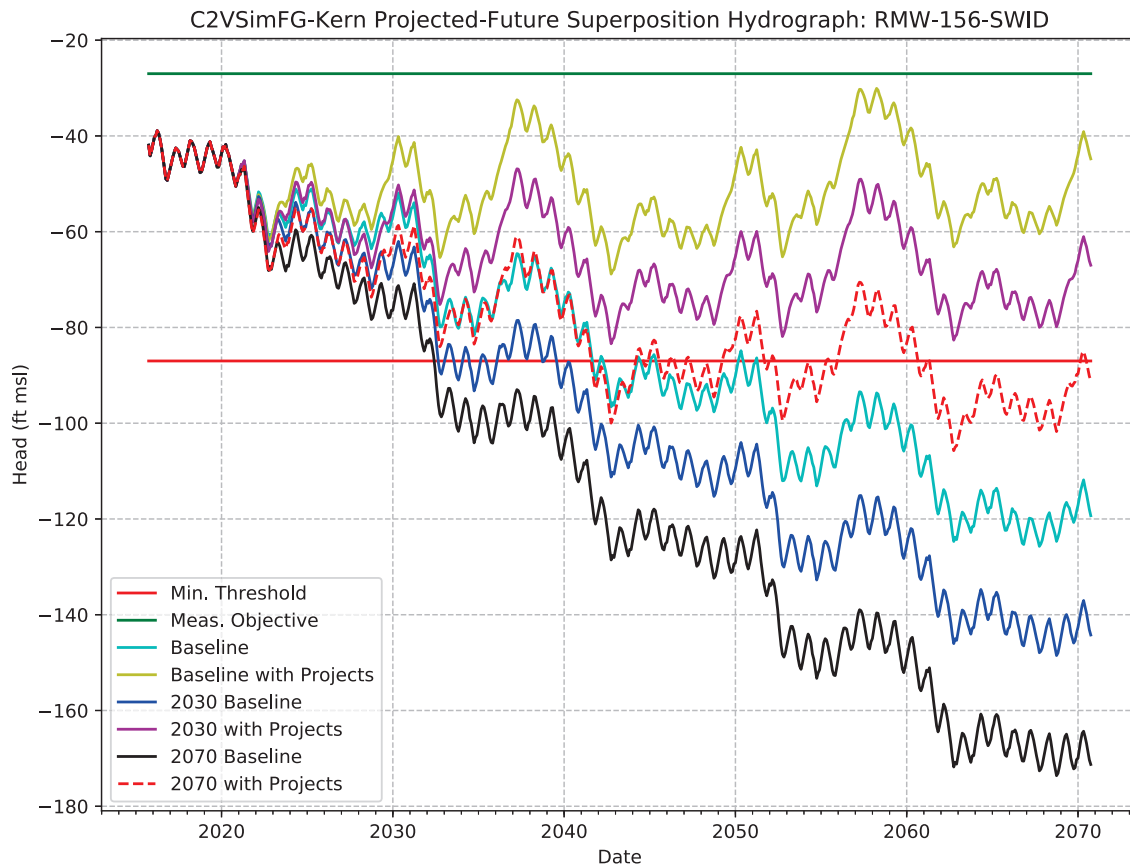
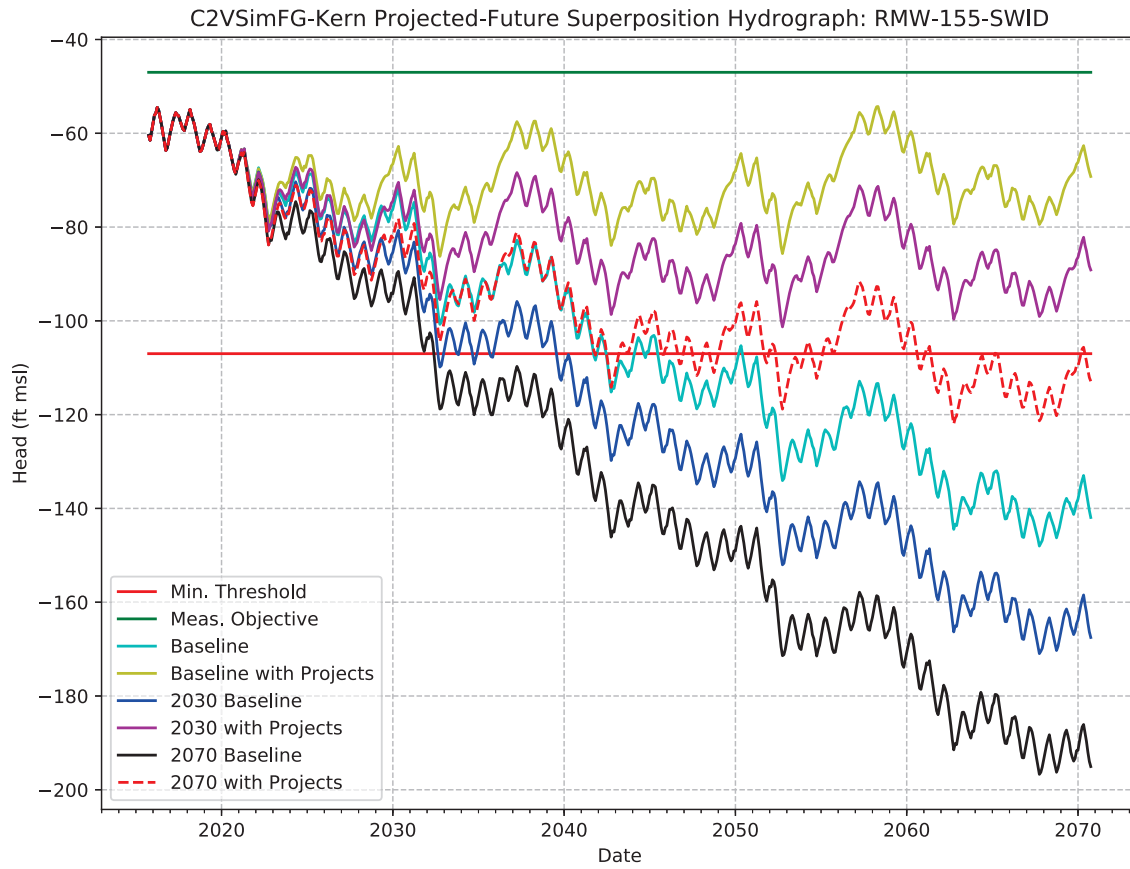


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-153-SWID

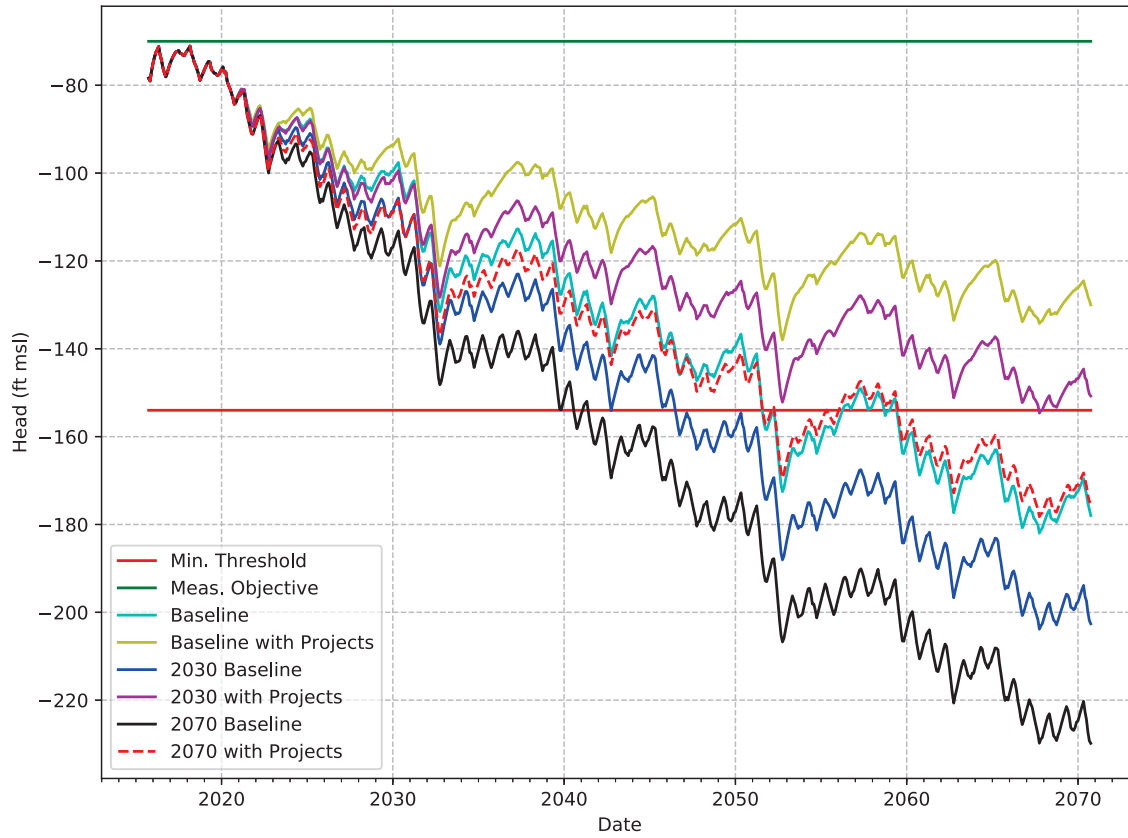


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-154-SWID

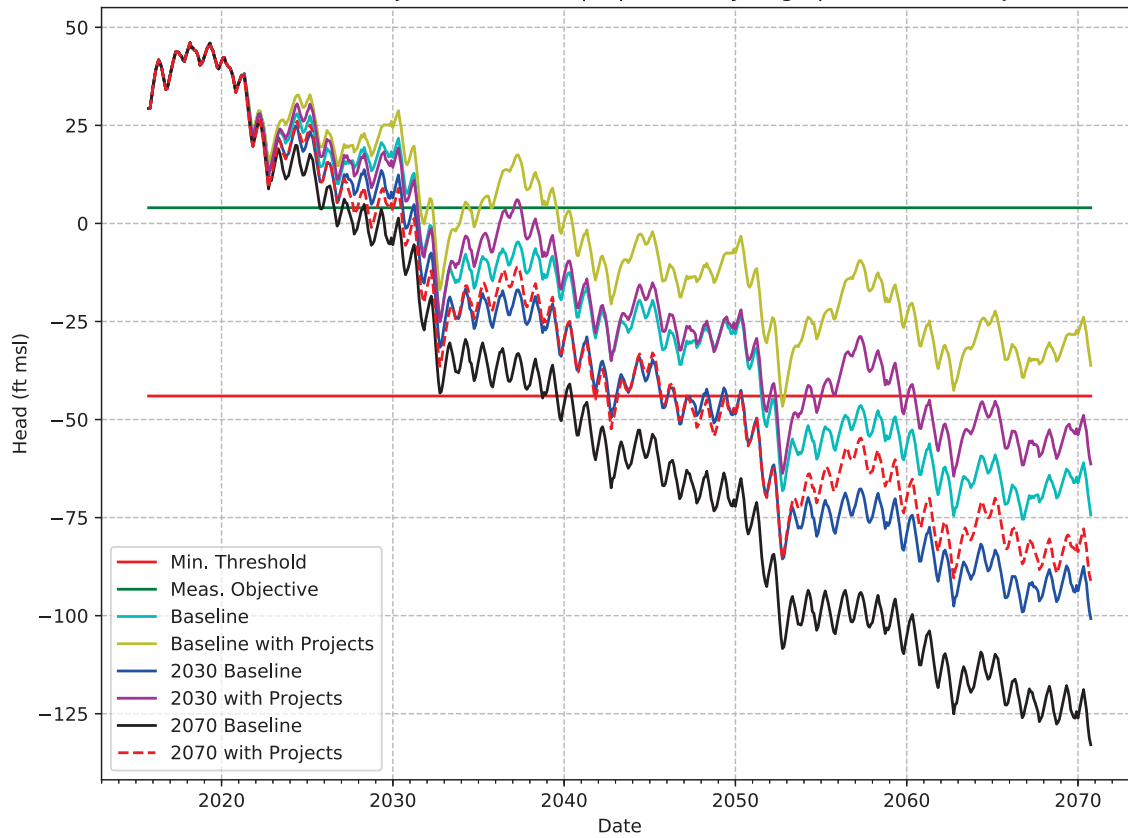




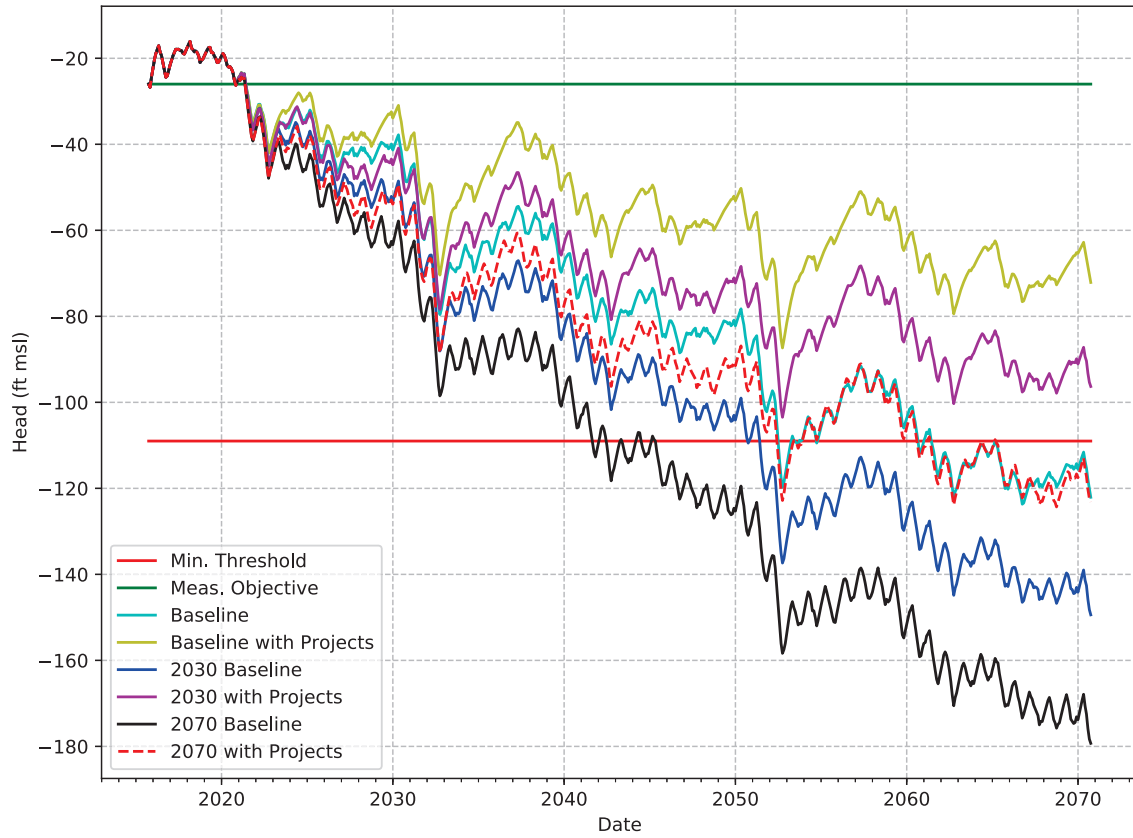
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-157-SSJMUD



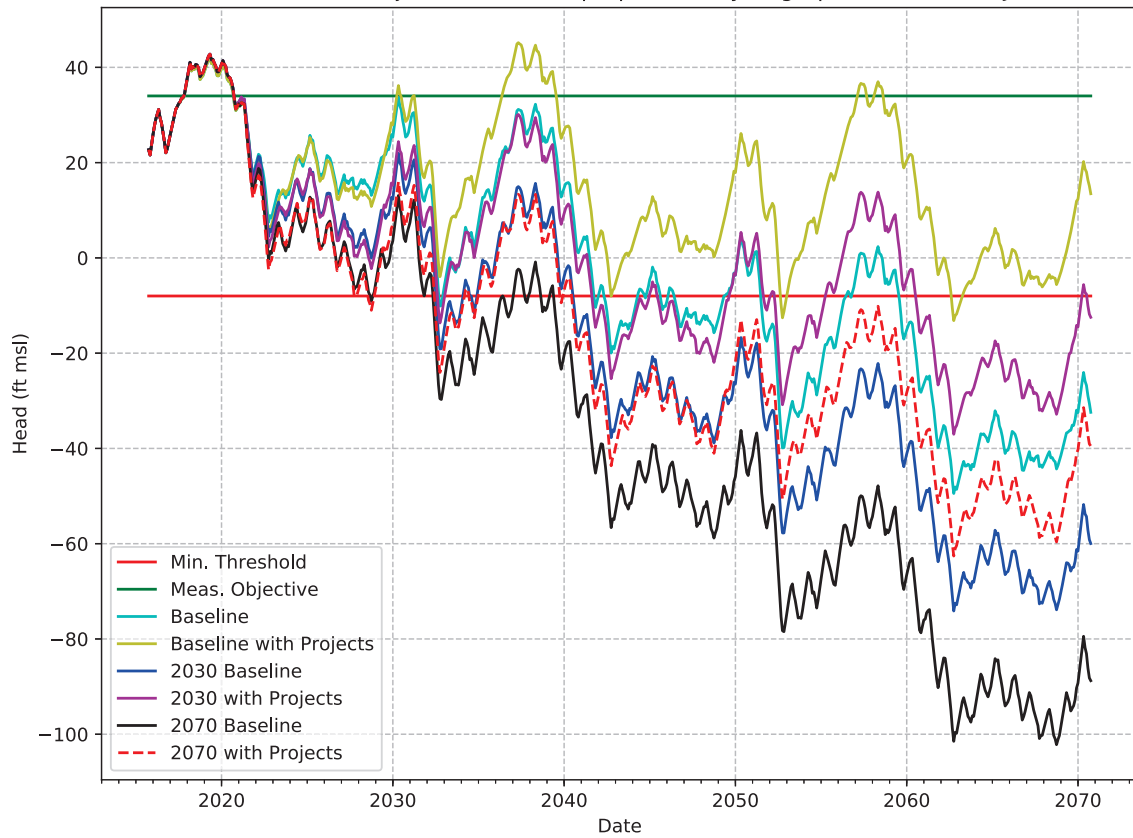
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-158-SSJMUD

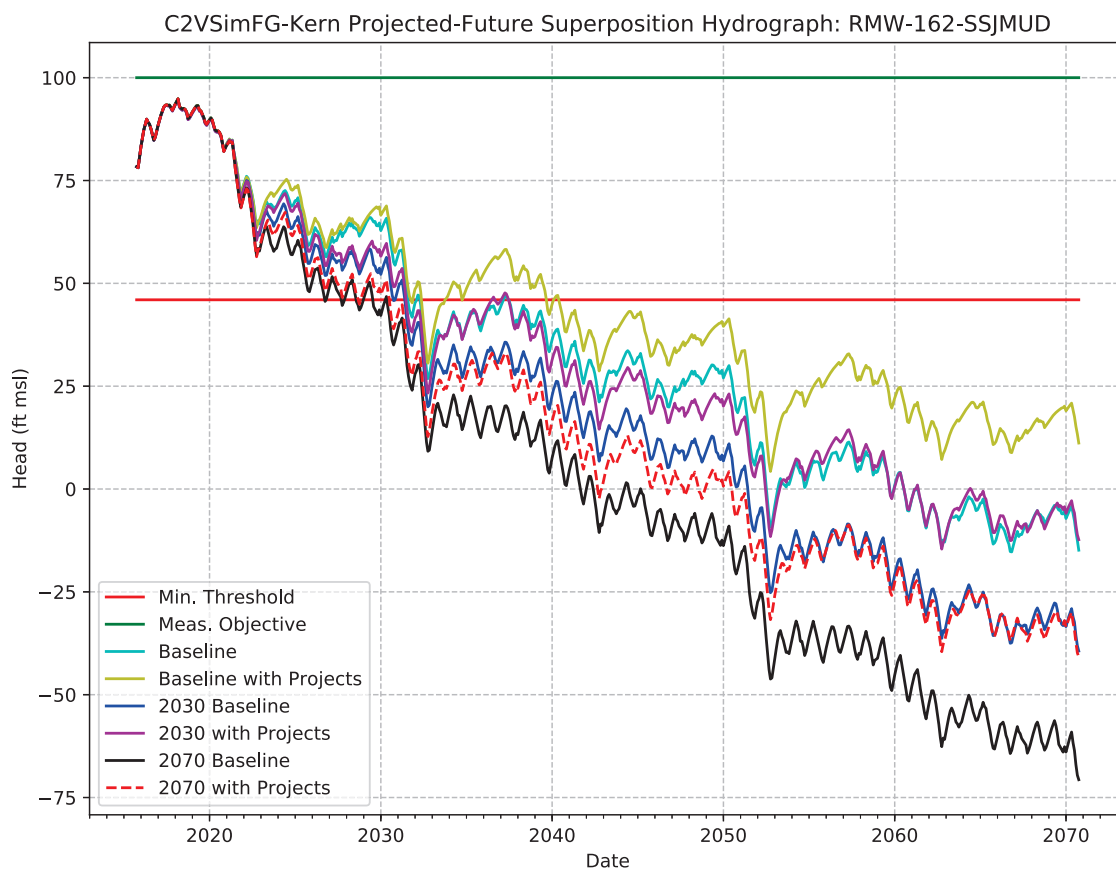
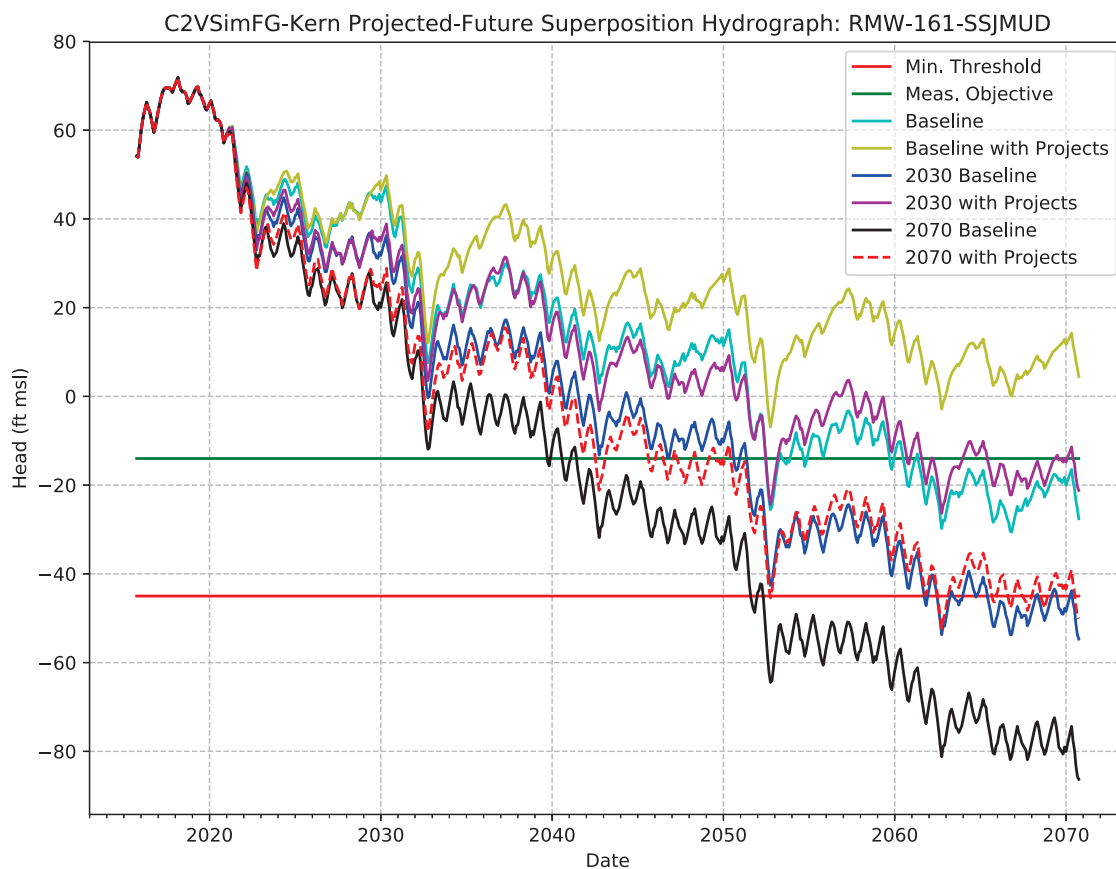


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-159-SSJMUD

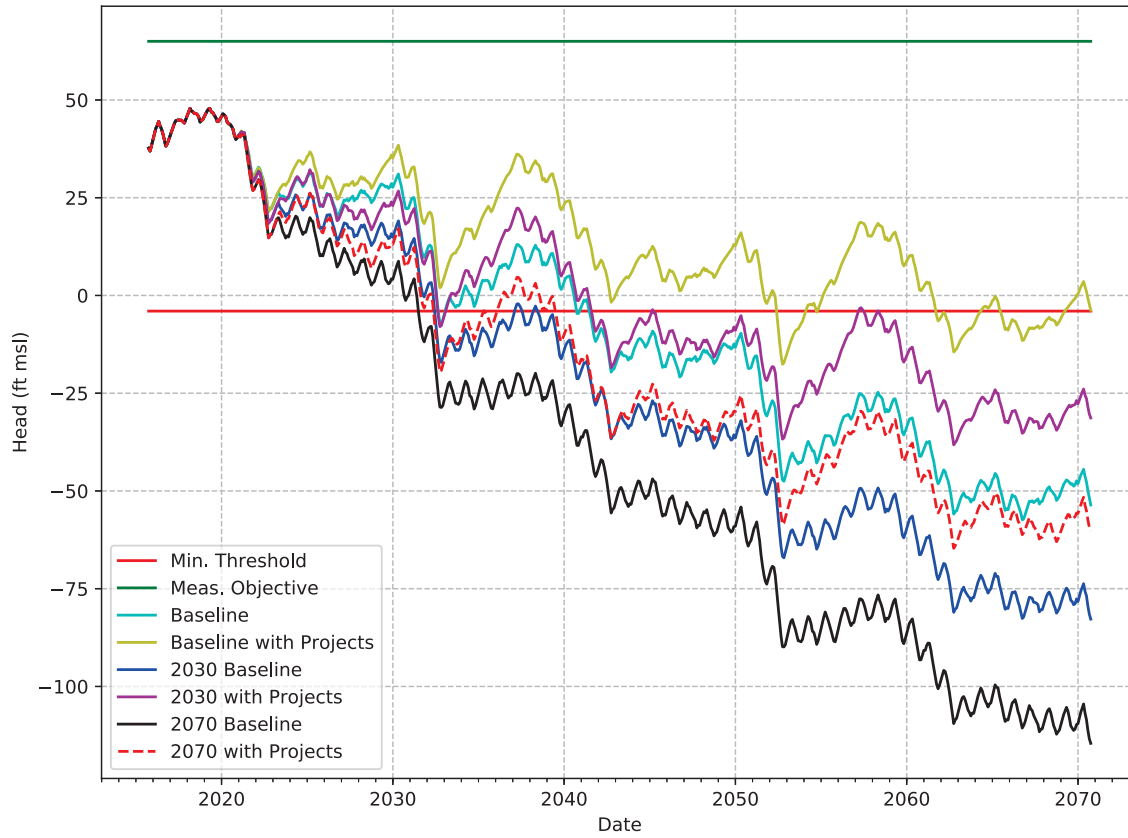


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-160-SSJMUD

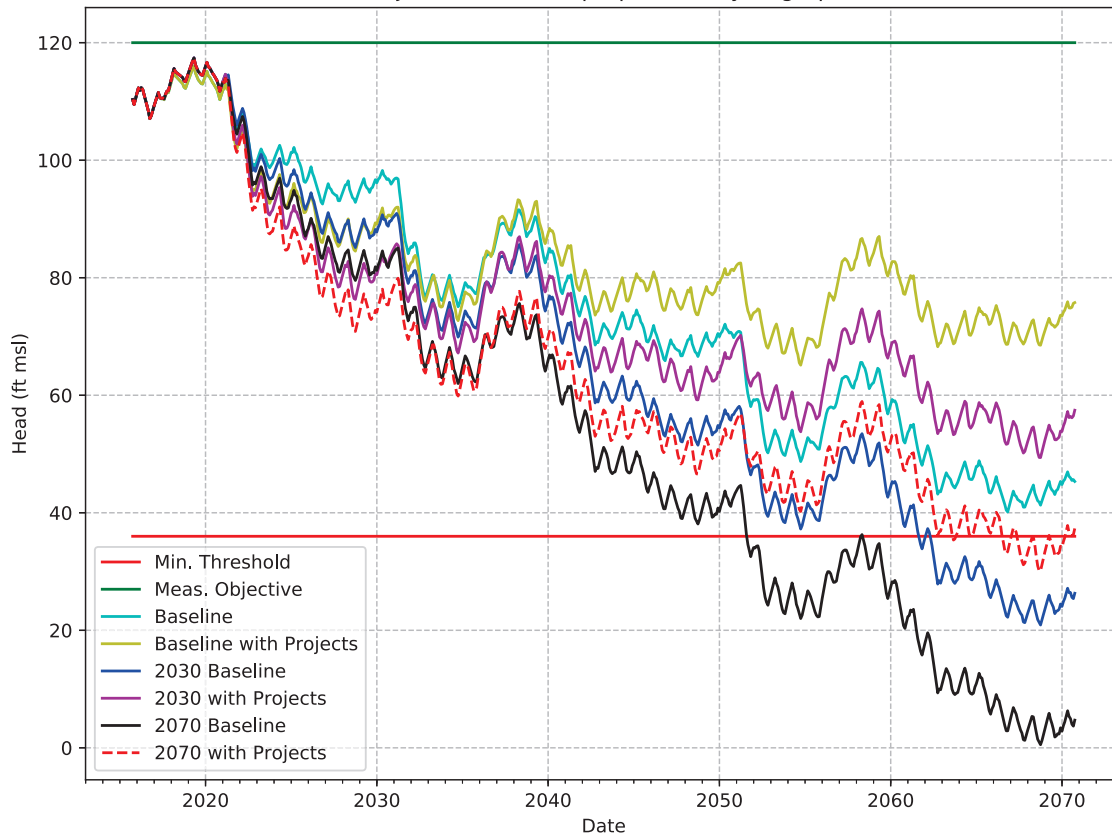




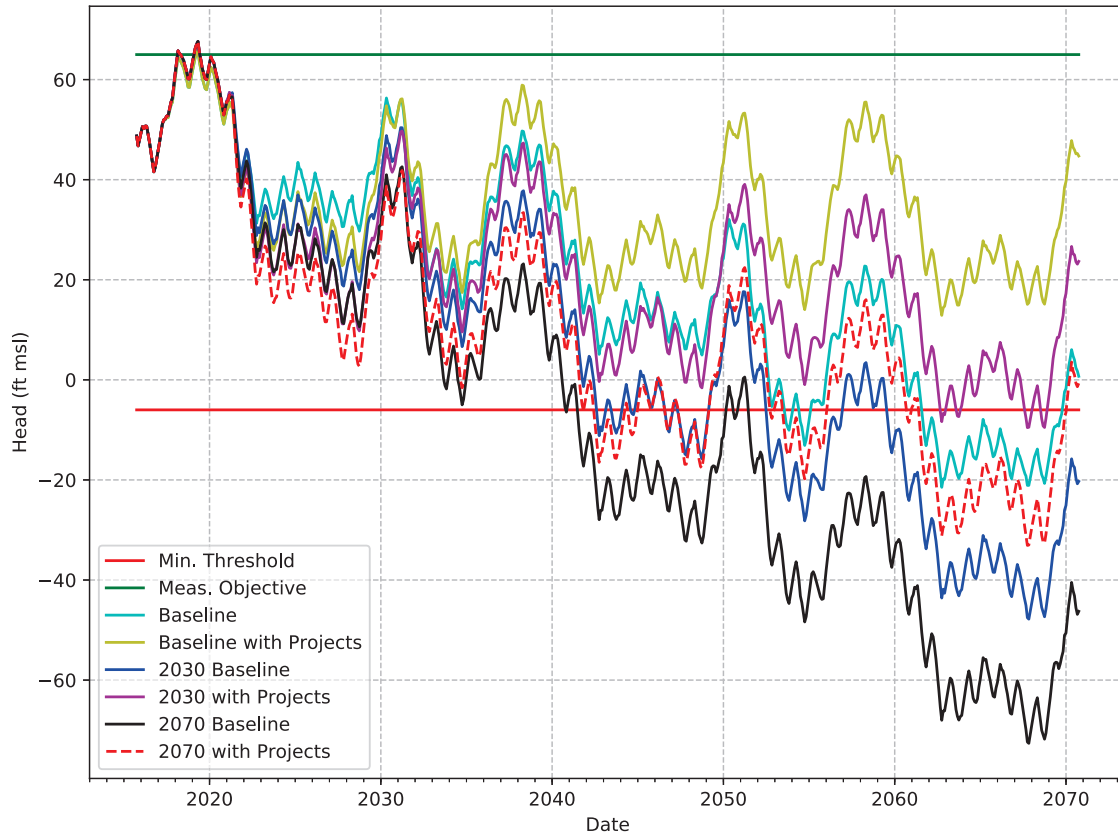
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-163-SSJMUD



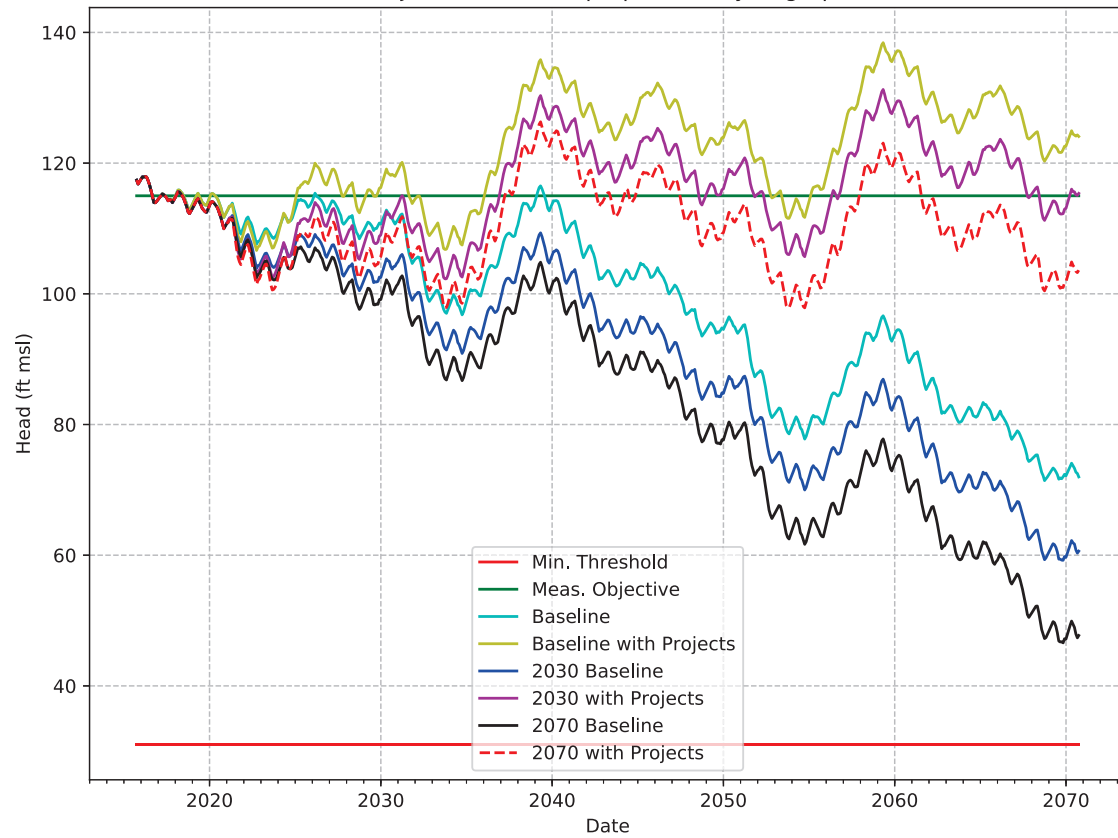
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-167-CWD



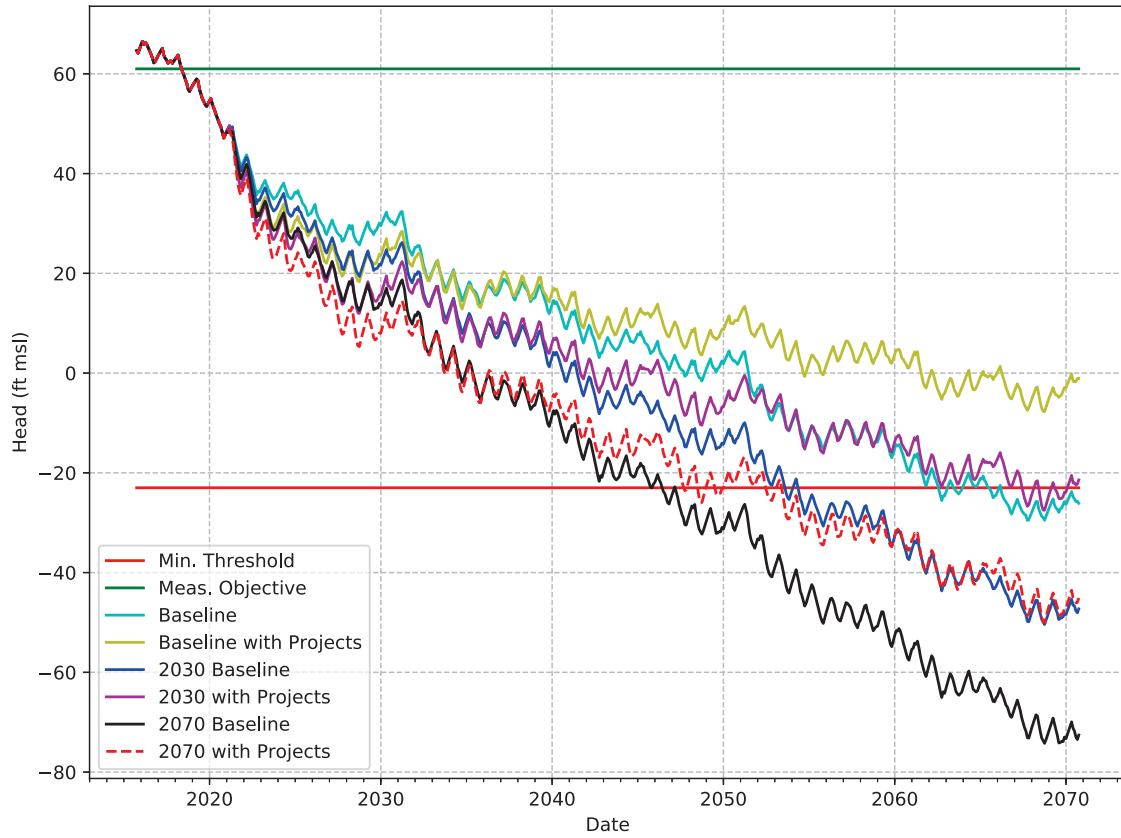
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-168-CWD



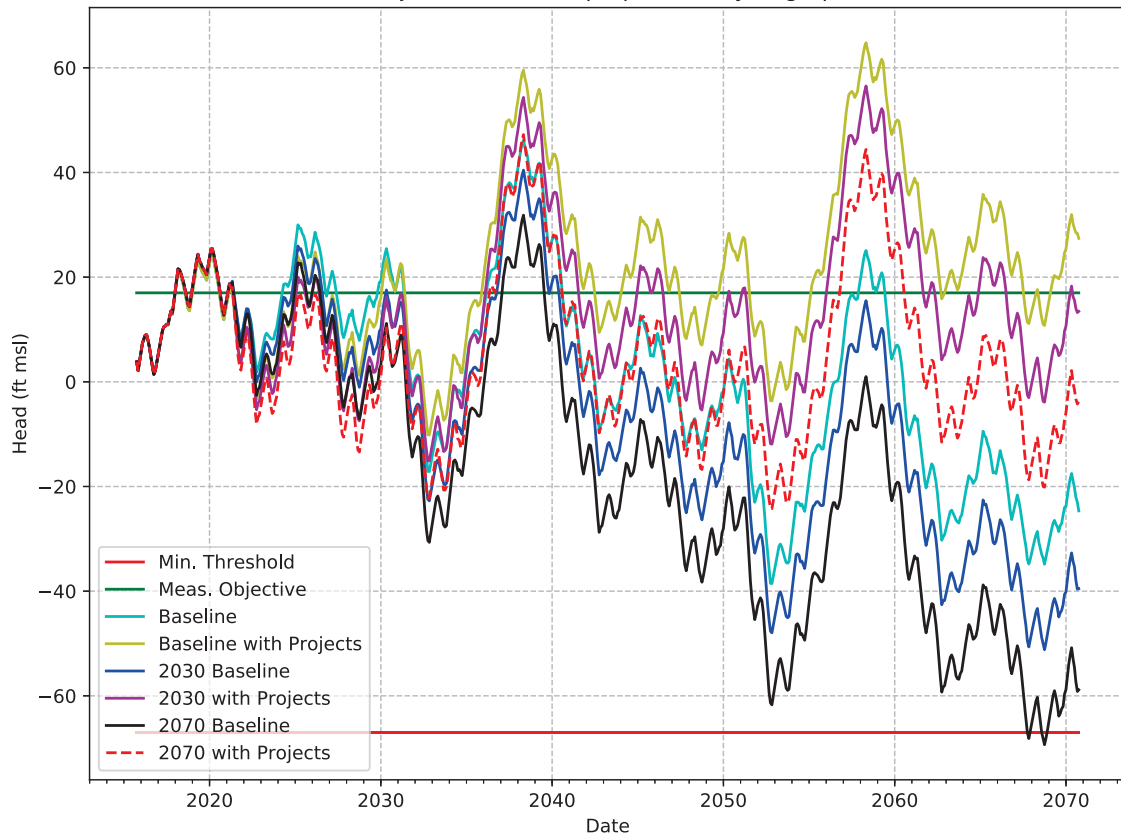
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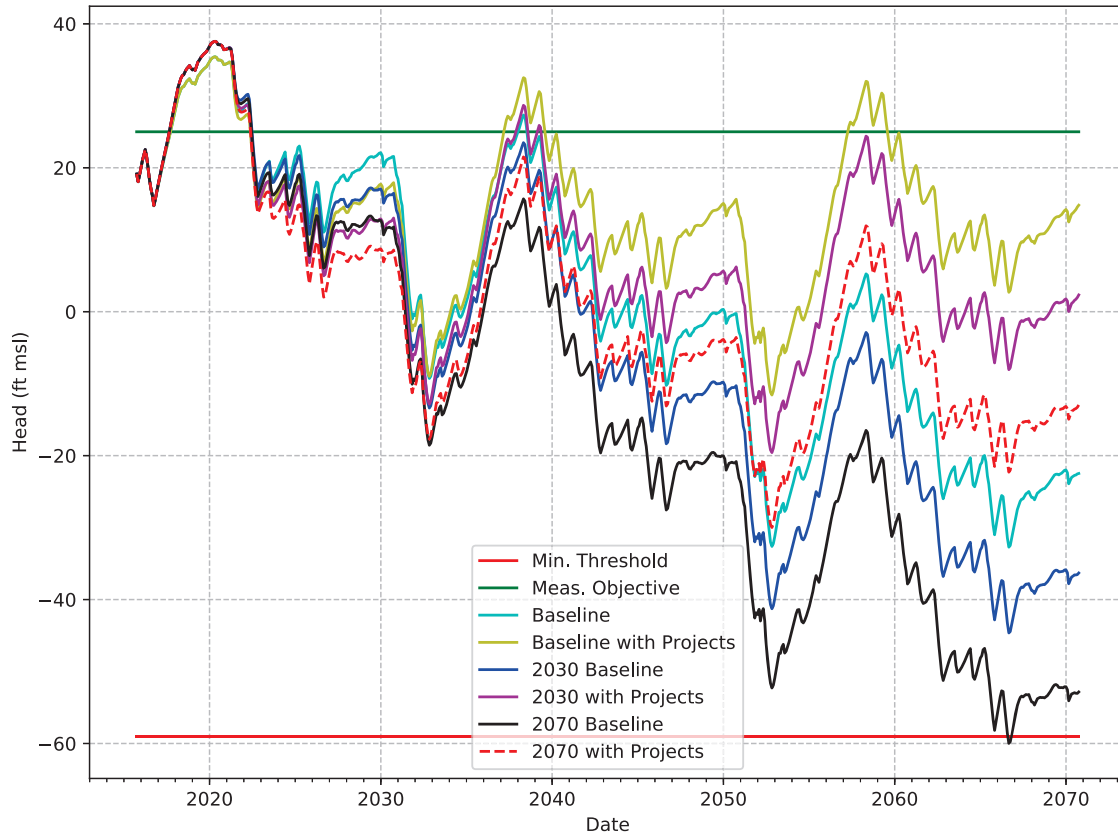
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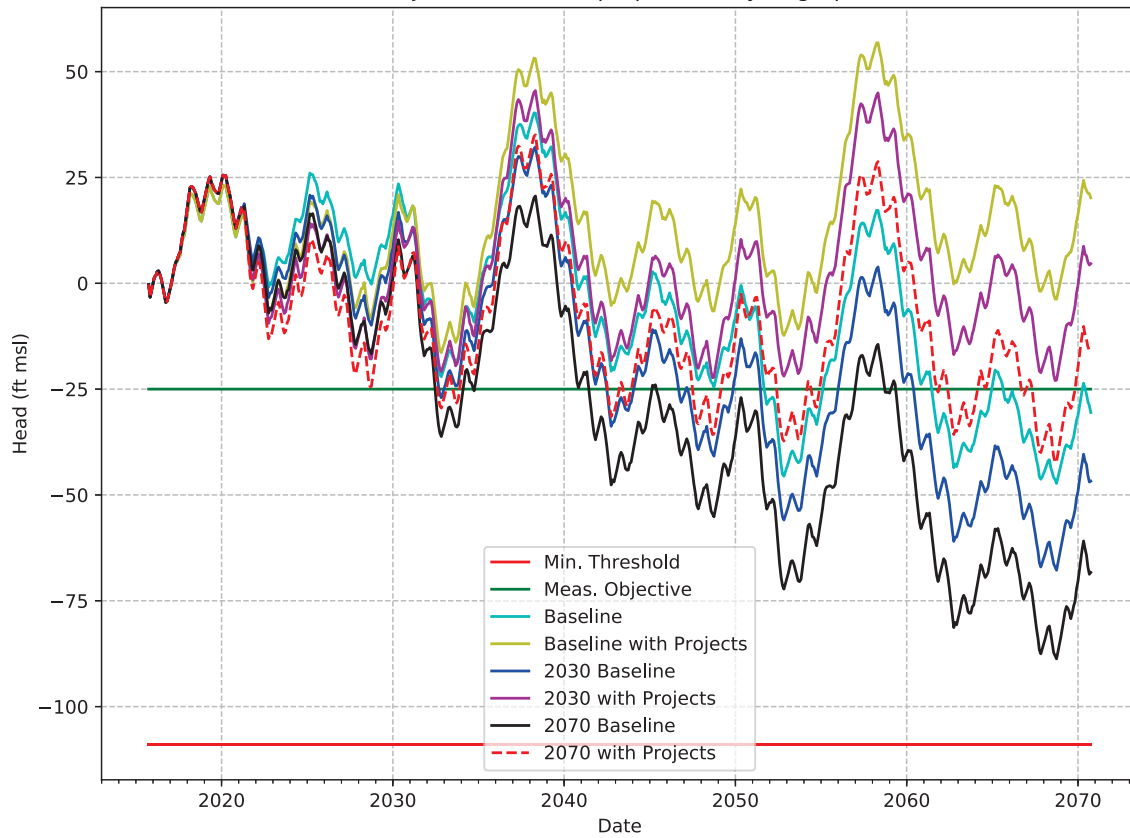
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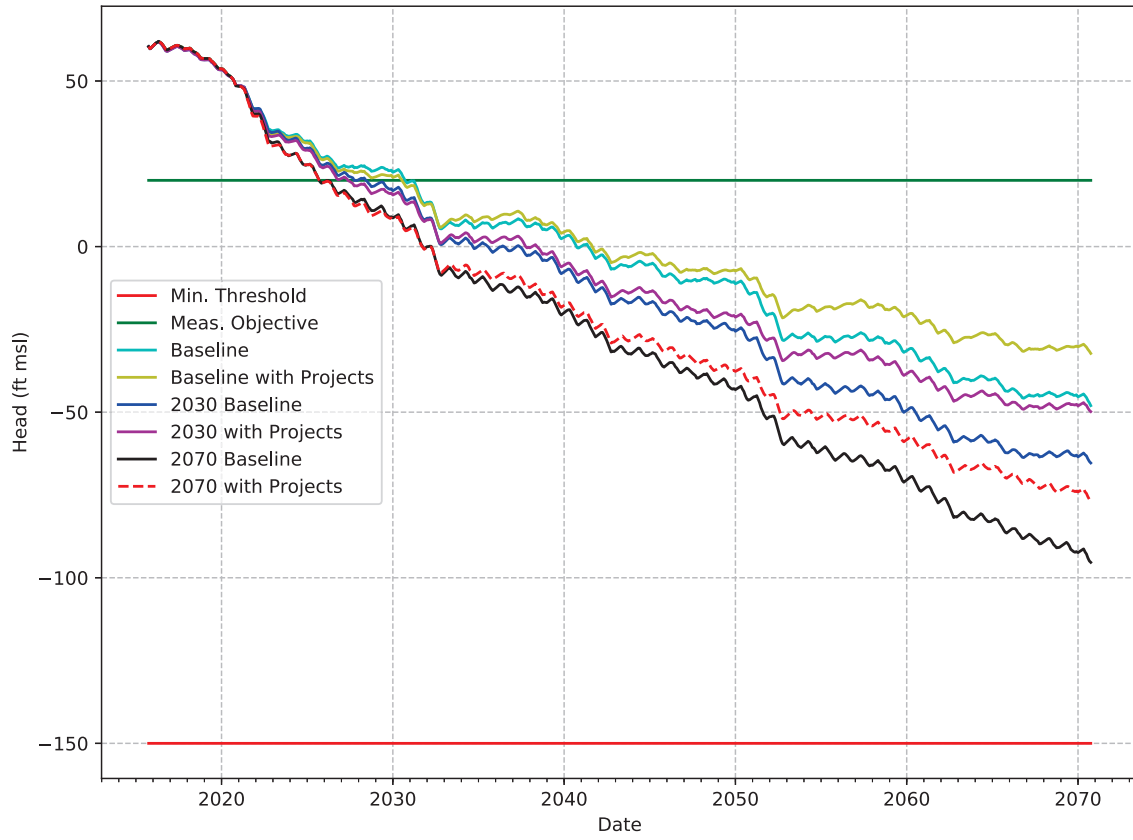
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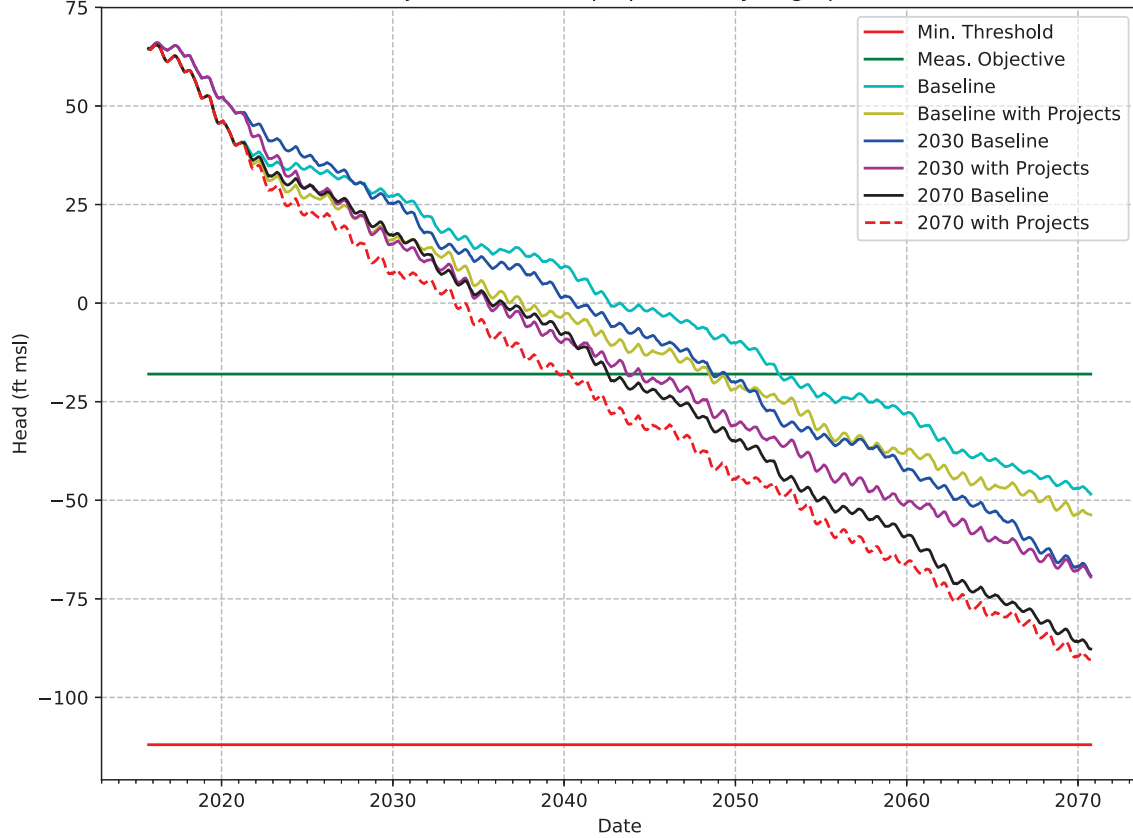
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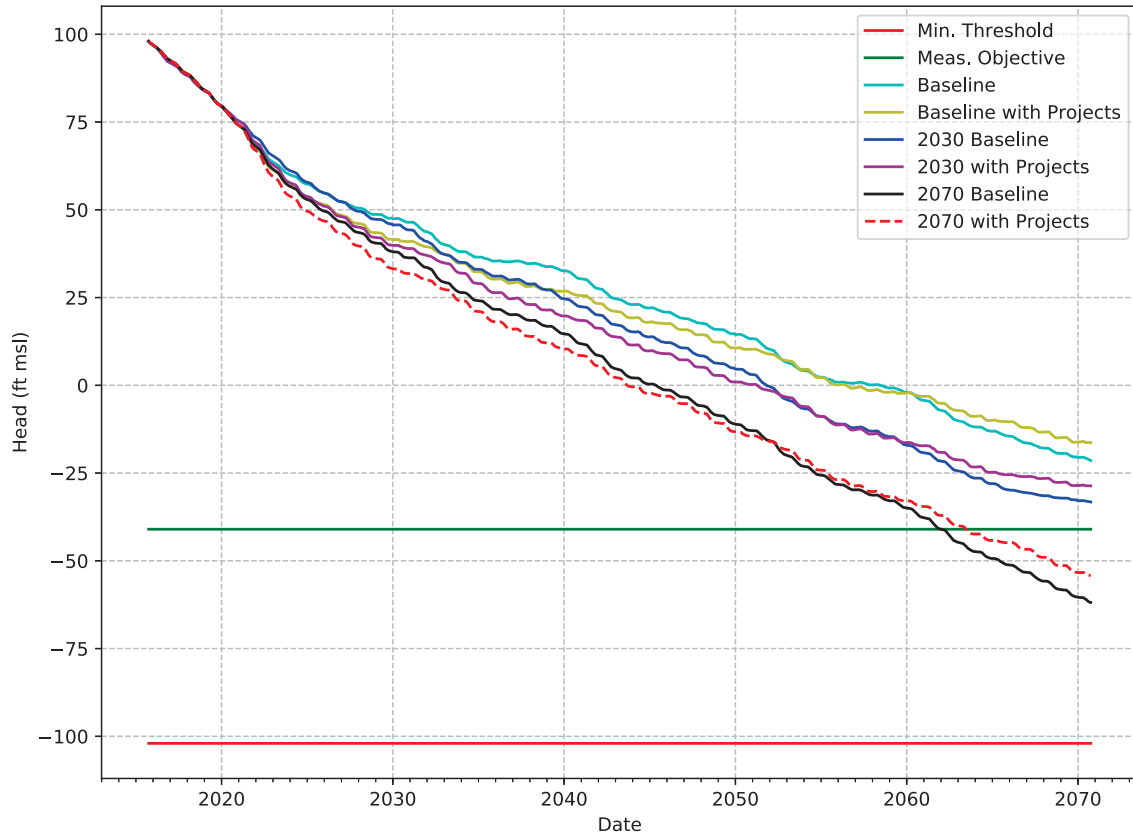
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-174-KTWD



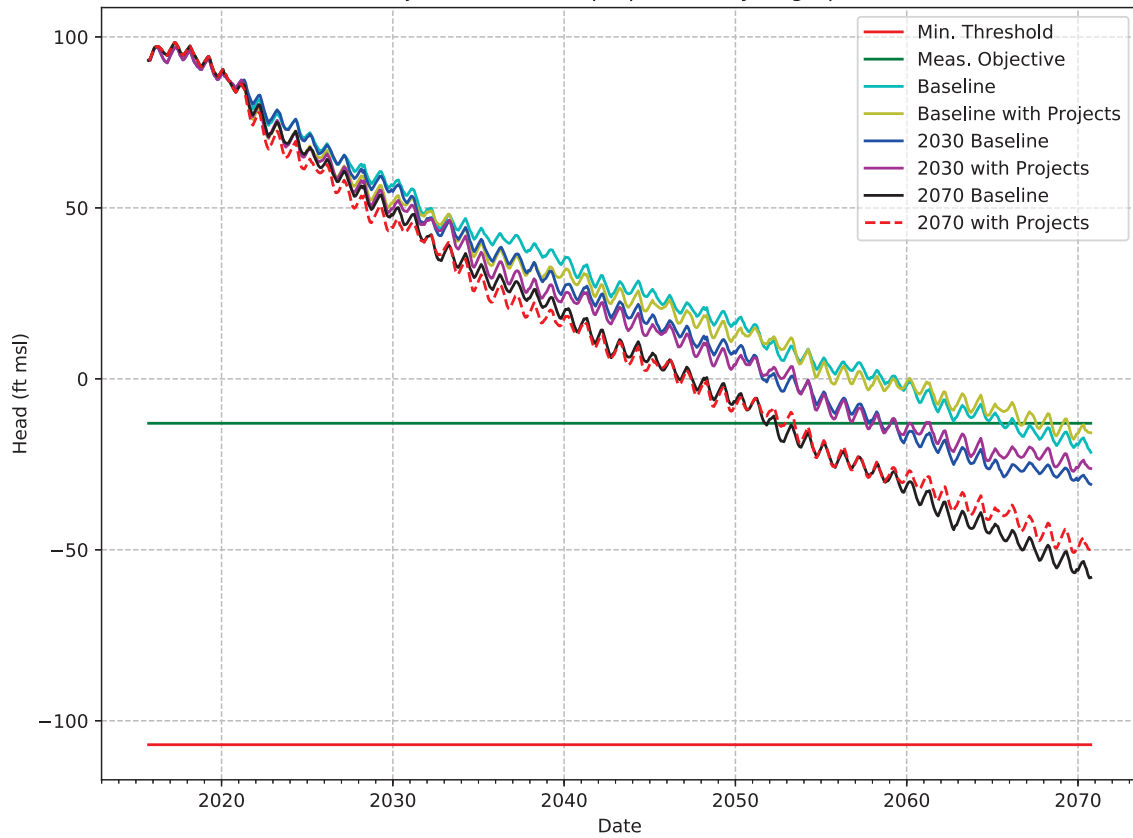
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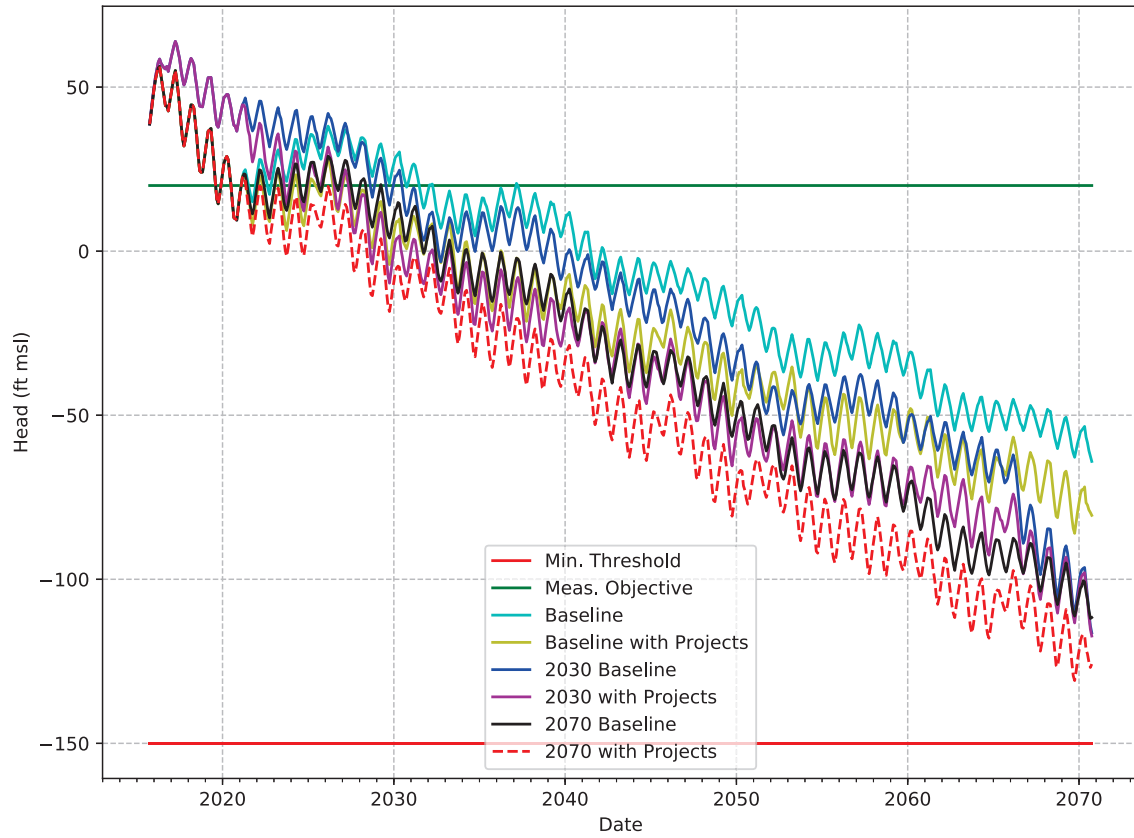
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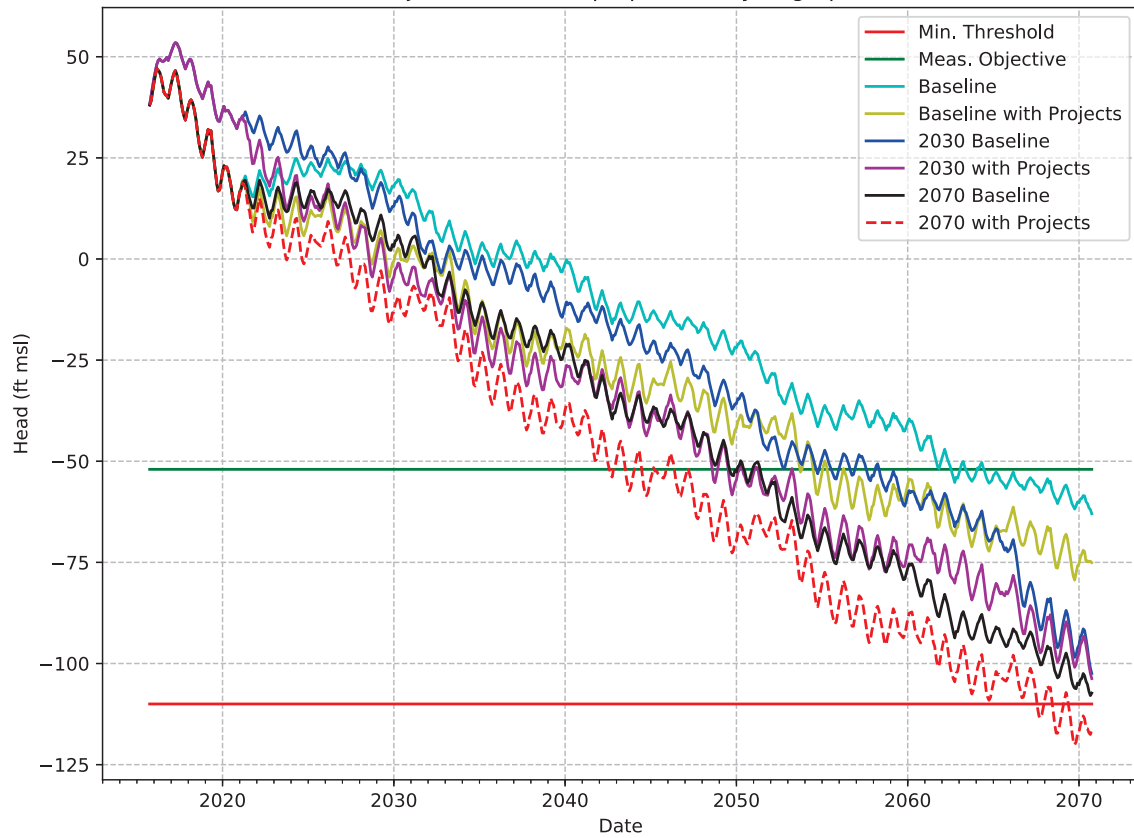
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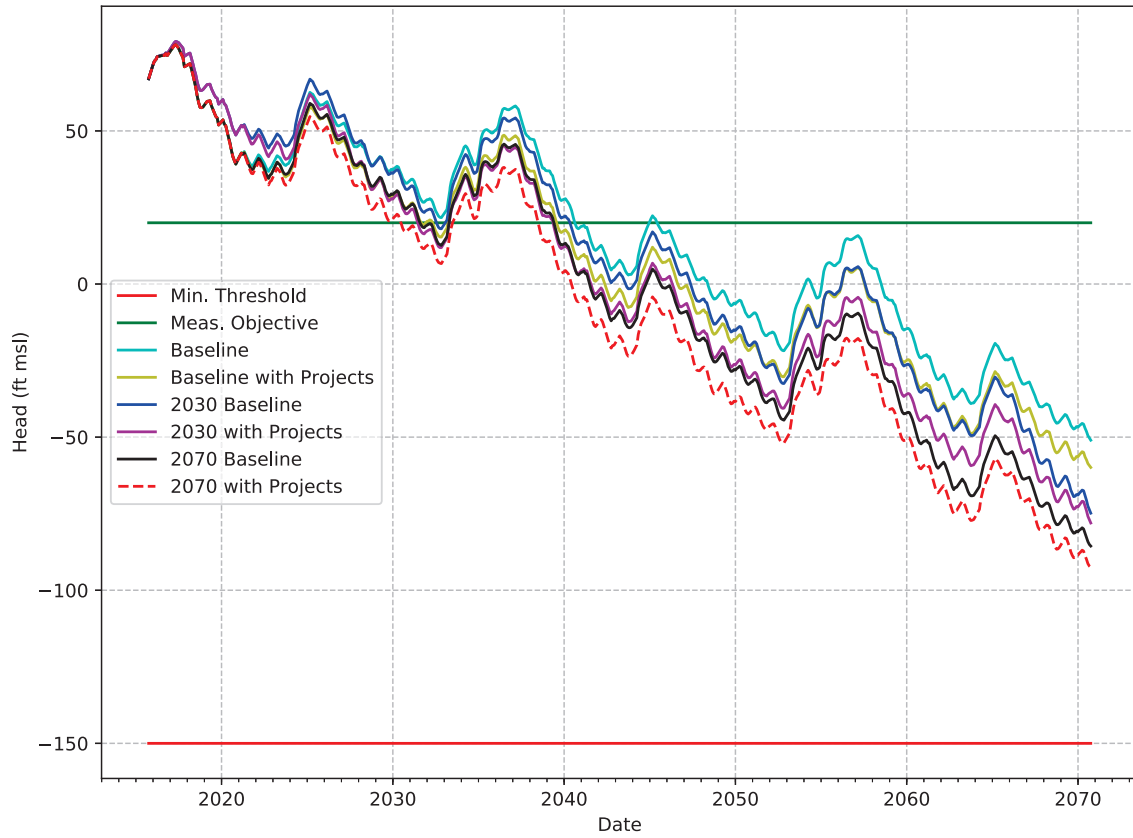
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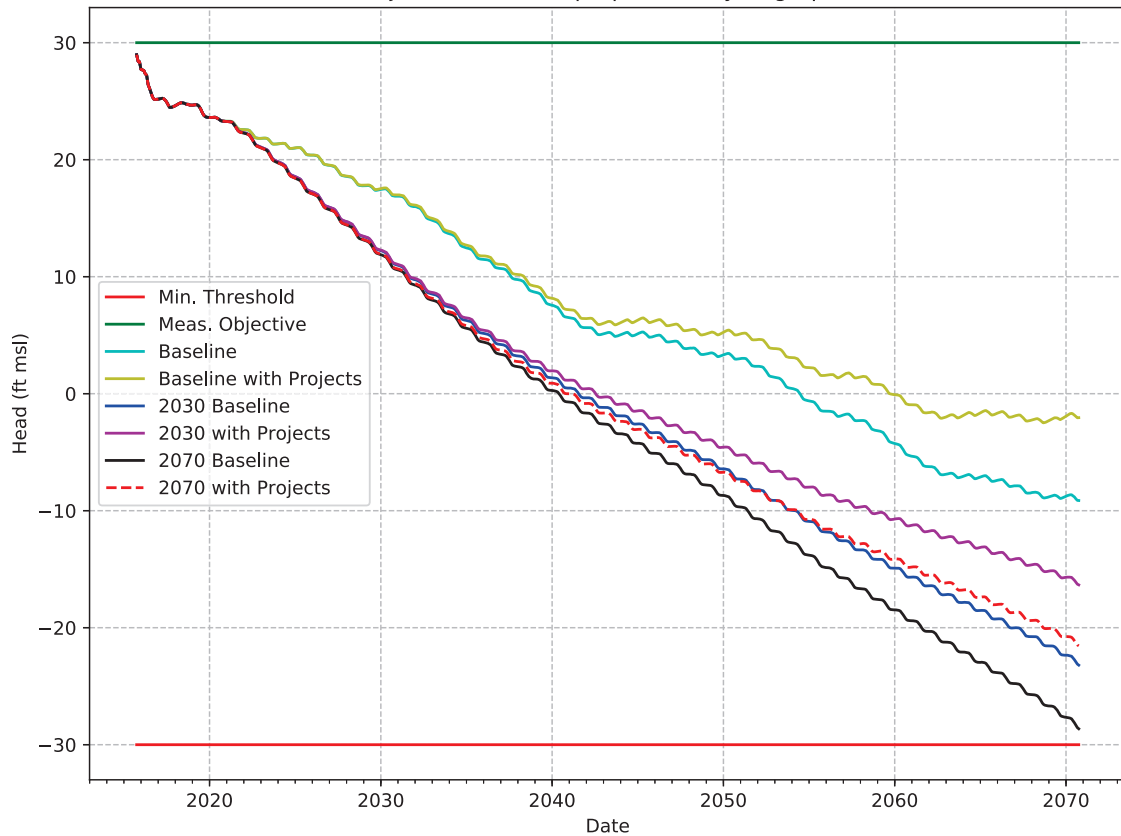
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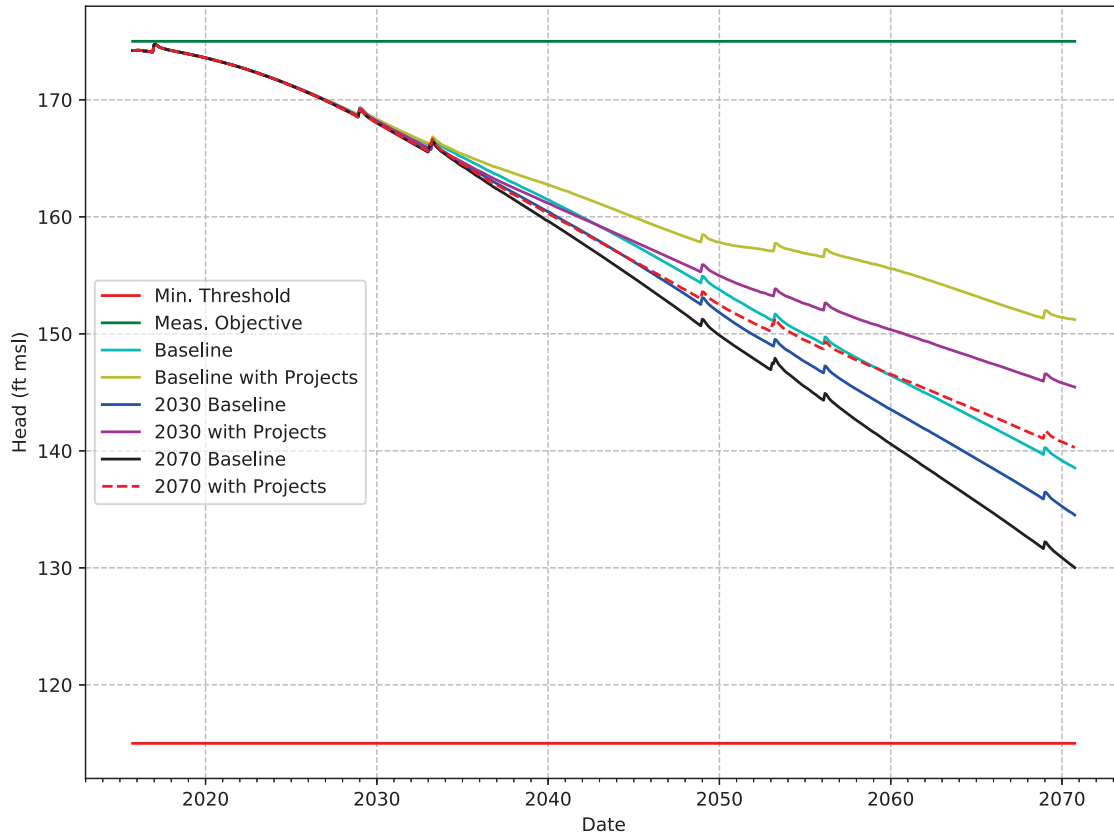
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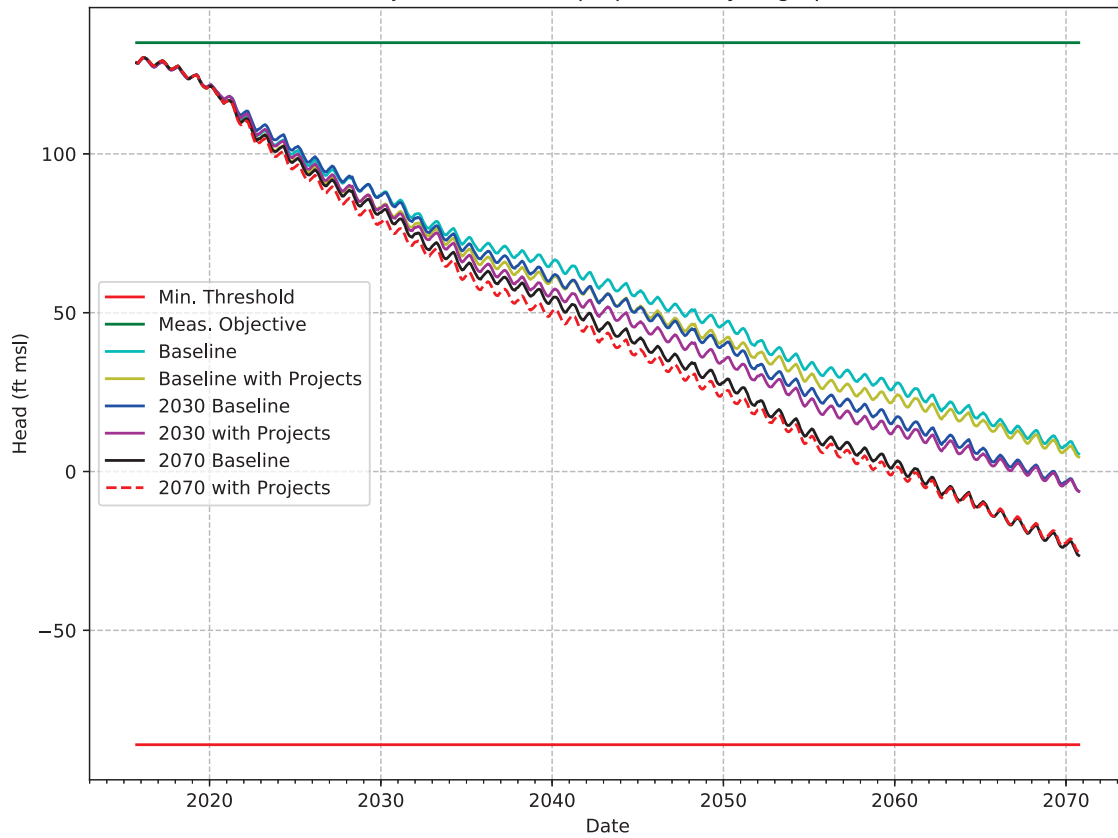
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-181-WDWA



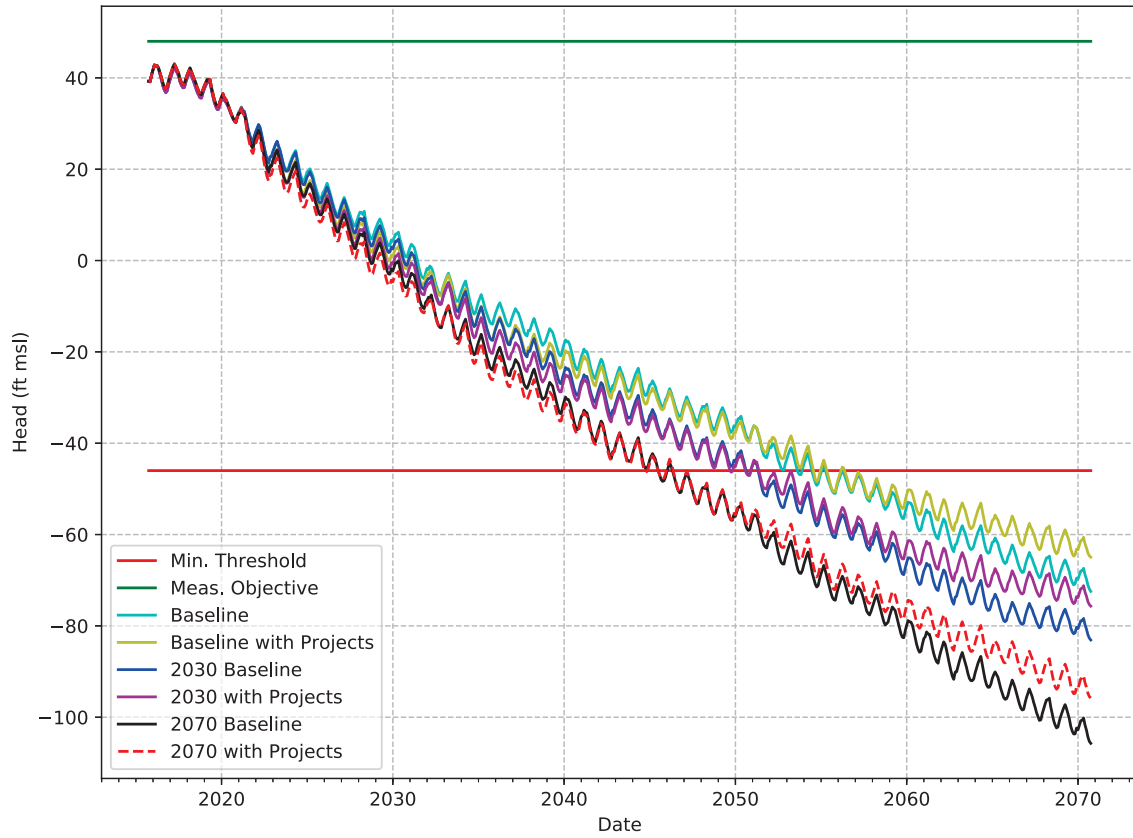
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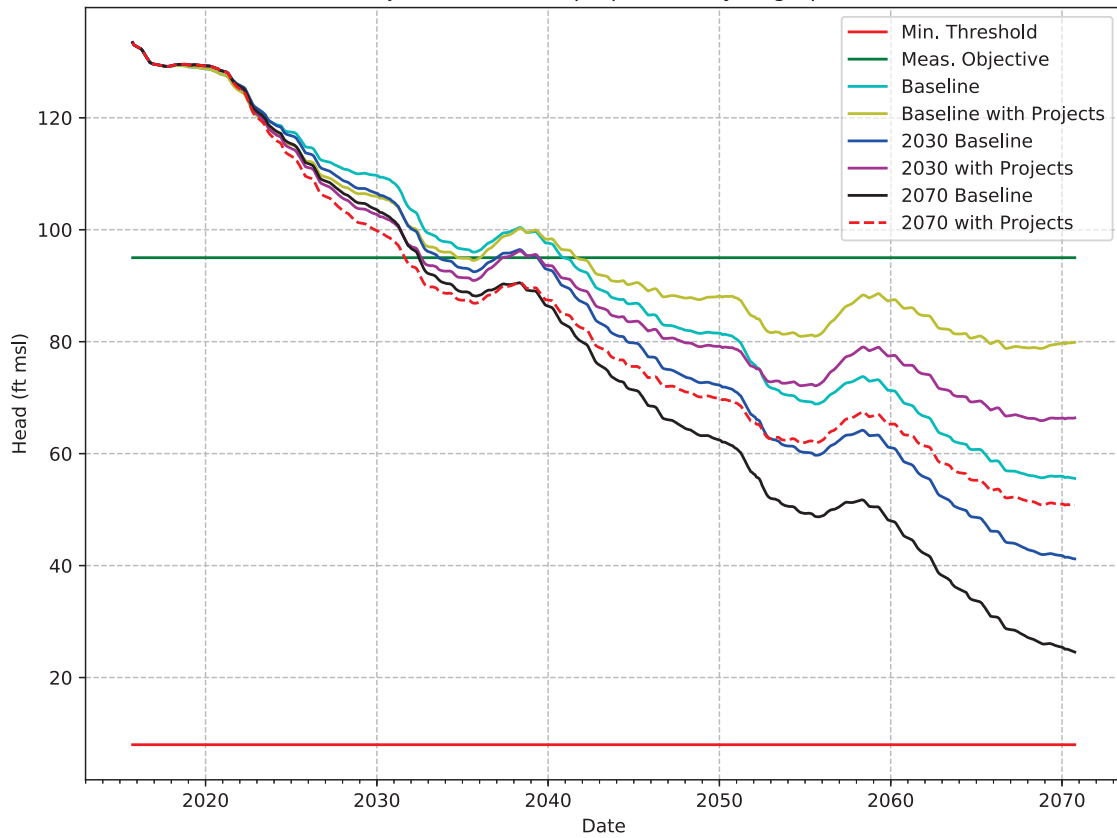
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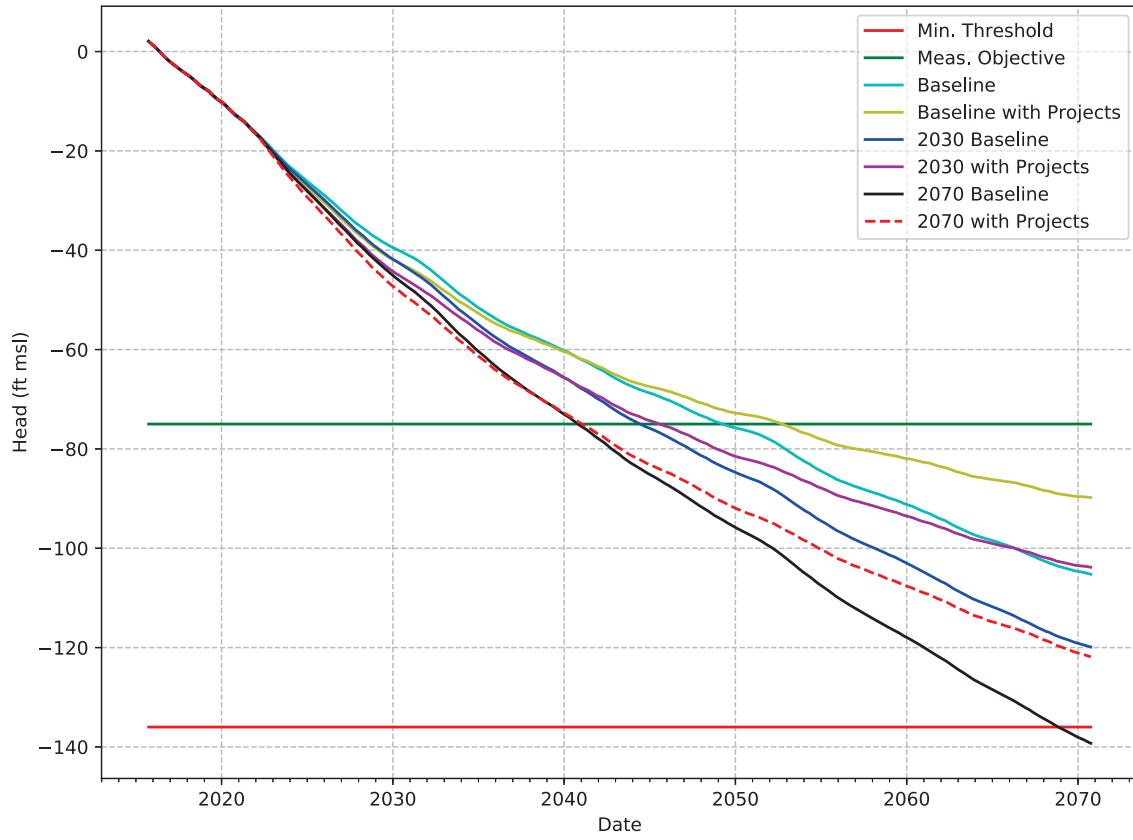
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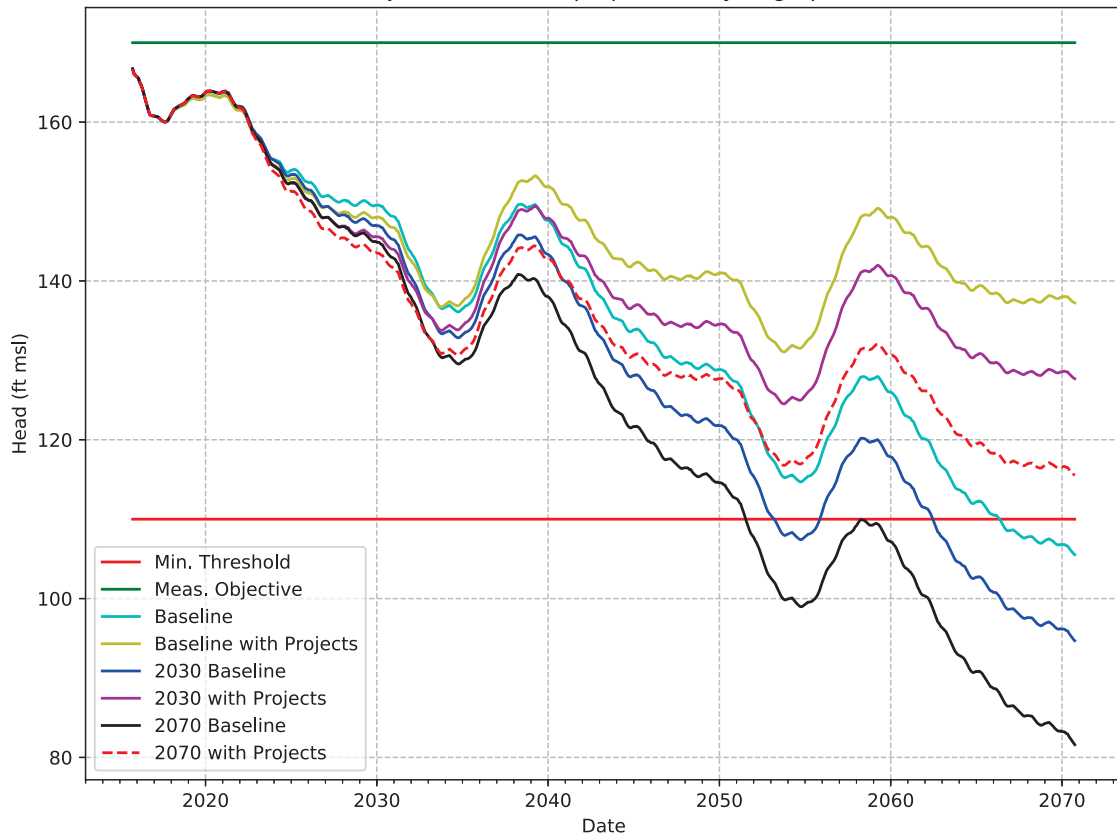
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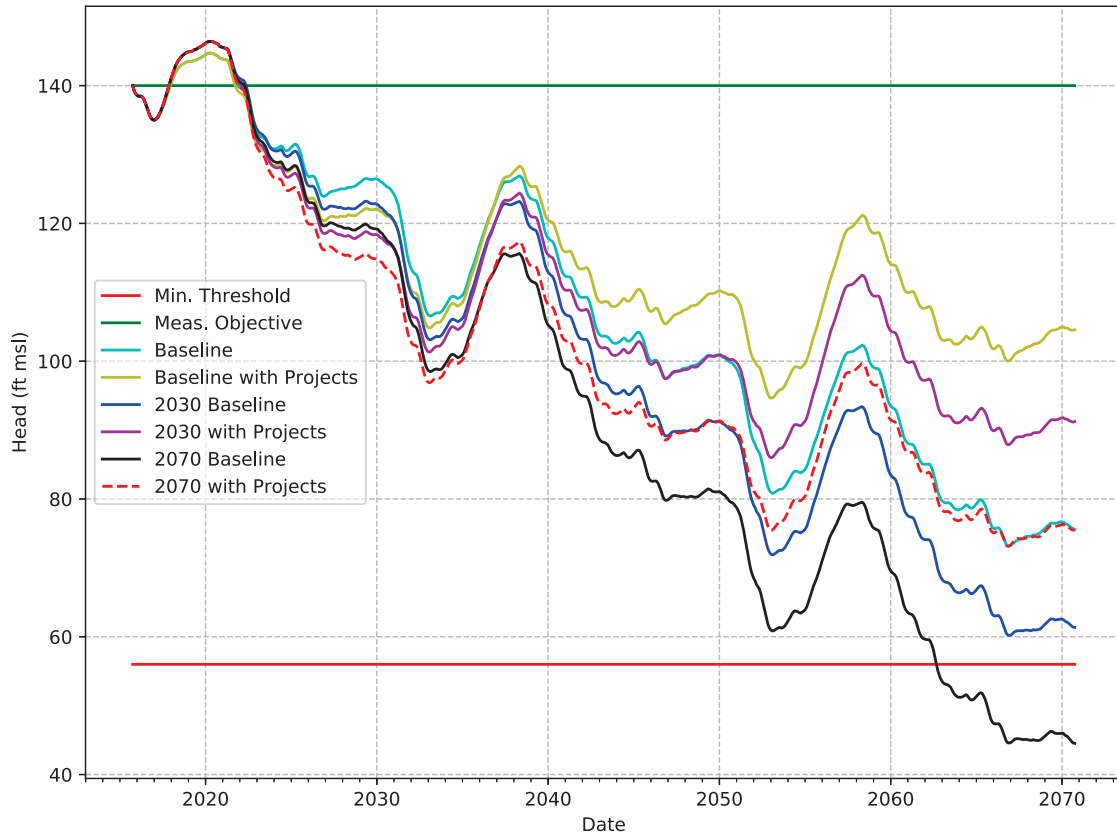
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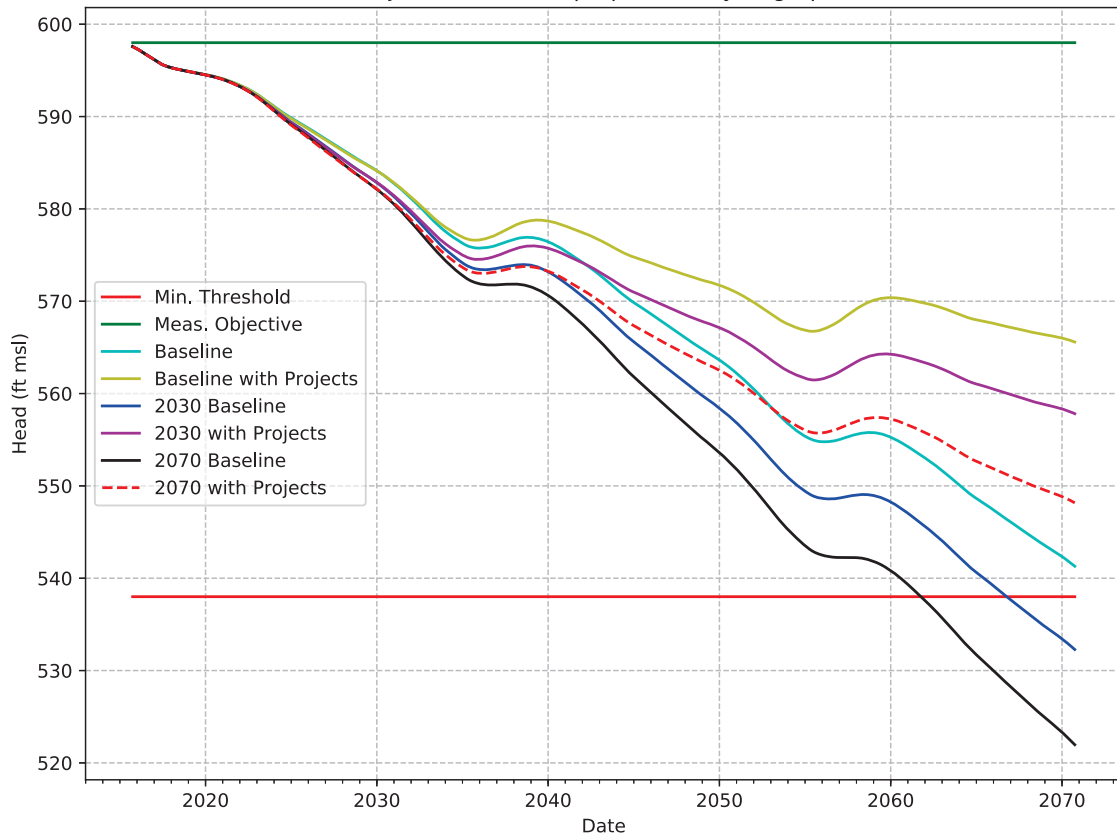
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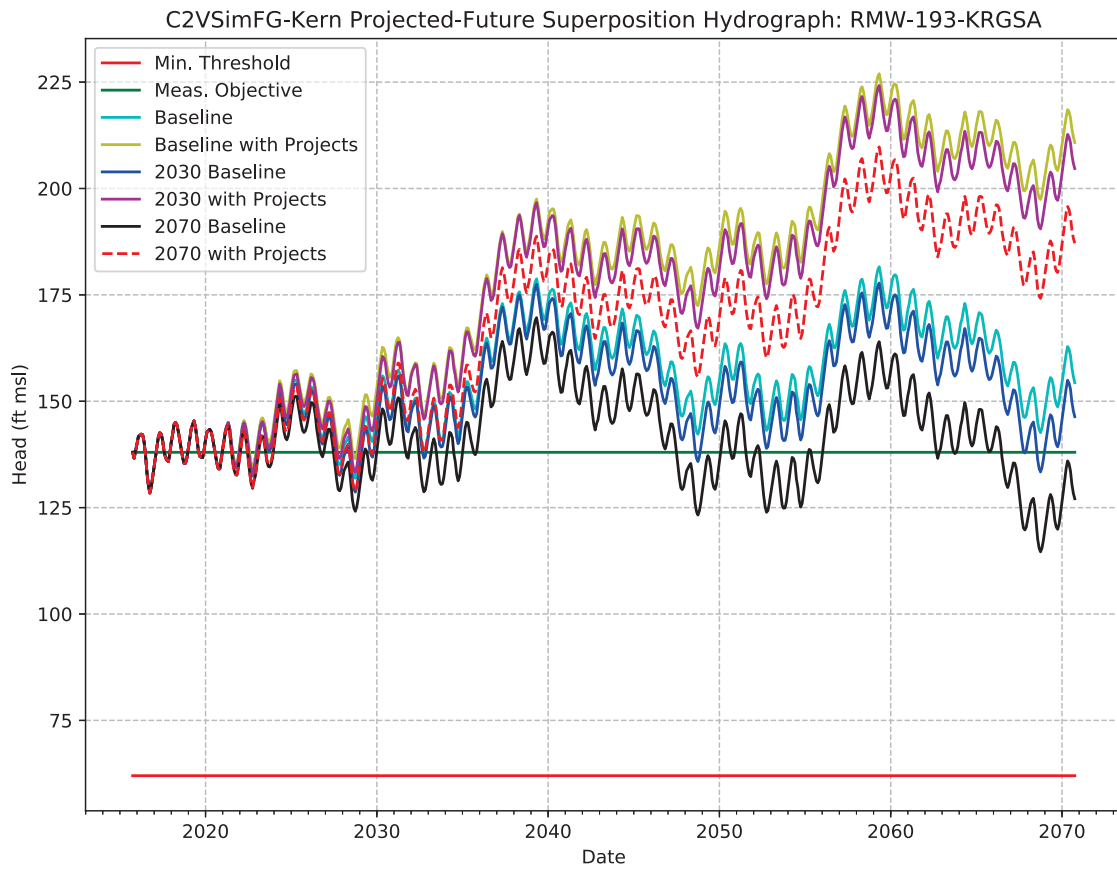
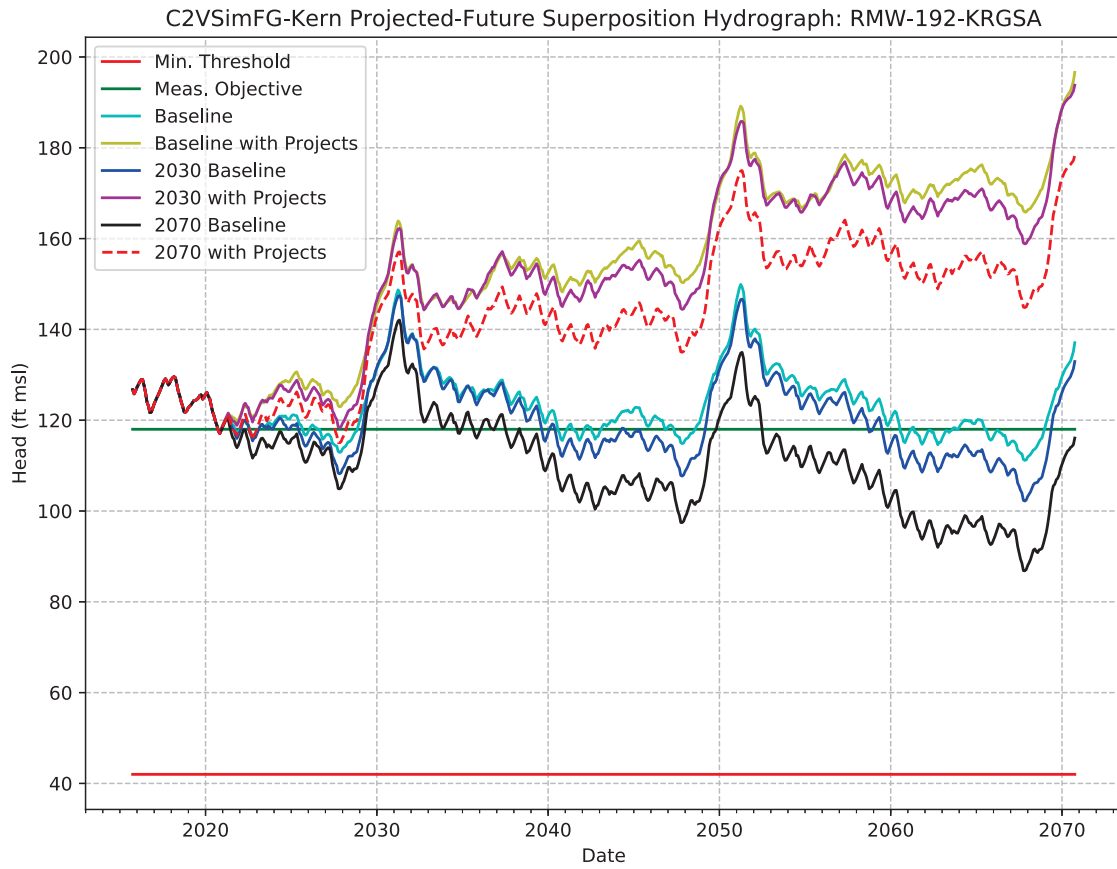


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-189-EWMA

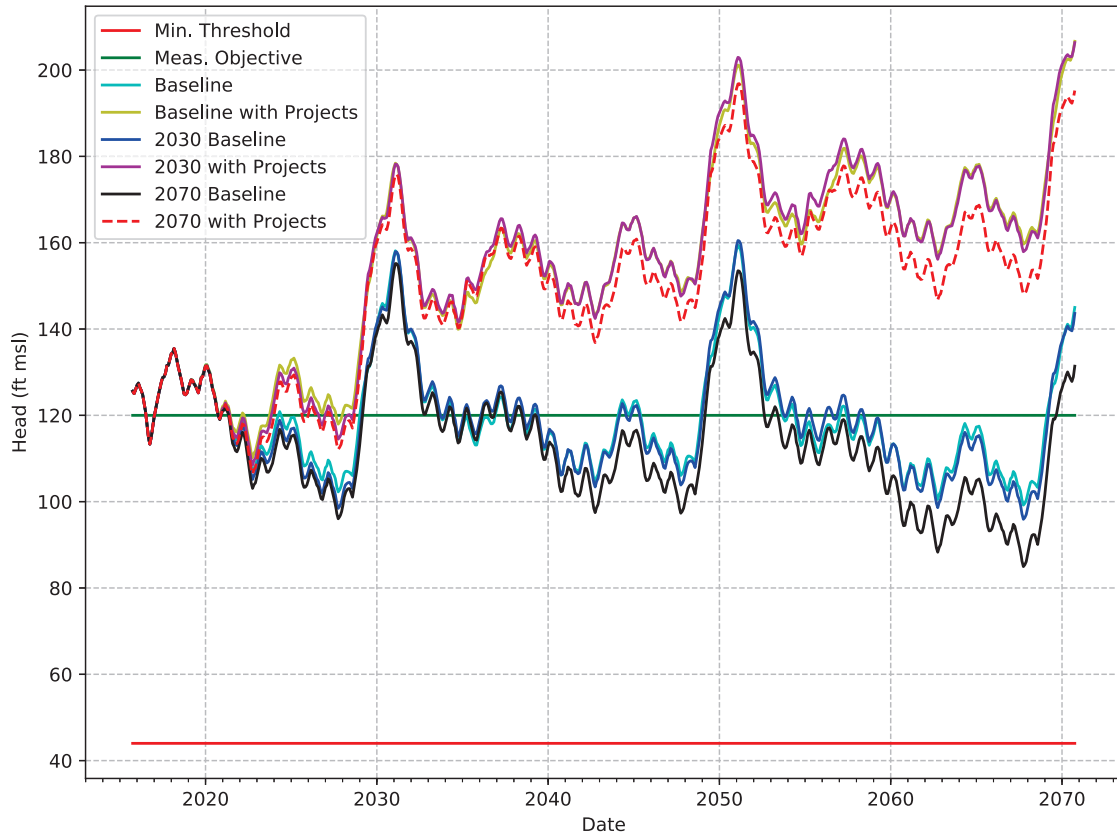


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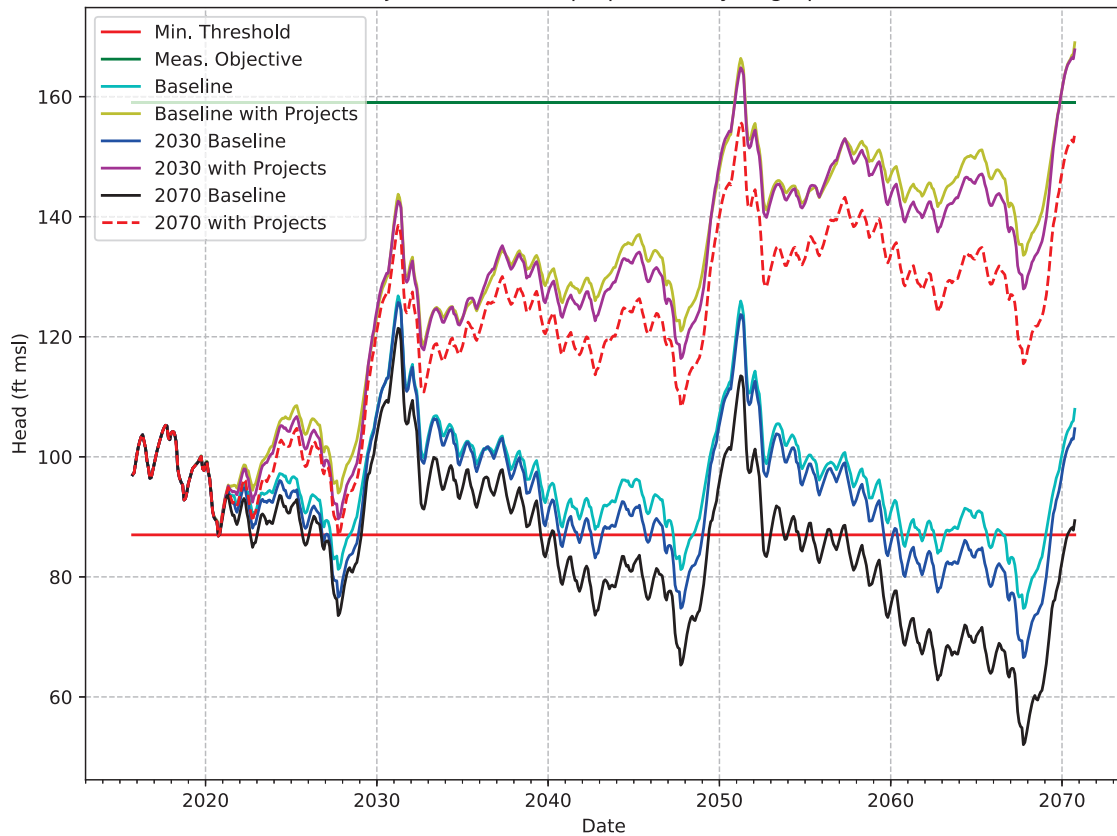




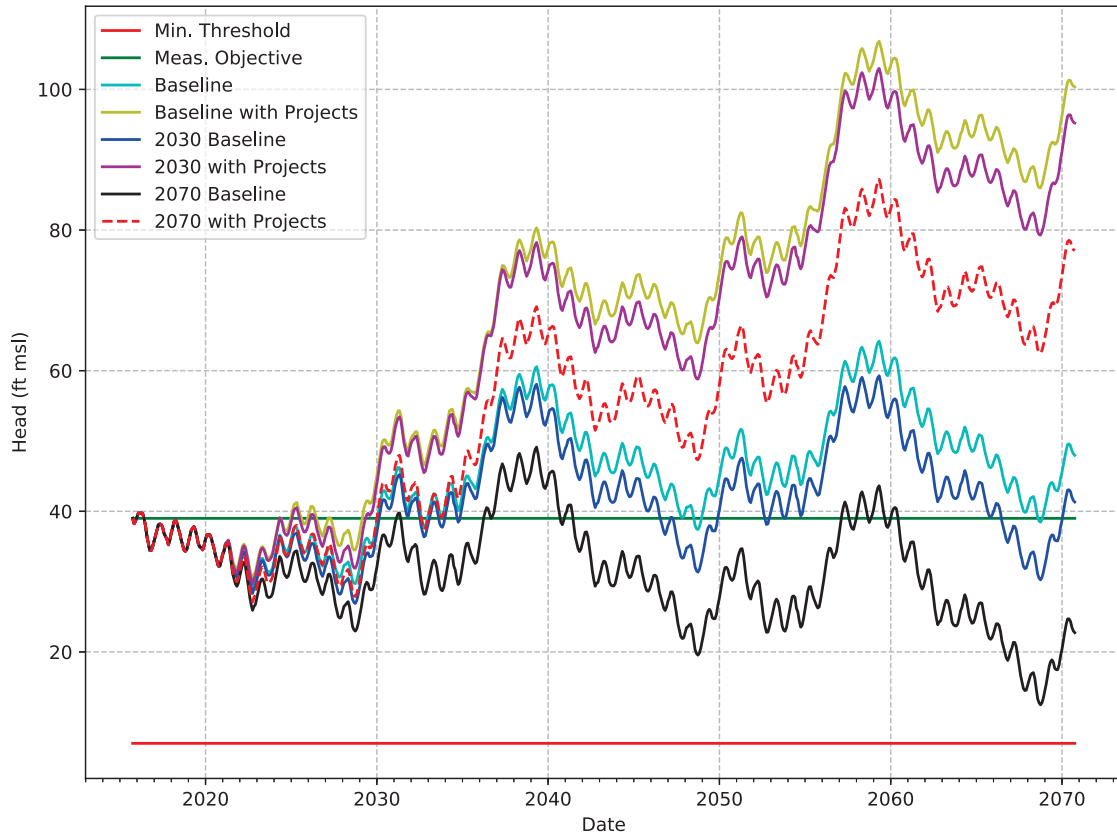
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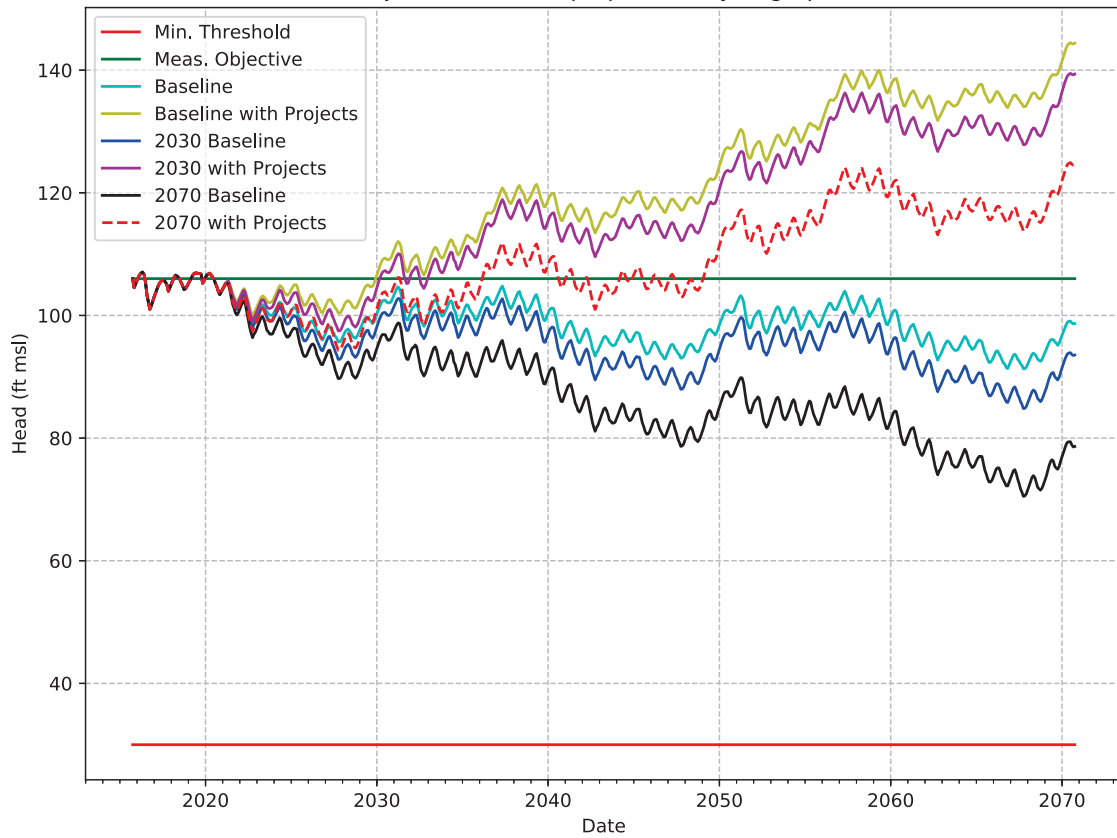
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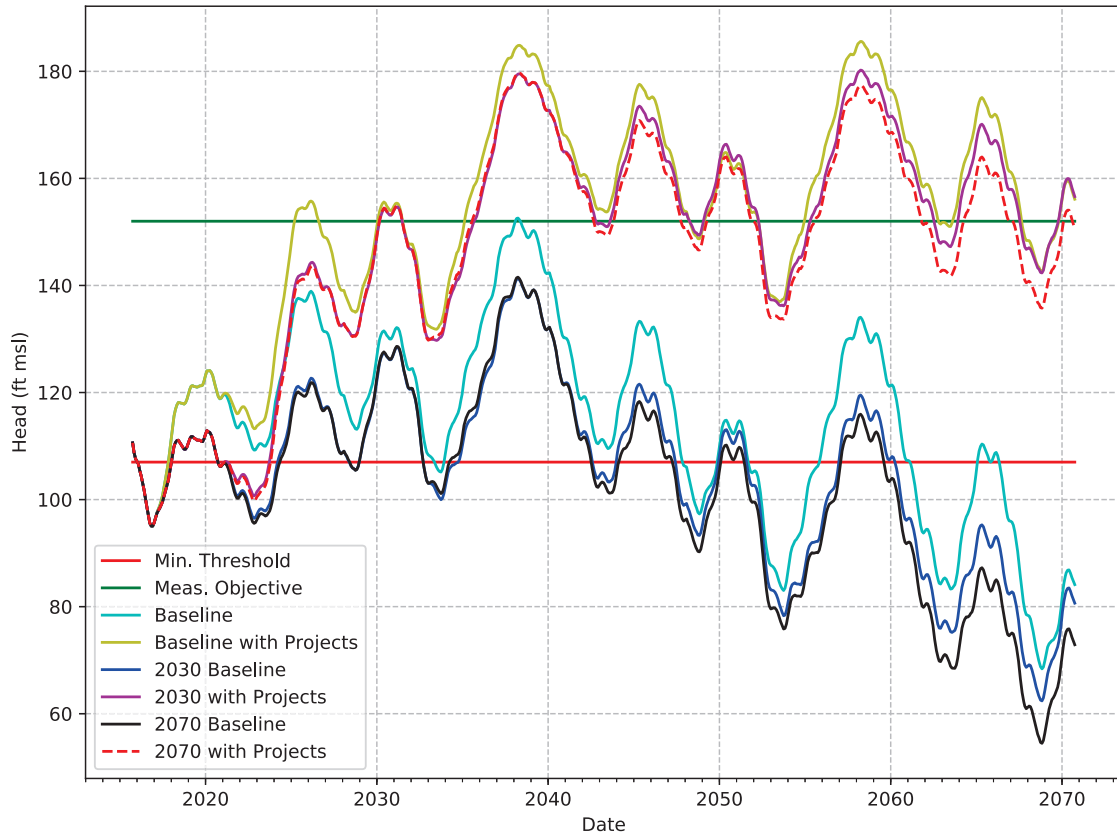
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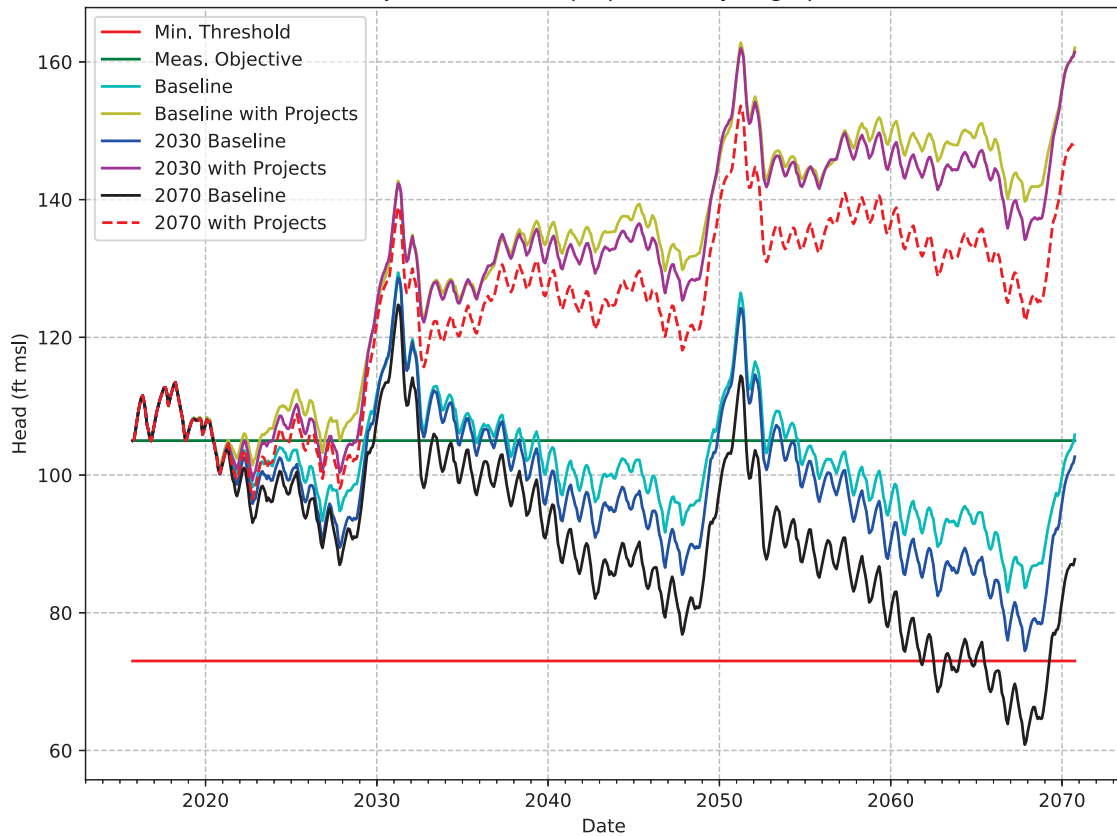
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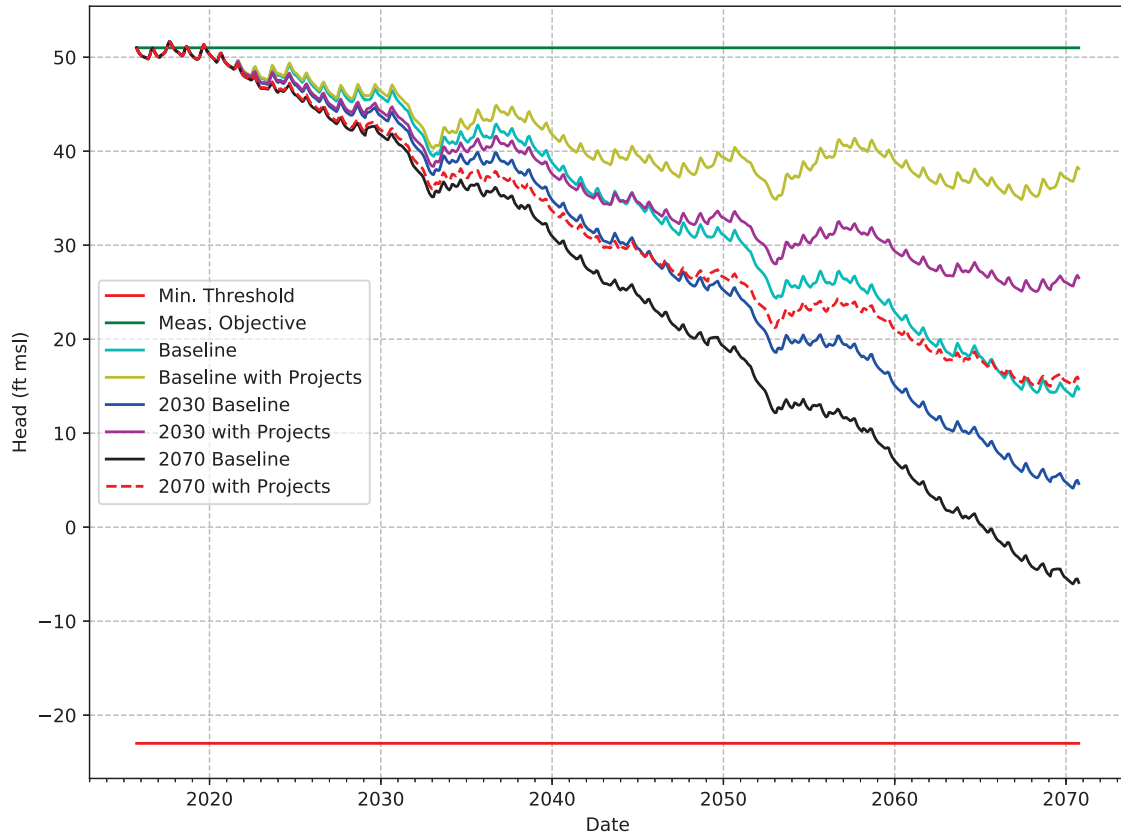
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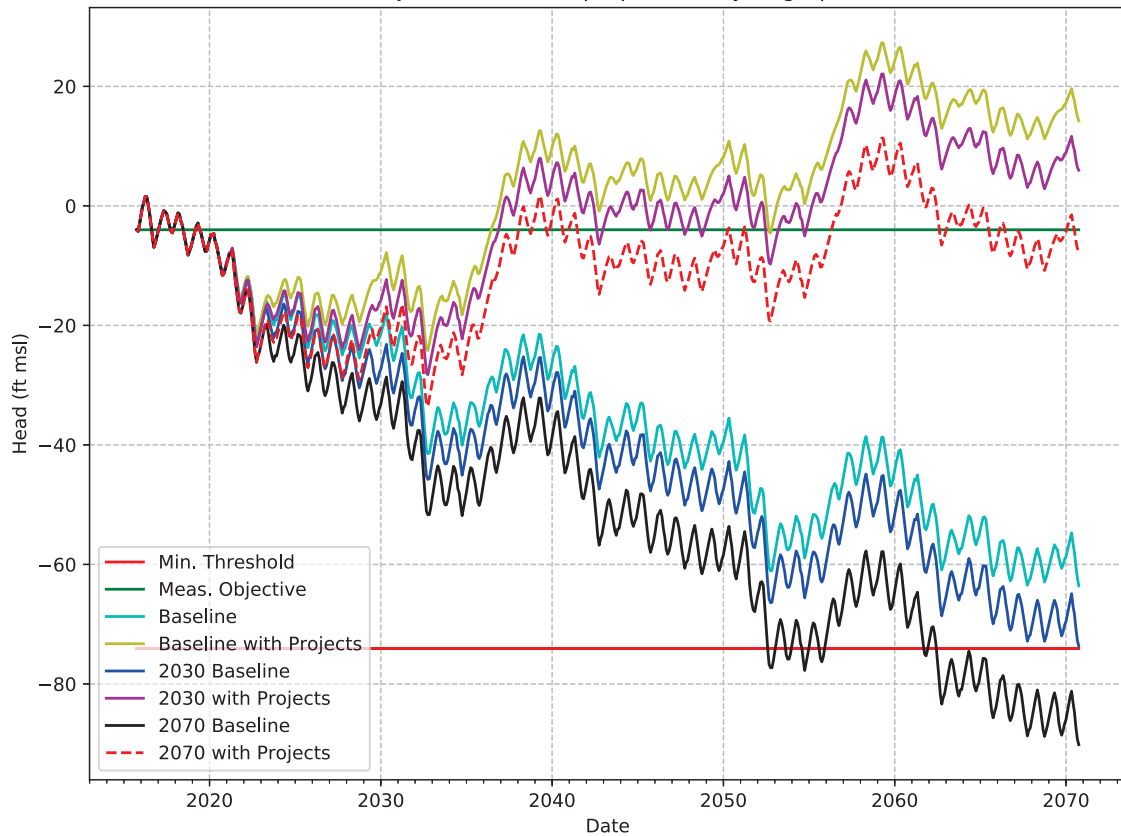
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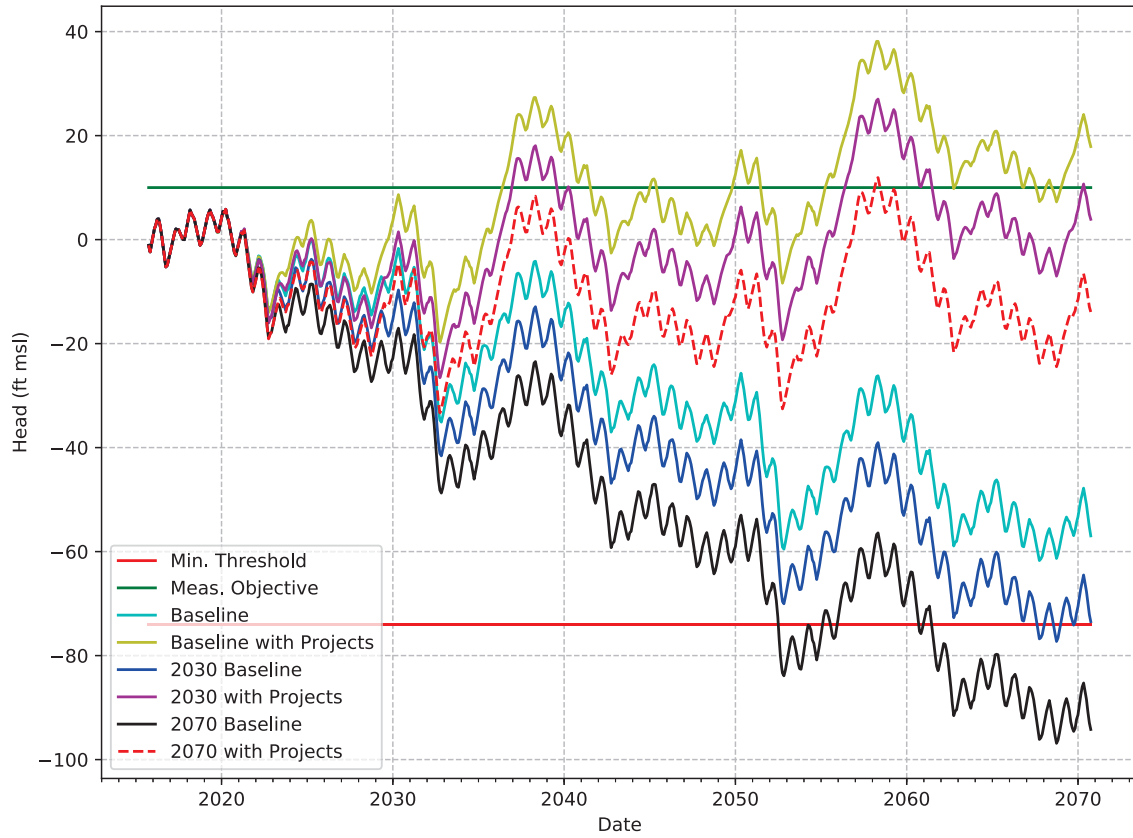
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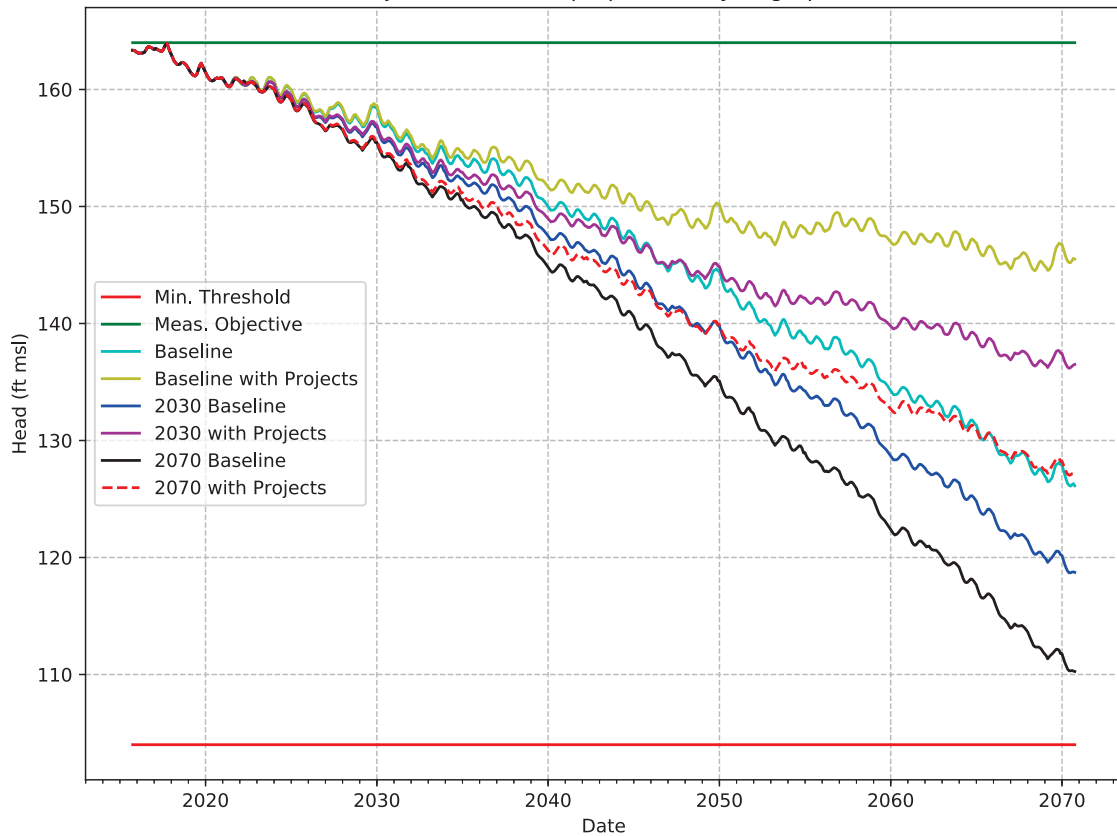
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-204-SWID



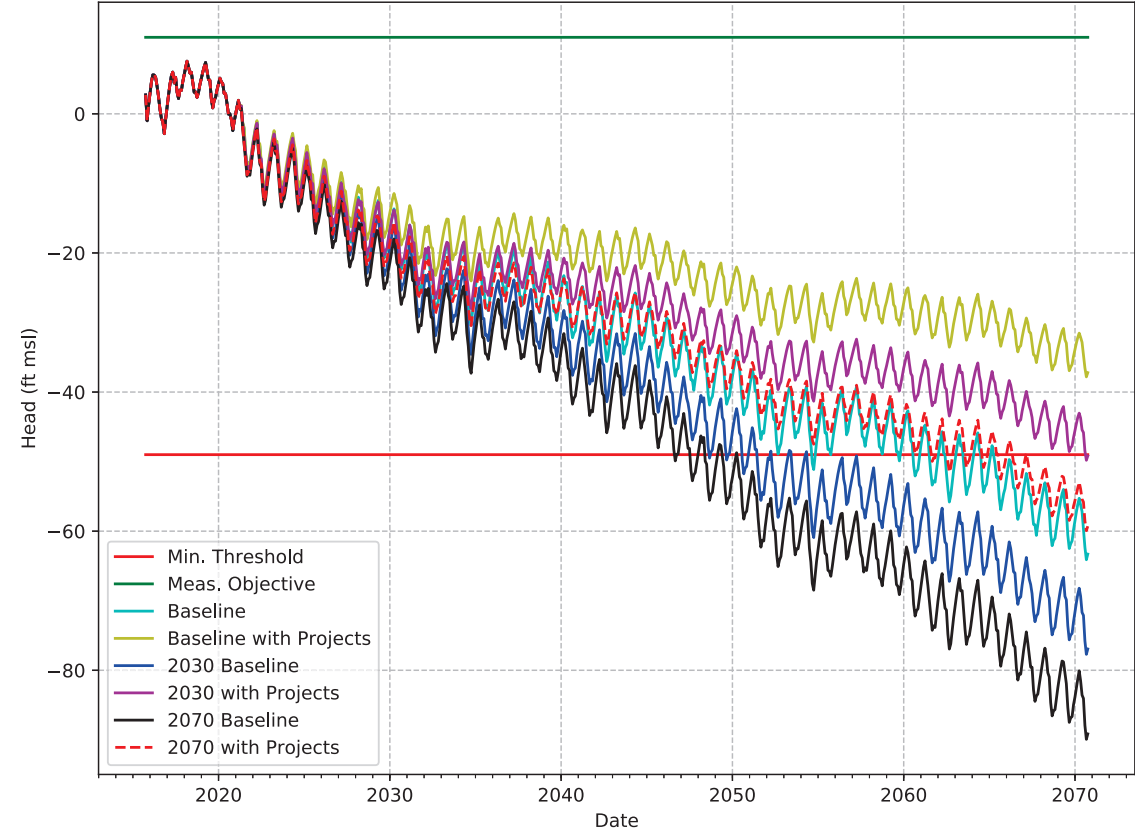
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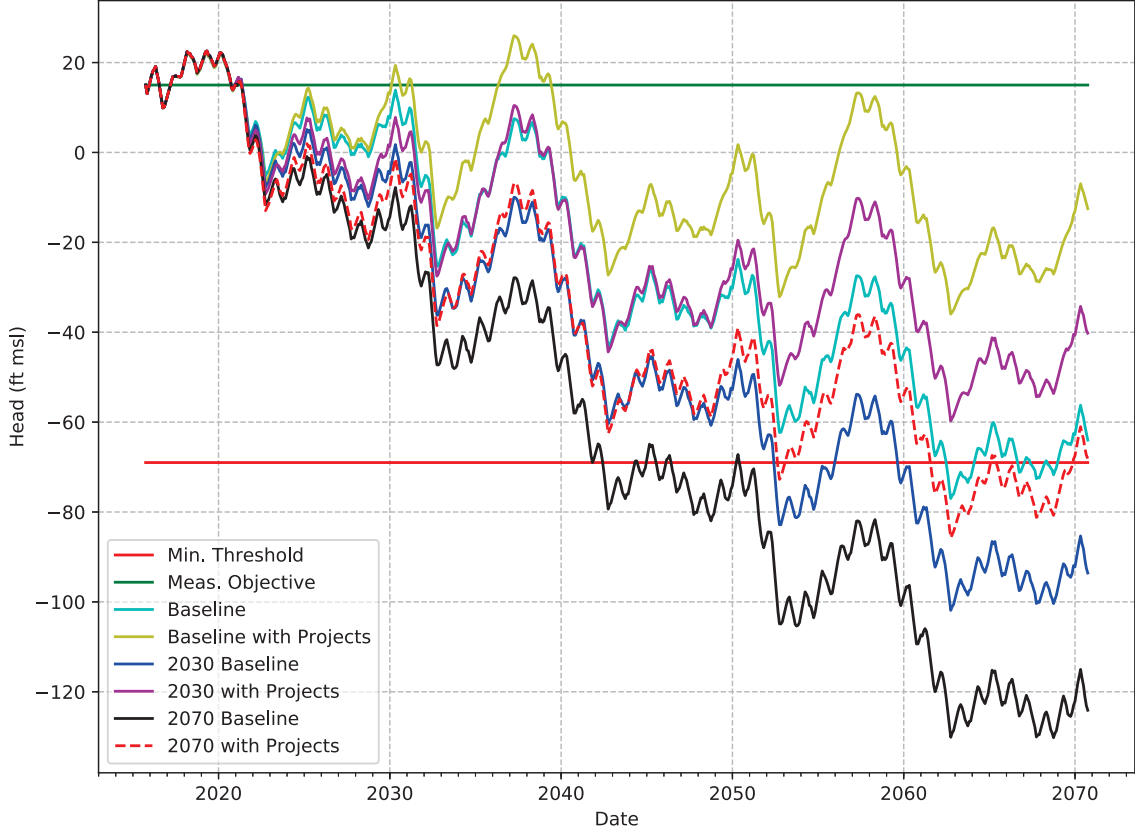
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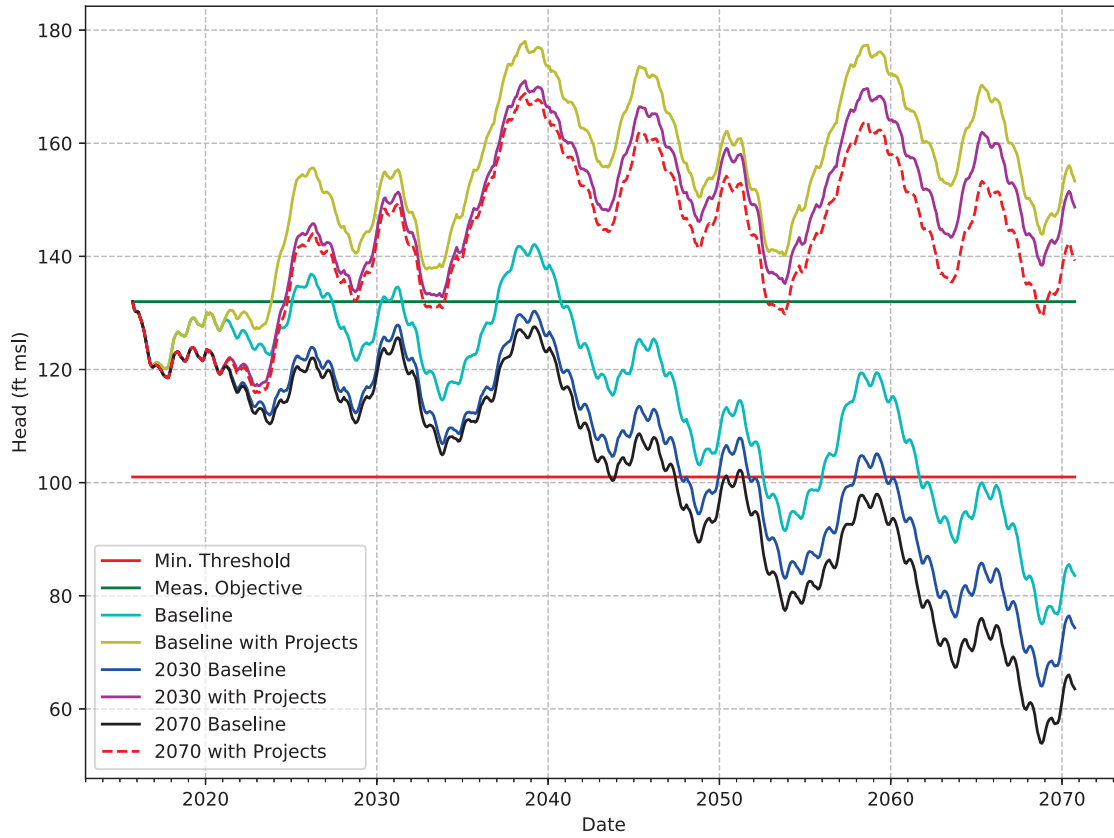
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-207-SWSD



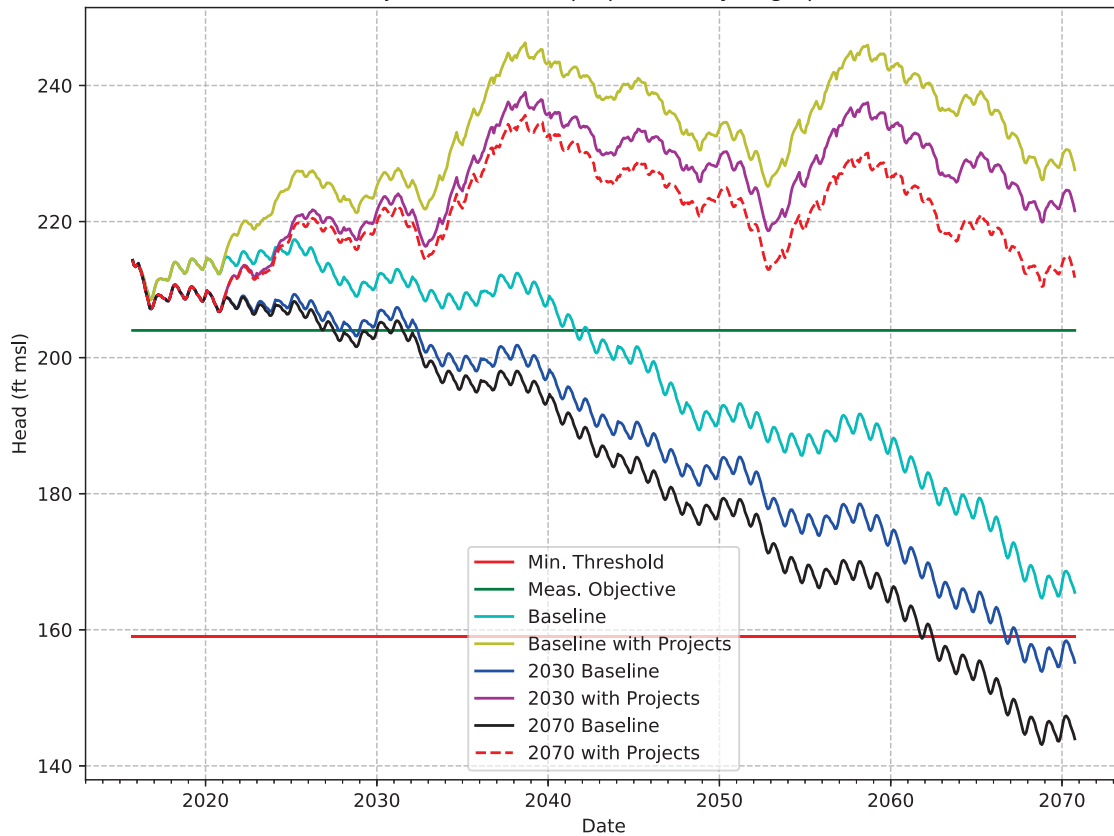
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-208-SSJMUD



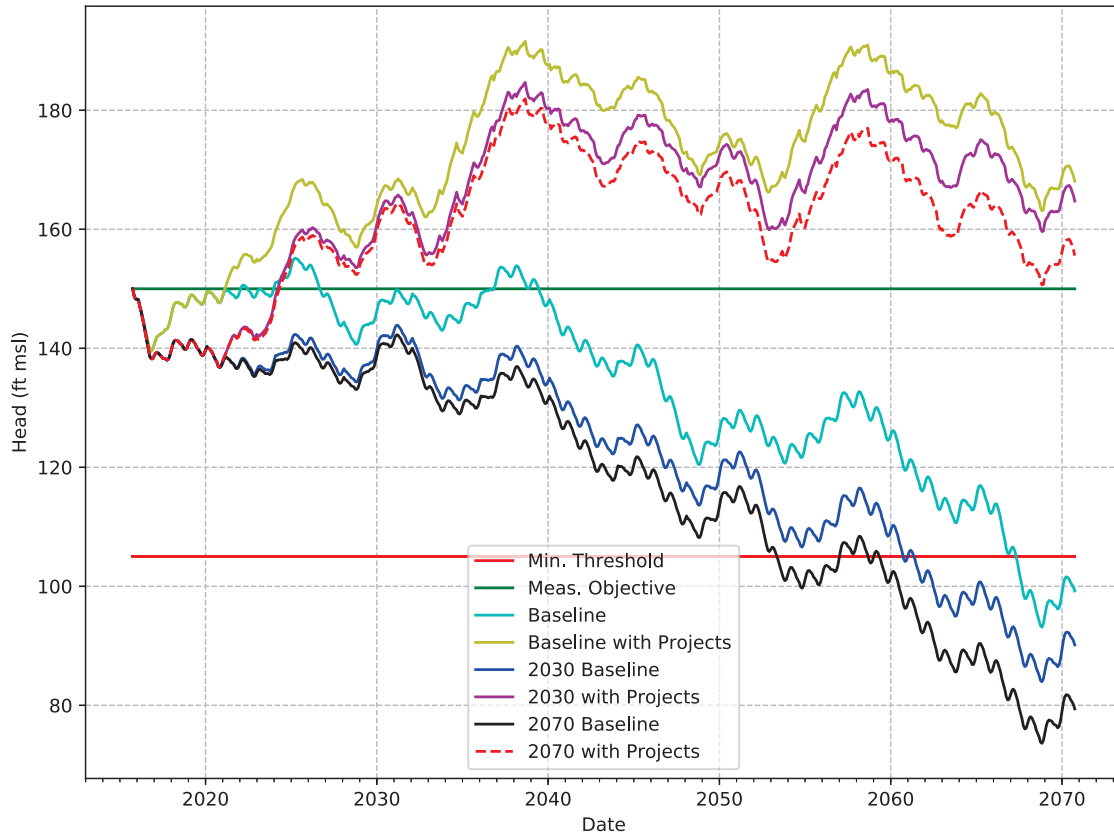
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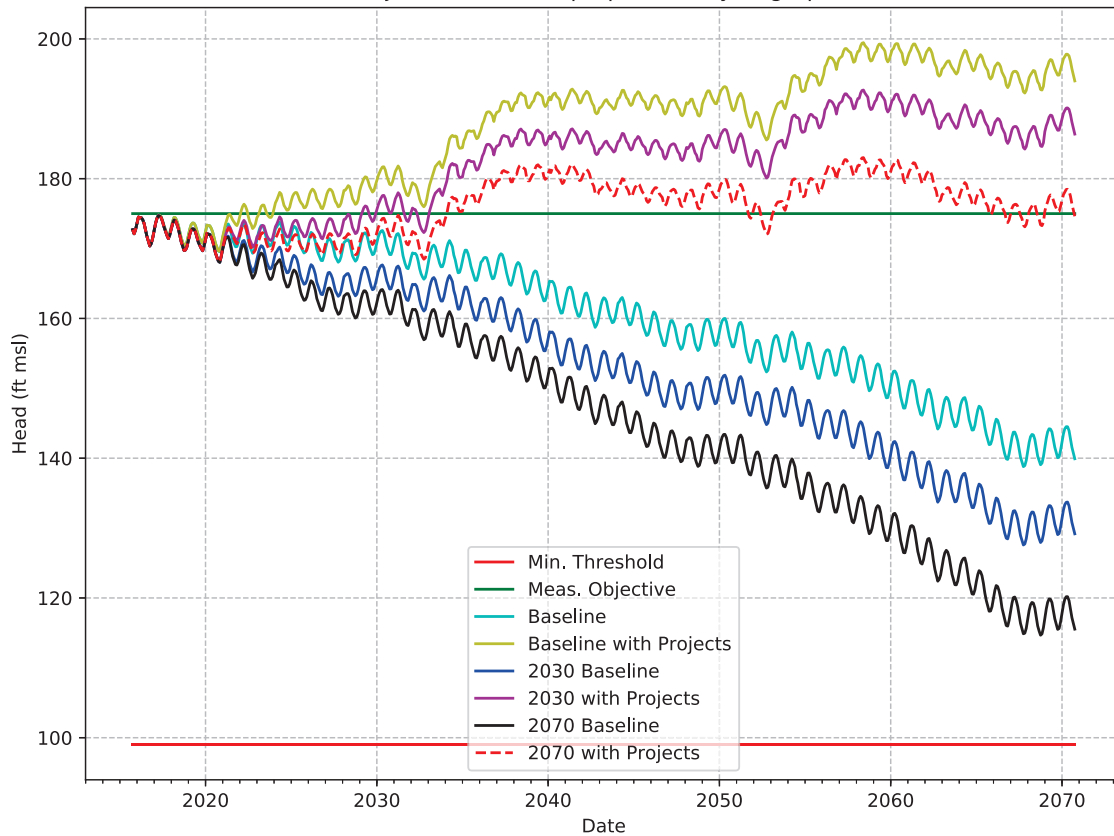
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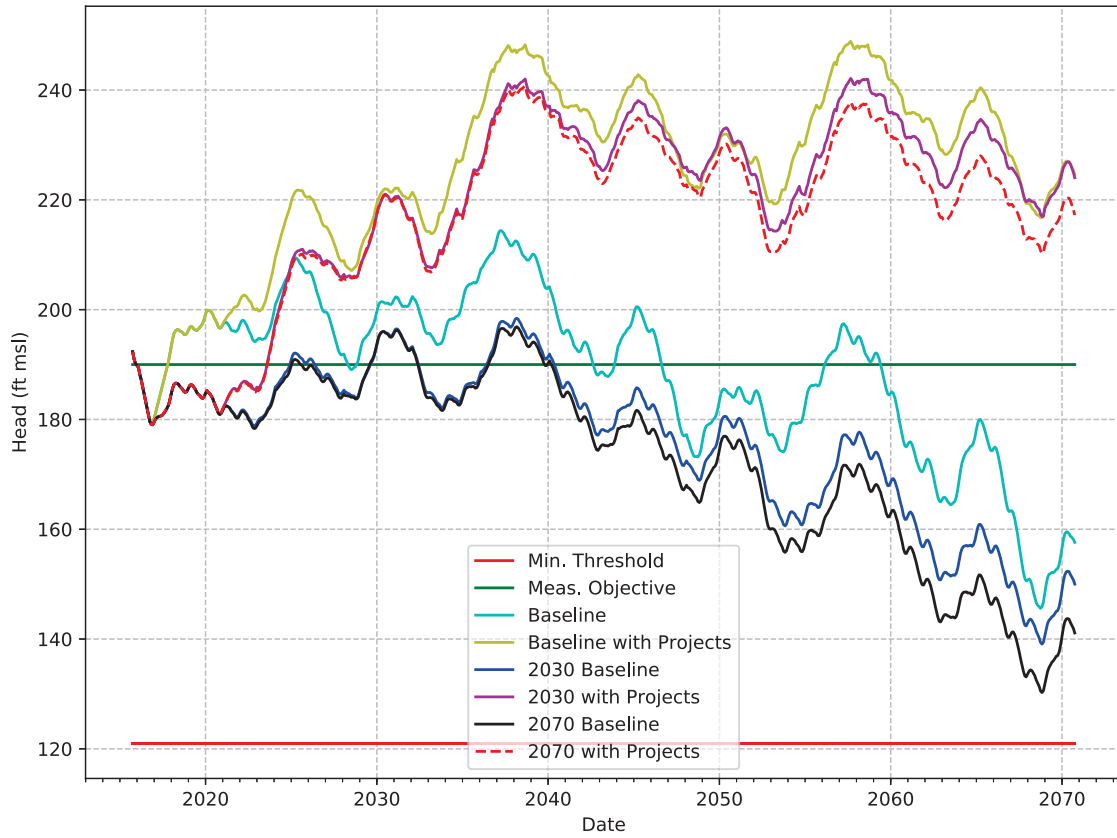
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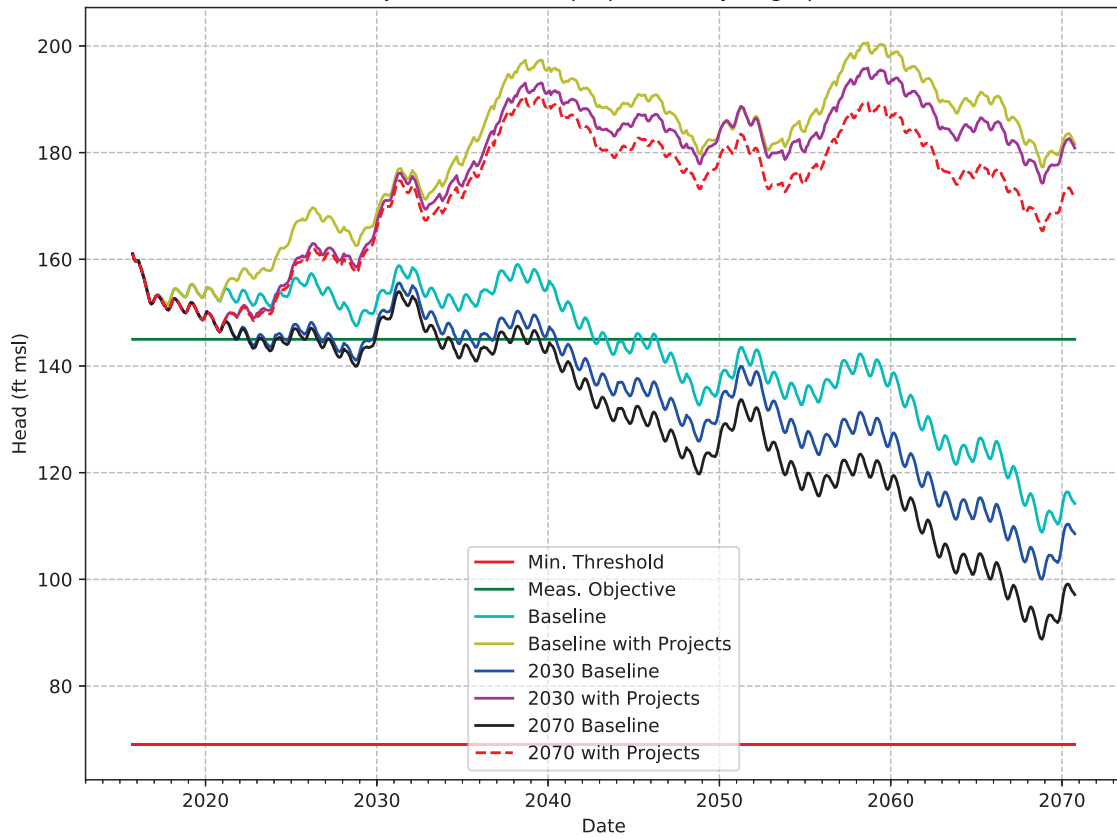
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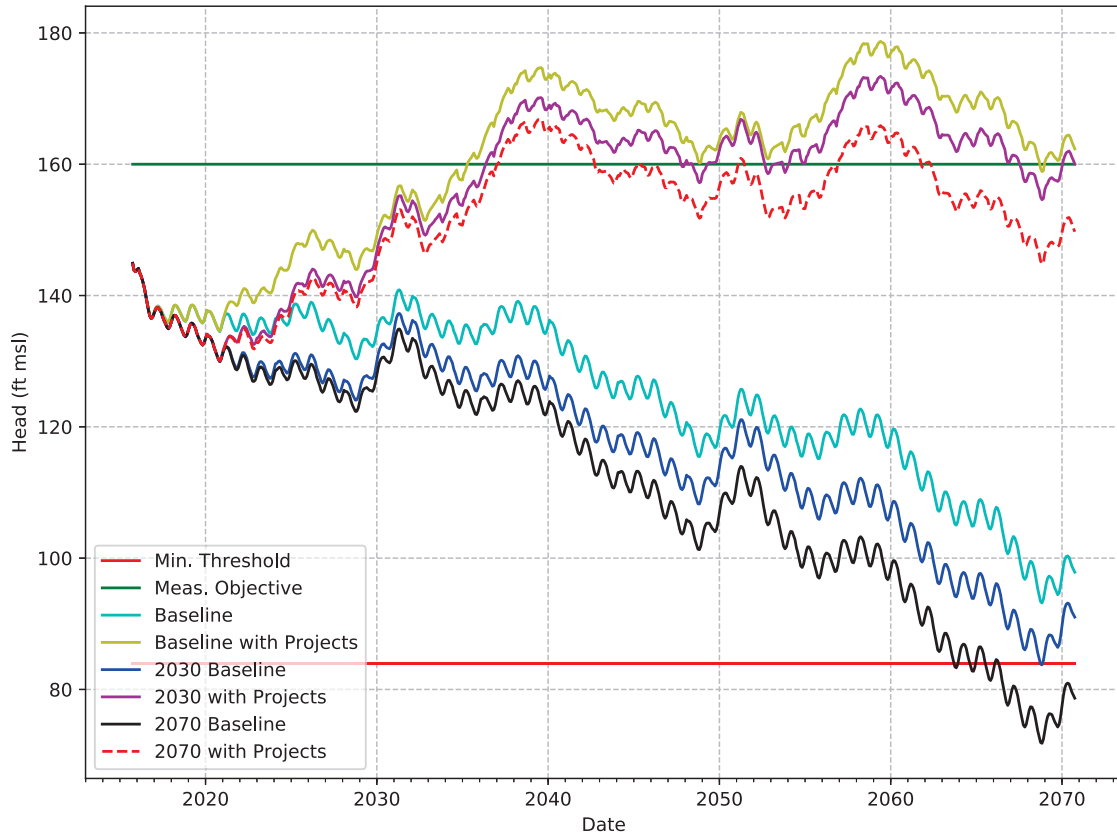
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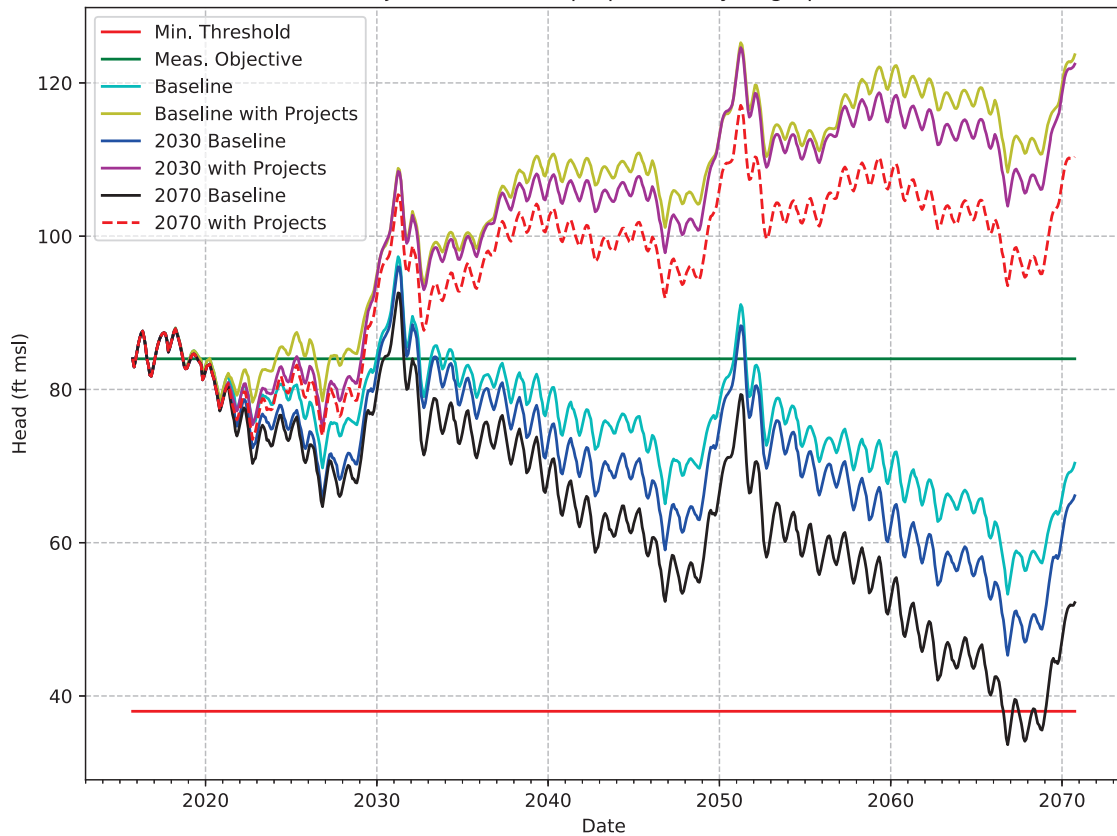
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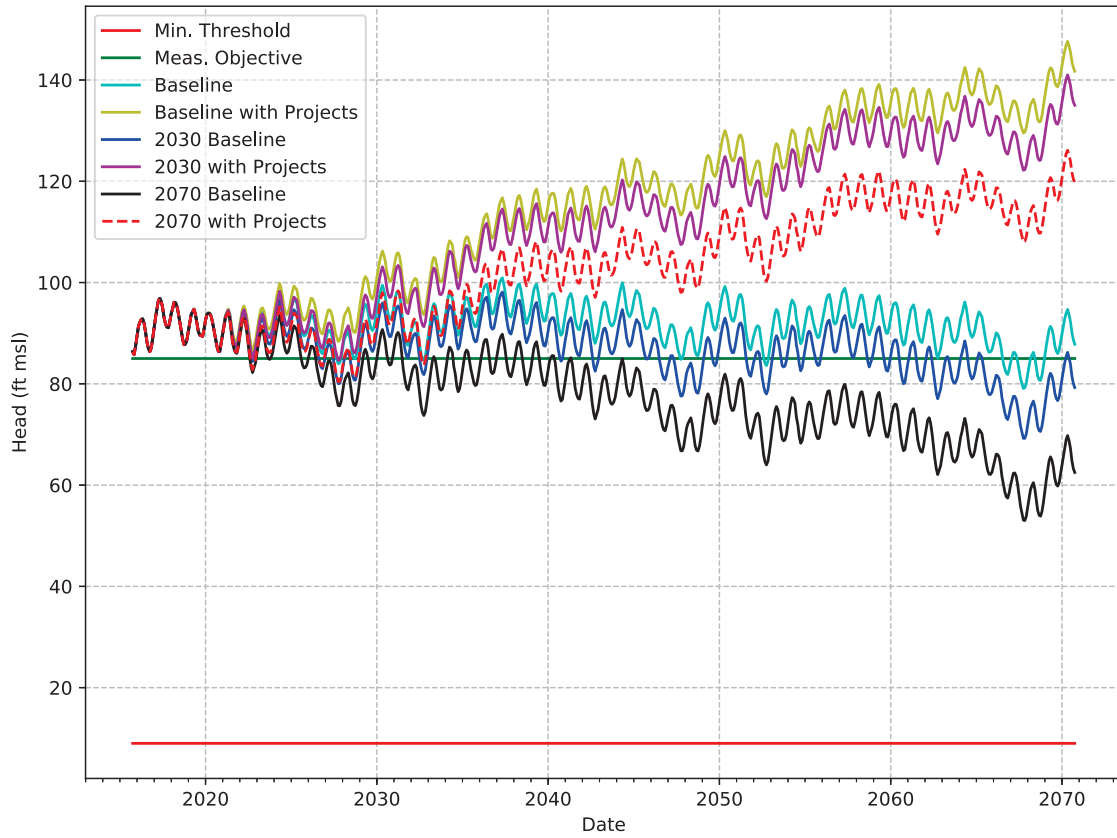
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-215-KRGSA



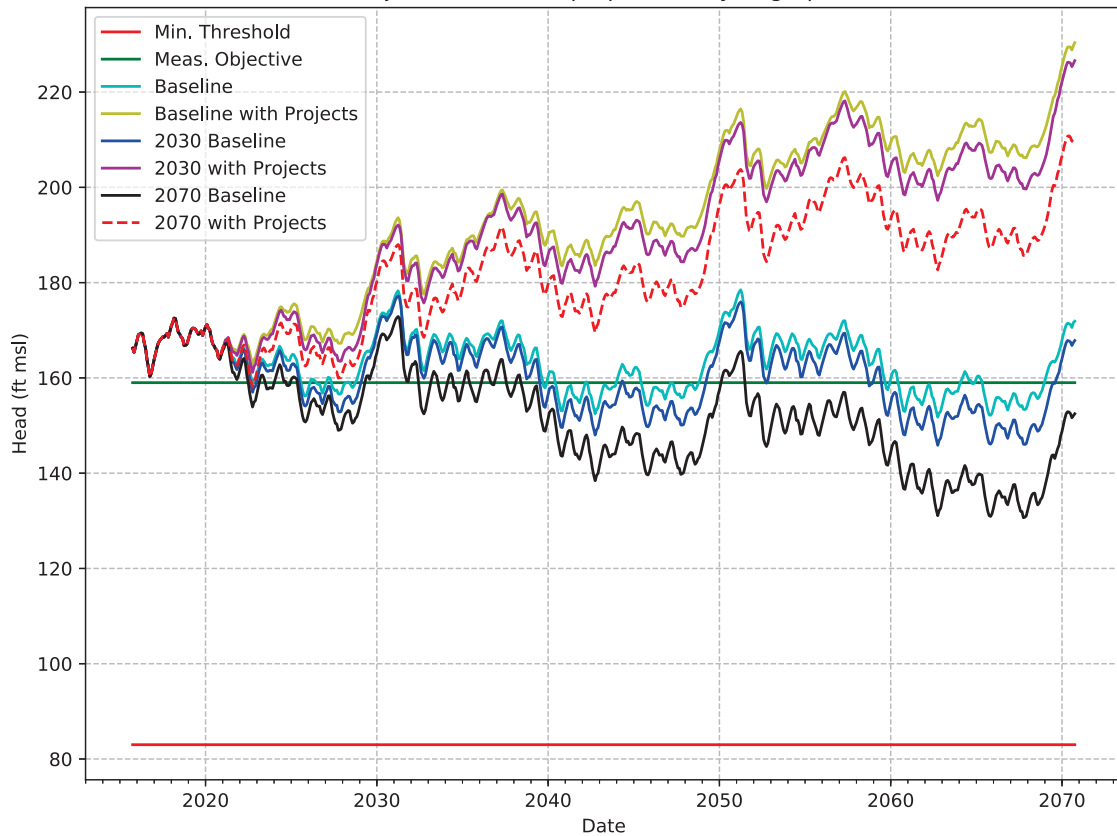
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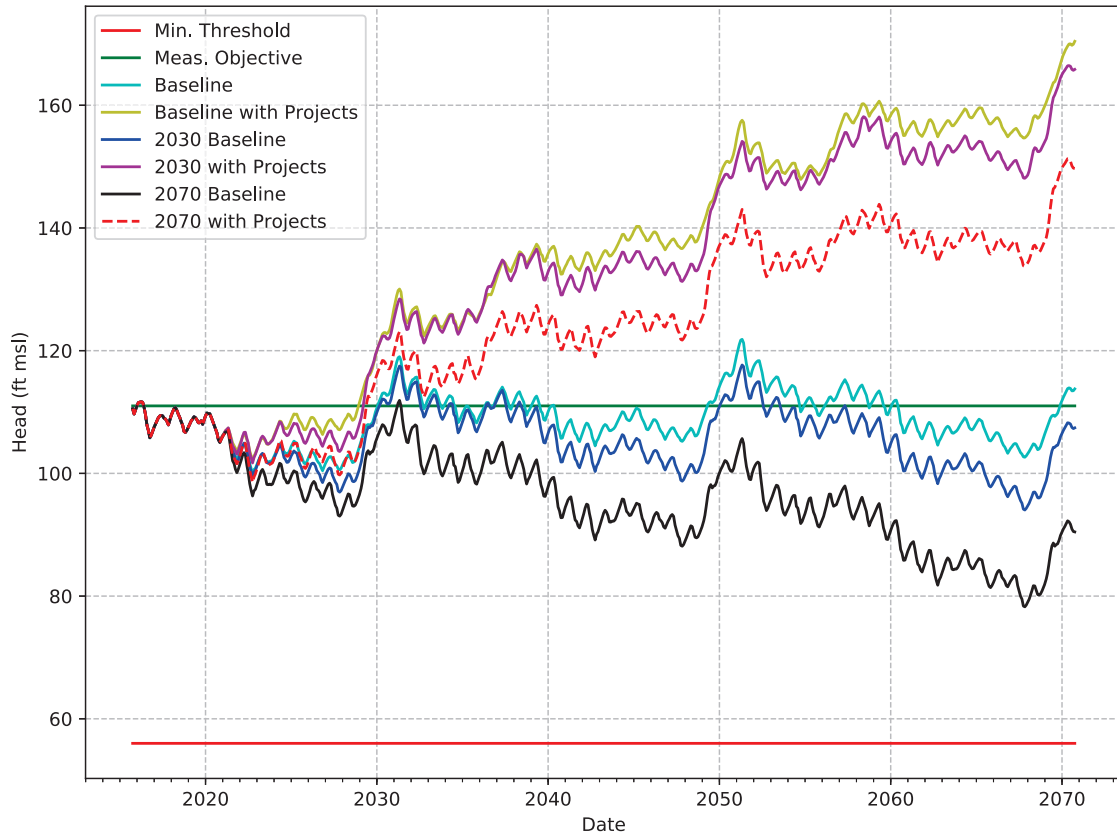
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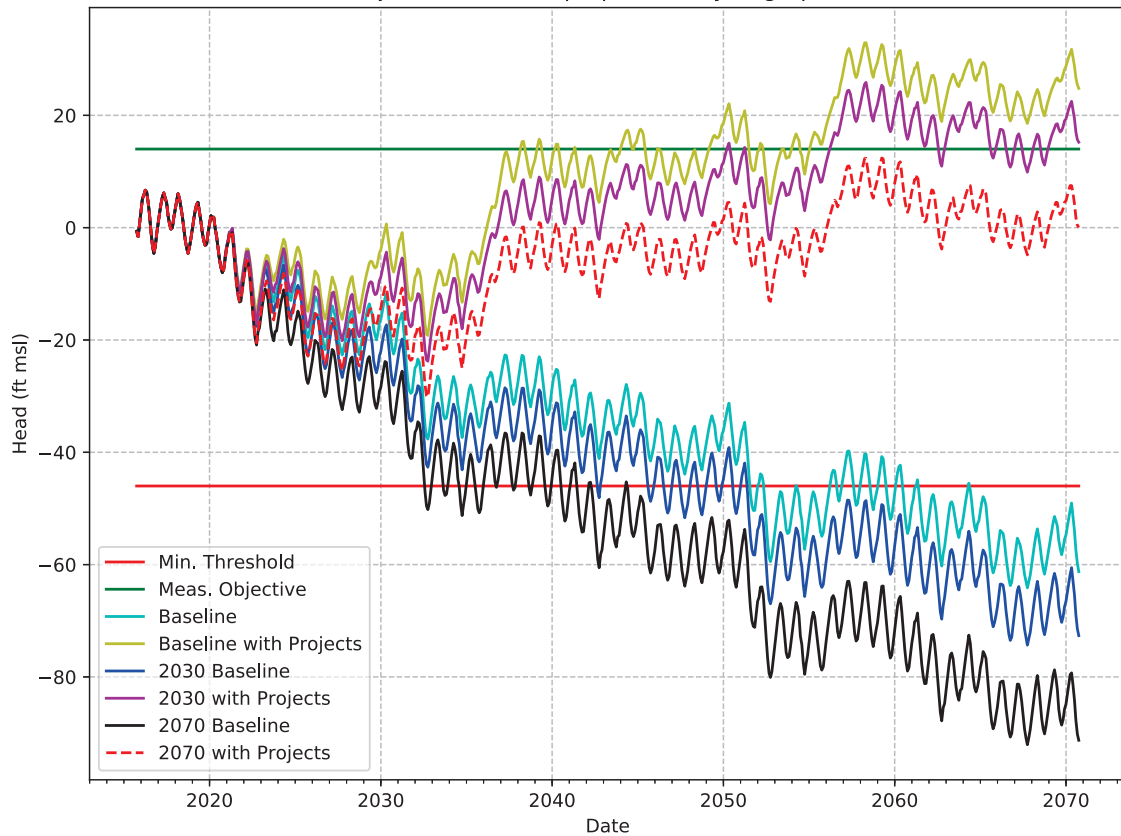
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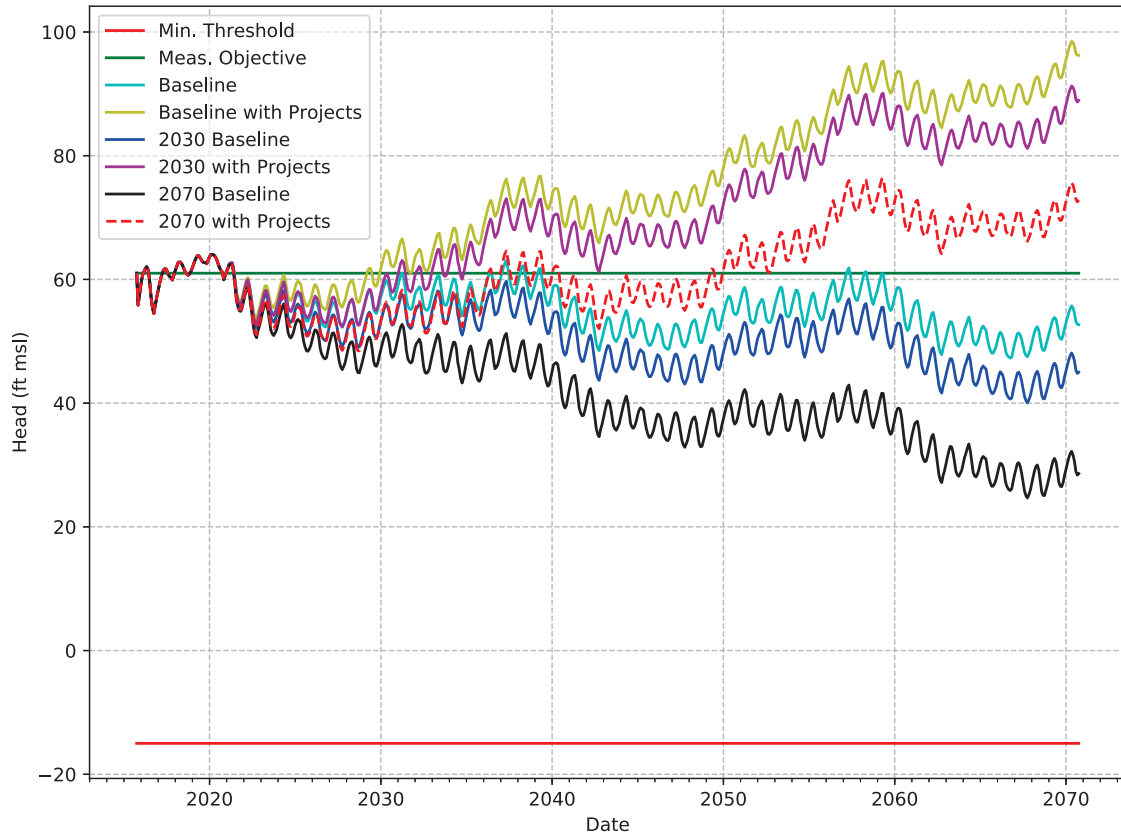
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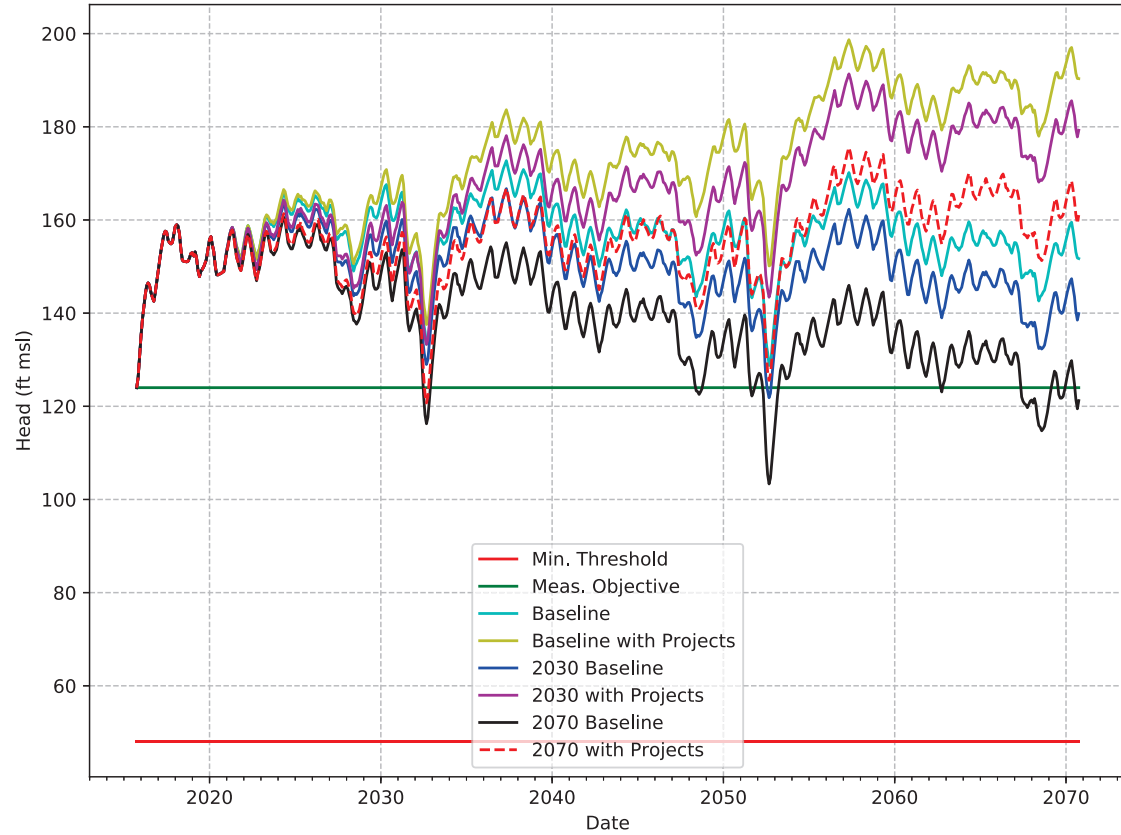
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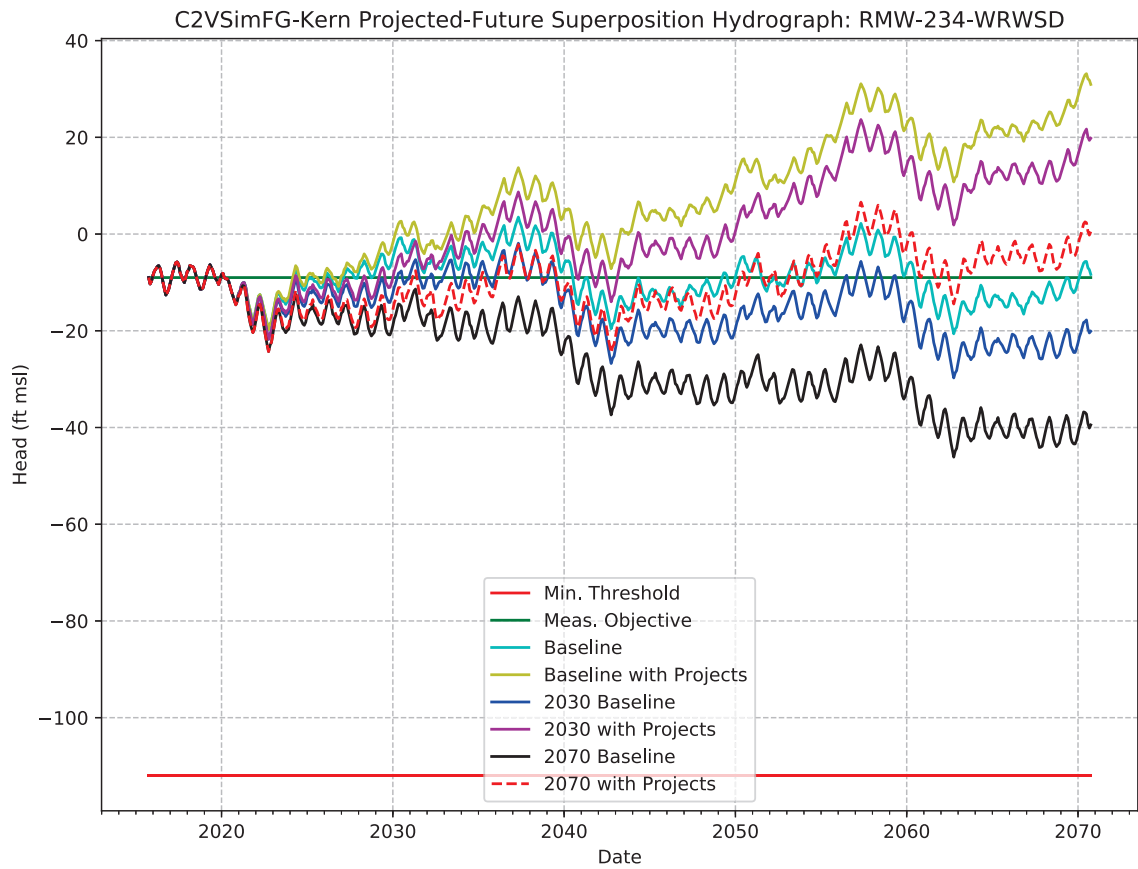
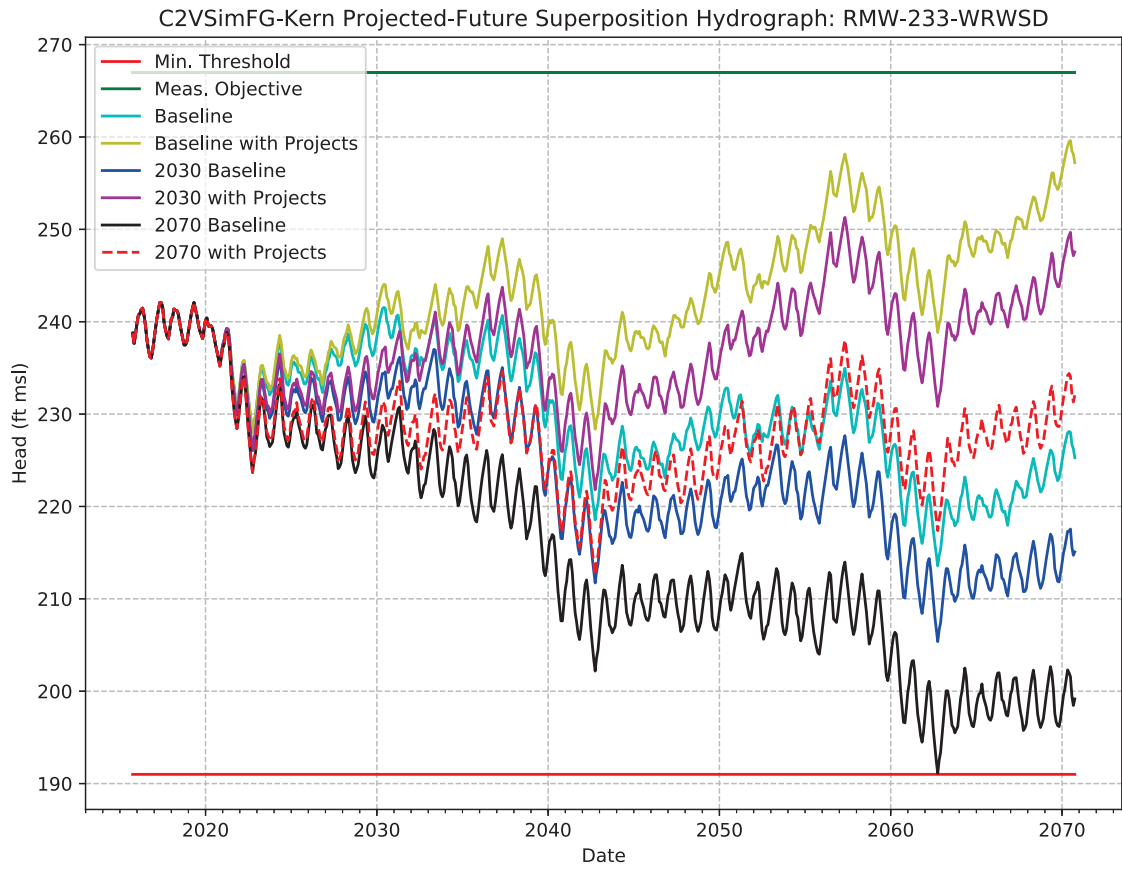


C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-231-WRWSD

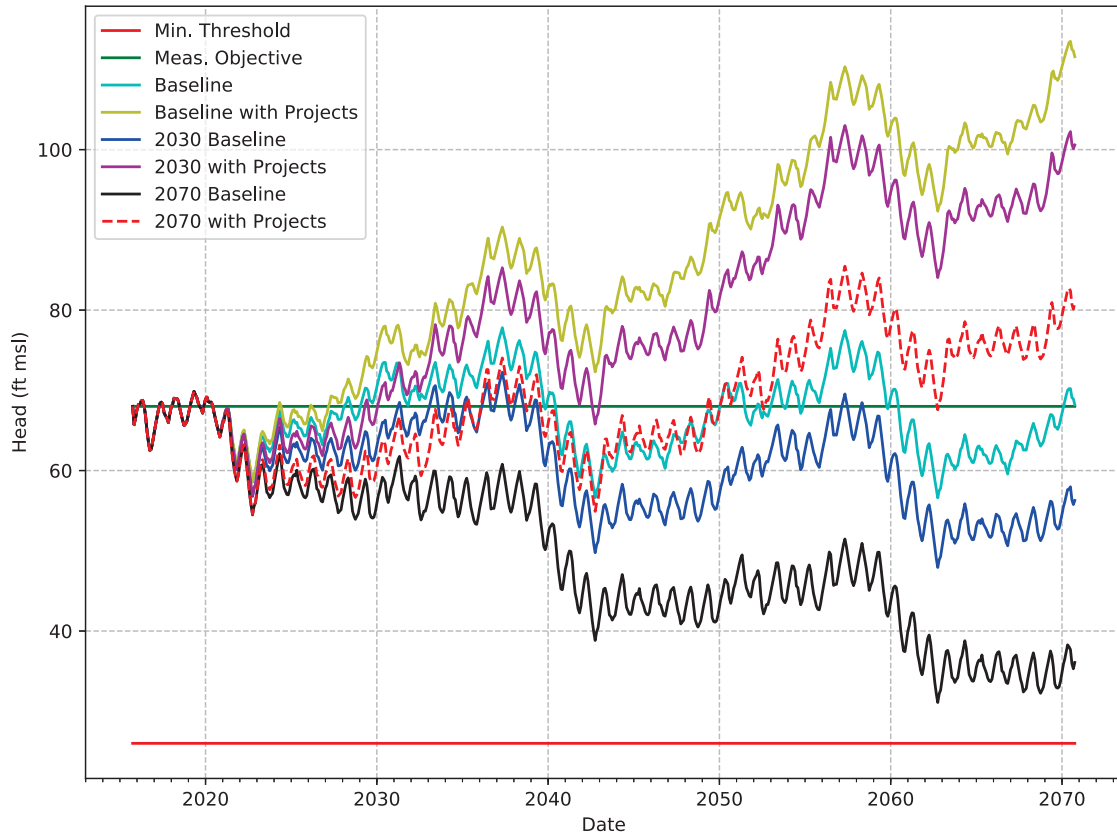


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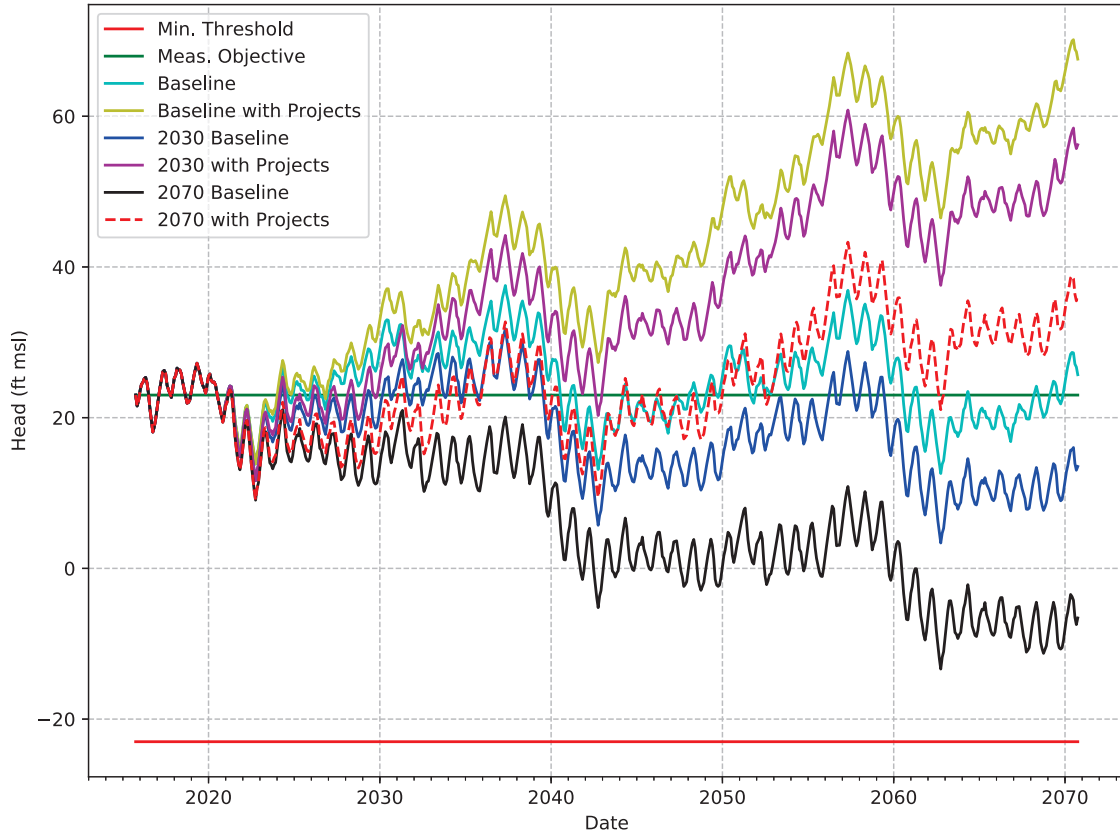




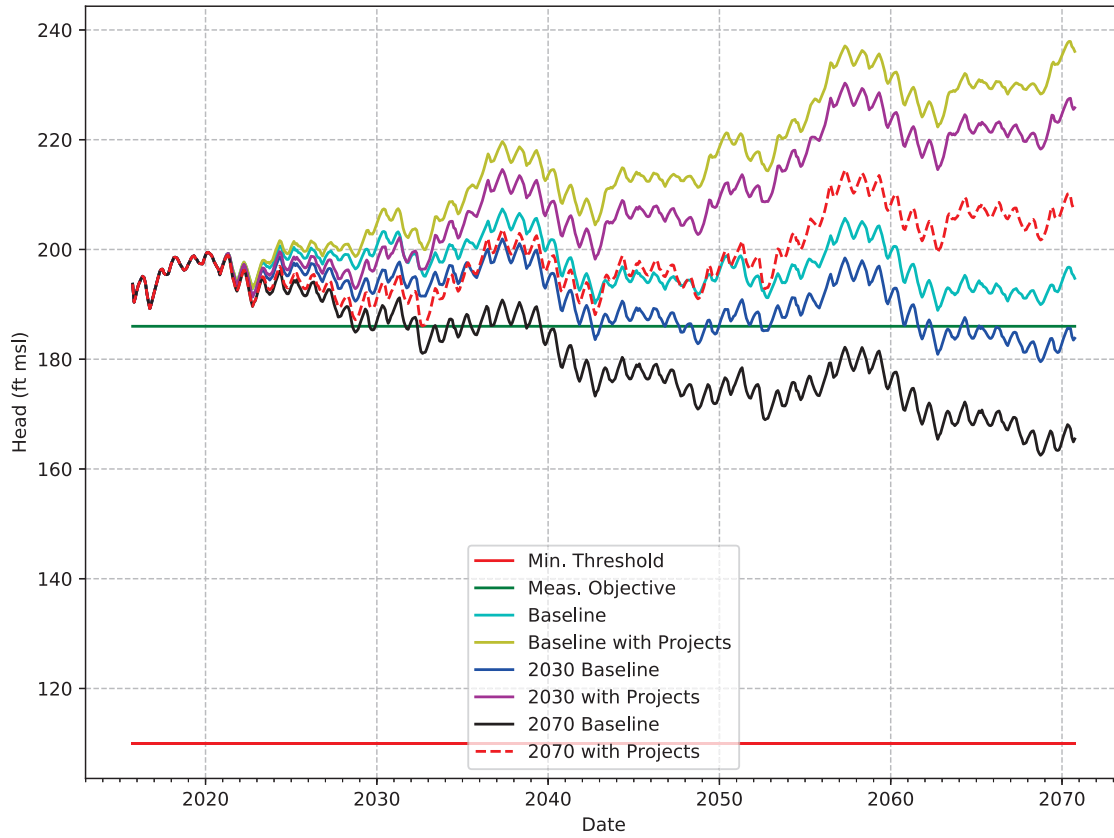
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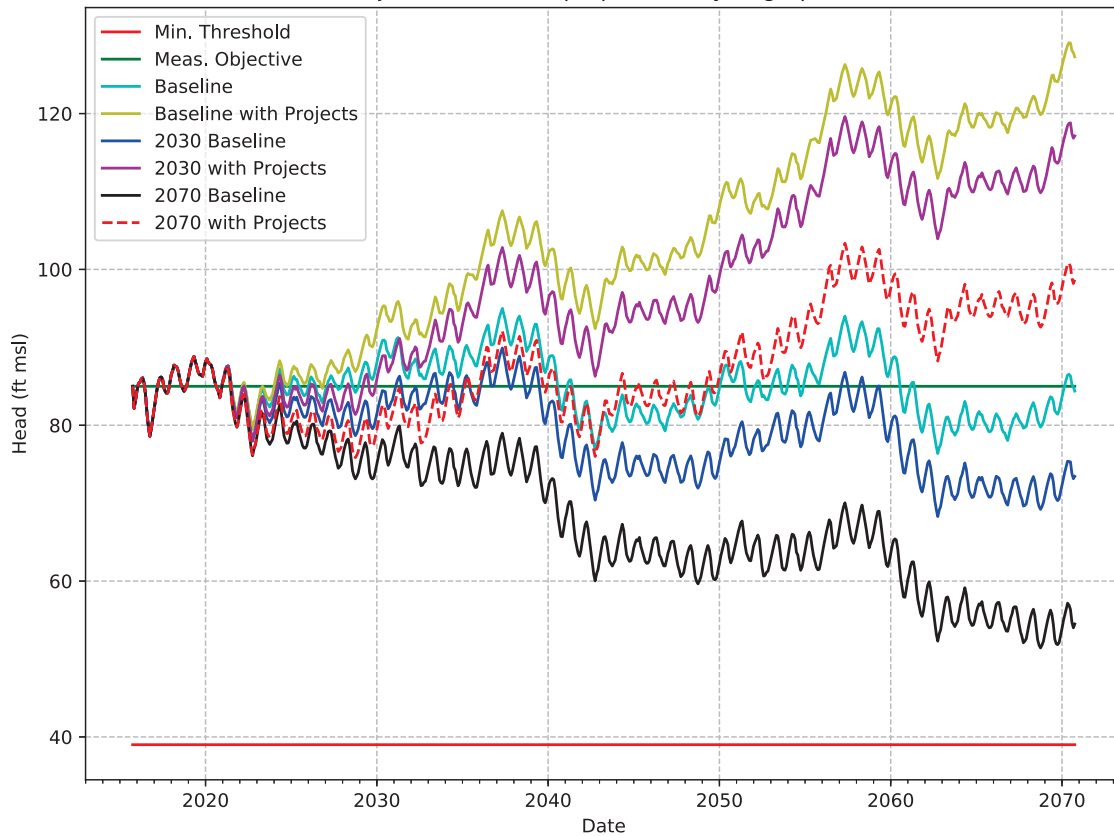
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-236-WRWSD



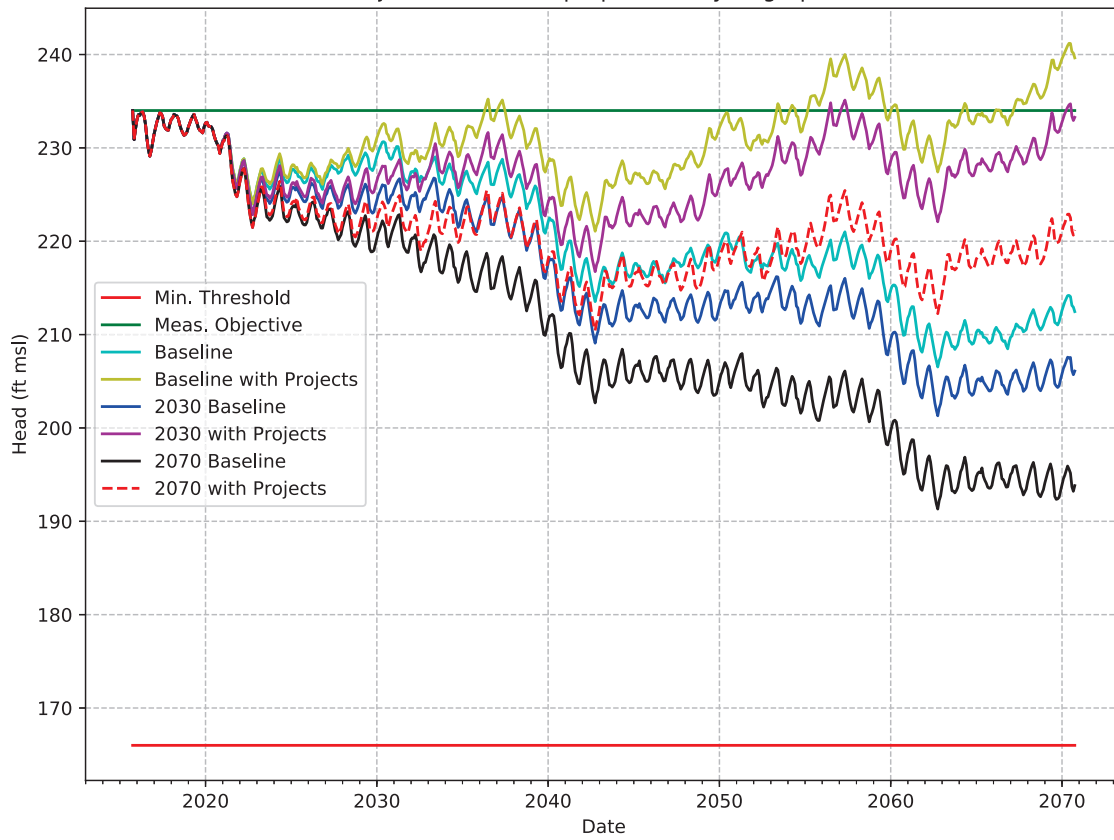
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-237-WRWSD



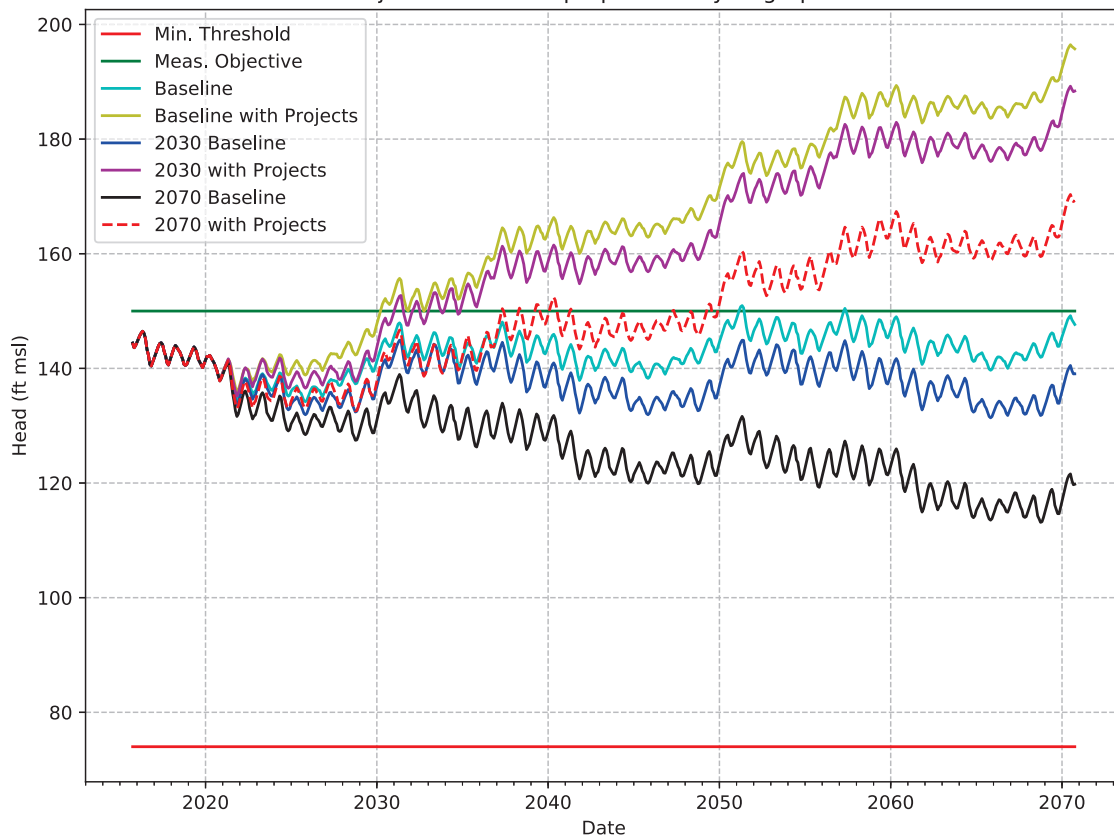
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-238-WRWSD



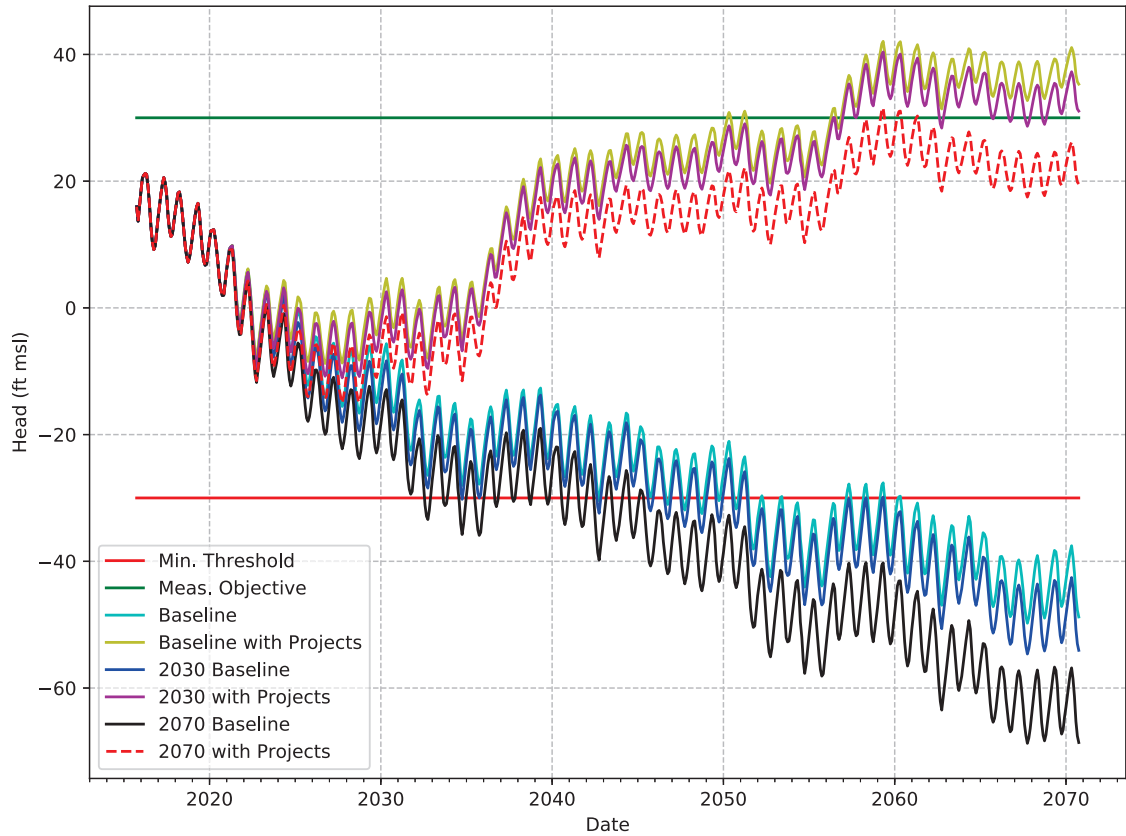
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-239-WRWSD



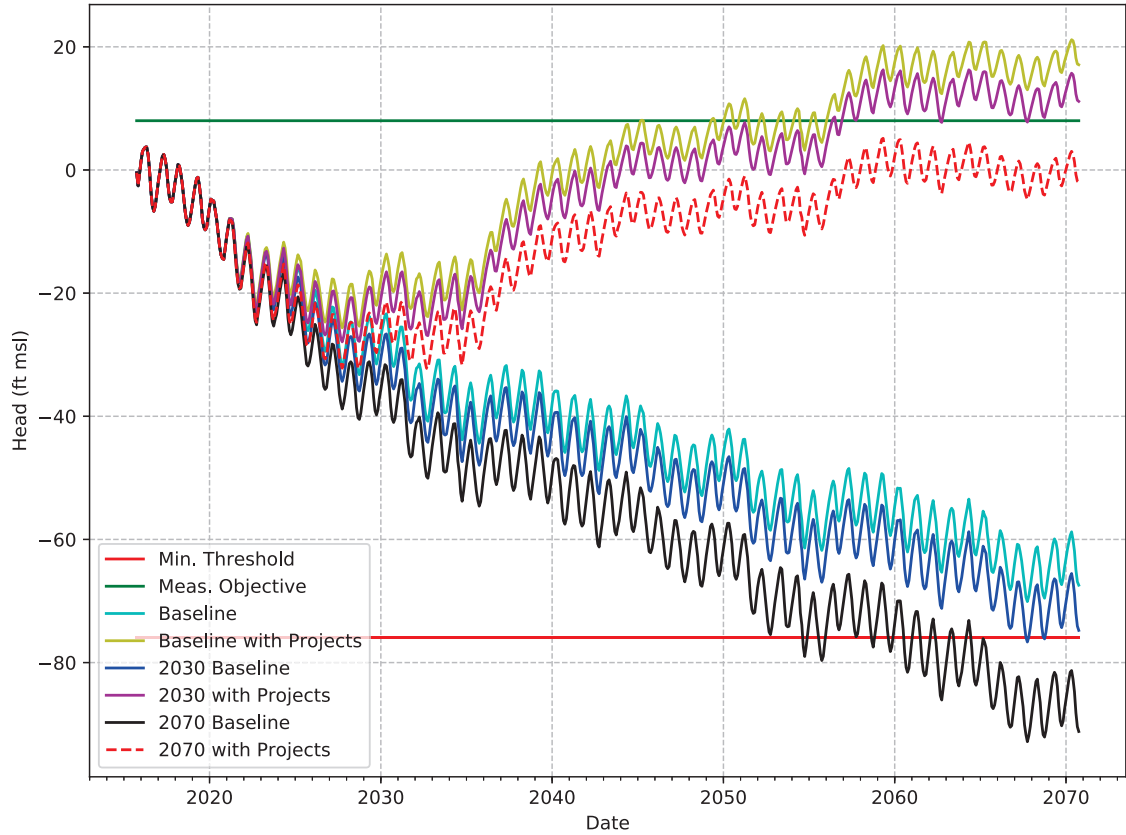
C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-240-WRWSD



C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-248-7TH-STD



C2VSimFG-Kern Projected-Future Superposition Hydrograph: RMW-249-7TH-STD



Appendix H-4: GSA Operational Water Budgets

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H-4.1 GSA OPERATIONAL WATER BUDGET SUPPORTING INFORMATION

The development of GSA scale water budgets provides a means to assess the net groundwater use from GSA water management operations. The GSA Operational Water Budgets are a checkbook-style analysis used to develop an applied water balance for each of the GSAs. This process consistent with checkbook water budgets presented in prior Kern County Subbasin Coordination Agreements. These local water budgets support the GSAs in their sustainability planning including the development of Projects and Management Actions (P/MAs). The following discussion provides a description of the data fields presented on the attached GSA Operational Water Budget Tables.

Data for the GSA operational water budgets are based on updated Basin Study data in spreadsheet format while model calibration is being finalized. Therefore, these are considered interim results as additional future local scale water budget analysis is currently underway and is anticipated to be ongoing process throughout SGMA implementation.

H-4.1.1 MANAGED SURFACE WATER INFLOWS AND OUTFLOWS

Surface water inflows/outflows to the basin were developed based on data entered into the Kern Subbasin Data Management System (DMS) by local agencies. All major surface inflows/outflows were quantified primarily based on measured data. Flows that have not been entered into the DMS were manually entered into the analysis. This data was based on either previous work on the basin groundwater model or provided directly by local agencies. In the future, it is envisioned that all data required for the groundwater model and/or the checkbook would be fully incorporated into the DMS.

Surface inflows/outflows were broken down into the sources/types listed and defined below.

- **Managed Surface Water Inflows**
 - **DWR State Water Project (SWP)** – State Water Project water volume diverted into the Kern Subbasin by the California Aqueduct. The Kern County Water Agency (KCWA) was created in 1961 by a special act of the California State legislature to serve as the local contracting entity for the State Water Project (SWP).
 - **USBR Central Valley Project (CVP)** – Center Valley Project water volume diverted into the Kern Subbasin primarily via the Friant-Kern Canal. The Central Valley Project (CVP), operated by the U.S. Bureau of Reclamation

(USBR), has provided water supply to CVP contractors in the Kern Subbasin since 1951 with the completion of the Friant-Kern Canal.

- **Kern River** – Kern River flows consist of regulated and managed releases from Lake Isabella, which was constructed by the U.S. Army Corp of Engineers (USACE) in 1953. Since that time, Isabella Dam has been operated for flood control, hydroelectric power, water supply, and conservation storage. Reservoir storage and Kern River flow management are coordinated by the Kern River Watermaster, working with the USACE, participating water districts, and the City of Bakersfield. Except for periods of high runoff, releases from Lake Isabella are regulated through requests, or “calls” for water by the City on behalf of the Kern River Watermaster.
- **CVC** – Water transfers that may be of local or undifferentiated sources that are diverted from Cross Valley Canal water volume to the GSA.
- **Poso Creek** – Poso Creek water volume diverted under SWRCB- approved *Agreement Regarding Operation And Monitoring Of Poso Creek Flows* (date May 23, 1997) among Cawelo Water District ("CWD"), Semitropic Water Storage District (SWSD), and North Kern Water Storage District ("NKWSD") for maximizing "in-lieu" groundwater recharge through direct deliveries for irrigation and groundwater recharge.
- **Transfers In** – Transfers of water from one GSA to another to account for water volumes diverted into the GSA from outside agency
- **Recycled, Produced, Reclaimed, Other** – Water volumes from wastewater treatment facilities that percolates or is applied to land for irrigation; Water volumes produce during oil extraction process from oil fields that is reused for agriculture; Any other volume that doesn't fit into the other inflow categories above.
- **Managed Surface Water Outflows**
 - **Transfers Out** – Water volume diverted out of the GSA to another GSA.
 - **Pump-In** – Recovery of banked water within the Kern Subbasin that is delivered, or pumped in, to the California Aqueduct or Friant-Kern Canal for delivery to an entity outside of the Kern Subbasin representing a return of a banking obligation to a banking partner.
 - **Exports** – Diversion of water within the Kern Subbasin that is exported to an area outside of the Kern Subbasin for use. In most cases, this represents a water district that overlies areas both inside and outside of the Kern Subbasin.

The total surface water supply that remains in the area is calculated as the sum of the inflows minus the sum of the outflows. A summary table of these volumes for the Kern Subbasin excluding the major banking areas is displayed below in GSA Operational Water Budget Tables.

H-4.1.2 OPERATIONAL WATER USAGE

The operational water usage accounts for agricultural crop demand, urban usage and water surface evaporation. The following discussion provides additional information on how these were derived.

H-4.1.2.1 GSA Land Area

Land use is not a direct water use, but it is a component in calculating components of the operational water budget, so it is presented here. The following land use categories are used in the GSA Operational Water Budgets. Definitions for each of the land use categories are listed below.

- ***GSA Land Area***
 - Total area of the GSA for all land uses
- ***Developed Land Area***
 - Irrigated Area- Lands that were cropped and irrigated at any time during the year, including a fall crop or a spring crop or both fall and spring crop.
 - Urban Lands - cities, industrial, roads, railroads, farmhouses, etc.
 - Fallow Lands – Lands that were not cropped and were not irrigated for the entire year, but have been previously cropped.
 - Recharge Basin – area of dedicated recharge basins for water banking and conjunctive use operations.

Land uses developed for the Basin Study model were used to identify the irrigated area within the basin for each year. The ET volume for the irrigated area was used in the analysis to quantify the ET of applied water for irrigated agriculture.

A complete coverage of land use for Kern Subbasin for each year for the 1995 through 2023 period were developed by merging together the various sources of spatial data as shown on Table 1. Priority was given to the DWR Statewide Crop Mapping Data and the DWR Land Use Surveys. Kern County Agricultural Commissioner's data was used where DWR data was unavailable. Land use data was quality controlled by extracting an ET value for each polygon/field in the land use coverage and comparing the ET to the land use type.

H-4.1.2.2 Agricultural Water Usage

Evapotranspiration (ET) and evaporation volumes were taken directly from the Basin Study groundwater model that is currently in development. This section will describe the data sets and processes related to ET that were used in the groundwater model. More detailed documentation will be released early next year as part of the Basin Study. The Basin Study model has not been fully calibrated at this time. The ET results from

the model are subject to change during model calibration, however changes are expected to be small.

Table 1. Data Sources used for Land Use in the Basin Study model

Data Source	Data Type	Extent	Years Available	Land Use Types Covered
California Department of Water Resources (DWR) Land Use Survey	Spatial	Kern County	1990, 1998, 2006	Full Coverage
California Department of Water Resources (DWR) Statewide Crop Mapping (LandIQ)	Spatial	California	2014, 2016	Full Coverage, no fallow/idle or native vegetation
California Department of Water Resources (DWR) Statewide Crop Mapping (LandIQ)	Spatial	California	2018-2022	All Irrigated Agriculture, Dairy Farms, and Urban
Kern County Department Of Agriculture And Measurement Standards (Spatial Data)	Spatial	Kern County	1997-2024	All Irrigated Agriculture, Dairy Farms
Land IQ Kern Subbasin Crop Mapping	Spatial	Kern Subbasin	2022, 2023	All Irrigated Agriculture, Dairy Farms
Cawelo Water District (CWD) Crop Data	Spatial	CWD	2015-2023	Full Coverage
Henry Miller Water District (HMWD) Crop Data	Spatial	HMWD	1999-2024	All Irrigated Ag, Fallow/Idle
Semitropic Water Storage District (SWSD) Crop Data	Spatial	SWSD	2011-2017, 2019-2023	Full Coverage
US Census Bureau Topologically Integrated Geographic Encoding and Referencing (TIGER)	Spatial	USA	All Model Years	Roads
California Geologic Energy Management (CalGEM) Inland Well Data	Spatial	California	All Model Years	Wells/Oil Fields

H-4.1.2.2.1 Crop Evapotranspiration

Actual crop ET (ET_c) data was provided by the Irrigation Training Research Center at California Polytechnic State University. ITRC uses a modified Mapping of EvapoTranspiration with Internal Calibration (ITRC - METRIC) procedure to compute actual evapotranspiration using LandSAT Thematic Mapper (LandSAT) data. Raster results from the process were provided to the basin for the 1993 through 2022 period. ET_c data for 2023 was developed and provided to the basin by LandIQ .

A comparison of the overlap period between the LandIQ and the ITRC-METRIC data was reviewed. Results from the analysis show that the ITRC-METRIC data is likely underestimating ET_c particularly in the winter months. An adjustment was performed on the data to correct the underestimation of winter ET_c. This analysis on the ET_c is part of the ongoing Basin Study (Section 9.4.1). General analysis steps are listed below.

- Estimate idle land ET using the IWFM-IDC model to perform a monthly rootzone water balance; reference ET was used as model input for the idle land ET and the model applied water stress when precipitation was depleted.
- Compare idle land ET to ITRC-METRIC ET on a field-by-field basis for each month.
- If the idle land ET was greater than the ITRC-METRIC ET than the idle land ET was used for that month otherwise the ITRC-METRIC ET was used for that month

An example of the adjustments on a 127-acre field of cotton is displayed in Figure 3. The idle land ET was greater than the ITRC-METRIC during the winter months and the ITRC-METRIC was greater than the idle land ETc during the summer months.

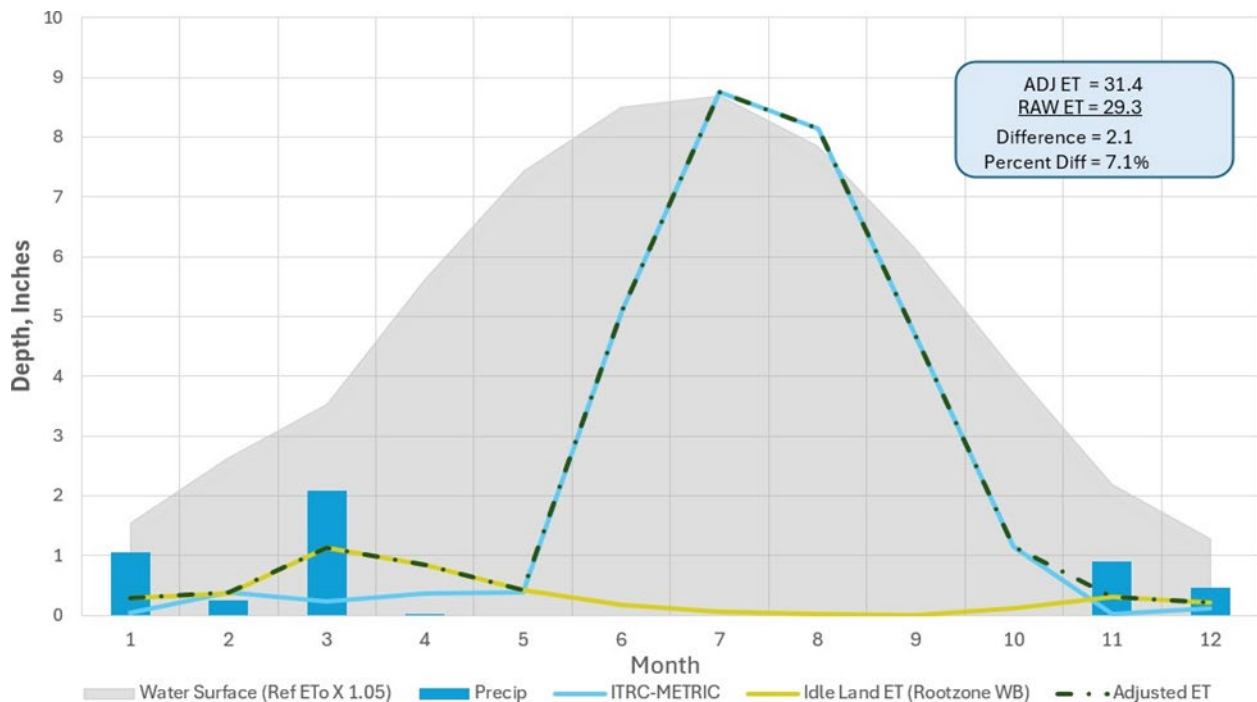


Figure 1. ET Adjustment Example

This general trend was seen across the Kern Subbasin and resulted in a 7% (1.3 inches) increase in basin wide ET over the 1995-2022 period (Table 2). A methodology change in the ITRC-METRIC processing occurred around 2013. This resulted in a higher increase during the 2013 through 2022 period. No adjustments were made to the 2023 LandIQ ETc.

Table 2. Kern Subbasin Results of ETc Adjustment

Period	ITRC-METRIC Average ETc (inches)	Adjusted Average ETc (inches)	Difference (inches)	Percent Difference
1995-2010	19.1	19.6	0.6	3%
2013-2022	15.6	17.8	2.2	14%
1995-2022	17.7	19.0	1.3	7%

The adjusted ET values for each field were averaged by land use and model subregion for use as input to the groundwater model. The model was used to partition the ETc into ET of applied water and ET of precipitation. ETc and ET of precipitation outputs from the model for the irrigated areas were used for the GSA Operational Water Budgets (Table 2). The total Subbasin-wide ET output from the model was compared to the ITRC- METRIC data clipped to the Subbasin boundary as a final validation of the model ET setup (Figure 2). During the early period, wet years show an increase in ETc and the dry years show no change in ETc. During the later period all year were increased indicating that the ITRC-METRIC methodology changed for this period.

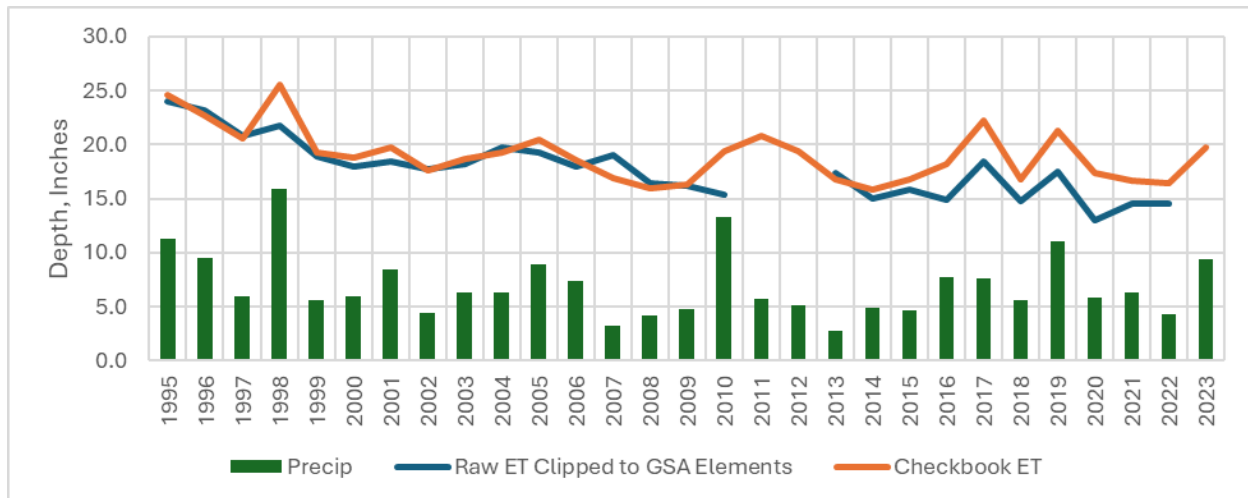


Figure 2. Basin wide ET Validation

The following GSAs have purchased one or more additional years of Land IQ ETc independent from the Basin Study. The additional years provided a period of overlap between the LandIQ data and the ITRC-METRIC data.

- North Kern GSA (2021-2023)
- Shafter-Wasco GSA (2020-2022)
- South San Joaquin MUD GSA (2021-2023)
- Cawelo GSA (2021-2022)
- Kern River GSA (2022)
- Semitropic Water Storage District (2017-2022)

This general trend was seen across the Kern Subbasin and resulted in a 7% (1.3 inches) increase in basin wide ET over the 1995-2022 period (Table 1). A methodology change in the ITRC-METRIC processing occurred around 2013. This resulted in a higher increase during the 2013 through 2022 period. No adjustments were made to the 2023 LandIQ ETc.

H-4.1.2.2.2 Effective Precipitation

Effective precipitation is the volume of precipitation that meets part of the agricultural crop demand. The spatial distribution of precipitation for 1995 through 2022 was developed using PRISM data. A precipitation timeseries was developed for each element of the model based on the PRISM spatial data set. The 2023 model precipitation was developed using monthly raster provide by LandIQ.

H-4.1.2.2.3 Applied Water Demand

The applied water demand is the fraction of the ETc that is met by applied water following the application of effective precipitation.

H-4.1.2.3 Urban Water Use

The urban water use is to account for residential, commercial and industrial water usage within the Kern Subbasin.

H-4.1.2.3.1 Municipal and Industrial Water Use

List of major water purveyors whose historical water use is included under the *Municipal and Industrial Water Use* category.

- Arvin CSD
- Bakersfield Municipal
- California Water Service
- City of Delano
- City of Shafter
- City of Wasco
- East Niles CSD
- Greenfield CWD
- Kern Valley State Prison
- Lamont PUD
- Lerdo County Jail
- Lost Hills Utility District
- McFarland MWC
- North of the River MWD

- Oildale MWC
- Vaughn WC
- Wasco State Prison
- West Kern WD

Water supply and use data for these are derived from the Kern Subbasin DMS and other sources including data compiled by GSAs, KCWA Water Supply Reports (1977-2011) and data provided by the cities.

H-4.1.2.3.2 Domestic, Industrial and Small Water System Water Use

The majority of the population resides within the major urban areas that are served by one the major water purveyors listed above. Limited data are available for determining the water use in areas outside of these major water purveyors. A GIS spatial analysis was applied to determine the population located outside if the major water purveyor Table 3 summarizes the results of this preliminary analysis which indicates that a very high percentage of the population within the Kern Subbasin resides in municipal areas with water service. The population trends show that the Kern Subbasin population has grown by over 350,000 people whereas the population outside of the municipal areas with water service has decreased. This represents an overall trend of urban expansion over this period.

The water use was calculated based on an estimated per capita water use that is consistent with urban uses and shows a decreasing trend over time to account for statewide efforts for water conservation. The estimated water use for this population has declined proportionally to the decreasing population and per capita water use. The GIS spatial analysis applied this water use to the various GSAs.

Table 3. Estimated Population and Water Use for areas outside of the major water purveyors

Data Source	Estimated Population with the Kern Subbasin	Estimated Population Outside of Major Water Purveyors	Estimated Per Capita Water Use (AFY)	Estimated Water Use (AFY)
1990 Census	454,507	41,325	0.40	16,530
2000 Census	571,448	33,369	0.375	12,513
2010 Census	741,385	38,860	0.34	13,212
2020 Census	810,259	33,703	0.30	10,111

In addition, seventy-three small water systems were identified from state and county agencies the provide water supply to industries or institutions. These are calculated separately because their water use is not population based. At this time, only limited water use data is available for this systems. To account for this water use, a conservative assumption of 30 AFY per year as assumed for each of the seventy-three

small water systems, resulting in 2,190 AFY of additional water use in the Kern Subbasin.

These water use estimates should be considered as a preliminary screening level analysis to incorporate this water use in the GSA Operational Water Budgets. Future work will be necessary to improve these estimates.

H-4.1.2.4 Water Surface Evaporation

Evaporation of water surfaces for open channel conveyance systems and recharge basins was estimated for the operational water budgets. Evaporation from conveyance systems was estimated by multiplying the average water surface areas by reference ET and then by a water surface evaporation coefficient of 1.05. Evaporation from recharge basins was estimated from 3 to 6 percent of the recharge basin delivery volume to the GSA. Refinement of these initial estimates should be considered in future updates.

H-4.1.3 OPERATIONAL WATER BUDGET CALCULATION

The GSA Operational Water Budgets provides a summation of total annual supplies and demands. The result is shown as the net groundwater deficit within each GSA as shown by the following relationships:

$$\begin{aligned} \text{Net Groundwater Deficit} &= \text{Outflows} - \text{Inflows} \\ \text{Net Groundwater Deficit} &= \text{TD} + \text{WBA} - \text{SW} - \text{EP} - \text{NYA} \end{aligned}$$

Since the result is shown as a deficit, a positive number represents the total net use of groundwater beyond the native yield whereas a negative number represents the net surface water surplus to meet demand. A surplus indicates a higher reliance on surface water resources where deep percolation of applied surface water to groundwater and water banking/conjunctive use operations exceed groundwater pumping. Conversely, a deficit indicates a higher reliance of groundwater resources.

H-4.1.3.1 Operational Water Budget Calculation Components

The following summarize the components shown on the following GSA Operational Water Budget Tables

- **Total Water Demand (TD):** The total water demand is the summation of the managed water uses including agriculture, managed refuge, municipal, industrial, small water systems and domestic water demands within the Kern Subbasin. Evaporative losses from surface conveyance and recharge basins are also included as part of the total demand. Water use for water banking, conjunctive use operations, and deep percolation of applied surface water are not included as part of the demand because their net effect is groundwater recharge.

- **Total Surface Water Supplies (SW):** Summation of surface water inflows and outflows shown under the *Managed Surface Water Inflows And Outflows* Section.
- **Effective precipitation (EP):** Volume of precipitation that meets part of the agricultural crop demand as shown under *Operational Water Usage* Section.
- **Native Yield on Developed Area (NYA):** The volume of groundwater based on natural recharge sources, deep percolation of precipitation to groundwater and groundwater recharge from small watersheds surrounding the Kern Subbasin. The native yield, discussed Section 9.4.2, is an estimate of the sustainable volume of groundwater that can be used in the Kern Subbasin to meet total demand. Additional work on deriving the native and sustainable yields of the Kern Subbasin is ongoing. As a preliminary, planning level assumption, the native yield is applied as 0.15 feet of water for each acre of developed agricultural and urban land in the GSA. This method accounts for about 58 percent of the estimated 280,754 AFY native yield discussed in Section 9.4.2.
- **Water Banking Adjustment (WBA):** An adjustment to account for water banking activities based on change in the overall bank accounts. For bank operators, an increase in the overall account balances represents an increase in bank storage which has a future return obligation; therefore, the adjustment is to decrease the water supply to meet the total demand. Conversely, a decrease in the overall account balances represents an decrease in water in bank storage representing a lowering of future return obligations.
- **Net Subbasin Operational Deficit:** Sum of the Net GSA Operational Deficit and the Water Banking Adjustment. This includes the effects of the water banking operations by the GSA that are not restricted to the geographic boundaries of the GSA. This is the deficit that is utilized for developing the P/MA targets for future planning. The GSA operational water budgets are also used to develop the P/MA targets used in Section 14.

H-4.1.3.2 GSA Operational Water Budget Data Tables

The following data tables provide an annual summary of the operational water budget is calculated for each GSA.

H-4.1.4 WATER BANKING ACCOUNT BALANCE SUMMARY

Kern County entities have been involved in water banking for several decades.

H-4.1.4.1 Water Bank Account Balance Tables

To integrate the water banking operations into the GSA Operational Water Budgets, each water bank operator provided a summary table of the account balances at the end of each water year from 1994 to 2023. Water bank account balances are provided for the following categories:

- **Out-of-Subbasin Return Obligation** - Account balances of remaining return obligations of surface water stored at the water bank facility for banking partners located outside of the Kern Subbasin.
- **In Subbasin Return Obligation** - Account balances of remaining return obligations of surface water stored at the water bank facility for banking partners at specified GSAs located inside of the Kern Subbasin.
- **Other Return Obligations** - Account balances of remaining return obligations of surface water stored at the water bank facility for banking partners where the location of use by the receiving entity is unspecified and may be located either within the Kern Subbasin and/or outside of the Kern Subbasin.
- **Storage Account Balances** – Account balances of remaining return obligations of surface water stored on behalf of Kern Subbasin GSAs that have storage accounts at one or more Kern Subbasin water banking operations.

Tables of these account balances is providing in the tables attached following the GSA Operational Water Budget Tables.

H-4.1.4.2 Project and Management Action (P/MA) Target Methodology

The P/MA targets presented in Section 14 are based on the Net Subbasin Operational Deficit from the GSA Operational Water Budgets. A deficit adjustment is added to the Net Subbasin Operational Deficit that to distribute the difference with the 2030 Climate Change Scenario planning deficit to calculate the Adjusted Subbasin Planning Deficit. GSAs with an Adjusted Subbasin Planning Deficit that is negative represent a negative deficit are set to zero. GSAs with an Adjusted Subbasin Planning Deficit that is positive are rounded to the nearest ten to develop the Proposed P/MA Target used in Section 14.

The exclusive water bank GSAs and projects (Kern Water Bank GSA, Pioneer GSA and Berrenda Mesa Spreading Grounds) are shown with a zero P/MA target in Table 4 because their total supplies and demands are banking related, and as such are operated in a manner to maintain a positive banking balance over time as is demonstrated by the account balances shown in Table 9-7 and this document in the Water Bank Account Balance Tables.

Table 4. Project and Management Action (P/MA) Target

GSA	Net Subbasin Operational Deficit (AFY)	Deficit Adjustment (AFY)	Adjusted Subbasin Planning Deficit (AFY)	Proposed PMA Target Rounded (AFY)
Arvin GSA	27,604	-781	26,823	26,820
Buena Vista WSD GSA	-20,937	-456	-21,394	0
Berrenda Mesa Spreading Ground	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	0
Cawelo WD GSA	847	-320	526	530
Eastside Water Management Area	3,336	-10	3,326	3,330
Henry Miller WD GSA	6,057	-104	5,953	5,950
Kern River GSA	63,608	-1,391	62,217	62,220
Kern Water Bank GSA	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	0
Kern-Tulare WD GSA	-3,687	-101	-3,788	0
North Kern WSD GSA	-28,961	-805	-29,766	0
Olcese WD GSA	181	-4	177	180
Pioneer GSA	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	0
Rosedale-Rio Bravo WSD GSA	10,304	-450	9,853	9,850
Semitropic WSD GSA	164,031	-1,087	162,944	162,940
Kern National Wildlife Refuge	-8	-73	-81	0
Shafter-Wasco ID GSA	22,489	-304	22,185	22,190
7th Standard	17,287	-39	17,249	17,250
Southern San Joaquin MUD GSA	26,541	-468	26,073	26,070
Tejon-Castac WD GSA	-1,751	0	-1,751	0
West Kern WD GSA	-2,534	-81	-2,615	0
Westside DWA GSA	-89,527	-1,339	-90,866	0
Wheeler Ridge-Maricopa GSA	14,990	-629	14,361	14,360
Kern Non-Districted Land Authority	23,949	-29	23,920	23,920
Total	233,819	-8,471	225,346	375,610

H-4.2 GSA OPERATIONAL WATER BUDGET TABLES

Arvin GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	203,813	9,441	16,435	0	7,128	1,063	0	0	-22,833	215,047	98,589	107,605	224,854	60,451	164,403	1,959	1,777	1,046	0	229,636	215,047	60,451	14,788	-60,651	-13,010	-73,661
136%	W	1996	0	207,698	30,548	19,460	0	8,875	1,122	0	0	-27,186	240,517	98,492	107,605	230,353	30,898	199,455	1,959	1,685	1,302	0	235,300	240,517	30,898	14,774	-50,889	-34,531	-85,420
175%	W	1997	0	155,874	79,127	1,768	0	10,320	1,181	0	0	-24,060	224,210	99,531	107,605	194,866	24,793	170,074	1,959	1,594	1,514	1,914	201,848	224,210	24,793	14,930	-62,085	-18,385	-80,470
237%	W	1998	0	149,995	65,326	20,311	0	6,470	1,240	0	0	-19,394	223,948	100,869	107,605	179,956	56,078	123,879	1,832	1,503	949	5,826	190,066	223,948	56,078	15,130	-105,090	23,410	-81,680
70%	AN	1999	0	77,790	58,243	101,359	0	7,852	1,299	0	0	-22,577	223,966	101,554	107,605	199,354	38,887	160,467	2,602	1,411	1,225	4,884	209,476	223,966	38,887	15,233	-68,610	113,565	44,955
67%	AN	2000	0	104,806	3,663	150,957	0	8,406	1,358	0	0	-26,416	242,774	102,055	107,605	196,906	27,088	169,819	2,738	1,320	1,232	5,747	207,943	242,774	27,088	15,308	-77,226	76,436	-791
53%	D	2001	0	40,650	2,520	57,624	0	6,315	1,348	0	0	-23,759	84,698	102,172	107,605	198,428	31,673	166,755	2,578	1,299	1,284	2,326	205,914	84,698	31,673	15,326	74,217	34,670	108,888
51%	D	2002	2,772	34,716	1,693	41,008	0	6,639	1,339	0	0	-25,561	62,606	102,165	107,605	217,451	18,418	199,033	2,593	1,278	1,260	266	222,848	62,606	18,418	15,325	126,499	-7,610	118,889
83%	BN	2003	12,894	92,993	1,154	62,810	0	6,101	1,329	0	-12,380	-24,587	140,314	101,905	107,605	193,024	33,275	159,749	2,848	1,257	1,087	2,642	200,858	140,314	33,275	15,286	11,983	19,861	31,843
57%	D	2004	9,092	39,878	0	50,736	0	6,965	1,320	0	-11,573	-26,613	69,804	102,290	107,605	230,110	28,590	201,519	2,885	1,235	1,220	430	235,879	69,804	28,590	15,344	122,141	5,271	127,412
157%	W	2005	4,467	208,155	8,846	5,870	0	6,097	1,310	0	-13,939	-21,959	198,847	101,852	107,605	181,173	44,746	136,427	2,747	1,214	1,088	6,019	192,241	198,847	44,746	15,278	-66,629	-64,252	-130,881
153%	W	2006	5,719	182,882	16,367	35,185	0	6,518	1,330	0	0	-22,421	225,580	102,065	107,605	188,001	34,775	153,226	3,011	1,193	1,115	5,443	198,762	225,580	34,775	15,310	-76,902	3,296	-73,606
39%	C	2007	4,122	22,132	300	57,535	0	7,702	1,350	0	-7,609	-24,628	60,903	102,051	107,605	208,005	21,285	186,719	3,330	1,172	1,262	1,201	214,969	60,903	21,285	15,308	117,472	3,152	120,624
71%	C	2008	156	31,039	14,955	21,795	0	6,114	1,369	0	-42,615	-25,532	7,281	101,633	107,605	190,385	13,819	176,566	2,903	1,151	1,260	265	195,963	7,281	13,819	15,245	159,618	-33,444	126,174
64%	BN	2009	1,280	73,088	18,209	2,811	0	6,195	1,389	0	-43,080	-23,857	36,036	101,714	107,605	188,398	22,128	166,270	3,189	1,129	1,151	2,040	195,908	36,036	22,128	15,257	122,486	-41,094	81,392
113%	AN	2010	19,419	163,675	1,547	69,725	0	5,742	1,409	0	-56,229	-22,588	182,700	101,604	107,605	168,059	31,688	136,371	2,946	1,108	1,041	6,096	179,251	182,700	31,688	15,241	-50,378	-25,657	-76,035
203%	W	2011	25,427	194,718	0	26,521	0	5,698	1,371	0	-16,065	-22,318	215,351	101,695	107,605	167,113	45,359	121,754	2,817	1,102	1,075	5,974	178,082	215,351	45,359	15,254	-97,883	-18,913	-116,796
53%	D	2012	38,430	32,013	0	75,534	0	6,669	1,326	0	-10,010	-24,712	119,250	101,750	107,605	240,988	37,974	203,014	2,866	1,097	1,224	1,668	247,843	119,250	37,974	15,262	75,356	97,720	173,076
30%	C	2013	12,499	19,925	868	16,048	0	6,629	1,282	0	-15,111	-26,479	15,661	102,050	107,605	206,109	17,720	188,389	3,008	1,091	1,268	237	211,712	15,661	17,720	15,308	163,024	-6,079	156,946
25%	C	2014	0	11,918	11,666	16,668	0	4,920	1,238	0	-45,195	-24,090	-22,875	102,075	107,605	194,843	19,440	175,404	2,808	1,085	1,156	211	200,104	-22,875	19,440	15,311	188,228	-7,014	181,214
18%	C	2015	0	2,001	31,003	12,489	0	4,478	1,194	0	-67,142	-16,633	-32,611	102,250	107,605	201,414	30,038	171,377	1,949	1,080	932	40	205,416	-32,611	30,038	15,338	192,651	-30,405	162,246
51%	D	2016	799	58,814	18,189	10,217	0	5,648	1,099	0	-53,134	-16,996	24,637	102,151	107,605	185,043	35,571	149,472	2,523	1,074	951	347	189,938	24,637	35,571	15,323	114,407	-26,612	87,795

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
275%	W	2017	8,083	206,292	25,346	25,737	0	6,973	1,188	0	-5,963	-18,656	249,001	102,175	107,605	203,107	45,173	157,934	2,612	1,068	1,189	7,980	215,956	249,001	45,173	15,326	-93,544	9,207	-84,338
60%	BN	2018	26,927	104,869	827	44,113	0	6,345	1,122	0	-13,893	-20,542	149,768	102,196	107,605	199,135	26,880	172,256	2,339	1,063	1,106	3,507	207,150	149,768	26,880	15,329	15,173	32,995	48,168
177%	W	2019	3,661	174,115	4,594	38,908	0	7,196	1,163	0	-6,393	-18,169	205,075	102,272	107,605	201,995	45,222	156,773	2,547	1,057	1,068	5,877	212,544	205,075	45,222	15,341	-53,094	-24,779	-77,873
55%	D	2020	0	50,053	3,056	22,150	0	5,985	1,197	0	0	-20,064	62,377	102,121	107,605	168,104	37,952	130,152	2,569	1,051	1,034	562	173,320	62,377	37,952	15,318	57,673	10,000	67,673
22%	C	2021	0	2,307	5,624	8,067	0	5,688	1,260	0	0	-18,391	4,554	102,099	107,605	195,464	19,259	176,205	2,690	1,051	1,014	106	200,325	4,554	19,259	15,315	161,197	7,280	168,477
29%	C	2022	0	41,328	10,000	420	0	5,714	1,199	0	-3,574	-19,571	35,516	101,901	107,605	196,681	22,313	174,368	2,561	1,051	873	99	201,265	35,516	22,313	15,285	128,151	-10,656	117,495
320%	W	2023	349	221,071	48,281	6,922	0	5,446	1,019	0	-17,694	-19,117	246,277	102,156	107,605	197,893	49,712	148,180	2,175	1,051	957	9,764	211,840	246,277	49,712	15,323	-99,472	-28,190	-127,662
Average (1995-2014)			6,814	102,388	16,224	42,508	0	6,868	1,299	0	-13,690	-24,079	138,331	101,406	107,605	199,919	31,954	167,965	2,679	1,285	1,188	2,659	207,730	138,331	31,954	15,211	22,234	5,370	27,604
Average (2015-2023)			4,424	95,650	16,324	18,780	0	5,942	1,160	0	-18,644	-18,682	104,955	102,147	107,605	194,315	34,680	159,635	2,440	1,061	1,014	3,143	201,973	104,955	34,680	15,322	47,016	-6,796	40,220
Average (1995-2023)			6,072	100,297	16,255	35,144	0	6,580	1,256	0	-15,228	-22,404	127,973	101,636	107,605	198,180	32,800	165,380	2,605	1,215	1,134	2,809	205,943	127,973	32,800	15,245	29,925	1,594	31,519
Wet (W, AN)			5,163	173,145	27,025	39,935	0	7,132	1,235	0	-8,945	-22,130	222,561	101,147	107,605	194,895	41,144	153,751	2,454	1,314	1,139	5,040	204,842	222,561	41,144	15,172	-74,035	-139	-74,174
Dry (D, BN)			10,244	58,564	5,072	40,778	0	6,318	1,274	0	-16,008	-22,966	83,277	102,052	107,605	202,298	30,274	172,024	2,710	1,165	1,146	1,532	208,851	83,277	30,274	15,308	79,993	13,911	93,904
Critically Dry (C)			2,397	18,664	10,631	19,003	0	5,892	1,270	0	-25,892	-22,189	9,776	102,008	107,605	198,986	20,553	178,432	2,750	1,097	1,109	308	204,250	9,776	20,553	15,301	158,620	-11,024	147,597
Percent of Total			5%	78%	13%	27%	0%	5%	1%	0%	-12%	-18%	100%	94%	100%		17%	83%	68%	32%			100%	62%	16%	7%	15%	-1%	15%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Buena Vista Water Storage District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	98,350	0	116,086	0	0	0	88	-41,850	0	0	172,674	43,135	51,035	145,947	28,935	117,012	486	470	1,592	1,422	149,917	172,674	28,935	6,470	-58,162	-7,083	-65,245
136%	W	1996	107,098	0	131,650	0	0	27,142	88	-43,976	0	0	222,002	43,283	51,035	150,088	16,580	133,508	486	456	1,666	587	153,283	222,002	16,580	6,493	-91,791	4,455	-87,336
175%	W	1997	77,897	0	143,671	0	0	0	88	-49,815	0	0	171,841	43,303	51,035	139,972	15,942	124,030	486	441	1,552	859	143,310	171,841	15,942	6,495	-50,968	-3,738	-54,706
237%	W	1998	53,339	0	133,292	0	0	9,273	88	-44,815	0	0	151,177	43,154	51,035	128,451	30,939	97,513	473	427	1,448	1,338	132,137	151,177	30,939	6,473	-56,451	-8,167	-64,618
70%	AN	1999	79,245	0	103,222	0	0	14,267	88	-35,852	0	0	160,970	43,270	51,035	129,194	19,314	109,880	466	413	1,549	178	131,801	160,970	19,314	6,491	-54,974	0	-54,974
67%	AN	2000	92,720	0	59,784	0	0	0	88	-31,026	0	0	121,566	43,359	51,035	135,551	14,751	120,800	460	399	1,530	5	137,944	121,566	14,751	6,504	-4,877	0	-4,877
53%	D	2001	52,469	0	39,740	0	0	0	88	-10,394	0	0	81,903	43,312	51,035	131,978	15,251	116,727	453	398	1,571	2	134,402	81,903	15,251	6,497	30,752	-17	30,735
51%	D	2002	63,341	0	35,368	0	0	0	88	-6,021	0	0	92,776	43,289	51,035	127,231	9,435	117,796	446	398	1,548	21	129,645	92,776	9,435	6,493	20,941	2,134	23,075
83%	BN	2003	74,714	0	45,836	0	0	0	88	-13,421	0	0	107,217	43,425	51,035	119,792	13,477	106,315	440	398	1,504	25	122,159	107,217	13,477	6,514	-5,048	2,781	-2,267
57%	D	2004	63,552	0	45,204	0	0	0	88	-11,534	0	0	97,310	43,193	51,035	125,516	11,185	114,332	433	397	1,579	0	127,926	97,310	11,185	6,479	12,953	0	12,953
157%	W	2005	74,177	0	82,193	0	0	0	88	-15,374	0	0	141,084	43,326	51,035	129,360	21,054	108,306	427	397	1,517	663	132,364	141,084	21,054	6,499	-36,273	-22,359	-58,632
153%	W	2006	76,416	0	109,791	0	0	0	88	-27,673	0	0	158,622	43,345	51,035	124,279	17,490	106,789	420	397	1,558	459	127,113	158,622	17,490	6,502	-55,500	-884	-56,384
39%	C	2007	63,999	0	65,916	0	0	9,854	88	-16,092	0	0	123,765	43,404	51,035	123,059	8,800	114,259	413	397	1,568	0	125,438	123,765	8,800	6,511	-13,638	0	-13,638
71%	C	2008	49,609	0	39,540	0	0	0	88	-5,561	0	0	83,676	43,100	51,035	116,296	6,332	109,963	407	396	1,579	0	118,678	83,676	6,332	6,465	22,205	0	22,205
64%	BN	2009	72,608	0	21,463	0	0	0	88	-1,712	0	0	92,447	43,078	51,035	116,793	9,039	107,754	400	396	1,617	60	119,266	92,447	9,039	6,462	11,319	0	11,319
113%	AN	2010	60,454	0	67,673	0	0	0	88	-7,518	0	0	120,697	43,225	51,035	103,098	13,610	89,488	400	396	1,538	410	105,843	120,697	13,610	6,484	-34,948	-3,600	-38,548
203%	W	2011	66,437	0	98,987	0	0	0	88	-22,300	0	0	143,212	43,059	51,035	101,674	20,404	81,271	390	379	1,498	1,749	105,690	143,212	20,404	6,459	-64,384	-29,249	-93,633
53%	D	2012	71,615	0	48,106	0	0	0	88	-17,158	0	0	102,651	43,016	51,035	105,035	14,214	90,821	380	363	1,651	0	107,428	102,651	14,214	6,452	-15,889	5,000	-10,889
30%	C	2013	55,200	0	2,174	0	0	0	88	-4,460	0	0	53,002	43,212	51,035	95,570	7,427	88,143	370	347	1,657	0	97,944	53,002	7,427	6,482	31,033	0	31,033
25%	C	2014	14,287	0	0	0	0	0	88	0	0	0	14,375	43,153	51,035	79,056	4,913	74,143	359	330	1,694	0	81,439	14,375	4,913	6,473	55,679	0	55,679
18%	C	2015	9,337	0	0	0	0	0	88	0	0	0	9,425	43,056	51,035	77,868	8,310	69,558	349	314	1,632	0	80,163	9,425	8,310	6,458	55,970	8,886	64,856
51%	D	2016	46,517	0	3,442	0	0	0	88	-681	0	0	49,366	43,052	51,035	83,847	16,458	67,389	339	297	1,672	0	86,156	49,366	16,458	6,458	13,874	3,100	16,974
275%	W	2017	60,564	0	191,398	0	0	4,511	88	-41,833	0	0	214,728	43,170	51,035	99,273	21,998	77,275	329	281	1,634	2,870	104,386	214,728	21,998	6,476	-138,815	-33,861	-172,676

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)		Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)									
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	69,868	0	7,486	0	0	0	88	-3,152	0	0	74,290	43,153	51,035	85,539	12,309	73,230	318	264	1,670	312	88,104	74,290	12,309	6,473	-4,968	0	-4,968
177%	W	2019	107,096	0	60,395	0	0	0	88	-18,366	0	0	149,213	43,160	51,035	96,401	18,991	77,410	308	248	1,629	1,248	99,834	149,213	18,991	6,474	-74,843	-20,211	-95,054
55%	D	2020	40,859	0	2,866	0	0	0	88	-1,233	0	0	42,580	43,214	51,035	76,361	17,122	59,239	298	232	1,628	58	78,577	42,580	17,122	6,482	12,394	6,404	18,798
22%	C	2021	25,162	0	1,716	0	0	0	89	0	0	0	26,967	43,216	51,035	85,520	11,920	73,600	296	232	1,728	72	87,847	26,967	11,920	6,482	42,478	99	42,577
29%	C	2022	7,574	0	942	0	0	0	90	0	0	0	8,606	43,219	51,035	85,143	13,061	72,082	262	232	1,676	51	87,364	8,606	13,061	6,483	59,214	4,362	63,576
320%	W	2023	74,818	0	147,582	0	0	0	84	-7,118	0	0	215,366	43,402	51,035	110,734	26,934	83,800	251	232	1,545	7,332	120,093	215,366	26,934	6,510	-128,717	-159,666	-288,383
Average (1995-2014)			68,376	0	69,485	0	0	3,027	88	-20,328	0	0	120,648	43,232	51,035	121,397	14,955	106,442	430	400	1,571	389	124,186	120,648	14,955	6,485	-17,901	-3,036	-20,937
Average (2015-2023)			49,088	0	46,203	0	0	501	88	-8,043	0	0	87,838	43,182	51,035	88,965	16,345	72,620	306	259	1,646	1,327	92,503	87,838	16,345	6,477	-18,157	-21,210	-39,367
Average (1995-2023)			62,390	0	62,259	0	0	2,243	88	-16,515	0	0	110,466	43,217	51,035	111,332	15,386	95,946	391	356	1,594	680	114,354	110,466	15,386	6,483	-17,980	-8,676	-26,657
Wet (W, AN)			79,124	0	111,210	0	0	4,246	87	-29,809	0	0	164,858	43,246	51,035	122,617	20,534	102,083	414	380	1,558	1,471	126,440	164,858	20,534	6,487	-65,439	-21,874	-87,313
Dry (D, BN)			61,727	0	27,723	0	0	0	88	-7,256	0	0	82,282	43,192	51,035	108,010	13,166	94,845	390	349	1,605	53	110,407	82,282	13,166	6,479	8,481	2,156	10,637
Critically Dry (C)			32,167	0	15,755	0	0	1,408	88	-3,730	0	0	45,688	43,194	51,035	94,645	8,680	85,964	351	321	1,648	18	96,982	45,688	8,680	6,479	36,134	1,907	38,041
Percent of Total			56%	0%	56%	0%	0%	2%	0%	-15%	0%	0%	100%	85%	100%		14%	86%	52%	48%			100%	97%	13%	6%	-16%	8%	-23%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Cawelo Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)								Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed, Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	32,577	0	35,751	0	18,444	0	5,135	-5,637	0	0	86,270	42,625	62,802	128,503	29,811	98,692	341	445	1,007	0	130,295	86,270	29,811	6,394	7,821	-3,050	4,771
136%	W	1996	38,456	0	39,602	0	13,013	0	12,418	-2,007	0	0	101,482	42,632	62,802	121,267	16,369	104,898	274	455	1,264	0	123,261	101,482	16,369	6,395	-985	-1,880	-2,865
175%	W	1997	41,596	0	33,853	0	8,442	0	20,525	0	0	0	104,416	42,539	62,802	109,378	17,797	91,581	273	466	1,248	451	111,816	104,416	17,797	6,381	-16,778	0	-16,778
237%	W	1998	22,795	0	34,953	0	8,967	0	21,434	0	0	0	88,149	42,743	62,802	117,864	35,778	82,086	317	477	983	548	120,189	88,149	35,778	6,411	-10,150	0	-10,150
70%	AN	1999	42,484	0	29,310	0	9,568	227	21,061	-1,875	0	0	100,775	43,170	62,802	98,490	17,478	81,012	341	487	1,202	367	100,887	100,775	17,478	6,475	-23,841	-5,291	-29,132
67%	AN	2000	36,612	0	29,711	0	7,970	592	24,909	0	0	0	99,794	42,475	62,802	107,028	14,856	92,172	357	498	1,307	207	109,396	99,794	14,856	6,371	-11,625	305	-11,320
53%	D	2001	21,325	2,146	16,593	0	598	9,296	24,690	-488	0	0	74,160	42,343	62,802	107,403	14,489	92,914	396	496	1,169	161	109,624	74,160	14,489	6,351	14,624	15,107	29,731
51%	D	2002	25,296	573	12,501	0	406	16,242	23,446	0	0	0	78,464	42,268	62,802	109,005	11,190	97,815	392	494	1,227	156	111,273	78,464	11,190	6,340	15,279	0	15,279
83%	BN	2003	28,080	1,270	29,434	0	3,405	0	20,566	0	0	0	82,755	42,562	62,802	103,487	14,208	89,279	318	491	1,172	199	105,667	82,755	14,208	6,384	2,319	2,279	4,598
57%	D	2004	27,774	5,071	18,275	0	256	9,600	23,266	-2,910	0	0	81,332	42,564	62,802	115,559	12,563	102,996	280	489	1,243	310	117,882	81,332	12,563	6,385	17,602	2,154	19,756
157%	W	2005	21,819	0	36,113	0	9,187	4,636	23,698	-1,344	0	0	94,109	42,465	62,802	99,966	23,846	76,120	313	487	1,147	473	102,386	94,109	23,846	6,370	-21,939	600	-21,339
153%	W	2006	26,203	0	38,990	0	5,601	12,108	14,918	-12,094	0	0	85,726	42,486	62,802	95,797	19,968	75,829	289	485	1,217	253	98,041	85,726	19,968	6,373	-14,026	3,064	-10,962
39%	C	2007	38,997	4,788	3,898	0	0	9,679	15,409	-4,065	0	0	68,706	42,548	62,802	100,288	10,991	89,297	362	483	1,114	314	102,561	68,706	10,991	6,382	16,482	1,426	17,908
71%	C	2008	8,698	1,361	28,115	0	0	1,732	27,950	-2,416	0	0	65,440	42,287	62,802	96,503	8,596	87,907	388	481	1,143	304	98,819	65,440	8,596	6,343	18,440	2,533	20,973
64%	BN	2009	8,061	841	30,538	0	0	2,000	31,475	0	0	0	72,915	41,786	62,802	93,896	10,290	83,605	373	478	1,025	314	96,086	72,915	10,290	6,268	6,613	1,320	7,933
113%	AN	2010	18,142	0	31,269	0	5,082	891	32,639	0	0	0	88,023	42,278	62,802	102,931	19,549	83,382	378	476	1,151	375	105,311	88,023	19,549	6,342	-8,602	4,080	-4,522
203%	W	2011	39,133	1,666	37,419	0	27,408	8,325	29,762	0	0	0	143,713	42,190	62,802	101,758	25,501	76,257	457	476	1,320	1,778	105,788	143,713	25,501	6,329	-69,754	4,669	-65,085
53%	D	2012	39,965	0	20,598	0	7,568	2,083	34,699	0	0	0	104,913	41,848	62,802	121,686	16,230	105,456	485	475	1,305	430	124,381	104,913	16,230	6,277	-3,040	10,936	7,896
30%	C	2013	17,367	0	2,619	0	0	4,000	35,801	-874	0	0	58,913	43,437	62,802	99,794	10,409	89,385	513	475	1,094	561	102,437	58,913	10,409	6,516	26,599	1,419	28,018
25%	C	2014	9,198	0	679	0	0	1,291	32,975	-6,546	0	0	37,597	43,192	62,802	90,184	7,786	82,397	541	475	934	126	92,259	37,597	7,786	6,479	40,397	-8,173	32,224
18%	C	2015	6,551	0	0	0	0	5,938	32,110	-11,293	0	0	33,306	43,910	62,802	84,824	11,571	73,254	569	474	849	354	87,070	33,306	11,571	6,587	35,607	2,022	37,629
51%	D	2016	24,058	3,174	0	0	3,398	0	29,744	-500	0	0	59,875	43,568	62,802	93,077	17,770	75,307	597	474	991	269	95,408	59,875	17,770	6,535	11,228	4,100	15,328
275%	W	2017	42,340	4,452	28,724	0	34,251	7,093	26,620	-545	0	0	142,934	44,181	62,802	112,171	22,597	89,574	625	474	1,131	1,964	116,365	142,934	22,597	6,627	-55,794	15,477	-40,317

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	14,277	0	4,939	0	6,880	7,870	27,020	0	0	0	60,986	43,778	62,802	97,111	12,029	85,082	625	473	1,023	430	99,663	60,986	12,029	6,567	20,081	600	20,681
177%	W	2019	48,697	0	22,356	0	20,175	0	31,992	0	0	0	123,220	44,238	62,802	101,515	21,917	79,597	625	473	1,106	2,342	106,061	123,220	21,917	6,636	-45,712	5,600	-40,112
55%	D	2020	10,548	3,045	5,582	0	11,386	0	31,556	0	0	0	62,117	44,233	62,802	85,490	17,901	67,589	625	473	956	396	87,940	62,117	17,901	6,635	1,286	1,252	2,538
22%	C	2021	2,558	0	1,483	0	0	0	30,260	0	0	0	34,301	44,308	62,802	92,945	9,368	83,577	625	473	772	166	94,981	34,301	9,368	6,646	44,666	-1,310	43,356
29%	C	2022	551	0	0	0	0	0	31,901	-7,744	0	0	24,708	43,494	62,802	92,278	12,562	79,716	625	473	712	320	94,408	24,708	12,562	6,524	50,613	-10,583	40,030
320%	W	2023	21,553	0	71,271	0	15,339	0	29,460	-28,930	0	0	108,693	44,200	62,802	88,794	21,975	66,819	625	473	1,011	1,395	92,297	108,693	21,975	6,630	-45,001	600	-44,401
Average (1995-2014)			27,229	886	25,511	0	6,296	4,135	23,839	-2,013	0	0	85,883	42,522	62,802	106,039	16,885	89,154	369	479	1,164	366	108,418	85,883	16,885	6,378	-728	1,575	847
Average (2015-2023)			19,015	1,186	14,928	0	10,159	2,322	30,074	-5,446	0	0	72,238	43,990	62,802	94,245	16,410	77,835	616	473	950	848	97,132	72,238	16,410	6,599	1,886	1,973	3,859
Average (1995-2023)			24,680	979	22,227	0	7,495	3,573	25,774	-3,078	0	0	81,648	42,978	62,802	102,379	16,738	85,641	446	477	1,097	516	104,916	81,648	16,738	6,447	83	1,698	1,782
Wet (W, AN)			33,262	471	36,102	0	14,111	2,606	22,659	-4,033	0	0	105,177	42,940	62,802	106,574	22,111	84,463	401	475	1,161	781	109,392	105,177	22,111	6,441	-24,337	1,860	-22,478
Dry (D, BN)			22,154	1,791	15,384	0	3,766	5,232	27,385	-433	0	0	75,280	42,772	62,802	102,968	14,074	88,894	455	483	1,123	296	105,325	75,280	14,074	6,416	9,555	4,194	13,749
Critically Dry (C)			11,989	878	5,256	0	0	3,234	29,487	-4,705	0	0	46,139	43,311	62,802	93,831	10,183	83,647	518	476	946	306	96,076	46,139	10,183	6,497	33,258	-1,809	31,448
Percent of Total			30%	1%	27%	0%	9%	4%	32%	-4%	0%	0%	100%	68%	100%		16%	84%	48%	52%			100%	78%	16%	6%	0%	-2%	2%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Eastside Water Management Area - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	0	0	0	0	0	0	0	0	0	0	2,472	39,266	6,293	2,181	4,112	0	108	0	0	6,401	0	2,181	371	3,849	0	3,849
136%	W	1996	0	0	0	0	0	0	0	0	0	0	0	2,492	39,266	5,433	1,181	4,252	0	103	0	0	5,536	0	1,181	374	3,981	0	3,981
175%	W	1997	0	0	0	0	0	0	0	0	0	0	0	3,178	39,266	6,293	1,808	4,485	0	99	0	0	6,392	0	1,808	477	4,108	0	4,108
237%	W	1998	0	0	0	0	0	0	0	0	0	0	0	4,271	39,266	7,142	2,858	4,285	0	95	0	0	7,237	0	2,858	641	3,739	0	3,739
70%	AN	1999	0	0	0	0	0	0	0	0	0	0	0	3,807	39,266	6,726	2,210	4,516	0	91	0	0	6,816	0	2,210	571	4,036	0	4,036
67%	AN	2000	0	0	0	0	0	0	0	0	0	0	0	3,020	39,266	4,319	934	3,385	0	86	0	0	4,405	0	934	453	3,018	0	3,018
53%	D	2001	0	0	0	0	0	0	0	0	0	0	0	2,951	39,266	4,603	1,001	3,602	0	91	0	0	4,694	0	1,001	443	3,250	0	3,250
51%	D	2002	0	0	0	0	0	0	0	0	0	0	0	3,040	39,266	4,740	831	3,908	0	96	0	0	4,835	0	831	456	3,548	0	3,548
83%	BN	2003	0	0	0	0	0	0	0	0	0	0	0	3,063	39,266	5,204	1,398	3,806	0	100	0	0	5,304	0	1,398	459	3,447	0	3,447
57%	D	2004	0	0	0	0	0	0	0	0	0	0	0	3,135	39,266	6,139	1,300	4,839	0	105	0	0	6,244	0	1,300	470	4,474	0	4,474
157%	W	2005	0	0	0	0	0	0	0	0	0	0	0	3,084	39,266	5,403	1,796	3,608	0	109	0	0	5,513	0	1,796	463	3,254	0	3,254
153%	W	2006	0	0	0	0	0	0	0	0	0	0	0	3,079	39,266	4,898	1,616	3,282	0	114	0	0	5,012	0	1,616	462	2,934	0	2,934
39%	C	2007	0	0	0	0	0	0	0	0	0	0	0	3,073	39,266	4,773	991	3,783	0	119	0	0	4,892	0	991	461	3,441	0	3,441
71%	C	2008	0	0	0	0	0	0	0	0	0	0	0	3,076	39,266	4,370	815	3,555	0	123	0	0	4,493	0	815	461	3,217	0	3,217
64%	BN	2009	0	0	0	0	0	0	0	0	0	0	0	3,088	39,266	3,611	657	2,955	0	128	0	0	3,739	0	657	463	2,619	0	2,619
113%	AN	2010	0	0	0	0	0	0	0	0	0	0	0	3,173	39,266	4,382	1,373	3,009	0	133	0	0	4,515	0	1,373	476	2,666	0	2,666
203%	W	2011	0	0	0	0	0	0	0	0	0	0	0	3,182	39,266	3,523	1,340	2,183	0	131	0	0	3,654	0	1,340	477	1,837	0	1,837
53%	D	2012	0	0	0	0	0	0	0	0	0	0	0	3,326	39,266	6,962	2,447	4,516	0	129	0	0	7,092	0	2,447	499	4,146	0	4,146
30%	C	2013	0	0	0	0	0	0	0	0	0	0	0	4,036	39,266	4,349	1,124	3,226	0	128	0	0	4,477	0	1,124	605	2,748	0	2,748
25%	C	2014	0	0	0	0	0	0	0	0	0	0	0	3,955	39,266	3,670	787	2,882	0	126	0	0	3,796	0	787	593	2,415	0	2,415
18%	C	2015	0	0	0	0	0	0	0	0	0	0	0	4,657	39,266	4,910	1,642	3,268	0	125	0	0	5,035	0	1,642	698	2,694	0	2,694
51%	D	2016	0	0	0	0	0	0	0	0	0	0	0	4,748	39,266	4,857	2,145	2,712	0	123	0	0	4,981	0	2,145	712	2,123	0	2,123
275%	W	2017	0	0	0	0	0	0	0	0	0	0	0	5,892	39,266	7,555	3,889	3,666	0	122	0	0	7,676	0	3,889	884	2,904	0	2,904

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation										
60%	BN	2018	0	0	0	0	0	0	0	0	0	0	0	6,413	39,266	4,633	1,657	2,975	0	120	0	0	4,753	0	1,657	962	2,134	0	2,134
177%	W	2019	0	0	0	0	0	0	0	0	0	0	0	7,112	39,266	7,256	3,684	3,572	0	119	0	0	7,375	0	3,684	1,067	2,624	0	2,624
55%	D	2020	0	0	0	0	0	0	0	0	0	0	0	7,225	39,266	8,241	4,370	3,871	0	117	0	0	8,358	0	4,370	1,084	2,905	0	2,905
22%	C	2021	0	0	0	0	0	0	1,646	0	0	0	1,646	7,290	39,266	8,883	2,639	6,244	0	117	0	0	9,000	1,646	2,639	1,093	3,622	0	3,622
29%	C	2022	0	0	0	0	0	0	1,000	0	0	0	1,000	7,290	39,266	10,221	2,937	7,283	0	117	0	0	10,338	1,000	2,937	1,094	5,307	0	5,307
320%	W	2023	0	0	0	0	0	0	871	0	0	0	871	7,635	39,266	11,700	4,635	7,065	0	117	0	0	11,817	871	4,635	1,145	5,166	0	5,166
Average (1995-2014)			0	0	0	0	0	0	0	0	0	0	0	3,225	39,266	5,142	1,432	3,709	0	111	0	0	5,252	0	1,432	484	3,336	0	3,336
Average (2015-2023)			0	0	0	0	0	0	391	0	0	0	391	6,474	39,266	7,584	3,066	4,518	0	120	0	0	7,704	391	3,066	971	3,275	0	3,275
Average (1995-2023)			0	0	0	0	0	0	121	0	0	0	121	4,233	39,266	5,900	1,939	3,960	0	113	0	0	6,013	121	1,939	635	3,317	0	3,317
Wet (W, AN)			0	0	0	0	0	0	67	0	0	0	67	4,031	39,266	6,225	2,269	3,955	0	110	0	0	6,334	67	2,269	605	3,393	0	3,393
Dry (D, BN)			0	0	0	0	0	0	0	0	0	0	0	4,110	39,266	5,443	1,756	3,687	0	112	0	0	5,555	0	1,756	616	3,183	0	3,183
Critically Dry (C)			0	0	0	0	0	0	378	0	0	0	378	4,768	39,266	5,882	1,562	4,320	0	122	0	0	6,005	378	1,562	715	3,349	0	3,349
Percent of Total			0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	11%	100%		33%	67%	0%	100%			100%	2%	32%	11%	55%	0%	55%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Henry Miller Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation								Recharge Basin Evaporation
190%	W	1995	12,072	0	18,433	0	0	0	0	0	0	0	30,505	23,287	26,051	63,032	13,210	49,822	0	30	305	0	63,367	30,505	13,210	3,493	16,159	-8,607	7,552
136%	W	1996	20,268	0	16,940	0	0	0	0	-27,142	0	0	10,066	23,287	26,051	68,279	10,660	57,620	0	30	372	0	68,681	10,066	10,660	3,493	44,463	3,413	47,876
175%	W	1997	16,112	0	34,472	0	0	0	0	0	0	0	50,584	23,487	26,051	56,454	6,569	49,885	0	30	506	0	56,990	50,584	6,569	3,523	-3,686	-12,928	-16,614
237%	W	1998	7,642	0	22,618	0	0	0	0	-9,273	0	0	20,987	23,489	26,051	58,237	15,836	42,401	0	30	295	0	58,562	20,987	15,836	3,523	18,216	-10,345	7,871
70%	AN	1999	20,163	0	33,695	0	0	0	0	-14,267	0	0	39,591	23,503	26,051	56,090	10,570	45,520	0	30	530	0	56,650	39,591	10,570	3,525	2,963	-2,099	864
67%	AN	2000	19,397	0	24,905	0	0	0	0	0	0	0	44,302	23,470	26,051	53,441	7,072	46,369	0	30	443	0	53,914	44,302	7,072	3,520	-980	-316	-1,296
53%	D	2001	14,726	0	16,653	0	0	0	0	0	0	0	31,379	23,497	26,051	54,017	7,399	46,618	0	30	314	0	54,361	31,379	7,399	3,525	12,058	-1,778	10,280
51%	D	2002	13,371	0	18,353	0	0	0	0	0	0	0	31,724	23,471	26,051	57,150	5,673	51,478	0	30	317	0	57,497	31,724	5,673	3,521	16,580	9,752	26,332
83%	BN	2003	12,544	0	21,397	0	0	0	0	0	0	0	33,941	23,348	26,051	50,660	6,744	43,916	0	30	339	0	51,029	33,941	6,744	3,502	6,842	-283	6,559
57%	D	2004	11,741	0	27,360	0	0	0	0	0	0	0	39,101	23,347	26,051	57,919	5,627	52,292	0	30	391	0	58,340	39,101	5,627	3,502	10,110	-3,289	6,821
157%	W	2005	11,547	0	27,701	0	0	0	0	0	0	0	39,248	23,324	26,051	51,307	9,496	41,810	0	30	392	0	51,729	39,248	9,496	3,499	-514	-9,717	-10,231
153%	W	2006	14,024	0	32,514	0	0	0	0	0	0	0	46,538	23,329	26,051	49,361	7,948	41,413	0	30	465	0	49,857	46,538	7,948	3,499	-8,129	-4,159	-12,288
39%	C	2007	19,057	0	29,425	0	0	0	0	-9,854	0	0	38,628	23,332	26,051	57,750	4,840	52,910	0	30	444	0	58,224	38,628	4,840	3,500	11,257	-1,285	9,972
71%	C	2008	7,304	0	10,852	0	0	0	0	0	0	0	18,156	23,331	26,051	47,689	2,908	44,780	0	30	182	0	47,900	18,156	2,908	3,500	23,336	-1,031	22,305
64%	BN	2009	8,887	0	3,242	0	0	0	0	0	0	0	12,129	23,331	26,051	34,895	3,457	31,438	0	30	121	0	35,046	12,129	3,457	3,500	15,961	-3,536	12,425
113%	AN	2010	11,909	0	17,785	0	0	0	0	0	0	0	29,694	23,277	26,051	41,982	7,479	34,503	0	30	297	0	42,309	29,694	7,479	3,491	1,644	0	1,644
203%	W	2011	11,357	0	28,285	0	0	0	0	0	0	0	39,642	23,297	26,051	40,476	8,799	31,677	0	30	396	0	40,902	39,642	8,799	3,495	-11,033	-806	-11,839
53%	D	2012	21,657	0	19,896	0	0	0	0	0	0	0	41,553	23,345	26,051	42,391	7,029	35,363	0	30	416	0	42,837	41,553	7,029	3,502	-9,247	-8,817	-18,064
30%	C	2013	11,787	0	6,746	0	0	0	0	0	0	0	18,533	23,405	26,051	40,783	4,726	36,056	0	30	185	0	40,998	18,533	4,726	3,511	14,228	998	15,226
25%	C	2014	1,394	0	852	0	0	0	0	0	0	0	2,246	23,405	26,051	26,662	2,352	24,310	0	30	22	0	26,715	2,246	2,352	3,511	18,606	-2,867	15,739
18%	C	2015	0	0	0	0	0	0	0	0	0	0	0	23,417	26,051	20,329	2,979	17,350	0	30	0	0	20,359	0	2,979	3,513	13,867	4,999	18,866
51%	D	2016	1,012	0	1,123	0	0	0	0	0	0	0	2,135	23,394	26,051	19,824	4,854	14,970	0	30	21	0	19,875	2,135	4,854	3,509	9,377	0	9,377
275%	W	2017	1,540	0	38,048	0	0	0	0	-4,511	0	0	35,077	23,437	26,051	18,720	3,836	14,884	0	30	396	0	19,146	35,077	3,836	3,516	-23,282	-15,815	-39,097
60%	BN	2018	3,330	0	93	0	0	0	0	0	0	0	3,423	23,463	26,051	8,599	1,785	6,814	0	30	23	0	8,652	3,423	1,785	3,519	-76	17,000	16,924
177%	W	2019	7,999	0	2,497	0	0	0	0	0	0	0	10,496	23,429	26,051	10,147	3,115	7,032	0	30	105	0	10,282	10,496	3,115	3,514	-6,844	-5,391	-12,235
55%	D	2020	382	0	2,329	0	0	0	0	0	0	0	2,711	23,410	26,051	9,076	3,871	5,204	0	30	27	0	9,133	2,711	3,871	3,511	-961	-6,869	-7,830

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation								Recharge Basin Evaporation
22%	C	2021	1,109	0	137	0	0	0	0	0	0	1,246	23,403	26,051	4,904	2,175	2,729	0	30	12	0	4,947	1,246	2,175	3,510	-1,985	-132	-2,117	
29%	C	2022	1,731	0	399	0	0	0	0	0	0	2,130	23,281	26,051	5,947	2,516	3,431	0	30	21	0	5,998	2,130	2,516	3,492	-2,140	-4,354	-6,494	
320%	W	2023	11,845	0	247	0	0	31,922	0	0	0	44,014	23,375	26,051	26,650	7,392	19,258	0	30	440	0	27,120	44,014	7,392	3,506	-27,793	-64,034	-91,827	
Average (1995-2014)			13,348	0	20,606	0	0	0	0	-3,027	0	0	30,927	23,378	26,051	50,429	7,420	43,009	0	30	337	0	50,795	30,927	7,420	3,507	8,942	-2,885	6,057
Average (2015-2023)			3,216	0	4,986	0	0	3,547	0	-501	0	0	11,248	23,401	26,051	13,799	3,614	10,186	0	30	116	0	13,946	11,248	3,614	3,510	-4,426	-8,288	-12,715
Average (1995-2023)			10,204	0	15,759	0	0	1,101	0	-2,243	0	0	24,820	23,385	26,051	39,061	6,238	32,823	0	30	268	0	39,359	24,820	6,238	3,508	4,793	-4,562	231
Wet (W, AN)			12,760	0	22,934	0	0	2,456	0	-4,246	0	0	33,903	23,384	26,051	45,706	8,614	37,092	0	30	380	0	46,116	33,903	8,614	3,508	91	-10,062	-9,971
Dry (D, BN)			9,739	0	12,272	0	0	0	0	0	0	22,011	23,401	26,051	37,170	5,160	32,010	0	30	219	0	37,419	22,011	5,160	3,510	6,738	242	6,981	
Critically Dry (C)			6,055	0	6,916	0	0	0	0	-1,408	0	0	11,563	23,368	26,051	29,152	3,214	25,938	0	30	124	0	29,306	11,563	3,214	3,505	11,024	-525	10,500
Percent of Total			41%	0%	63%	0%	0%	4%	0%	-9%	0%	0%	100%	90%	100%		16%	84%	0%	100%			100%	63%	16%	9%	12%	12%	1%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor service areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Kern River GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed, Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation								Recharge Basin Evaporation
190%	W	1995	13,533	0	348,178	0	0	2,438	34,940	0	0	0	399,089	201,910	232,403	377,437	83,164	294,273	129,814	5,272	1,198	160	513,880	399,089	83,164	30,287	1,340	-91,576	-90,236
136%	W	1996	29,175	0	320,942	0	0	1,885	32,668	0	0	0	384,670	202,221	232,403	375,788	44,382	331,406	143,517	4,916	1,247	292	525,759	384,670	44,382	30,333	66,374	-68,096	-1,722
175%	W	1997	26,170	0	360,808	0	0	0	33,424	0	0	0	420,402	202,634	232,403	338,372	43,246	295,126	131,766	4,560	1,448	225	476,370	420,402	43,246	30,395	-17,673	-10,318	-27,991
237%	W	1998	13,622	0	335,759	0	0	411	36,065	0	0	0	385,857	201,767	232,403	324,122	92,322	231,800	106,646	4,204	1,063	663	436,698	385,857	92,322	30,265	-71,745	-50,324	-122,069
70%	AN	1999	30,053	0	251,470	0	0	302	30,657	0	0	0	312,482	202,298	232,403	320,452	49,370	271,082	143,736	3,847	1,031	280	469,346	312,482	49,370	30,345	77,150	-55,939	21,211
67%	AN	2000	32,774	0	241,505	0	0	1,018	37,596	0	0	0	312,893	207,334	232,403	327,337	37,469	289,868	148,425	3,491	1,038	551	480,842	312,893	37,469	31,100	99,379	-254,369	-154,990
53%	D	2001	10,284	0	193,031	0	0	2,221	33,523	0	0	0	239,059	207,065	232,403	312,235	38,134	274,101	150,452	3,547	947	129	467,310	239,059	38,134	31,060	159,057	290,276	449,333
51%	D	2002	14,322	0	203,778	0	0	729	34,783	0	0	0	253,612	206,774	232,403	325,976	26,139	299,837	155,322	3,602	1,020	43	485,963	253,612	26,139	31,016	175,196	31,579	206,775
83%	BN	2003	32,038	0	229,041	0	0	1,519	33,955	0	0	0	296,553	207,002	232,403	316,993	37,814	279,179	152,560	3,658	1,254	198	474,662	296,553	37,814	31,050	109,246	15,421	124,667
57%	D	2004	27,947	0	235,567	0	0	0	34,807	0	0	0	298,320	207,275	232,403	333,599	29,992	303,607	177,323	3,713	991	444	516,070	298,320	29,992	31,091	156,666	-5,326	151,340
157%	W	2005	16,566	0	357,287	0	0	558	35,305	0	0	0	409,716	205,765	232,403	297,724	57,380	240,344	152,646	3,769	1,151	417	455,706	409,716	57,380	30,865	-42,255	-31,694	-73,949
153%	W	2006	20,843	0	346,279	0	0	353	36,577	0	0	0	404,052	205,504	232,403	291,969	43,714	248,255	155,352	3,824	1,062	384	452,592	404,052	43,714	30,826	-26,000	-93,193	-119,193
39%	C	2007	14,521	0	203,506	0	0	574	36,750	0	0	-1,418	253,933	207,060	232,403	323,786	25,875	297,911	182,749	3,879	846	150	511,410	253,933	25,875	31,059	200,544	9,822	210,366
71%	C	2008	9,123	0	250,438	0	0	0	36,194	0	0	-9,140	286,614	205,472	232,403	314,604	17,308	297,296	188,496	3,935	923	51	508,009	286,614	17,308	30,821	173,267	33,031	206,298
64%	BN	2009	8,965	0	225,851	0	0	406	37,407	0	0	-14,697	257,932	205,746	232,403	304,510	26,115	278,394	176,191	3,990	746	51	485,488	257,932	26,115	30,862	170,579	9,709	180,288
113%	AN	2010	28,716	0	358,483	0	0	0	36,836	0	0	-4,466	419,569	205,005	232,403	269,520	39,292	230,228	173,923	4,046	1,218	528	449,235	419,569	39,292	30,751	-40,377	59,192	18,815
203%	W	2011	81,636	0	482,592	0	0	0	36,622	0	0	0	600,850	205,413	232,403	270,510	54,924	215,586	183,638	3,954	1,488	2,082	461,672	600,850	54,924	30,812	-224,914	47,739	-177,175
53%	D	2012	113,578	0	250,976	0	0	0	39,607	0	0	0	404,161	204,911	232,403	289,821	34,392	255,429	205,999	3,862	1,919	489	502,090	404,161	34,392	30,737	32,801	8,388	41,189
30%	C	2013	26,377	0	189,040	0	0	115	53,930	0	0	-1,500	267,962	209,164	232,403	302,750	26,283	276,467	183,686	3,770	1,066	50	491,322	267,962	26,283	31,375	165,703	25,085	190,788
25%	C	2014	1,000	0	172,954	0	0	0	45,295	0	0	-24,498	194,751	208,352	232,403	287,013	19,559	267,455	184,563	3,679	864	3	476,122	194,751	19,559	31,253	230,559	7,853	238,412
18%	C	2015	100	0	174,637	0	0	0	45,241	0	0	-33,527	186,451	208,596	232,403	266,587	29,909	236,678	152,894	3,587	704	2	423,774	186,451	29,909	31,289	176,125	-11,975	164,150
51%	D	2016	11,664	0	214,233	0	0	126	45,784	0	0	-4,139	267,668	208,864	232,403	248,500	38,157	210,344	151,862	3,495	1,099	1	404,958	267,668	38,157	31,330	67,804	-12,175	55,629
275%	W	2017	50,431	0	521,327	0	0	0	48,067	0	0	0	619,825	209,677	232,403	272,455	49,346	223,110	160,845	3,403	1,738	1,384	439,825	619,825	49,346	31,452	-260,798	-35,880	-296,677
60%	BN	2018	26,981	0	307,898	0	0	279	41,422	0	0	-1,634	374,945	209,517	232,403	256,339	30,687	225,652	155,441	3,312	1,448	276	416,816	374,945	30,687	31,428	-20,244	6,943	-13,301
177%	W	2019	62,649	0	411,017	0	0	0	42,382	0	0	0	516,048	209,973	232,403	276,697	51,290	225,407	140,152	3,220	1,303	2,963	424,335	516,048	51,290	31,496	-174,499	39,347	-135,152
55%	D	2020	15,485	0	295,186	0	0	0	47,843	0	0	-3,845	354,669	209,714	232,403	239,264	46,738	192,525	141,238	3,128	1,096	1,164	385,890	354,669	46,738	31,457	-46,975	-9,763	-56,738
22%	C	2021	3,593	0	142,223	0	0	0	66,051	-49,888	0	-5,623	156,355	209,975	232,403	272,400	23,969	248,431	139,264	3,128	683	45	415,520	156,355	23,969	31,496	203,700	3,083	206,783

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)	Total Demand ⁵ (acre-foot)	Total Surface Water Supply (acre-foot)	Effective Precipitation (ETpr) (acre-foot)	Native Yield Supply ⁶ (acre-foot)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-foot)	Water Banking Adjustment ^{8, 9} (acre-foot)	Net Subbasin Operational Deficit ¹⁰ (acre-foot)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation								Recharge Basin Evaporation
29%	C	2022	0	0	152,871	0	0	0	43,961	-1,115	0	-10,155	185,562	208,991	232,403	275,706	29,286	246,421	141,054	3,128	892	284	421,064	185,562	29,286	31,349	174,868	-5,079	169,789
320%	W	2023	56,839	0	514,783	0	0	0	33,911	0	0	0	605,533	210,209	232,403	281,699	60,214	221,485	137,761	3,128	1,385	3,548	427,520	605,533	60,214	31,531	-269,759	-96,384	-366,143
Average (1995-2014)			27,562	0	277,874	0	0	626	36,847	0	0	-2,786	340,124	205,434	232,403	315,226	41,344	273,882	161,340	3,976	1,126	359	482,027	340,124	41,344	30,815	69,745	-6,137	63,608
Average (2015-2023)			25,305	0	303,797	0	0	45	46,074	-5,667	0	-6,547	363,006	209,502	232,403	265,516	39,955	225,561	146,723	3,281	1,150	1,074	417,744	363,006	39,955	31,425	-16,642	-13,542	-30,184
Average (1995-2023)			26,862	0	285,919	0	0	446	39,710	-1,759	0	-3,953	347,225	206,696	232,403	299,799	40,913	258,886	156,804	3,760	1,133	581	462,078	347,225	40,913	31,004	42,935	-8,435	34,500
Wet (W, AN)			35,616	0	373,110	0	0	536	36,542	0	0	-344	445,461	205,362	232,403	309,545	54,316	255,228	146,786	3,972	1,259	1,037	462,598	445,461	54,316	30,804	-67,983	-49,346	-117,328
Dry (D, BN)			29,029	0	239,507	0	0	587	38,792	0	0	-2,702	305,213	207,430	232,403	291,915	34,241	257,674	162,932	3,590	1,169	311	459,916	305,213	34,241	31,114	89,348	37,228	126,576
Critically Dry (C)			7,816	0	183,667	0	0	98	46,774	-7,286	0	-12,266	218,804	208,230	232,403	291,835	24,598	267,237	167,529	3,587	854	84	463,889	218,804	24,598	31,234	189,252	8,831	198,083
Percent of Total			8%	0%	82%	0%	0%	0%	11%	-1%	0%	-1%	100%	89%	100%		14%	86%	98%	2%			100%	75%	9%	7%	9%	2%	7%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor service areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Kern-Tulare Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	24,585	0	0	0	380	-307	0	0	24,659	10,897	11,270	33,358	9,635	23,723	0	66	290	0	33,715	24,659	9,635	1,635	-2,213	0	-2,213	
136%	W	1996	0	25,876	0	0	0	378	-307	0	0	25,946	10,897	11,270	32,700	5,340	27,359	0	61	383	0	33,144	25,946	5,340	1,635	223	0	223	
175%	W	1997	0	27,686	0	0	0	351	-307	0	0	27,730	11,111	11,270	27,989	5,422	22,567	0	56	373	0	28,419	27,730	5,422	1,667	-6,400	0	-6,400	
237%	W	1998	0	22,591	0	0	0	307	-307	0	0	22,591	11,080	11,270	30,761	10,465	20,296	0	52	278	0	31,090	22,591	10,465	1,662	-3,627	0	-3,627	
70%	AN	1999	0	24,987	0	0	0	1,781	237	-307	0	0	26,699	10,974	11,270	27,182	5,738	21,444	0	47	344	0	27,572	26,699	5,738	1,646	-6,510	0	-6,510
67%	AN	2000	0	26,991	0	0	0	2,299	265	-307	0	0	29,248	10,934	11,270	30,450	5,765	24,686	0	42	376	0	30,867	29,248	5,765	1,640	-5,785	0	-5,785
53%	D	2001	0	29,117	0	0	0	209	251	-307	0	0	29,271	10,996	11,270	30,757	5,015	25,743	0	41	384	0	31,182	29,271	5,015	1,649	-4,752	-782	-5,535
51%	D	2002	0	25,004	0	0	0	0	251	-307	0	0	24,948	10,995	11,270	31,370	4,327	27,043	0	40	324	0	31,734	24,948	4,327	1,649	810	0	810
83%	BN	2003	0	22,405	0	0	0	1,898	172	-307	0	0	24,168	10,968	11,270	29,239	4,967	24,272	0	39	311	0	29,589	24,168	4,967	1,645	-1,191	0	-1,191
57%	D	2004	0	25,179	0	0	0	0	278	-307	0	0	25,150	10,979	11,270	30,029	4,192	25,838	0	38	336	0	30,403	25,150	4,192	1,647	-585	0	-585
157%	W	2005	0	20,087	0	0	0	1,749	230	-307	0	0	21,759	10,938	11,270	26,356	7,560	18,796	0	37	288	0	26,681	21,759	7,560	1,641	-4,279	-32,029	-36,308
153%	W	2006	0	21,493	0	0	0	1,730	184	-307	0	0	23,100	10,947	11,270	26,943	7,057	19,885	0	36	304	0	27,282	23,100	7,057	1,642	-4,517	-2,820	-7,337
39%	C	2007	0	23,208	0	0	0	219	311	-307	0	0	23,430	10,931	11,270	28,969	4,276	24,693	0	35	315	0	29,320	23,430	4,276	1,640	-27	9,855	9,828
71%	C	2008	0	24,319	0	0	0	0	591	-655	0	0	24,255	10,889	11,270	26,286	3,531	22,754	0	34	335	0	26,654	24,255	3,531	1,633	-2,765	0	-2,765
64%	BN	2009	0	21,435	0	0	0	1,745	658	-293	0	0	23,545	10,881	11,270	22,973	3,386	19,587	0	33	306	0	23,312	23,545	3,386	1,632	-5,252	-2,238	-7,489
113%	AN	2010	0	19,909	0	0	0	134	645	-389	0	0	20,298	10,872	11,270	25,593	6,094	19,499	0	32	274	0	25,899	20,298	6,094	1,631	-2,124	-13,689	-15,813
203%	W	2011	0	20,236	0	0	0	0	789	-301	0	0	20,724	10,862	11,270	26,277	8,294	17,983	0	32	273	0	26,581	20,724	8,294	1,629	-4,066	-4,241	-8,307
53%	D	2012	0	21,660	0	0	0	0	1,120	-314	0	0	22,466	10,870	11,270	34,858	6,006	28,852	0	31	289	0	35,178	22,466	6,006	1,630	5,076	-5,293	-217
30%	C	2013	0	22,342	0	0	0	0	423	-242	0	0	22,523	10,973	11,270	23,956	3,420	20,536	0	30	299	0	24,285	22,523	3,420	1,646	-3,304	11,400	8,096
25%	C	2014	0	14,273	0	0	0	0	824	-193	0	0	14,904	10,976	11,270	25,216	2,866	22,351	0	29	197	0	25,443	14,904	2,866	1,646	6,026	11,363	17,390
18%	C	2015	0	8,951	0	0	0	0	1,568	-45	0	0	10,473	10,991	11,270	25,253	3,923	21,330	0	29	122	0	25,405	10,473	3,923	1,649	9,360	10,537	19,897
51%	D	2016	0	16,885	0	0	0	0	1,494	-114	0	0	18,264	10,991	11,270	28,146	6,142	22,004	0	28	244	0	28,418	18,264	6,142	1,649	2,362	5,984	8,346
275%	W	2017	0	19,925	0	0	0	0	1,804	-9	0	0	21,720	11,070	11,270	35,176	8,166	27,009	0	27	292	0	35,495	21,720	8,166	1,660	3,948	-16,123	-12,175
60%	BN	2018	0	20,069	0	0	0	0	2,481	-19	0	0	22,532	11,047	11,270	28,412	4,069	24,344	0	27	293	0	28,732	22,532	4,069	1,657	475	-16,544	-16,069
177%	W	2019	0	19,922	0	0	0	0	2,726	-48	0	0	22,600	11,047	11,270	30,921	7,709	23,212	0	26	296	0	31,242	22,600	7,709	1,657	-724	-23,808	-24,532
55%	D	2020	0	16,913	0	0	0	0	2,629	-42	0	0	19,500	11,048	11,270	24,291	5,779	18,512	0	25	255	0	24,571	19,500	5,779	1,657	-2,365	8,646	6,281
22%	C	2021	0	10,717	0	0	0	364	2,575	-8	0	0	13,648	11,041	11,270	27,003	3,222	23,781	0	25	157	0	27,185	13,648	3,222	1,656	8,659	10,518	19,177

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)	Total Demand ⁵ (acre-foot)	Total Surface Water Supply (acre-foot)	Effective Precipitation (ETpr) (acre-foot)	Native Yield Supply ⁶ (acre-foot)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-foot)	Water Banking Adjustment ^{8, 9} (acre-foot)	Net Subbasin Operational Deficit ¹⁰ (acre-foot)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation								Recharge Basin Evaporation
29%	C	2022	0	11,886	0	0	0	408	2,725	-48	0	0	14,971	11,039	11,270	29,317	4,530	24,787	0	25	183	0	29,526	14,971	4,530	1,656	8,369	9,717	18,086
320%	W	2023	0	15,674	0	0	0	165	2,755	-8	0	0	18,586	11,045	11,270	27,640	8,080	19,560	0	25	228	0	27,893	18,586	8,080	1,657	-430	-8,204	-8,634
Average (1995-2014)			0	23,169	0	0	0	588	432	-319	0	0	23,871	10,949	11,270	28,563	5,668	22,895	0	41	314	0	28,918	23,871	5,668	1,642	-2,263	-1,424	-3,687
Average (2015-2023)			0	15,660	0	0	0	104	2,306	-38	0	0	18,033	11,035	11,270	28,462	5,736	22,727	0	26	230	0	28,719	18,033	5,736	1,655	3,295	-2,142	1,153
Average (1995-2023)			0	20,839	0	0	0	438	1,014	-232	0	0	22,059	10,976	11,270	28,532	5,689	22,843	0	36	288	0	28,856	22,059	5,689	1,646	-538	-1,647	-2,185
Wet (W, AN)			0	22,305	0	0	0	604	850	-247	0	0	23,512	10,975	11,270	29,334	7,333	22,001	0	41	307	0	29,683	23,512	7,333	1,646	-2,808	-7,763	-10,571
Dry (D, BN)			0	22,074	0	0	0	428	1,037	-223	0	0	23,316	10,975	11,270	28,897	4,876	24,022	0	33	305	0	29,235	23,316	4,876	1,646	-602	-1,136	-1,739
Critically Dry (C)			0	16,528	0	0	0	142	1,288	-214	0	0	17,743	10,977	11,270	26,572	3,681	22,890	0	30	230	0	26,831	17,743	3,681	1,647	3,760	9,056	12,815
Percent of Total			0%	94%	0%	0%	0%	2%	5%	-1%	0%	0%	100%	97%	100%		20%	80%	0%	100%			100%	76%	20%	6%	-2%	6%	-8%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor service areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

North Kern Water Storage District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)								Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	21,111	245,017	6,324	18,429	52,576	10,535	-25,917	0	-3,262	324,813	64,542	67,400	191,813	40,860	150,953	1,226	473	1,152	8,997	203,660	324,813	40,860	9,681	-171,693	17,190	-154,503
136%	W	1996	0	3,419	236,282	796	9,076	53,532	8,339	-5,728	0	-4,726	300,990	64,749	67,400	195,539	21,060	174,479	1,226	414	1,082	6,197	204,457	300,990	21,060	9,712	-127,305	-5,224	-132,529
175%	W	1997	0	3,871	212,264	0	19,656	56,831	2,649	0	0	-4,261	291,010	64,592	67,400	169,046	24,061	144,985	1,226	355	972	6,123	177,721	291,010	24,061	9,689	-147,039	4,957	-142,082
237%	W	1998	0	3,877	301,281	0	25,761	40,725	2,491	-8,265	0	-318	365,552	64,518	67,400	170,038	49,692	120,346	1,534	296	810	11,788	184,466	365,552	49,692	9,678	-240,456	-238	-240,694
70%	AN	1999	0	5,175	112,478	59,650	11,027	38,821	2,248	-2,081	0	-1,128	226,190	64,531	67,400	152,801	23,986	128,815	1,771	237	815	4,145	159,769	226,190	23,986	9,680	-100,087	56,131	-43,956
67%	AN	2000	0	0	94,676	30,140	3,693	33,953	4,071	-24,938	0	-902	140,693	64,790	67,400	166,556	19,414	147,142	1,854	178	888	10	169,486	140,693	19,414	9,718	-339	2,390	2,051
53%	D	2001	0	0	65,312	0	0	29,913	3,564	-19,084	0	-820	78,885	64,740	67,400	179,463	21,996	157,467	1,901	208	859	0	182,431	78,885	21,996	9,711	71,839	-12,400	59,439
51%	D	2002	0	0	64,555	10,053	0	28,407	2,048	-38,191	0	-3,141	63,731	64,747	67,400	176,813	14,333	162,481	1,948	237	801	0	179,800	63,731	14,333	9,712	92,024	-26,446	65,578
83%	BN	2003	0	2,779	105,203	7,397	0	35,543	913	-40,739	0	-458	110,638	64,574	67,400	163,782	17,659	146,123	2,039	267	881	22	166,992	110,638	17,659	9,686	29,009	-11,124	17,885
57%	D	2004	0	0	89,338	6,567	0	22,397	1,313	-13,445	0	-1,131	105,039	64,842	67,400	180,942	15,114	165,828	1,967	297	989	182	184,377	105,039	15,114	9,726	54,498	-14,676	39,822
157%	W	2005	0	61,467	170,041	14,886	0	51,801	1,740	-22,097	0	0	277,838	64,437	67,400	161,362	32,580	128,782	1,962	326	1,415	4,454	169,519	277,838	32,580	9,666	-150,564	41,651	-108,913
153%	W	2006	0	31,089	238,217	20,308	0	49,126	6,016	-8,331	0	-723	335,702	64,415	67,400	166,642	30,154	136,488	2,033	356	1,034	8,322	178,386	335,702	30,154	9,662	-197,132	103,691	-93,441
39%	C	2007	0	58,033	69,775	16,052	0	37,219	3,523	-21,951	0	-2,869	159,782	64,502	67,400	167,136	13,044	154,092	2,004	386	858	4,828	175,211	159,782	13,044	9,675	-7,290	13,834	6,544
71%	C	2008	0	0	80,017	0	0	23,729	1,193	-17,218	0	-10,317	77,404	64,305	67,400	168,556	11,610	156,946	2,197	415	801	0	171,970	77,404	11,610	9,646	73,310	-44,380	28,930
64%	BN	2009	0	688	85,201	0	0	21,675	1,249	-23,967	0	-9,885	74,961	64,493	67,400	166,585	13,297	153,287	1,932	445	865	156	169,983	74,961	13,297	9,674	72,051	-19,279	52,772
113%	AN	2010	0	33,970	163,167	0	0	26,860	1,248	-23,804	0	-2,468	198,973	64,380	67,400	180,104	26,850	153,255	1,960	474	1,645	1,103	185,286	198,973	26,850	9,657	-50,194	952	-49,242
203%	W	2011	0	14,399	316,840	165	9,859	33,329	1,220	-25,857	0	-471	349,484	64,257	67,400	181,584	37,533	144,051	2,107	483	1,632	8,855	194,661	349,484	37,533	9,639	-201,994	17,925	-184,069
53%	D	2012	0	21,022	139,835	2,759	0	667	1,174	-13,870	0	-19,491	132,096	64,464	67,400	210,388	21,609	188,779	2,064	491	1,425	3,637	218,005	132,096	21,609	9,670	54,631	-17,744	36,887
30%	C	2013	0	0	35,936	10,533	0	2,977	1,147	-9,327	0	-15,394	25,872	64,799	67,400	182,957	14,038	168,919	2,018	499	1,505	305	187,284	25,872	14,038	9,720	137,654	-20,139	117,515
25%	C	2014	0	0	15,302	698	0	2,454	1,138	968	0	-16,026	4,534	64,790	67,400	180,018	10,034	169,984	1,955	507	1,171	0	183,651	4,534	10,034	9,718	159,365	-16,576	142,789
18%	C	2015	0	0	13,897	0	0	1,839	1,574	1,901	0	-9,286	9,925	64,926	67,400	165,888	15,443	150,445	1,900	516	1,278	286	169,868	9,925	15,443	9,739	134,761	-11,284	123,477
51%	D	2016	0	0	49,136	0	256	3,470	9,978	0	0	-2,273	60,567	64,799	67,400	170,827	24,165	146,662	1,846	524	1,026	613	174,836	60,567	24,165	9,720	80,384	2,155	82,539
275%	W	2017	0	33,441	224,149	0	36,617	99,586	3,723	-20,668	0	-5,922	370,926	64,824	67,400	203,787	31,411	172,376	2,011	532	2,096	9,868	218,294	370,926	31,411	9,724	-193,767	46,935	-146,832
60%	BN	2018	0	0	101,009	0	0	45,567	10,447	-5,751	0	-7,843	143,429	64,810	67,400	172,255	13,864	158,391	2,025	540	1,671	1,170	177,661	143,429	13,864	9,721	10,647	41,933	52,580
177%	W	2019	0	0	178,285	0	10,014	139,062	9,942	-25,363	0	-2,040	309,900	64,793	67,400	172,268	29,557	142,711	2,019	548	1,363	8,632	184,831	309,900	29,557	9,719	-164,345	56,376	-107,969

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)								Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed, Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
55%	D	2020	0	0	72,380	0	0	20,592	10,389	0	0	-18,090	85,271	64,814	67,400	147,945	25,508	122,437	2,043	557	1,092	1,759	153,396	85,271	25,508	9,722	32,895	-16,127	16,768
22%	C	2021	0	0	22,258	0	0	914	10,023	-726	0	-17,783	14,686	64,791	67,400	169,091	12,605	156,486	2,095	557	1,074	293	173,109	14,686	12,605	9,719	136,099	-17,363	118,736
29%	C	2022	0	0	20,296	0	0	16,505	10,543	0	0	-15,192	32,152	64,791	67,400	165,212	17,008	148,204	1,978	557	1,449	1,054	170,249	32,152	17,008	9,719	111,371	-24,430	86,941
320%	W	2023	0	0	141,808	0	6,298	175,282	9,130	0	0	-1,354	331,164	64,811	67,400	166,236	33,335	132,900	1,978	557	1,433	613	170,816	331,164	33,335	9,722	-203,405	29,036	-174,369
Average (1995-2014)			0	13,045	142,037	9,316	4,875	32,127	2,891	-17,192	0	-4,890	182,209	64,573	67,400	175,606	22,946	152,660	1,846	367	1,080	3,456	182,356	182,209	22,946	9,686	-32,486	3,525	-28,961
Average (2015-2023)			0	3,716	91,469	0	5,909	55,869	8,417	-5,623	0	-8,865	150,891	64,818	67,400	170,390	22,544	147,846	1,988	543	1,387	2,699	177,007	150,891	22,544	9,723	-6,151	11,915	5,763
Average (1995-2023)			0	10,150	126,343	6,425	5,196	39,495	4,606	-13,602	0	-6,123	172,490	64,649	67,400	173,987	22,821	151,166	1,890	422	1,175	3,221	180,696	172,490	22,821	9,697	-24,313	6,128	-18,184
Wet (W, AN)			0	16,294	202,654	10,175	11,572	65,499	4,873	-14,850	0	-2,121	294,095	64,588	67,400	175,214	30,807	144,406	1,762	402	1,257	6,085	184,719	294,095	30,807	9,688	-149,871	28,598	-121,273
Dry (D, BN)			0	2,721	85,774	2,975	28	23,137	4,564	-17,227	0	-7,015	94,957	64,698	67,400	174,333	18,616	155,717	1,974	396	1,068	838	178,609	94,957	18,616	9,705	55,331	-8,190	47,141
Critically Dry (C)			0	8,290	36,783	3,898	0	12,234	4,163	-6,622	0	-12,410	46,336	64,700	67,400	171,265	13,397	157,868	2,021	491	1,162	966	175,906	46,336	13,397	9,705	106,467	-17,191	89,276
Percent of Total			0%	6%	73%	4%	3%	23%	3%	-8%	0%	-4%	100%	96%	100%		13%	87%	82%	18%			100%	95%	13%	5%	-13%	-3%	-10%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor service areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Olcese Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield on Developed Area ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	0	2,681	0	0	0	0	-229	0	-759	1,693	1,308	3,203	3,481	1,049	2,432	490	0	0	0	3,971	1,693	1,049	196	1,033	0	1,033
136%	W	1996	0	0	3,314	0	0	0	0	-420	0	-721	2,173	1,308	3,203	3,173	542	2,631	490	0	0	0	3,663	2,173	542	196	752	0	752
175%	W	1997	0	0	2,952	0	0	0	0	-346	0	-588	2,018	1,362	3,203	2,655	478	2,177	490	0	0	0	3,145	2,018	478	204	445	0	445
237%	W	1998	0	0	1,536	0	0	0	0	-123	0	-679	734	1,370	3,203	2,514	1,004	1,511	490	0	0	0	3,004	734	1,004	206	1,061	0	1,061
70%	AN	1999	0	0	1,972	0	0	0	254	-278	0	-748	1,200	1,372	3,203	2,160	673	1,487	490	0	0	0	2,650	1,200	673	206	571	0	571
67%	AN	2000	0	0	2,864	0	0	0	218	-326	0	-756	2,001	1,445	3,203	1,835	406	1,429	643	0	0	0	2,478	2,001	406	217	-145	0	-145
53%	D	2001	0	0	3,392	0	0	0	69	-365	0	-775	2,321	1,443	3,203	1,803	429	1,374	775	0	0	0	2,578	2,321	429	216	-389	0	-389
51%	D	2002	0	0	3,495	0	0	0	112	-384	0	-793	2,431	1,441	3,203	2,207	308	1,899	793	0	0	0	3,001	2,431	308	216	46	0	46
83%	BN	2003	0	0	3,396	0	0	0	574	-413	0	-778	2,779	1,428	3,203	1,858	487	1,371	778	0	0	0	2,636	2,779	487	214	-845	0	-845
57%	D	2004	0	0	3,470	0	0	0	265	-398	0	-979	2,358	1,435	3,203	2,418	412	2,007	825	0	0	0	3,243	2,358	412	215	259	0	259
157%	W	2005	0	0	3,001	0	0	0	768	-368	0	-802	2,600	1,436	3,203	2,071	739	1,332	762	0	0	0	2,834	2,600	739	215	-721	0	-721
153%	W	2006	0	0	2,898	0	0	0	1,009	-368	0	-775	2,763	1,438	3,203	2,423	735	1,688	774	0	0	0	3,197	2,763	735	216	-517	0	-517
39%	C	2007	0	0	3,161	0	0	0	264	-417	0	-821	2,187	1,438	3,203	2,571	464	2,107	821	0	0	0	3,392	2,187	464	216	525	0	525
71%	C	2008	0	0	3,343	0	0	0	432	-441	0	-910	2,424	1,438	3,203	2,448	407	2,041	826	0	0	0	3,274	2,424	407	216	227	0	227
64%	BN	2009	0	0	3,410	0	0	0	400	-527	0	-824	2,459	1,438	3,203	2,506	392	2,114	806	0	0	0	3,312	2,459	392	216	245	0	245
113%	AN	2010	0	0	3,292	0	0	0	248	-452	0	-715	2,373	1,438	3,203	2,441	651	1,790	715	0	0	0	3,156	2,373	651	216	-83	0	-83
203%	W	2011	0	0	3,146	0	0	0	0	-414	0	-654	2,078	1,438	3,203	2,499	1,017	1,481	654	0	0	0	3,152	2,078	1,017	216	-159	0	-159
53%	D	2012	0	0	3,465	0	0	0	245	-445	0	-788	2,477	1,438	3,203	2,194	371	1,822	788	0	0	0	2,982	2,477	371	216	-83	0	-83
30%	C	2013	0	0	3,813	0	0	0	196	-504	0	-820	2,684	1,464	3,203	2,545	634	1,911	820	0	0	0	3,365	2,684	634	220	-172	0	-172
25%	C	2014	0	0	3,861	0	0	0	64	-516	0	-1,836	1,573	1,464	3,203	2,995	431	2,564	792	0	0	0	3,787	1,573	431	220	1,563	0	1,563
18%	C	2015	0	0	3,071	0	0	0	10	-419	0	-649	2,013	1,464	3,203	2,676	443	2,233	649	0	0	0	3,325	2,013	443	220	650	0	650
51%	D	2016	0	0	3,104	0	0	0	0	-418	0	-679	2,007	1,464	3,203	2,352	649	1,703	679	0	0	0	3,031	2,007	649	220	156	0	156
275%	W	2017	0	0	3,006	0	0	0	483	-335	0	-714	2,441	1,464	3,203	2,567	832	1,735	700	0	0	0	3,267	2,441	832	220	-227	0	-227

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield on Developed Area ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	0	0	2,985	0	0	0	14	-367	0	-684	1,948	1,464	3,203	2,576	601	1,974	684	0	0	0	3,259	1,948	601	220	490	0	490
177%	W	2019	0	0	3,245	0	0	0	14	-403	0	-622	2,235	1,464	3,203	2,932	1,011	1,921	622	0	0	0	3,554	2,235	1,011	220	89	0	89
55%	D	2020	0	0	3,229	0	0	0	14	-398	0	-611	2,234	1,427	3,203	2,204	800	1,404	611	0	0	0	2,815	2,234	800	214	-433	0	-433
22%	C	2021	0	0	3,700	0	0	0	0	-445	0	-717	2,538	1,430	3,203	2,564	343	2,222	717	0	0	0	3,281	2,538	343	214	185	0	185
29%	C	2022	0	0	3,548	0	0	0	14	-441	0	-646	2,476	1,430	3,203	2,629	398	2,231	646	0	0	0	3,274	2,476	398	214	186	0	186
320%	W	2023	0	0	3,088	0	0	0	848	-368	0	-644	2,925	1,430	3,203	3,096	753	2,342	644	0	0	0	3,740	2,925	753	214	-153	0	-153
Average (1995-2014)			0	0	3,123	0	0	0	256	-387	0	-826	2,166	1,417	3,203	2,440	581	1,858	701	0	0	0	3,141	2,166	581	213	181	0	181
Average (2015-2023)			0	0	3,220	0	0	0	155	-399	0	-663	2,313	1,449	3,203	2,622	648	1,974	661	0	0	0	3,283	2,313	648	217	105	0	105
Average (1995-2023)			0	0	3,153	0	0	0	225	-391	0	-775	2,212	1,427	3,203	2,496	602	1,894	689	0	0	0	3,185	2,212	602	214	157	0	157
Wet (W, AN)			0	0	2,846	0	0	0	296	-341	0	-706	2,095	1,406	3,203	2,604	761	1,843	613	0	0	0	3,216	2,095	761	211	150	0	150
Dry (D, BN)			0	0	3,327	0	0	0	188	-413	0	-768	2,335	1,442	3,203	2,235	494	1,741	749	0	0	0	2,984	2,335	494	216	-62	0	-62
Critically Dry (C)			0	0	3,500	0	0	0	140	-455	0	-914	2,271	1,447	3,203	2,633	446	2,187	753	0	0	0	3,385	2,271	446	217	452	0	452
Percent of Total			0%	0%	143%	0%	0%	0%	10%	-18%	0%	-35%	100%	45%	100%		24%	76%	100%	0%			100%	69%	19%	7%	5%	0%	5%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Kern Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA. This type of water storage is considered a conjunctive use project, and this stored water is already accounted for in the Total Water Supply.

Rosedale-Rio Bravo Water Storage District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	22,940	16,152	85,838	0	0	0	0	0	0	0	124,930	44,266	49,024	108,024	23,120	84,904	2,580	781	168	3,580	115,133	124,930	23,120	6,640	-39,557	12,251	-27,306
136%	W	1996	38,327	37,024	57,153	0	0	0	0	0	0	0	132,504	44,349	49,024	113,726	11,858	101,868	2,942	836	474	3,501	121,479	132,504	11,858	6,652	-29,535	19,946	-9,589
175%	W	1997	27,353	43,319	54,687	0	0	0	0	0	0	0	125,359	44,407	49,024	100,426	12,303	88,123	2,942	890	499	3,261	108,019	125,359	12,303	6,661	-36,304	24,177	-12,127
237%	W	1998	88,625	2,770	62,397	0	0	0	0	0	0	0	153,792	44,420	49,024	98,153	27,711	70,441	2,745	945	526	4,088	106,457	153,792	27,711	6,663	-81,709	-17,285	-98,994
70%	AN	1999	82,353	3,187	10,200	0	0	0	0	0	0	0	95,740	44,512	49,024	95,234	13,021	82,213	3,353	1,000	504	2,368	102,460	95,740	13,021	6,677	-12,978	-26,566	-39,544
67%	AN	2000	15,821	24,938	10,758	0	0	0	0	0	0	0	51,517	44,825	49,024	98,877	10,699	88,178	3,547	1,055	210	1,335	105,025	51,517	10,699	6,724	36,085	5,245	41,330
53%	D	2001	402	2,775	2,878	0	0	0	0	0	0	0	6,055	44,884	49,024	101,255	11,707	89,548	8,148	1,122	12	170	110,707	6,055	11,707	6,733	86,213	-3,520	82,693
51%	D	2002	0	0	1,404	0	0	0	0	0	0	0	1,404	44,838	49,024	101,180	7,288	93,892	3,864	1,189	0	42	106,275	1,404	7,288	6,726	90,857	-23,874	66,983
83%	BN	2003	7,186	16,037	7,407	0	0	0	0	0	0	0	30,630	44,868	49,024	94,276	10,121	84,154	3,973	1,256	104	815	100,423	30,630	10,121	6,730	52,941	-9,940	43,001
57%	D	2004	8,959	0	3,342	0	0	0	0	0	0	0	12,301	44,826	49,024	102,124	8,034	94,089	4,201	1,323	80	289	108,017	12,301	8,034	6,724	80,958	-92,933	-11,975
157%	W	2005	6,718	45,057	114,841	0	0	0	0	0	0	0	166,616	44,845	49,024	90,818	17,418	73,400	4,208	1,390	464	4,534	101,414	166,616	17,418	6,727	-89,346	36,417	-52,929
153%	W	2006	112,894	6,115	64,559	0	0	0	0	0	0	0	183,568	44,648	49,024	86,431	14,228	72,203	4,551	1,457	286	5,222	97,946	183,568	14,228	6,697	-106,548	41,183	-65,365
39%	C	2007	23,320	0	0	0	0	0	0	0	0	0	23,320	44,723	49,024	89,452	6,596	82,857	4,940	1,523	89	610	96,615	23,320	6,596	6,708	59,991	-19,003	40,988
71%	C	2008	0	0	0	0	0	0	0	0	0	0	0	44,569	49,024	83,957	4,995	78,962	5,002	1,590	0	0	90,550	0	4,995	6,685	78,869	-23,244	55,625
64%	BN	2009	0	2,354	0	0	0	0	0	0	0	0	2,354	44,533	49,024	86,840	7,178	79,662	4,875	1,657	0	71	93,443	2,354	7,178	6,680	77,231	-14,807	62,424
113%	AN	2010	16,508	49,733	10,816	0	0	0	0	0	0	0	77,057	44,624	49,024	81,162	12,117	69,044	4,875	1,724	373	1,939	90,073	77,057	12,117	6,694	-5,795	78,680	72,885
203%	W	2011	59,708	72,033	115,524	0	0	0	0	0	0	0	247,265	44,653	49,024	85,975	17,792	68,183	4,604	1,682	667	6,751	99,679	247,265	17,792	6,698	-172,076	115,203	-56,873
53%	D	2012	60,935	24,923	7,569	0	0	0	0	0	0	0	93,427	44,481	49,024	96,738	10,514	86,224	5,013	1,639	155	2,648	106,193	93,427	10,514	6,672	-4,420	-1,024	-5,444
30%	C	2013	3,885	1,737	0	0	0	0	0	0	0	-14,277	-8,655	44,740	49,024	90,536	6,619	83,918	5,054	1,596	0	0	97,187	-8,655	6,619	6,711	92,512	-44,655	47,857
25%	C	2014	0	0	0	0	0	0	0	0	0	-38,942	-38,942	44,765	49,024	91,659	5,098	86,562	4,914	1,554	0	0	98,128	-38,942	5,098	6,715	125,257	-52,823	72,434
18%	C	2015	0	0	0	0	0	0	0	0	0	-33,627	-33,627	44,887	49,024	95,570	8,945	86,625	3,840	1,511	0	0	100,921	-33,627	8,945	6,733	118,870	-39,059	79,811
51%	D	2016	0	4,117	0	0	0	0	0	0	0	-15,140	-11,023	44,732	49,024	87,597	13,305	74,292	4,172	1,469	0	0	93,238	-11,023	13,305	6,710	84,246	-24,798	59,448
275%	W	2017	44,813	57,798	187,308	0	0	0	0	0	0	-2,560	287,359	44,980	49,024	107,007	17,555	89,451	4,547	1,426	539	8,082	121,601	287,359	17,555	6,747	-190,060	65,877	-124,183

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	60,946	18,822	10,122	0	0	0	0	0	0	-11,129	78,761	44,823	49,024	95,234	9,069	86,165	4,729	1,383	144	2,219	103,710	78,761	9,069	6,723	9,156	-12,206	-3,050
177%	W	2019	19,349	88,227	62,453	0	0	0	0	0	0	0	170,029	44,830	49,024	98,308	16,811	81,497	4,625	1,341	388	4,713	109,375	170,029	16,811	6,724	-84,190	123,073	38,883
55%	D	2020	23,544	0	16,193	0	0	0	0	0	0	-41,485	-1,748	44,697	49,024	77,327	14,537	62,791	4,981	1,298	76	0	83,683	-1,748	14,537	6,705	64,189	-68,855	-4,666
22%	C	2021	0	12,424	0	0	0	49,888	0	0	0	-55,702	6,610	44,729	49,024	90,015	7,129	82,887	5,109	1,298	7	191	96,621	6,610	7,129	6,709	76,173	-77,135	-962
29%	C	2022	0	0	0	0	0	1,115	0	0	0	-40,333	-39,218	44,610	49,024	88,418	8,767	79,650	4,700	1,298	0	0	94,416	-39,218	8,767	6,692	118,175	-52,136	66,039
320%	W	2023	70,592	50,833	135,597	0	0	0	0	0	0	-1,533	255,489	44,885	49,024	84,590	17,657	66,933	5,057	1,298	333	7,148	98,427	255,489	17,657	6,733	-181,452	46,629	-134,823
Average (1995-2014)			28,797	17,408	30,469	0	0	0	0	0	0	-2,661	74,012	44,639	49,024	94,842	11,921	82,921	4,317	1,310	231	2,061	102,761	74,012	11,921	6,696	10,132	171	10,304
Average (2015-2023)			24,360	25,802	45,741	0	0	5,667	0	0	0	-22,390	79,181	44,797	49,024	91,563	12,642	78,921	4,640	1,369	165	2,484	100,221	79,181	12,642	6,720	1,679	-4,290	-2,611
Average (1995-2023)			27,420	20,013	35,208	0	0	1,759	0	0	0	-8,784	75,616	44,688	49,024	93,824	12,145	81,680	4,417	1,329	210	2,192	101,973	75,616	12,145	6,703	7,509	-1,213	6,296
Wet (W, AN)			46,615	38,245	74,779	0	0	0	0	0	0	-315	159,325	44,634	49,024	96,056	16,330	79,726	3,891	1,217	418	4,348	105,930	159,325	16,330	6,695	-76,420	40,372	-36,049
Dry (D, BN)			17,997	7,670	5,435	0	0	0	0	0	0	-7,528	23,573	44,742	49,024	93,619	10,195	83,424	4,884	1,371	63	695	100,632	23,573	10,195	6,711	60,152	-27,995	32,157
Critically Dry (C)			3,886	2,023	0	0	0	7,286	0	0	0	-26,126	-12,930	44,718	49,024	89,944	6,878	83,066	4,794	1,482	14	115	96,348	-12,930	6,878	6,708	95,692	-44,008	51,685
Percent of Total			36%	26%	47%	0%	0%	2%	0%	0%	0%	-12%	100%	91%	100%		13%	87%	77%	23%			100%	74%	12%	7%	7%	1%	6%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Semitropic Water Storage District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	195,723	0	0	0	5,427	0	9,067	-5,803	0	0	204,413	151,859	218,208	455,463	103,416	352,048	621	2,038	1,177	326	459,625	204,413	103,416	22,779	129,017	41,064	170,081
136%	W	1996	270,344	0	0	0	14,212	0	6,038	-8,379	0	0	282,215	152,245	218,208	472,830	54,899	417,931	679	2,279	1,559	853	478,200	282,215	54,899	22,837	118,249	117,085	235,334
175%	W	1997	258,075	0	0	0	18,274	0	28,829	-12,449	0	0	292,728	154,488	218,208	442,166	62,901	379,265	679	2,521	1,521	1,096	447,983	292,728	62,901	23,173	69,180	108,830	178,010
237%	W	1998	196,374	0	0	0	7,888	0	24,030	-3,543	0	0	224,749	153,535	218,208	429,337	123,256	306,081	829	2,762	1,183	473	434,584	224,749	123,256	23,030	63,548	51,124	114,672
70%	AN	1999	273,921	0	0	0	7,804	0	27,453	-4,379	0	0	304,799	154,472	218,208	405,939	67,530	338,409	976	3,003	1,520	468	411,906	304,799	67,530	23,171	16,407	119,934	136,341
67%	AN	2000	289,303	0	0	0	12,237	0	32,340	-3,433	0	0	330,447	150,726	218,208	402,503	47,904	354,599	1,019	3,245	1,564	734	409,064	330,447	47,904	22,609	8,104	67,509	75,613
53%	D	2001	57,602	0	0	0	1,113	0	23,750	0	-1,457	0	81,008	150,932	218,208	402,054	53,390	348,664	970	3,185	327	67	406,603	81,008	53,390	22,640	249,565	-30,996	218,569
51%	D	2002	160,150	0	0	0	257	0	14,564	-2,448	-21,819	0	150,704	150,300	218,208	382,376	33,809	348,568	1,054	3,126	814	15	387,386	150,704	33,809	22,545	180,328	49,568	229,896
83%	BN	2003	253,866	0	0	0	1,673	0	7,739	-301	0	0	262,977	150,953	218,208	368,339	41,550	326,790	1,070	3,067	1,326	100	373,903	262,977	41,550	22,643	46,734	93,105	139,839
57%	D	2004	164,412	0	0	0	1,495	0	5,773	-1,285	-8,965	0	161,430	151,948	218,208	405,588	39,507	366,081	1,070	3,008	868	90	410,624	161,430	39,507	22,792	186,895	-14,145	172,749
157%	W	2005	281,161	0	0	0	4,950	0	10,662	0	-19,103	0	277,670	151,398	218,208	371,908	77,189	294,718	1,031	2,949	1,470	297	377,654	277,670	77,189	22,710	85	72,183	72,268
153%	W	2006	302,431	0	0	0	14,729	0	9,847	-2,365	0	0	324,642	151,344	218,208	341,922	68,786	273,136	1,071	2,889	1,641	884	348,408	324,642	68,786	22,702	-67,722	74,012	6,289
39%	C	2007	131,476	0	0	0	7,099	0	8,586	-385	-6,282	0	140,494	152,239	218,208	340,487	36,664	303,823	1,087	2,830	731	426	345,561	140,494	36,664	22,836	145,567	-114,489	31,078
71%	C	2008	18,670	0	0	0	1,468	0	13,341	-3,813	-92,169	0	-62,503	150,986	218,208	330,579	28,962	301,617	1,010	2,771	105	88	334,554	-62,503	28,962	22,648	345,447	-71,782	273,665
64%	BN	2009	19,967	0	0	0	731	0	8,628	-6,484	-86,194	0	-63,352	151,656	218,208	333,381	33,100	300,281	822	2,712	113	44	337,071	-63,352	33,100	22,748	344,575	-99,031	245,544
113%	AN	2010	161,127	0	0	0	3,068	0	4,800	-2,143	-37,995	0	128,857	150,886	218,208	326,526	54,414	272,112	682	2,653	836	184	330,880	128,857	54,414	22,633	124,976	107,961	232,937
203%	W	2011	334,874	0	0	0	16,017	0	1,150	-582	0	0	351,460	152,154	218,208	387,383	95,313	292,070	781	2,581	1,675	961	393,381	351,460	95,313	22,823	-76,215	108,136	31,921
53%	D	2012	206,996	0	0	0	13,006	0	3,384	-527	0	0	222,859	152,991	218,208	413,671	59,744	353,927	770	2,510	1,135	780	418,866	222,859	59,744	22,949	113,313	91,920	205,234
30%	C	2013	58,920	0	0	0	4,099	0	2,364	-116	-5,610	0	59,656	157,297	218,208	371,747	34,327	337,420	759	2,439	402	246	375,592	59,656	34,327	23,595	258,015	-80,746	177,269
25%	C	2014	0	0	0	0	0	0	3,373	0	-111,092	0	-107,719	157,328	218,208	361,620	23,715	337,905	747	2,367	25	0	364,760	-107,719	23,715	23,599	425,164	-91,858	333,307
18%	C	2015	0	0	0	0	0	0	796	0	-98,309	0	-97,513	156,392	218,208	368,893	36,922	331,971	736	2,296	35	0	371,960	-97,513	36,922	23,459	409,092	-147,359	261,732
51%	D	2016	93,331	0	0	0	248	0	550	-1,001	-89,371	0	3,757	156,073	218,208	377,207	64,344	312,863	725	2,224	534	15	380,705	3,757	64,344	23,411	289,193	24,047	313,240
275%	W	2017	334,539	0	0	0	36,894	0	550	-3,949	0	0	368,033	156,280	218,208	405,322	84,902	320,420	714	2,153	1,596	2,214	411,999	368,033	84,902	23,442	-64,378	148,850	84,472

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
60%	BN	2018	141,399	0	0	0	9,907	0	550	-3,605	0	0	148,251	155,538	218,208	408,378	36,687	371,691	702	2,082	741	594	412,498	148,251	36,687	23,331	204,230	26,305	230,535
177%	W	2019	301,323	0	0	0	18,062	0	550	-2,330	0	0	317,604	155,863	218,208	398,748	78,603	320,145	691	2,010	1,504	1,084	404,037	317,604	78,603	23,379	-15,549	79,383	63,834
55%	D	2020	45,659	0	0	0	0	0	550	-161	0	0	46,048	155,761	218,208	362,828	66,994	295,834	680	1,939	354	0	365,801	46,048	66,994	23,364	229,395	-32,365	197,030
22%	C	2021	0	0	0	0	0	0	533	0	-62,280	0	-61,747	155,936	218,208	367,523	40,136	327,387	680	1,939	36	0	370,178	-61,747	40,136	23,390	368,399	-130,928	237,471
29%	C	2022	0	0	0	0	0	0	921	0	-153,044	0	-152,123	155,615	218,208	361,436	43,208	318,228	680	1,939	14	0	364,069	-152,123	43,208	23,342	449,642	-126,623	323,019
320%	W	2023	288,247	0	0	0	37,218	0	442	0	-73,252	0	252,654	157,068	218,208	369,510	96,262	273,248	680	1,939	1,507	2,233	375,868	252,654	96,262	23,560	3,392	51,602	54,994
Average (1995-2014)			181,770	0	0	0	6,777	0	12,286	-2,922	-19,534	0	178,377	152,487	218,208	387,291	57,019	330,272	886	2,747	999	407	392,330	178,377	57,019	22,873	134,062	29,969	164,031
Average (2015-2023)			133,833	0	0	0	11,370	0	605	-1,227	-52,917	0	91,663	156,058	218,208	379,983	60,895	319,087	699	2,058	702	682	384,124	91,663	60,895	23,409	208,157	-11,899	196,256
Average (1995-2023)			166,893	0	0	0	8,203	0	8,661	-2,396	-29,895	0	151,465	153,595	218,208	385,023	58,222	326,801	828	2,533	907	492	389,783	151,465	58,222	23,039	157,057	16,976	174,033
Wet (W, AN)			268,265	0	0	0	15,137	0	11,981	-3,797	-10,027	0	281,559	153,255	218,208	400,735	78,106	322,629	804	2,540	1,442	908	406,430	281,559	78,106	22,988	23,777	88,283	112,059
Dry (D, BN)			127,042	0	0	0	3,159	0	7,277	-1,757	-23,090	0	112,631	152,906	218,208	383,758	47,680	336,078	874	2,650	690	190	388,162	112,631	47,680	22,936	204,914	12,045	216,959
Critically Dry (C)			29,867	0	0	0	1,809	0	4,273	-616	-75,541	0	-40,208	155,113	218,208	357,469	34,848	322,621	814	2,369	193	109	360,953	-40,208	34,848	23,267	343,046	-109,112	233,934
Percent of Total			110%	0%	0%	0%	5%	0%	6%	-2%	-20%	0%	100%	70%	100%		15%	85%	25%	75%			100%	39%	15%	6%	40%	-4%	45%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Southern San Joaquin Municipal Utility District - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	0	108,778	0	0	0	307	2,366	0	0	0	111,451	60,317	66,031	174,060	40,929	133,131	8,289	944	0	0	183,293	111,451	40,929	9,048	21,865	-10,868	10,997
136%	W	1996	0	128,865	0	0	0	307	2,390	0	0	0	131,562	60,472	66,031	175,663	19,811	155,853	9,114	892	0	0	185,669	131,562	19,811	9,071	25,226	0	25,226
175%	W	1997	0	124,456	0	0	0	307	2,625	0	0	0	127,388	61,107	66,031	164,157	26,216	137,941	9,114	840	0	0	174,111	127,388	26,216	9,166	11,341	0	11,341
237%	W	1998	0	89,373	0	0	0	307	2,546	0	0	0	92,226	61,200	66,031	162,004	48,844	113,160	9,032	788	0	0	171,824	92,226	48,844	9,180	21,574	0	21,574
70%	AN	1999	0	112,467	0	0	0	307	2,814	-1,781	0	0	113,807	61,054	66,031	144,987	25,705	119,282	10,353	736	0	0	156,076	113,807	25,705	9,158	7,405	0	7,405
67%	AN	2000	0	121,896	0	0	0	307	2,814	-2,299	0	0	122,718	60,615	66,031	149,905	21,386	128,519	10,513	684	0	0	161,102	122,718	21,386	9,092	7,906	0	7,906
53%	D	2001	0	98,313	0	0	0	307	3,145	-209	0	0	101,556	60,477	66,031	155,220	21,489	133,731	10,741	668	0	0	166,629	101,556	21,489	9,072	34,513	0	34,513
51%	D	2002	0	103,849	0	0	0	307	3,333	0	0	0	107,489	60,273	66,031	156,279	16,584	139,696	11,035	652	0	0	167,967	107,489	16,584	9,041	34,853	0	34,853
83%	BN	2003	0	108,677	0	0	0	307	3,424	-1,898	0	0	110,510	60,302	66,031	145,367	18,934	126,434	11,342	637	0	0	157,346	110,510	18,934	9,045	18,857	0	18,857
57%	D	2004	0	106,537	0	0	0	307	3,692	0	0	0	110,536	60,754	66,031	165,788	17,024	148,764	11,925	621	0	0	178,334	110,536	17,024	9,113	41,661	10,868	52,529
157%	W	2005	0	111,465	0	0	0	307	3,938	-1,749	0	0	113,961	60,565	66,031	141,525	33,813	107,712	11,541	605	0	0	153,671	113,961	33,813	9,085	-3,188	0	-3,188
153%	W	2006	0	121,836	0	0	0	307	3,978	-1,730	0	0	124,391	60,745	66,031	139,044	29,518	109,526	11,741	589	0	0	151,373	124,391	29,518	9,112	-11,647	0	-11,647
39%	C	2007	0	75,861	0	0	0	307	4,180	-219	0	0	80,129	60,679	66,031	138,734	15,741	122,993	12,355	573	0	0	151,662	80,129	15,741	9,102	46,690	0	46,690
71%	C	2008	0	87,776	0	0	0	655	4,404	0	0	0	92,835	60,747	66,031	139,181	14,426	124,754	11,950	557	0	0	151,688	92,835	14,426	9,112	35,314	0	35,314
64%	BN	2009	0	118,712	0	0	0	293	4,547	-1,745	0	0	121,807	60,275	66,031	133,848	13,069	120,780	12,114	541	0	0	146,503	121,807	13,069	9,041	2,587	0	2,587
113%	AN	2010	0	120,528	0	0	0	389	4,882	-134	0	0	125,665	60,381	66,031	139,598	25,026	114,572	11,443	525	0	0	151,566	125,665	25,026	9,057	-8,182	0	-8,182
203%	W	2011	0	124,678	0	0	0	301	4,210	0	0	0	129,189	60,437	66,031	152,133	36,427	115,706	11,297	522	0	0	163,952	129,189	36,427	9,066	-10,730	0	-10,730
53%	D	2012	0	81,602	0	0	0	314	4,710	0	0	0	86,626	60,478	66,031	173,731	22,115	151,616	11,362	519	0	0	185,611	86,626	22,115	9,072	67,799	0	67,799
30%	C	2013	0	58,923	0	0	0	242	4,462	0	0	0	63,627	60,791	66,031	151,029	16,041	134,988	11,426	516	0	0	162,971	63,627	16,041	9,119	74,184	0	74,184
25%	C	2014	0	14,249	0	0	0	193	4,259	0	0	0	18,701	60,784	66,031	139,683	11,071	128,612	11,491	513	0	0	151,687	18,701	11,071	9,118	112,798	0	112,798
18%	C	2015	0	3,020	0	0	0	45	4,009	0	0	0	7,074	60,956	66,031	125,875	14,727	111,148	11,556	510	0	0	137,941	7,074	14,727	9,143	106,996	0	106,996
51%	D	2016	0	62,934	0	0	0	114	4,137	0	0	0	67,185	60,888	66,031	143,862	23,921	119,941	11,620	507	0	0	155,990	67,185	23,921	9,133	55,750	0	55,750
275%	W	2017	0	113,084	0	0	0	9	4,117	0	0	0	117,210	61,032	66,031	170,381	32,533	137,848	11,310	504	0	65	182,260	117,210	32,533	9,155	23,363	0	23,363

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)									
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)				
60%	BN	2018	0	105,065	0	0	0	19	3,938	0	0	0	109,022	60,919	66,031	140,630	14,683	125,947	11,798	501	0	155	153,085	109,022	14,683	9,138	20,241	-6,532	13,709	
177%	W	2019	0	104,818	0	0	0	48	4,004	0	0	0	108,870	60,963	66,031	147,650	28,819	118,830	11,807	498	0	121	160,076	108,870	28,819	9,144	13,242	-20,490	-7,248	
55%	D	2020	0	84,880	0	0	0	2,466	4,047	0	0	0	91,393	61,058	66,031	126,298	23,754	102,544	12,029	495	0	72	138,894	91,393	23,754	9,159	14,588	3,030	17,618	
22%	C	2021	0	28,988	0	0	0	3,249	3,831	0	0	0	36,067	61,074	66,031	119,605	12,642	106,963	8,545	495	0	0	128,645	36,067	12,642	9,161	70,774	613	71,387	
29%	C	2022	0	42,303	0	0	0	1,826	3,685	0	0	0	47,815	60,992	66,031	119,627	17,066	102,561	9,741	495	0	8	129,871	47,815	17,066	9,149	55,841	-4,116	51,725	
320%	W	2023	0	112,722	0	0	0	8	385	0	0	0	113,115	61,105	66,031	122,080	31,574	90,506	8,445	495	0	913	131,932	113,115	31,574	9,166	-21,922	-5,491	-27,413	
Average (1995-2014)			0	100,942	0	0	0	319	3,636	-588	0	0	104,309	60,623	66,031	152,097	23,708	128,389	10,909	646	0	0	163,652	104,309	23,708	9,093	26,541	0	26,541	
Average (2015-2023)			0	73,090	0	0	0	865	3,573	0	0	0	77,528	60,999	66,031	135,112	22,191	112,921	10,761	500	0	148	146,521	77,528	22,191	9,150	37,653	-3,665	33,987	
Average (1995-2023)			0	92,298	0	0	0	489	3,616	-406	0	0	95,998	60,739	66,031	146,826	23,237	123,588	10,863	601	0	46	158,335	95,998	23,237	9,111	29,990	-1,137	28,852	
Wet (W, AN)			0	114,997	0	0	0	247	3,159	-592	0	0	117,812	60,769	66,031	152,553	30,815	121,737	10,308	663	0	85	163,608	117,812	30,815	9,115	5,866	-2,835	3,031	
Dry (D, BN)			0	96,730	0	0	0	493	3,886	-428	0	0	100,681	60,603	66,031	149,003	19,064	129,939	11,552	571	0	25	161,151	100,681	19,064	9,090	32,316	818	33,135	
Critically Dry (C)			0	44,446	0	0	0	931	4,119	-31	0	0	49,464	60,861	66,031	133,391	14,530	118,860	11,009	523	0	1	144,923	49,464	14,530	9,129	71,800	-500	71,299	
Percent of Total			0%	96%	0%	0%	0%	1%	4%	0%	0%	0%	100%	92%	100%		16%	84%	95%	5%			100%	61%	15%	6%	19%	1%	18%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Shafter-Wasco Irrigation District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	0	64,395	0	0	0	5,265	1,504	0	0	0	71,164	38,083	40,022	114,475	21,470	93,005	5,867	893	0	0	121,235	71,164	21,470	5,712	22,889	-12,026	10,863
136%	W	1996	0	72,960	0	0	0	9,433	1,972	0	0	0	84,365	38,164	40,022	116,252	11,056	105,196	5,859	806	0	0	122,917	84,365	11,056	5,725	21,771	-1,578	20,193
175%	W	1997	0	64,243	0	0	0	9,892	1,727	0	0	0	75,862	38,255	40,022	101,042	13,702	87,340	5,859	718	0	0	107,620	75,862	13,702	5,738	12,317	-10,451	1,866
237%	W	1998	0	54,702	0	0	0	3,821	1,980	0	0	0	60,503	38,218	40,022	98,004	28,354	69,650	5,969	631	0	0	104,604	60,503	28,354	5,733	10,014	-118	9,896
70%	AN	1999	0	59,415	0	0	0	3,944	1,945	0	0	0	65,304	38,218	40,022	94,432	12,664	81,768	6,637	544	0	0	101,613	65,304	12,664	5,733	17,912	-474	17,438
67%	AN	2000	0	59,281	0	0	0	3,493	2,314	0	0	0	65,089	38,390	40,022	94,668	9,991	84,677	6,929	457	0	0	102,053	65,089	9,991	5,759	21,215	0	21,215
53%	D	2001	0	52,876	0	0	0	820	2,101	0	0	0	55,797	38,421	40,022	97,098	12,030	85,067	6,990	452	0	0	104,540	55,797	12,030	5,763	30,950	1,073	32,023
51%	D	2002	0	54,221	0	0	0	5,210	2,900	0	0	0	62,331	38,422	40,022	97,264	7,143	90,122	7,163	448	0	0	104,876	62,331	7,143	5,763	29,638	3,056	32,694
83%	BN	2003	0	58,847	0	0	0	580	2,366	0	0	0	61,793	38,406	40,022	89,972	9,364	80,608	7,382	444	0	0	97,798	61,793	9,364	5,761	20,880	247	21,127
57%	D	2004	0	58,351	0	0	0	1,785	2,901	0	0	0	63,036	38,502	40,022	97,663	7,351	90,312	6,896	440	0	0	104,999	63,036	7,351	5,775	28,836	1,784	30,620
157%	W	2005	0	59,722	0	0	0	0	2,183	0	0	0	61,905	38,436	40,022	87,526	17,799	69,727	7,169	436	0	0	95,131	61,905	17,799	5,765	9,661	0	9,661
153%	W	2006	0	70,439	0	0	0	2,300	2,874	0	0	0	75,613	38,309	40,022	82,822	15,235	67,587	7,446	431	0	0	90,699	75,613	15,235	5,746	-5,896	34	-5,862
39%	C	2007	0	40,212	0	0	0	2,025	3,252	0	0	0	45,489	38,455	40,022	81,433	5,714	75,719	7,565	427	0	0	89,426	45,489	5,714	5,768	32,454	6,991	39,445
71%	C	2008	0	46,238	0	0	0	2,236	3,199	0	0	0	51,673	38,340	40,022	82,128	5,268	76,861	7,857	423	0	0	90,408	51,673	5,268	5,751	27,717	2,200	29,917
64%	BN	2009	0	48,330	0	0	0	5,594	3,162	0	0	0	57,086	38,342	40,022	81,321	6,506	74,815	7,533	419	0	0	89,273	57,086	6,506	5,751	19,930	993	20,923
113%	AN	2010	0	65,240	0	0	0	869	3,151	0	0	0	69,260	38,357	40,022	79,234	12,712	66,523	7,386	415	0	0	87,035	69,260	12,712	5,754	-690	0	-690
203%	W	2011	0	74,954	0	0	0	889	3,087	0	0	0	78,929	38,339	40,022	86,297	18,431	67,866	7,526	406	0	0	94,228	78,929	18,431	5,751	-8,883	-718	-9,601
53%	D	2012	0	36,374	0	0	0	13,224	2,967	0	0	0	52,565	38,338	40,022	100,041	10,398	89,643	7,470	397	0	0	107,907	52,565	10,398	5,751	39,193	4,957	44,150
30%	C	2013	0	27,017	0	0	0	8,039	3,174	0	0	0	38,230	38,427	40,022	92,740	7,042	85,697	7,298	388	0	0	100,425	38,230	7,042	5,764	49,388	2,040	51,428
25%	C	2014	0	8,303	0	0	0	5,298	3,139	0	0	0	16,740	38,427	40,022	88,784	4,692	84,092	6,596	378	0	0	95,758	16,740	4,692	5,764	68,562	3,915	72,477
18%	C	2015	0	0	0	0	0	3,123	2,956	0	0	0	6,079	38,451	40,022	85,408	7,655	77,753	6,156	369	0	0	91,934	6,079	7,655	5,768	72,432	3,168	75,600
51%	D	2016	0	36,342	0	0	0	2,247	2,903	0	0	0	41,492	38,368	40,022	86,826	13,848	72,978	5,752	360	0	0	92,939	41,492	13,848	5,755	31,843	-1,155	30,688
275%	W	2017	0	81,166	17,538	0	0	4,632	3,004	0	0	0	106,339	38,400	40,022	105,393	15,379	90,014	6,211	351	0	1,536	113,491	106,339	15,379	5,760	-13,987	-10,846	-24,833

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage										Operational Water Budget Calculation						
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)									
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)				
60%	BN	2018	0	61,441	0	0	0	7,625	2,922	0	0	0	71,988	38,376	40,022	94,050	7,409	86,641	5,924	342	0	259	100,575	71,988	7,409	5,756	15,421	-14,271	1,150	
177%	W	2019	0	79,402	10,426	0	0	7,192	2,507	0	0	0	99,528	38,380	40,022	99,385	15,333	84,052	5,999	333	0	960	106,677	99,528	15,333	5,757	-13,941	-18,273	-32,214	
55%	D	2020	0	55,871	0	0	0	1,410	2,937	0	0	0	60,219	38,384	40,022	85,956	13,468	72,488	6,258	324	0	6	92,544	60,219	13,468	5,758	13,100	-7,774	5,326	
22%	C	2021	0	15,009	0	0	0	5,245	2,899	0	0	0	23,153	38,446	40,022	90,232	6,230	84,002	6,066	324	0	0	96,622	23,153	6,230	5,767	61,472	1,550	63,022	
29%	C	2022	0	24,231	0	0	0	3,400	2,960	0	0	0	30,591	38,420	40,022	89,430	8,975	80,455	5,883	324	0	145	95,782	30,591	8,975	5,763	50,453	18,742	69,195	
320%	W	2023	0	92,084	15,391	0	0	20,257	2,986	-138	0	0	130,580	38,443	40,022	86,211	17,938	68,273	5,883	324	0	2,593	95,012	130,580	17,938	5,766	-59,273	-11,289	-70,562	
Average (1995-2014)			0	53,806	0	0	0	4,236	2,595	0	0	0	60,637	38,343	40,022	93,160	11,846	81,314	6,970	498	0	0	100,627	60,637	11,846	5,751	22,393	96	22,489	
Average (2015-2023)			0	49,505	4,817	0	0	6,126	2,897	-15	0	0	63,330	38,408	40,022	91,432	11,804	79,628	6,015	339	0	611	98,397	63,330	11,804	5,761	17,502	-4,461	13,041	
Average (1995-2023)			0	52,471	1,495	0	0	4,822	2,689	-5	0	0	61,473	38,363	40,022	92,624	11,833	80,791	6,673	448	0	190	99,935	61,473	11,833	5,754	20,875	-1,318	19,557	
Wet (W, AN)			0	69,077	3,335	0	0	5,538	2,403	-11	0	0	80,342	38,307	40,022	95,826	16,159	79,667	6,518	519	0	392	103,255	80,342	16,159	5,746	1,008	-5,057	-4,048	
Dry (D, BN)			0	51,406	0	0	0	4,277	2,795	0	0	0	58,479	38,396	40,022	92,244	9,724	82,519	6,819	403	0	29	99,494	58,479	9,724	5,759	25,532	-1,232	24,300	
Critically Dry (C)			0	23,001	0	0	0	4,195	3,083	0	0	0	30,279	38,424	40,022	87,165	6,511	80,654	6,774	376	0	21	94,336	30,279	6,511	5,764	51,783	5,515	57,298	
Percent of Total			0%	85%	2%	0%	0%	8%	4%	0%	0%	0%	100%	96%	100%		13%	87%	94%	6%			100%	62%	12%	6%	21%	1%	20%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

7th Standard Mgmt Area (SWID) - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	0	0	0	0	2,491	0	0	0	2,491	8,721	10,038	28,961	5,891	23,070	0	0	0	0	28,961	2,491	5,891	1,308	19,271	0	19,271	
136%	W	1996	0	0	0	0	0	2,496	0	0	0	2,496	8,721	10,038	28,782	3,175	25,607	0	0	0	0	28,782	2,496	3,175	1,308	21,803	0	21,803	
175%	W	1997	0	0	0	0	0	2,492	0	0	0	2,492	8,743	10,038	27,461	3,624	23,838	0	0	0	0	27,461	2,492	3,624	1,311	20,034	0	20,034	
237%	W	1998	0	0	0	0	0	2,491	0	0	0	2,491	8,735	10,038	25,710	7,386	18,324	0	0	0	0	25,710	2,491	7,386	1,310	14,523	0	14,523	
70%	AN	1999	0	0	0	0	0	2,774	0	0	0	2,774	8,746	10,038	25,940	4,186	21,754	0	0	0	0	25,940	2,774	4,186	1,312	17,669	0	17,669	
67%	AN	2000	0	0	0	0	0	3,442	0	0	0	3,442	8,832	10,038	26,223	3,076	23,146	0	0	0	0	26,223	3,442	3,076	1,325	18,380	0	18,380	
53%	D	2001	0	0	0	0	0	3,625	0	0	0	3,625	8,830	10,038	24,992	3,323	21,668	0	0	0	0	24,992	3,625	3,323	1,324	16,719	0	16,719	
51%	D	2002	0	0	0	0	0	3,623	0	0	0	3,623	8,821	10,038	27,360	2,298	25,062	0	0	0	0	27,360	3,623	2,298	1,323	20,116	0	20,116	
83%	BN	2003	0	0	0	0	0	3,708	0	0	0	3,708	8,816	10,038	26,005	2,822	23,183	0	0	0	0	26,005	3,708	2,822	1,322	18,153	0	18,153	
57%	D	2004	0	0	0	0	0	3,744	0	0	0	3,744	8,816	10,038	26,368	2,234	24,134	0	0	0	0	26,368	3,744	2,234	1,322	19,068	0	19,068	
157%	W	2005	0	0	0	0	0	3,739	0	0	0	3,739	8,816	10,038	24,327	4,715	19,612	0	0	0	0	24,327	3,739	4,715	1,322	14,551	0	14,551	
153%	W	2006	0	0	0	0	0	3,736	0	0	0	3,736	8,816	10,038	23,297	4,146	19,152	0	0	0	0	23,297	3,736	4,146	1,322	14,093	0	14,093	
39%	C	2007	0	0	0	0	0	3,938	0	0	0	3,938	8,816	10,038	24,491	2,157	22,334	0	0	0	0	24,491	3,938	2,157	1,322	17,073	0	17,073	
71%	C	2008	0	0	0	0	0	4,002	0	0	0	4,002	8,816	10,038	24,004	1,557	22,447	0	0	0	0	24,004	4,002	1,557	1,322	17,122	0	17,122	
64%	BN	2009	0	0	0	0	0	3,758	0	0	0	3,758	8,816	10,038	24,229	2,013	22,216	0	0	0	0	24,229	3,758	2,013	1,322	17,135	0	17,135	
113%	AN	2010	0	0	0	0	0	3,419	0	0	0	3,419	8,816	10,038	22,454	3,398	19,057	0	0	0	0	22,454	3,419	3,398	1,322	14,315	0	14,315	
203%	W	2011	0	0	0	0	0	4,183	0	0	0	4,183	8,769	10,038	23,251	5,159	18,091	0	0	0	0	23,251	4,183	5,159	1,315	12,593	0	12,593	
53%	D	2012	0	0	0	0	0	4,698	0	0	0	4,698	8,770	10,038	23,776	3,255	20,522	0	0	0	0	23,776	4,698	3,255	1,315	14,508	0	14,508	
30%	C	2013	0	0	0	0	0	5,218	0	0	0	5,218	8,852	10,038	25,893	2,224	23,669	0	0	0	0	25,893	5,218	2,224	1,328	17,124	0	17,124	
25%	C	2014	0	0	0	0	0	2,682	0	0	0	2,682	8,853	10,038	27,080	1,571	25,509	0	0	0	0	27,080	2,682	1,571	1,328	21,499	0	21,499	
18%	C	2015	0	0	0	0	0	4,130	0	0	0	4,130	8,901	10,038	27,925	2,426	25,499	0	0	0	0	27,925	4,130	2,426	1,335	20,034	0	20,034	
51%	D	2016	0	0	0	0	0	5,649	0	0	0	5,649	8,896	10,038	23,577	3,617	19,961	0	0	0	0	23,577	5,649	3,617	1,334	12,977	0	12,977	
275%	W	2017	0	0	0	0	0	3,863	0	0	0	3,863	9,156	10,038	26,270	4,767	21,503	0	0	0	0	26,270	3,863	4,767	1,373	16,267	0	16,267	

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)									
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)				
60%	BN	2018	0	0	0	0	0	4,245	0	0	0	4,245	9,226	10,038	25,347	2,817	22,530	0	0	0	0	25,347	4,245	2,817	1,384	16,901	0	16,901		
177%	W	2019	0	0	0	0	0	4,330	0	0	0	4,330	9,184	10,038	26,512	4,784	21,728	0	0	0	0	26,512	4,330	4,784	1,378	16,021	0	16,021		
55%	D	2020	0	0	0	0	0	3,456	0	0	0	3,456	9,255	10,038	23,973	4,641	19,332	0	0	0	0	23,973	3,456	4,641	1,388	14,488	0	14,488		
22%	C	2021	0	0	0	0	0	3,484	0	0	0	3,484	9,299	10,038	27,646	2,440	25,206	0	0	0	0	27,646	3,484	2,440	1,395	20,327	0	20,327		
29%	C	2022	0	0	0	0	0	3,874	0	0	0	3,874	9,253	10,038	25,849	2,677	23,173	0	0	0	0	25,849	3,874	2,677	1,388	17,911	0	17,911		
320%	W	2023	0	0	0	0	0	3,114	0	0	0	3,114	9,296	10,038	21,864	4,888	16,977	0	0	0	0	21,864	3,114	4,888	1,394	12,468	0	12,468		
Average (1995-2014)			0	0	0	0	0	3,513	0	0	0	3,513	8,796	10,038	25,530	3,411	22,120	0	0	0	0	25,530	3,513	3,411	1,319	17,287	0	17,287		
Average (2015-2023)			0	0	0	0	0	4,016	0	0	0	4,016	9,163	10,038	25,440	3,673	21,768	0	0	0	0	25,440	4,016	3,673	1,374	16,377	0	16,377		
Average (1995-2023)			0	0	0	0	0	3,669	0	0	0	3,669	8,910	10,038	25,502	3,492	22,011	0	0	0	0	25,502	3,669	3,492	1,336	17,005	0	17,005		
Wet (W, AN)			0	0	0	0	0	3,275	0	0	0	3,275	8,873	10,038	25,466	4,553	20,912	0	0	0	0	25,466	3,275	4,553	1,331	16,307	0	16,307		
Dry (D, BN)			0	0	0	0	0	4,056	0	0	0	4,056	8,916	10,038	25,070	3,002	22,068	0	0	0	0	25,070	4,056	3,002	1,337	16,674	0	16,674		
Critically Dry (C)			0	0	0	0	0	3,904	0	0	0	3,904	8,970	10,038	26,127	2,150	23,977	0	0	0	0	26,127	3,904	2,150	1,345	18,727	0	18,727		
Percent of Total			0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	89%	100%		14%	86%	#DIV/0 !	#DIV/0 !			100%	14%	14%	5%	67%	0%	67%		

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Tejon-Castac Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	0	0	0	0	0	0	0	0	233	19,508	35	10	25	0	160	0	0	195	0	10	35	149	-3,041	-2,892			
136%	W	1996	0	0	0	0	0	0	0	0	233	19,508	30	4	26	0	142	0	0	171	0	4	35	132	-5,023	-4,891			
175%	W	1997	0	0	0	0	0	0	0	0	233	19,508	27	4	23	0	124	0	0	151	0	4	35	112	-2,164	-2,052			
237%	W	1998	0	0	0	0	0	0	0	0	234	19,508	8	3	5	0	105	0	0	113	0	3	35	75	-5,231	-5,156			
70%	AN	1999	0	0	0	0	0	0	0	0	247	19,508	35	17	18	0	87	0	0	123	0	17	37	68	-324	-256			
67%	AN	2000	0	0	0	0	0	0	0	0	834	19,508	9	1	8	0	69	0	0	78	0	1	125	-48	-1,488	-1,536			
53%	D	2001	0	0	0	0	0	0	0	0	859	19,508	162	84	78	0	63	0	0	225	0	84	129	12	-680	-668			
51%	D	2002	0	0	0	0	0	0	0	0	831	19,508	124	33	91	0	58	0	0	182	0	33	125	25	-3,072	-3,047			
83%	BN	2003	0	0	0	0	0	0	0	0	862	19,508	141	69	72	0	52	0	0	193	0	69	129	-5	59	54			
57%	D	2004	0	0	0	0	0	0	0	0	862	19,508	32	5	28	0	47	0	0	79	0	5	129	-55	-480	-535			
157%	W	2005	0	0	0	0	0	0	0	0	871	19,508	139	68	71	0	41	0	0	179	0	68	131	-19	-3,493	-3,512			
153%	W	2006	0	0	0	0	0	0	0	0	841	19,508	211	115	95	0	35	0	0	246	0	115	126	5	-4,738	-4,733			
39%	C	2007	0	0	0	0	0	0	0	0	841	19,508	788	293	494	0	30	0	0	817	0	293	126	398	-1,603	-1,205			
71%	C	2008	0	0	0	0	0	0	0	0	841	19,508	553	158	395	0	24	0	0	577	0	158	126	293	0	293			
64%	BN	2009	0	0	0	0	0	0	0	0	841	19,508	129	43	86	0	19	0	0	147	0	43	126	-22	52	30			
113%	AN	2010	0	0	0	0	0	0	0	0	841	19,508	374	159	215	0	13	0	0	387	0	159	126	102	-241	-139			
203%	W	2011	0	0	0	0	0	0	0	0	841	19,508	13	4	9	0	13	0	0	26	0	4	126	-104	-7,410	-7,514			
53%	D	2012	0	0	0	0	0	0	0	0	843	19,508	25	5	20	0	13	0	0	38	0	5	126	-93	0	-93			
30%	C	2013	0	0	0	0	0	0	0	0	843	19,508	26	2	24	0	13	0	0	39	0	2	126	-90	0	-90			
25%	C	2014	0	0	0	0	0	0	0	0	843	19,508	22	3	19	0	13	0	0	35	0	3	126	-94	3,016	2,922			
18%	C	2015	0	0	0	0	0	0	0	0	843	19,508	22	3	19	0	13	0	0	35	0	3	126	-94	0	-94			
51%	D	2016	0	0	0	0	0	0	0	0	843	19,508	25	6	20	0	13	0	0	39	0	6	126	-93	2,515	2,422			
275%	W	2017	0	0	0	0	0	0	0	0	843	19,508	32	8	24	0	14	0	0	46	0	8	126	-88	-14,166	-14,254			

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	0	0	0	0	0	0	0	0	0	0	0	843	19,508	15	2	13	0	14	0	0	29	0	2	126	-100	-5,244	-5,344
177%	W	2019	0	0	0	0	0	0	0	0	0	0	0	843	19,508	71	32	39	0	14	0	0	85	0	32	126	-74	-7,732	-7,806
55%	D	2020	0	0	0	0	0	0	0	0	0	0	0	843	19,508	11	3	8	0	14	0	0	25	0	3	126	-104	-554	-658
22%	C	2021	0	0	0	0	0	0	0	0	0	0	0	1,120	19,508	11	1	10	0	14	0	0	25	0	1	168	-144	4,868	4,724
29%	C	2022	0	0	0	0	0	0	0	0	0	0	0	242	19,508	11	1	10	0	14	0	0	25	0	1	36	-13	3,601	3,588
320%	W	2023	0	0	0	0	0	0	0	0	0	0	0	698	19,508	17	4	13	0	14	0	0	31	0	4	105	-78	-12,793	-12,871
Average (1995-2014)			0	0	0	0	0	0	0	0	0	0	0	694	19,508	144	54	90	0	56	0	0	200	0	54	104	42	-1,793	-1,751
Average (2015-2023)			0	0	0	0	0	0	0	0	0	0	0	791	19,508	24	7	17	0	14	0	0	38	0	7	119	-88	-3,278	-3,366
Average (1995-2023)			0	0	0	0	0	0	0	0	0	0	0	724	19,508	107	39	67	0	43	0	0	150	0	39	109	2	-2,254	-2,252
Wet (W, AN)			0	0	0	0	0	0	0	0	0	0	0	599	19,508	77	33	44	0	64	0	0	141	0	33	90	18	-5,219	-5,201
Dry (D, BN)			0	0	0	0	0	0	0	0	0	0	0	847	19,508	74	28	46	0	32	0	0	106	0	28	127	-48	-823	-871
Critically Dry (C)			0	0	0	0	0	0	0	0	0	0	0	796	19,508	205	66	139	0	17	0	0	222	0	66	119	37	1,412	1,448
Percent of Total			#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	#DIV/0 !	4%	100%		37%	63%	0%	100%			100%	0%	26%	73%	1%	1506%	-1504%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

West Kern Water District GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation						
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)							
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)
190%	W	1995	40,379	0	0	0	0	1,102	0	0	0	41,481	6,338	160,472	2,834	972	1,863	12,149	0	0	1,615	16,598	41,481	972	951	-26,805	0	-26,805
136%	W	1996	25,597	0	0	0	0	1,102	0	0	0	26,699	6,263	160,472	2,344	448	1,896	13,523	0	0	1,024	16,891	26,699	448	939	-11,196	0	-11,196
175%	W	1997	17,920	0	0	0	0	1,102	0	0	0	19,022	6,453	160,472	1,572	231	1,341	13,523	0	0	717	15,812	19,022	231	968	-4,409	0	-4,409
237%	W	1998	23,602	0	0	0	0	1,102	0	0	0	24,704	6,625	160,472	1,470	462	1,008	13,511	0	0	944	15,925	24,704	462	994	-10,235	0	-10,235
70%	AN	1999	29,758	0	0	0	0	1,102	0	0	0	30,860	6,340	160,472	1,450	307	1,143	15,043	0	0	1,190	17,683	30,860	307	951	-14,435	0	-14,435
67%	AN	2000	22,494	0	0	0	0	1,102	0	0	0	23,596	6,634	160,472	1,855	400	1,455	17,050	0	0	899	19,804	23,596	400	995	-5,187	0	-5,187
53%	D	2001	10,753	0	0	0	0	1,102	0	0	0	11,855	6,775	160,472	2,206	458	1,748	15,722	0	0	429	18,358	11,855	458	1,016	5,028	0	5,028
51%	D	2002	17,507	0	0	0	0	1,102	0	0	0	18,609	6,881	160,472	1,913	260	1,654	15,977	0	0	681	18,571	18,609	260	1,032	-1,330	0	-1,330
83%	BN	2003	18,400	0	0	0	0	1,102	0	0	0	19,502	6,709	160,472	1,544	225	1,320	18,910	0	0	654	21,109	19,502	225	1,006	375	0	375
57%	D	2004	7,523	0	0	0	0	1,102	0	0	0	8,625	6,710	160,472	1,738	182	1,556	20,883	0	0	141	22,761	8,625	182	1,006	12,947	-33,333	-20,386
157%	W	2005	33,142	0	0	0	0	1,102	0	0	0	34,244	6,676	160,472	1,598	310	1,289	21,129	0	0	1,182	23,909	34,244	310	1,001	-11,646	0	-11,646
153%	W	2006	18,344	0	0	0	0	1,102	0	0	0	19,446	6,766	160,472	2,017	505	1,512	21,871	0	0	575	24,463	19,446	505	1,015	3,497	-21,500	-18,003
39%	C	2007	8,505	0	0	0	0	1,102	0	0	0	9,607	6,577	160,472	1,533	152	1,381	22,612	0	0	168	24,314	9,607	152	987	13,568	0	13,568
71%	C	2008	4,525	0	0	0	0	1,102	0	0	0	5,627	6,628	160,472	1,656	136	1,519	27,666	0	0	0	29,322	5,627	136	994	22,563	0	22,563
64%	BN	2009	9,797	0	0	0	0	1,102	0	0	0	10,899	6,791	160,472	1,734	230	1,505	21,737	0	0	203	23,674	10,899	230	1,019	11,527	16,967	28,494
113%	AN	2010	14,675	0	0	0	0	1,102	0	0	0	15,777	6,791	160,472	1,648	256	1,392	20,145	0	0	417	22,209	15,777	256	1,019	5,157	10,151	15,308
203%	W	2011	33,773	0	0	0	0	1,102	0	0	0	34,875	6,787	160,472	581	127	453	18,552	0	0	1,611	20,743	34,875	127	1,018	-15,277	5,875	-9,402
53%	D	2012	50,081	0	0	0	0	1,102	0	0	0	51,183	6,879	160,472	909	119	790	19,413	0	0	2,204	22,526	51,183	119	1,032	-29,808	6,316	-23,492
30%	C	2013	16,066	0	0	0	0	1,102	0	-629	0	16,539	6,961	160,472	702	63	639	18,342	0	0	500	19,544	16,539	63	1,044	1,898	-5,375	-3,477
25%	C	2014	6,603	0	0	0	0	1,102	0	-16,451	0	-8,746	6,961	160,472	698	49	649	19,027	0	0	50	19,775	-8,746	49	1,044	27,428	-3,446	23,982
18%	C	2015	9,498	0	0	0	0	1,102	0	-5,705	0	4,895	7,298	160,472	662	80	581	21,000	0	0	300	21,962	4,895	80	1,095	15,891	-1,870	14,021
51%	D	2016	18,953	0	0	0	0	1,102	0	-3,895	0	16,160	7,295	160,472	675	107	568	18,625	0	0	730	20,030	16,160	107	1,094	2,668	5,608	8,276
275%	W	2017	57,354	0	0	0	0	1,205	0	0	0	58,559	7,189	160,472	721	133	588	17,877	0	0	2,458	21,056	58,559	133	1,078	-38,714	15,896	-22,818

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage										Operational Water Budget Calculation						
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	20,862	0	0	0	0	0	1,155	0	-1,322	0	20,695	7,190	160,472	491	67	424	18,239	0	0	857	19,588	20,695	67	1,078	-2,253	6,663	4,410
177%	W	2019	34,867	0	0	0	0	0	1,113	0	0	0	35,980	7,191	160,472	718	151	567	15,968	0	0	1,405	18,091	35,980	151	1,079	-19,119	3,362	-15,757
55%	D	2020	11,562	0	0	0	0	5,220	1,085	0	-4,165	0	13,702	7,183	160,472	501	121	380	24,503	0	0	321	25,326	13,702	121	1,077	10,425	-3,487	6,938
22%	C	2021	12,169	0	0	0	0	0	1,085	0	-2,002	0	11,252	7,170	160,472	602	64	538	19,921	0	0	90	20,613	11,252	64	1,076	8,221	-2,000	6,221
29%	C	2022	10,680	0	0	0	0	0	1,085	0	-6,989	0	4,776	7,173	160,472	461	51	410	27,859	0	0	1	28,321	4,776	51	1,076	22,418	-2,007	20,411
320%	W	2023	31,373	0	3,264	36	0	0	1,085	0	0	0	35,758	7,173	160,472	1,133	496	637	12,977	0	0	794	14,904	35,758	496	1,076	-22,425	0	-22,425
Average (1995-2014)			20,472	0	0	0	0	0	1,102	0	-854	0	20,721	6,677	160,472	1,600	295	1,306	18,339	0	0	760	20,700	20,721	295	1,002	-1,317	-1,217	-2,534
Average (2015-2023)			23,035	0	363	4	0	580	1,113	0	-2,675	0	22,420	7,207	160,472	663	141	522	19,663	0	0	773	21,099	22,420	141	1,081	-2,543	2,463	-80
Average (1995-2023)			21,268	0	113	1	0	180	1,106	0	-1,419	0	21,248	6,842	160,472	1,309	247	1,062	18,750	0	0	764	20,824	21,248	247	1,026	-1,698	-75	-1,773
Wet (W, AN)			29,483	0	251	3	0	0	1,110	0	0	0	30,847	6,710	160,472	1,534	369	1,165	16,409	0	0	1,141	19,084	30,847	369	1,006	-13,138	1,060	-12,078
Dry (D, BN)			18,382	0	0	0	0	580	1,106	0	-1,042	0	19,026	6,935	160,472	1,301	196	1,105	19,334	0	0	691	21,327	19,026	196	1,040	1,064	-141	924
Critically Dry (C)			9,721	0	0	0	0	0	1,097	0	-4,539	0	6,279	6,967	160,472	902	85	817	22,347	0	0	158	23,407	6,279	85	1,045	15,998	-2,100	13,898
Percent of Total			100%	0%	1%	0%	0%	1%	5%	0%	-7%	0%	100%	4%	100%		19%	81%	100%	0%		100%	102%	1%	5%	-8%	0%	-9%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Westside District Water Authority GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)							
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)
190%	W	1995	275,477	0	0	0	0	0	0	0	0	275,477	153,869	260,060	346,023	97,859	248,164	322	46	2,758	0	349,149	275,477	97,859	23,080	-47,267	-242,674	-289,941
136%	W	1996	372,894	0	0	0	0	0	0	0	0	372,894	154,088	260,060	382,953	58,420	324,533	322	45	3,732	0	387,051	372,894	58,420	23,113	-67,375	-47,061	-114,436
175%	W	1997	362,519	0	0	0	0	0	0	0	0	362,519	155,487	260,060	326,436	54,093	272,343	322	43	3,628	0	330,430	362,519	54,093	23,323	-109,506	-84,288	-193,794
237%	W	1998	246,119	0	0	0	0	0	0	0	0	246,119	156,850	260,060	337,943	103,274	234,669	302	41	2,464	0	340,750	246,119	103,274	23,527	-32,169	-198,208	-230,377
70%	AN	1999	303,547	0	0	0	0	0	0	0	0	303,547	157,419	260,060	305,152	59,859	245,293	307	39	3,039	0	308,537	303,547	59,859	23,613	-78,482	-17,429	-95,911
67%	AN	2000	318,085	0	0	0	0	0	0	0	0	318,085	156,090	260,060	311,256	42,710	268,546	301	37	3,184	0	314,779	318,085	42,710	23,414	-69,430	-29,559	-98,989
53%	D	2001	225,678	0	0	0	0	0	0	0	0	225,678	157,563	260,060	247,987	37,948	210,039	331	36	2,260	0	250,615	225,678	37,948	23,634	-36,646	74,403	37,757
51%	D	2002	238,896	0	0	0	0	0	0	0	0	238,896	155,812	260,060	226,806	23,610	203,197	361	35	2,393	0	229,595	238,896	23,610	23,372	-56,282	43,683	-12,599
83%	BN	2003	229,998	0	0	0	0	0	0	0	0	229,998	153,917	260,060	223,665	30,648	193,017	373	34	2,304	0	226,375	229,998	30,648	23,088	-57,358	98	-57,260
57%	D	2004	255,052	0	0	0	0	0	0	0	0	255,052	150,560	260,060	260,615	29,783	230,832	395	33	2,554	0	263,598	255,052	29,783	22,584	-43,821	-16,155	-59,976
157%	W	2005	235,739	0	0	0	0	0	0	0	0	235,739	152,250	260,060	260,426	67,478	192,948	408	32	2,361	0	263,228	235,739	67,478	22,837	-62,827	-205,741	-268,568
153%	W	2006	273,437	0	0	0	0	0	0	0	0	273,437	151,714	260,060	251,148	61,311	189,837	407	31	2,739	0	254,325	273,437	61,311	22,757	-103,180	-196,350	-299,530
39%	C	2007	304,123	0	0	0	0	0	0	0	0	304,123	151,266	260,060	235,356	28,669	206,687	423	30	3,045	0	238,855	304,123	28,669	22,690	-116,627	182,551	65,924
71%	C	2008	275,296	0	0	0	0	0	0	0	0	275,296	151,154	260,060	208,152	23,287	184,865	416	29	2,757	0	211,354	275,296	23,287	22,673	-109,902	177,755	67,853
64%	BN	2009	283,564	0	0	0	0	449	0	0	0	284,013	149,130	260,060	215,222	22,892	192,330	378	28	2,844	0	218,472	284,013	22,892	22,369	-110,802	147,794	36,992
113%	AN	2010	294,336	0	0	0	0	279	0	0	0	294,615	150,251	260,060	247,625	44,403	203,222	368	27	2,950	0	250,970	294,615	44,403	22,538	-110,586	28,862	-81,724
203%	W	2011	301,301	0	0	0	0	0	0	0	0	301,301	150,277	260,060	281,145	59,735	221,410	409	26	3,017	0	284,597	301,301	59,735	22,542	-98,980	-236,159	-335,139
53%	D	2012	310,232	0	0	0	0	0	0	0	0	310,232	150,686	260,060	352,809	47,977	304,831	377	25	3,106	0	356,318	310,232	47,977	22,603	-24,495	45,867	21,372
30%	C	2013	324,764	0	0	0	0	0	0	0	0	324,764	157,886	260,060	267,066	18,566	248,500	380	24	3,251	0	270,721	324,764	18,566	23,683	-96,292	105,378	9,086
25%	C	2014	288,667	0	0	0	0	0	0	0	0	288,667	157,414	260,060	276,502	14,907	261,595	343	23	2,890	0	279,758	288,667	14,907	23,612	-47,428	156,144	108,716
18%	C	2015	279,523	0	0	0	0	0	0	0	0	279,523	157,425	260,060	255,163	23,723	231,440	369	22	2,799	0	258,353	279,523	23,723	23,614	-68,507	108,948	40,441
51%	D	2016	271,658	0	0	0	0	0	0	0	0	271,658	158,445	260,060	260,721	36,260	224,461	372	21	2,720	0	263,834	271,658	36,260	23,767	-67,850	38,604	-29,246
275%	W	2017	295,727	0	0	0	0	0	0	0	0	295,727	158,817	260,060	303,755	46,157	257,598	372	20	2,958	0	307,105	295,727	46,157	23,823	-58,602	-337,338	-395,940

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation									
60%	BN	2018	291,969	0	0	0	0	0	0	0	291,969	157,448	260,060	252,318	22,734	229,585	372	19	2,920	0	255,629	291,969	22,734	23,617	-82,690	10,704	-71,986	
177%	W	2019	291,011	0	0	0	0	0	0	0	291,011	157,667	260,060	286,839	42,546	244,293	372	18	2,910	0	290,139	291,011	42,546	23,650	-67,068	-245,017	-312,085	
55%	D	2020	278,722	0	0	0	0	0	0	0	278,722	157,365	260,060	245,018	35,894	209,123	372	17	2,787	0	248,194	278,722	35,894	23,605	-90,027	62,505	-27,522	
22%	C	2021	260,366	0	0	0	0	0	0	0	260,366	157,307	260,060	243,348	24,875	218,473	372	17	2,604	0	246,341	260,366	24,875	23,596	-62,496	165,821	103,325	
29%	C	2022	272,169	0	0	0	0	0	0	0	272,169	156,228	260,060	207,347	24,096	183,252	372	17	2,299	0	210,036	272,169	24,096	23,434	-109,663	134,842	25,179	
320%	W	2023	209,601	0	0	0	0	0	0	0	209,601	158,254	260,060	266,154	82,114	184,040	372	17	2,367	0	268,910	209,601	82,114	23,738	-46,543	-376,443	-422,986	
Average (1995-2014)			285,986	0	0	0	0	36	0	0	0	286,023	153,684	260,060	278,214	46,371	231,843	362	33	2,864	0	281,474	286,023	46,371	23,053	-73,973	-15,554	-89,527
Average (2015-2023)			272,305	0	0	0	0	0	0	0	272,305	157,662	260,060	257,851	37,600	220,252	372	19	2,707	0	260,949	272,305	37,600	23,649	-72,605	-48,597	-121,202	
Average (1995-2023)			281,740	0	0	0	0	25	0	0	0	281,765	154,918	260,060	271,895	43,649	228,246	365	29	2,815	0	275,104	281,765	43,649	23,238	-73,548	-25,809	-99,357
Wet (W, AN)			290,753	0	0	0	0	21	0	0	0	290,775	154,849	260,060	300,527	63,074	237,453	353	33	2,931	0	303,844	290,775	63,074	23,227	-73,232	-168,262	-241,494
Dry (D, BN)			265,085	0	0	0	0	50	0	0	0	265,135	154,547	260,060	253,907	31,972	221,935	370	28	2,654	0	256,959	265,135	31,972	23,182	-63,330	45,278	-18,052
Critically Dry (C)			286,415	0	0	0	0	0	0	0	0	286,415	155,526	260,060	241,848	22,589	219,259	382	23	2,807	0	245,060	286,415	22,589	23,329	-87,273	147,348	60,075
Percent of Total			100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	60%	100%		16%	84%	93%	7%		100%	102%	16%	8%	-27%	9%	-36%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Wheeler Ridge-Maricopa GSA - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
190%	W	1995	119,390	0	0	0	0	0	-7,128	0	-14,911	97,351	75,243	87,372	190,783	51,485	139,298	0	429	0	0	191,212	97,351	51,485	11,286	31,091	-67,995	-36,904	
136%	W	1996	148,336	0	0	0	0	0	-8,875	0	-21,265	118,196	75,039	87,372	195,660	24,989	170,671	0	418	0	0	196,078	118,196	24,989	11,256	41,637	-16,590	25,047	
175%	W	1997	146,068	0	0	0	0	0	-10,320	0	-17,725	118,023	76,149	87,372	169,648	22,378	147,269	0	407	0	0	170,055	118,023	22,378	11,422	18,232	-20,015	-1,783	
237%	W	1998	107,452	0	0	0	0	0	-6,470	0	-14,507	86,476	75,746	87,372	166,403	53,130	113,274	0	396	0	0	166,800	86,476	53,130	11,362	15,832	-75,470	-59,638	
70%	AN	1999	124,464	0	0	0	0	0	-7,852	0	-15,577	101,035	76,961	87,372	171,562	34,324	137,238	0	385	0	0	171,947	101,035	34,324	11,544	25,044	-8,922	16,122	
67%	AN	2000	130,928	0	0	0	0	0	-8,406	0	-17,929	104,593	77,405	87,372	161,176	22,127	139,050	0	374	0	0	161,551	104,593	22,127	11,611	23,220	-24,466	-1,246	
53%	D	2001	95,773	0	0	0	0	0	-6,315	0	-14,603	74,855	77,357	87,372	134,707	21,951	112,756	0	364	0	0	135,070	74,855	21,951	11,604	26,662	32,523	59,185	
51%	D	2002	92,032	0	0	0	0	0	-6,639	0	-15,026	70,367	77,398	87,372	135,029	13,593	121,436	0	353	0	0	135,383	70,367	13,593	11,610	39,813	-12,999	26,814	
83%	BN	2003	84,349	0	0	0	0	0	-6,101	0	-13,990	64,258	77,548	87,372	132,611	23,564	109,047	0	343	0	0	132,954	64,258	23,564	11,632	33,499	-9,808	23,691	
57%	D	2004	95,449	0	0	0	0	0	-6,965	0	-15,573	72,911	77,476	87,372	133,971	16,879	117,093	0	333	0	0	134,304	72,911	16,879	11,621	32,893	-6,419	26,474	
157%	W	2005	90,747	0	0	0	0	0	-6,097	0	-13,510	71,141	76,727	87,372	122,267	31,878	90,389	0	322	0	0	122,589	71,141	31,878	11,509	8,062	-99,735	-91,673	
153%	W	2006	103,126	0	0	0	0	0	-6,518	0	-17,451	79,157	77,299	87,372	118,635	27,525	91,110	0	312	0	0	118,947	79,157	27,525	11,595	670	-60,604	-59,934	
39%	C	2007	118,475	0	0	0	0	0	-7,702	0	-18,304	92,469	77,717	87,372	140,350	18,109	122,240	0	301	0	0	140,651	92,469	18,109	11,658	18,415	76,817	95,232	
71%	C	2008	122,095	0	0	0	0	0	-6,114	0	-18,113	97,868	77,288	87,372	129,766	10,118	119,649	0	291	0	0	130,057	97,868	10,118	11,593	10,478	86,727	97,205	
64%	BN	2009	115,763	0	0	0	0	0	-6,195	0	-17,156	92,412	76,713	87,372	127,442	13,882	113,560	0	281	0	0	127,723	92,412	13,882	11,507	9,922	76,660	86,582	
113%	AN	2010	118,078	0	0	0	0	0	-5,742	0	-15,770	96,567	76,814	87,372	125,679	20,124	105,555	0	270	0	0	125,949	96,567	20,124	11,522	-2,264	14,331	12,067	
203%	W	2011	112,067	0	0	0	0	0	-5,698	0	-16,414	89,955	77,154	87,372	128,932	31,617	97,316	0	261	0	0	129,193	89,955	31,617	11,573	-3,951	-103,117	-107,068	
53%	D	2012	124,517	0	0	0	0	0	-6,669	0	-17,043	100,805	77,156	87,372	179,070	28,213	150,857	0	252	0	0	179,322	100,805	28,213	11,573	38,731	16,563	55,294	
30%	C	2013	127,904	0	0	0	0	0	-6,629	0	-17,848	103,427	77,614	87,372	141,995	14,524	127,472	0	243	0	0	142,238	103,427	14,524	11,642	12,646	54,377	67,023	
25%	C	2014	122,213	0	0	0	0	0	-4,920	0	-11,072	106,221	77,607	87,372	131,838	11,897	119,942	0	234	0	0	132,073	106,221	11,897	11,641	2,314	64,994	67,308	
18%	C	2015	115,806	0	0	0	0	0	-4,478	0	-8,939	102,390	78,103	87,372	157,104	22,296	134,808	0	225	0	0	157,329	102,390	22,296	11,715	20,928	51,752	72,680	
51%	D	2016	121,742	0	0	0	0	0	-5,648	0	-12,690	103,403	78,342	87,372	147,850	24,840	123,010	0	216	0	0	148,066	103,403	24,840	11,751	8,072	329	8,401	
275%	W	2017	125,478	0	0	0	0	0	-6,973	0	-13,712	104,792	78,345	87,372	175,683	35,398	140,285	0	207	0	0	175,890	104,792	35,398	11,752	23,948	-141,515	-117,567	

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)			
60%	BN	2018	124,530	0	0	0	0	0	-6,345	0	-9,664	108,520	78,181	87,372	152,581	19,973	132,608	0	199	0	0	152,779	108,520	19,973	11,727	12,559	26,322	38,881	
177%	W	2019	121,338	0	0	0	0	0	-7,196	0	-12,198	101,944	78,657	87,372	162,191	32,874	129,318	0	190	0	0	162,381	101,944	32,874	11,799	15,765	-51,577	-35,812	
55%	D	2020	110,511	0	0	0	0	0	-5,985	0	-9,532	94,994	78,978	87,372	137,163	29,956	107,207	0	181	0	0	137,343	94,994	29,956	11,847	547	42,846	43,393	
22%	C	2021	109,878	0	0	0	0	0	-5,688	0	-8,062	96,128	78,487	87,372	147,977	14,065	133,912	0	181	0	0	148,158	96,128	14,065	11,773	26,192	66,390	92,582	
29%	C	2022	95,883	0	0	0	0	0	-5,714	-25,367	-12,771	52,031	77,519	87,372	141,480	17,383	124,097	0	181	0	0	141,661	52,031	17,383	11,628	60,619	51,939	112,558	
320%	W	2023	100,716	0	0	0	0	0	-5,446	-5,543	0	89,727	78,409	87,372	145,407	36,836	108,571	0	181	0	0	145,588	89,727	36,836	11,761	7,263	-183,315	-176,052	
Average (1995-2014)			114,961	0	0	0	0	0	-6,868	0	-16,189	91,904	76,920	87,372	146,876	24,615	122,261	0	329	0	0	147,205	91,904	24,615	11,538	19,147	-4,157	14,990	
Average (2015-2023)			113,987	0	0	0	0	0	-5,942	-3,434	-9,730	94,881	78,336	87,372	151,937	25,958	125,979	0	196	0	0	152,133	94,881	25,958	11,750	19,544	-15,203	4,340	
Average (1995-2023)			114,659	0	0	0	0	0	-6,580	-1,066	-14,185	92,828	77,360	87,372	148,447	25,032	123,415	0	287	0	0	148,734	92,828	25,032	11,604	19,270	-7,585	11,685	
Wet (W, AN)			119,091	0	0	0	0	0	-7,132	-426	-14,690	96,843	76,919	87,372	156,464	32,668	123,796	0	320	0	0	156,783	96,843	32,668	11,538	15,735	-64,538	-48,803	
Dry (D, BN)			107,185	0	0	0	0	0	-6,318	0	-13,920	86,947	77,683	87,372	142,269	21,428	120,841	0	280	0	0	142,549	86,947	21,428	11,652	22,522	18,446	40,968	
Critically Dry (C)			116,036	0	0	0	0	0	-5,892	-3,624	-13,587	92,933	77,762	87,372	141,502	15,484	126,017	0	237	0	0	141,738	92,933	15,484	11,664	21,656	64,714	86,370	
Percent of Total			124%	0%	0%	0%	0%	0%	-7%	-1%	-15%	100%	89%	100%		17%	83%	0%	100%			100%	62%	17%	8%	13%	5%	8%	

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Kern Non-Districted Land Authority - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporation (acre-feet)		Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumps	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation							
190%	W	1995	0	0	0	0	0	0	20	-4,748	0	0	-4,728	14,631	241,286	26,087	7,925	18,161	766	2,811	0	0	29,663	-4,728	7,925	2,195	24,272	0	24,272
136%	W	1996	0	0	0	0	0	0	19	0	0	0	19	14,690	241,286	25,227	4,495	20,732	874	2,802	0	0	28,903	19	4,495	2,204	22,186	0	22,186
175%	W	1997	0	0	0	0	0	0	19	0	0	0	19	15,703	241,286	22,070	4,076	17,994	874	2,794	0	0	25,738	19	4,076	2,355	19,288	0	19,288
237%	W	1998	0	0	0	0	0	0	19	0	0	0	19	16,910	241,286	24,841	8,700	16,140	793	2,786	0	0	28,419	19	8,700	2,537	17,163	0	17,163
70%	AN	1999	0	0	0	0	0	0	19	0	0	0	19	16,560	241,286	21,695	5,627	16,067	1,022	2,777	0	0	25,494	19	5,627	2,484	17,364	0	17,364
67%	AN	2000	0	0	0	0	0	0	19	-56	0	0	-37	18,581	241,286	18,217	3,174	15,043	991	2,769	0	0	21,977	-37	3,174	2,787	16,053	0	16,053
53%	D	2001	0	0	0	0	0	0	19	-10,024	0	0	-10,005	19,230	241,286	19,295	3,617	15,678	1,037	2,803	0	0	23,135	-10,005	3,617	2,885	26,638	0	26,638
51%	D	2002	0	0	0	0	0	0	19	-22,402	0	0	-22,383	19,041	241,286	19,975	2,557	17,418	1,115	2,837	0	0	23,927	-22,383	2,557	2,856	40,897	0	40,897
83%	BN	2003	0	0	0	0	0	0	19	-9,886	0	0	-9,867	17,779	241,286	19,491	4,055	15,436	1,115	2,871	0	0	23,478	-9,867	4,055	2,667	26,622	0	26,622
57%	D	2004	0	0	0	0	0	0	19	-13,643	0	0	-13,624	18,246	241,286	20,218	3,599	16,619	1,115	2,905	0	0	24,238	-13,624	3,599	2,737	31,526	0	31,526
157%	W	2005	0	0	0	0	0	0	19	-6,071	0	0	-6,052	17,581	241,286	18,894	5,365	13,529	1,115	2,939	0	0	22,948	-6,052	5,365	2,637	20,999	0	20,999
153%	W	2006	0	0	0	0	0	0	19	0	0	0	19	17,710	241,286	19,236	5,306	13,930	1,115	2,974	0	0	23,325	19	5,306	2,657	15,343	0	15,343
39%	C	2007	0	0	0	0	0	0	19	-10,437	0	0	-10,418	18,176	241,286	19,765	3,394	16,371	1,115	3,008	0	0	23,888	-10,418	3,394	2,726	28,185	0	28,185
71%	C	2008	0	0	0	0	0	0	19	-17,351	0	0	-17,332	18,086	241,286	17,864	2,460	15,403	1,115	3,042	0	0	22,020	-17,332	2,460	2,713	34,179	0	34,179
64%	BN	2009	0	0	0	0	0	0	19	-7,786	0	0	-7,767	17,924	241,286	16,781	2,293	14,488	1,115	3,076	0	0	20,972	-7,767	2,293	2,689	23,757	0	23,757
113%	AN	2010	0	0	0	0	0	0	19	-7,019	0	0	-7,000	18,193	241,286	15,260	3,345	11,915	1,115	3,110	0	0	19,485	-7,000	3,345	2,729	20,411	0	20,411
203%	W	2011	0	0	0	0	0	0	19	-369	0	0	-350	18,102	241,286	15,614	4,624	10,990	1,115	3,044	0	0	19,773	-350	4,624	2,715	12,784	0	12,784
53%	D	2012	0	0	0	0	0	0	19	-1,889	0	0	-1,870	19,672	241,286	24,458	7,584	16,874	1,097	2,978	0	0	28,533	-1,870	7,584	2,951	19,868	0	19,868
30%	C	2013	0	0	0	0	0	0	19	-9,786	0	0	-9,767	19,243	241,286	16,177	2,539	13,638	1,078	2,912	0	0	20,168	-9,767	2,539	2,886	24,509	0	24,509
25%	C	2014	0	0	0	0	0	0	19	-21,567	0	0	-21,548	19,234	241,286	16,145	1,778	14,367	1,060	2,846	0	0	20,052	-21,548	1,778	2,885	36,936	0	36,936
18%	C	2015	0	0	0	0	0	0	19	-23,330	0	0	-23,311	21,015	241,286	17,853	3,610	14,243	1,042	2,781	0	0	21,675	-23,311	3,610	3,152	38,224	0	38,224
51%	D	2016	0	0	0	0	0	0	19	-10,809	0	0	-10,790	20,072	241,286	16,162	4,364	11,799	1,023	2,715	0	0	19,900	-10,790	4,364	3,011	23,316	0	23,316
275%	W	2017	0	0	0	0	0	0	19	-4,037	0	0	-4,018	21,233	241,286	21,235	6,289	14,946	1,005	2,649	0	0	24,889	-4,018	6,289	3,185	19,433	0	19,433

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation						
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)		Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)								
DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumpins	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area ¹	GSA Land Area	Crop Evapotranspiration ² (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use ³	Domestic, Industrial and Small System Water Use ⁴	Conveyance System Evaporation	Recharge Basin Evaporation	Total Demand ⁵ (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply ⁶ (acre-feet)	Net GSA Operational Deficit ⁷ (SUBTOTAL) (acre-feet)	Water Banking Adjustment ^{8, 9} (acre-feet)	Net Subbasin Operational Deficit ¹⁰ (acre-feet)		
60%	BN	2018	0	0	0	0	0	19	-8,844	0	0	-8,825	21,260	241,286	15,295	2,892	12,403	987	2,583	0	0	18,864	-8,825	2,892	3,189	21,609	0	21,609
177%	W	2019	0	0	0	0	0	19	-7,020	0	0	-7,001	22,654	241,286	18,733	5,086	13,647	968	2,517	0	0	22,218	-7,001	5,086	3,398	20,735	0	20,735
55%	D	2020	0	0	0	0	0	18	-8,079	0	0	-8,061	20,654	241,286	15,545	4,293	11,252	950	2,451	0	0	18,946	-8,061	4,293	3,098	19,616	0	19,616
22%	C	2021	0	0	0	0	0	18	-10,853	0	0	-10,835	21,555	241,286	17,092	2,818	14,274	950	2,451	0	0	20,493	-10,835	2,818	3,233	25,277	0	25,277
29%	C	2022	0	0	0	0	0	18	-9,847	0	0	-9,829	20,455	241,286	16,663	2,829	13,834	950	2,451	0	0	20,064	-9,829	2,829	3,068	23,996	0	23,996
320%	W	2023	0	0	0	0	0	18	0	0	0	18	21,551	241,286	22,369	6,842	15,526	950	2,451	0	0	25,770	18	6,842	3,233	15,676	0	15,676
Average (1995-2014)			0	0	0	0	0	19	-7,152	0	0	-7,133	17,765	241,286	19,866	4,326	15,540	1,037	2,904	0	0	23,807	-7,133	4,326	2,665	23,949	0	23,949
Average (2015-2023)			0	0	0	0	0	19	-9,202	0	0	-9,184	21,161	241,286	17,883	4,336	13,547	981	2,561	0	0	21,424	-9,184	4,336	3,174	23,098	0	23,098
Average (1995-2023)			0	0	0	0	0	19	-7,788	0	0	-7,769	18,819	241,286	19,250	4,329	14,921	1,020	2,798	0	0	23,067	-7,769	4,329	2,823	23,685	0	23,685
Wet (W, AN)			0	0	0	0	0	19	-2,255	0	0	-2,236	18,008	241,286	20,729	5,450	15,279	977	2,802	0	0	24,508	-2,236	5,450	2,701	18,593	0	18,593
Dry (D, BN)			0	0	0	0	0	19	-10,374	0	0	-10,355	19,320	241,286	18,580	3,917	14,663	1,062	2,802	0	0	22,444	-10,355	3,917	2,898	25,983	0	25,983
Critically Dry (C)			0	0	0	0	0	19	-14,739	0	0	-14,720	19,681	241,286	17,366	2,776	14,590	1,044	2,784	0	0	21,194	-14,720	2,776	2,952	30,187	0	30,187
Percent of Total			0%	0%	0%	0%	0%	0%	100%	0%	0%	100%	8%	100%		22%	78%	27%	73%			100%	-34%	19%	12%	103%	0%	103%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

Kern National Wildlife Refuge - GSA Operational Water Budget Summary

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows											Operational Water Usage								Operational Water Budget Calculation							
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)	Total Demand 5 (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply 6 (acre-feet)	Net GSA Operational Deficit 7 (SUBTOTAL) (acre-feet)	Water Banking Adjustment 8, 9 (acre-feet)	Net Subbasin Operational Deficit 10 (acre-feet)	
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumping	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area1	GSA Land Area	Crop Evapotranspiration 2 (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use 3	Domestic, Industrial and Small System Water Use 4	Conveyance System Evaporation								Recharge Basin Evaporation
190%	W	1995	12,097	0	0	0	0	0	0	0	0	0	12,097	6,287	6,012	20,854	2,270	18,584	0	0	0	0	20,854	12,097	2,270	943	5,544	0	5,544
136%	W	1996	12,776	0	0	0	0	0	0	0	0	0	12,776	6,287	6,012	19,816	665	19,151	0	0	0	0	19,816	12,776	665	943	5,432	0	5,432
175%	W	1997	7,964	0	0	0	0	0	0	0	0	0	7,964	6,287	6,012	18,501	1,037	17,464	0	0	0	0	18,501	7,964	1,037	943	8,557	0	8,557
237%	W	1998	12,268	0	0	0	0	0	0	0	0	0	12,268	6,287	6,012	22,647	1,014	21,633	0	0	0	0	22,647	12,268	1,014	943	8,422	0	8,422
70%	AN	1999	14,827	0	0	0	0	0	0	0	0	0	14,827	6,287	6,012	20,223	808	19,416	0	0	0	0	20,223	14,827	808	943	3,646	0	3,646
67%	AN	2000	7,489	0	0	0	0	0	0	0	0	0	7,489	5,733	6,012	21,498	517	20,982	0	0	0	0	21,498	7,489	517	860	12,633	0	12,633
53%	D	2001	13,179	0	0	0	0	0	0	0	0	0	13,179	5,733	6,012	21,881	481	21,399	0	0	0	0	21,881	13,179	481	860	7,360	0	7,360
51%	D	2002	19,299	0	0	0	0	0	0	0	0	0	19,299	5,733	6,012	20,240	212	20,028	0	0	0	0	20,240	19,299	212	860	-131	0	-131
83%	BN	2003	20,945	0	0	0	0	0	0	0	0	0	20,945	5,733	6,012	18,605	424	18,181	0	0	0	0	18,605	20,945	424	860	-3,624	0	-3,624
57%	D	2004	23,461	0	0	0	0	0	0	0	0	0	23,461	5,733	6,012	19,695	329	19,365	0	0	0	0	19,695	23,461	329	860	-4,956	0	-4,956
157%	W	2005	23,310	0	0	0	0	0	0	0	0	0	23,310	5,733	6,012	21,099	880	20,220	0	0	0	0	21,099	23,310	880	860	-3,950	0	-3,950
153%	W	2006	21,829	0	0	0	0	0	0	0	0	0	21,829	5,733	6,012	22,065	586	21,479	0	0	0	0	22,065	21,829	586	860	-1,210	0	-1,210
39%	C	2007	21,607	0	0	0	0	0	0	0	0	0	21,607	5,733	6,012	20,408	376	20,032	0	0	0	0	20,408	21,607	376	860	-2,434	0	-2,434
71%	C	2008	17,728	0	0	0	0	0	0	0	0	0	17,728	5,733	6,012	16,794	500	16,294	0	0	0	0	16,794	17,728	500	860	-2,294	0	-2,294
64%	BN	2009	19,494	0	0	0	0	0	0	0	0	0	19,494	5,733	6,012	17,674	328	17,346	0	0	0	0	17,674	19,494	328	860	-3,008	0	-3,008
113%	AN	2010	21,808	0	0	0	0	0	0	0	0	0	21,808	5,733	6,012	17,679	424	17,256	0	0	0	0	17,679	21,808	424	860	-5,412	0	-5,412
203%	W	2011	26,599	0	0	0	0	0	0	0	0	0	26,599	5,733	6,012	20,070	754	19,316	0	0	0	0	20,070	26,599	754	860	-8,143	0	-8,143
53%	D	2012	18,451	0	0	0	0	0	0	0	0	0	18,451	5,733	6,012	13,206	374	12,831	0	0	0	0	13,206	18,451	374	860	-6,480	0	-6,480
30%	C	2013	23,701	0	0	0	0	0	0	0	0	0	23,701	5,733	6,012	14,822	290	14,532	0	0	0	0	14,822	23,701	290	860	-10,029	0	-10,029
25%	C	2014	13,877	0	0	0	0	0	0	0	0	0	13,877	5,733	6,012	14,986	337	14,649	0	0	0	0	14,986	13,877	337	860	-88	0	-88
18%	C	2015	9,203	0	0	0	0	0	0	0	0	0	9,203	5,733	6,012	10,205	285	9,920	0	0	0	0	10,205	9,203	285	860	-143	0	-143
51%	D	2016	19,233	0	0	0	0	0	0	0	0	0	19,233	5,733	6,012	10,879	280	10,599	0	0	0	0	10,879	19,233	280	860	-9,494	0	-9,494
275%	W	2017	22,457	0	0	0	0	0	0	0	0	0	22,457	5,733	6,012	17,595	691	16,904	0	0	0	0	17,595	22,457	691	860	-6,412	0	-6,412

Kern River Percent of Average Natural Flow at First Point	San Joaquin Valley Water Year Index	Water Year	Managed Surface Water Inflows and Outflows										Operational Water Usage								Operational Water Budget Calculation								
			Managed Surface Water Inflows (acre-feet)							Managed Surface Water Outflows (acre-feet)			Net Inflow (acre-feet)	GSA Land Area (acre-feet)		Agricultural Usage (acre-feet)			Urban Water Use (acre-feet)		Water Surface Evaporati on (acre-feet)		Total Demand 5 (acre-feet)	Total Surface Water Supply (acre-feet)	Effective Precipitation (ETpr) (acre-feet)	Native Yield Supply 6 (acre-feet)	Net GSA Operational Deficit 7 (SUBTOTAL) (acre-feet)	Water Banking Adjustment 8, 9 (acre-feet)	Net Subbasin Operational Deficit 10 (acre-feet)
			DWR State Water Project (SWP)	USBR Central Valley Project (CVP)	Kern River	Cross Valley Canal Local Supply	Poso Creek	Transfers Into GSA	Recycled, Produced, Reclaimed , Other Water Inflows	Transfers Out of GSA	Aqueduct or Friant-Kern Canal Pumping	Water Export out of the Subbasin	Total Surface Water Supply	Developed Land Area1	GSA Land Area	Crop Evapotranspiration 2 (ETc)	Effective Precipitation (ETpr)	Applied Water Demand (ETaw)	Municipal & Industrial Water Use 3	Domestic, Industrial and Small System Water Use 4	Conveyance System Evaporation	Recharge Basin Evaporation							
60%	BN	2018	21,716	0	0	0	0	0	0	0	0	0	21,716	5,733	6,012	15,280	448	14,832	0	0	0	0	15,280	21,716	448	860	-7,744	0	-7,744
177%	W	2019	1,097	0	0	0	0	0	0	0	0	0	1,097	5,733	6,012	15,366	744	14,622	0	0	0	0	15,366	1,097	744	860	12,665	0	12,665
55%	D	2020	8,531	0	0	0	0	0	0	0	0	0	8,531	5,733	6,012	12,764	651	12,113	0	0	0	0	12,764	8,531	651	860	2,723	0	2,723
22%	C	2021	15,245	0	0	0	0	0	0	0	0	0	15,245	5,733	6,012	13,378	393	12,985	0	0	0	0	13,378	15,245	393	860	-3,120	0	-3,120
29%	C	2022	11,590	0	0	0	0	0	0	0	0	0	11,590	5,733	6,012	8,697	239	8,458	0	0	0	0	8,697	11,590	239	860	-3,993	0	-3,993
320%	W	2023	19,653	0	0	0	0	0	0	0	0	0	19,653	5,733	6,012	13,230	810	12,420	0	0	0	0	13,230	19,653	810	860	-8,093	0	-8,093
Average (1995-2014)			17,635	0	0	0	0	0	0	0	0	0	17,635	5,871	6,012	19,138	630	18,508	0	0	0	0	19,138	17,635	630	881	-8	0	-8
Average (2015-2023)			14,303	0	0	0	0	0	0	0	0	0	14,303	5,733	6,012	13,044	504	12,539	0	0	0	0	13,044	14,303	504	860	-2,623	0	-2,623
Average (1995-2023)			16,601	0	0	0	0	0	0	0	0	0	16,601	5,828	6,012	17,247	591	16,656	0	0	0	0	17,247	16,601	591	874	-820	0	-820
Wet (W, AN)			15,706	0	0	0	0	0	0	0	0	0	15,706	5,946	6,012	19,280	861	18,419	0	0	0	0	19,280	15,706	861	892	1,821	0	1,821
Dry (D, BN)			18,257	0	0	0	0	0	0	0	0	0	18,257	5,733	6,012	16,691	392	16,299	0	0	0	0	16,691	18,257	392	860	-2,817	0	-2,817
Critically Dry (C)			16,136	0	0	0	0	0	0	0	0	0	16,136	5,733	6,012	14,184	346	13,839	0	0	0	0	14,184	16,136	346	860	-3,157	0	-3,157
Percent of Total			100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	97%	100%		3%	97%	#DIV/0!	#DIV/0!			100%	96%	3%	5%	-5%	0%	-5%

¹ Developed Land Area includes Irrigated and Fallow Agriculture, Urban, and Recharge Basins

² ETc Demand developed as the average of raw METRIC ITRC and adjusted METRIC ITRC - adjusted to account for a low bias in the ITRC METRIC data compared to LandIQ ET data

³ Municipal and Industrial Water Supply is the total reported surface and groundwater supplied to major water purveyors

⁴ Domestic, Industrial and Small Water System Supply is an estimated water use based on population outside of major water purveyor servide areas plus estimated water use from reported industrial water systems

⁵ Total Demand = Crop Evapotranspiration + Urban Water Use + Water Surface Evaporation

⁶ Native Yield Supply applies a planning-level assumption of 0.15 feet of sustainable groundwater use per developed acre within GSA.

⁷ Net GSA Operational Deficit is a subtotal of the total water demands minus water supplies within the GSA used to estimate the GSA groundwater deficit for planning purposes.

⁸ Water Banking Adjustment provides an accounting for Banking Return Obligations stored in the GSA and the Stored Surface Water at water banks in the Subbasin outside of the GSA

⁹ The Water Bank Adjustment does not include surface water stored in the GSA for use by that GSA, which are considered conjunctive use projects and stored conjunctive usewater is already accounted for in the Total Water Supply.

¹⁰ Net Subbasin Operational Deficit is an estimate the Subbasin groundwater deficit that includes the adjustment of GSA water banking operations within the Subbasin.

H-4.3 WATER BANKING ACCOUNT BALANCE SUMMARY TABLES

Water Banking Account Balances for Return Obligations to Banking Partners Located Outside of the Kern Subbasin

Out of Subbasin Return Obligations	Arvin GSA	Buena Vista Water Storage District GSA	Cawelo Water District GSA	Eastside Water Management Area	Henry Miller Water District GSA	Berrenda Mesa Spreading Grounds	Kern River GSA	Kern Water Bank Groundwater Sustainability Agency	Kern-Tulare Water District GSA	North Kern Water Storage District GSA	Oicese Water District GSA	Pioneer GSA	Rosedale-Rio Bravo Water Storage District GSA	Semitropic Water Storage District GSA	Kern National Wildlife Refuge	Shafter-Wasco Irrigation District GSA	7th Standard	Southern San Joaquin Municipal Utility District	Tejon-Castac Water District GSA	West Kern Water District GSA	Westside District Water Authority GSA	Wheeler Ridge-Maricopa GSA	Kern Non-Districted Lands	Total
1994	0	0	0	0	0	0	0	0	0	0	0	0	1,374	95,541	0	0	0	0	0	0	0	0	0	96,915
1995	0	0	0	0	0	0	0	5,612	0	0	0	0	4,707	140,541	0	0	0	0	0	0	0	0	0	150,860
1996	0	0	0	0	0	0	0	18,925	0	0	0	894	4,707	272,121	0	0	0	0	0	0	0	0	0	296,647
1997	0	0	0	0	0	0	0	31,277	0	0	0	894	4,707	415,088	0	0	0	0	0	0	0	0	0	451,966
1998	18,280	0	0	0	0	0	0	43,672	0	0	0	894	4,707	480,833	0	0	0	0	0	0	0	0	0	548,386
1999	105,278	0	0	0	0	0	0	44,852	0	0	0	894	4,707	617,498	0	0	0	0	0	0	0	0	0	773,230
2000	208,900	0	0	0	0	0	0	47,136	0	0	0	7,894	4,707	674,998	0	0	0	0	0	0	0	0	0	943,635
2001	242,053	0	0	0	0	0	0	44,005	0	0	0	7,894	3,855	616,191	0	0	0	0	0	0	0	0	0	913,998
2002	226,253	0	0	0	0	0	0	43,274	0	0	0	894	0	655,504	0	0	0	0	0	0	0	0	0	925,925
2003	244,893	0	2,600	0	0	0	17,919	43,216	0	0	0	894	0	761,820	0	0	0	0	0	0	0	0	0	1,071,342
2004	232,226	0	4,754	0	0	0	17,919	39,767	0	0	0	894	802	705,088	0	0	0	0	0	0	0	0	0	1,001,450
2005	207,054	0	5,354	0	0	0	31,782	58,333	0	12,000	0	894	80,239	880,843	0	0	0	0	0	0	0	0	0	1,276,499
2006	209,933	0	10,954	0	0	0	36,290	70,626	0	29,310	0	894	135,692	971,834	0	0	0	0	0	0	0	0	0	1,465,533
2007	206,034	0	11,554	0	0	0	31,290	67,415	0	40,454	0	0	135,343	828,659	0	0	0	0	0	0	0	0	0	1,320,749
2008	163,419	0	13,172	0	0	0	22,888	46,822	0	34,119	0	0	127,093	694,106	0	0	0	0	0	0	0	0	0	1,101,619
2009	120,339	0	13,772	0	0	0	9,872	29,244	0	41,064	0	0	118,679	586,412	0	0	0	0	0	0	0	0	0	919,381
2010	94,682	0	19,372	0	0	0	80,141	15,238	0	58,389	0	0	174,552	710,249	0	0	0	0	0	0	0	0	0	1,152,622
2011	104,433	0	24,972	0	0	0	160,365	54,262	0	66,270	0	0	257,730	940,013	0	0	0	0	0	5,875	0	0	0	1,613,919
2012	214,489	0	35,727	0	0	0	204,943	50,326	0	53,439	0	0	245,162	977,109	0	0	0	0	0	4,875	0	0	0	1,786,069
2013	198,410	0	35,453	0	0	0	193,443	44,620	0	44,945	0	0	219,839	866,555	0	0	0	0	0	2,500	0	0	0	1,605,764
2014	181,396	0	27,280	0	0	0	167,352	27,476	0	37,714	0	0	191,344	759,439	0	0	0	0	0	500	0	0	0	1,392,500
2015	144,128	0	20,851	0	0	0	135,376	19,376	0	34,123	0	0	167,866	625,129	0	0	0	0	0	500	0	0	0	1,147,348
2016	108,013	0	24,951	0	0	0	115,533	19,235	0	34,123	0	0	165,225	643,896	0	0	0	0	0	500	0	0	0	1,111,475
2017	122,678	0	29,551	0	0	0	157,538	56,023	0	36,819	0	0	262,865	854,313	0	0	0	0	0	500	0	0	0	1,520,287

Water Banking Account Balances for Return Obligations to Banking Partners Located Within the Kern Subbasin

Within Subbasin Return Obligations	Arvin GSA	Buena Vista Water Storage District GSA	Cawelo Water District GSA	Eastside Water Management Area	Henry Miller Water District GSA	Berrenda Mesa Spreading Grounds	Kern River GSA	Kern Water Bank Groundwater Sustainability Agency	Kern-Tulare Water District GSA	North Kern Water Storage District GSA	Olcese Water District GSA	Pioneer GSA	Rosedale-Rio Bravo Water Storage District GSA	Semitropic Water Storage District GSA	Kern National Wildlife Refuge	Shafter-Wasco Irrigation District GSA	7th Standard District	Southern San Joaquin Municipal Utility District	Tejon-Castac Water District GSA	West Kern Water District GSA	Westside District Water Authority GSA	Wheeler Ridge-Maricopa GSA	Kern Non-Districted Lands	Total
1994	0	0	0	0	0	20,619	0	0	0	29,483	0	185,947	6,666	0	0	0	0	0	0	0	0	0	0	242,715
1995	0	0	0	0	0	46,527	0	254,299	0	46,852	0	343,319	23,010	2,153	0	0	0	0	0	0	0	0	0	716,160
1996	0	0	0	0	0	49,271	0	376,241	0	38,687	0	388,238	57,541	6,857	0	0	0	0	0	0	0	0	0	916,835
1997	0	0	0	0	0	55,196	0	507,644	0	43,660	0	418,184	75,926	8,759	0	0	0	0	0	0	0	0	0	1,109,369
1998	0	0	0	0	0	73,558	0	770,913	0	43,466	0	511,386	70,796	8,877	0	0	0	0	0	0	0	0	0	1,478,996
1999	0	0	0	0	0	75,336	0	801,935	0	102,797	0	526,464	44,230	9,351	0	0	0	0	0	0	0	0	0	1,560,113
2000	0	0	0	0	0	75,459	0	830,146	0	105,187	0	817,565	71,416	9,351	0	0	0	0	0	0	0	0	0	1,909,124
2001	0	0	0	0	0	72,559	0	739,009	0	89,441	0	490,563	70,681	9,351	0	0	0	0	0	0	0	0	0	1,471,604
2002	0	0	0	0	0	73,101	0	692,397	0	62,995	0	490,520	52,491	17,304	0	0	0	0	0	0	0	0	0	1,388,808
2003	0	0	0	0	0	72,081	0	709,107	0	49,976	0	519,504	51,270	17,057	0	0	0	0	0	0	0	0	0	1,418,995
2004	0	0	0	0	0	75,758	0	696,623	0	35,986	0	527,861	66,665	14,773	0	0	0	0	0	0	0	0	0	1,417,666
2005	0	0	0	0	0	105,046	0	1,011,195	0	64,322	0	759,968	119,774	14,773	0	0	0	0	0	0	0	0	0	2,075,078
2006	0	0	0	0	0	128,527	0	1,241,747	0	138,304	0	859,964	122,177	14,773	0	0	0	0	0	0	0	0	0	2,505,492
2007	0	0	0	0	0	108,641	0	1,030,510	0	129,578	0	796,771	107,745	9,873	0	0	0	0	0	0	0	0	0	2,183,118
2008	0	0	0	0	0	72,003	0	813,571	0	109,547	0	706,152	98,574	9,873	0	0	0	0	0	0	0	0	0	1,809,720
2009	0	0	0	0	0	44,205	0	676,761	0	85,050	0	630,306	95,498	9,873	0	0	0	0	0	0	0	0	0	1,541,693
2010	0	0	0	0	0	39,020	0	667,119	0	79,660	0	625,844	114,036	13,473	0	0	0	0	0	0	0	0	0	1,539,152
2011	0	0	0	0	0	72,632	0	1,030,546	0	77,601	0	781,875	152,342	17,973	0	0	0	0	0	0	0	0	0	2,132,969
2012	0	0	0	0	0	72,018	0	942,724	0	71,164	0	804,545	164,121	13,557	0	0	0	0	0	6,316	0	0	0	2,074,445
2013	0	0	0	0	0	69,239	0	761,697	0	70,551	0	754,192	173,721	13,557	0	0	0	0	0	3,316	0	0	0	1,846,273
2014	0	0	0	0	0	45,356	0	598,164	0	61,206	0	668,478	157,721	13,557	0	0	0	0	0	1,870	0	0	0	1,546,351
2015	0	0	0	0	0	29,245	0	469,907	0	60,140	0	612,008	144,636	13,557	0	0	0	0	0	0	0	0	0	1,329,492

Water Banking Account Balances for Return Obligations to Other Banking Partners

OtherReturn Obligations	Arvin GSA	Buena Vista Water Storage District GSA	Cawelo Water District GSA	Eastside Water Management Area	Henry Miller Water District GSA	Berrenda Mesa Spreading Grounds	Kern River GSA	Kern Water Bank Groundwater Sustainability Agency	Kern-Tulare Water District GSA	North Kern Water Storage District GSA	Olcese Water District GSA	Pioneer GSA	Rosedale-Rio Bravo Water Storage District GSA	Semitropic Water Storage District GSA	Kern National Wildlife Refuge	Shafter-Wasco Irrigation District GSA	7th Standard District	Southern San Joaquin Municipal Utility District	Tejon-Castac Water District GSA	West Kern Water District GSA	Westside District Water Authority GSA	Wheeler Ridge-Maricopa GSA	Kern Non-Districted Lands	Total
1994	0	0	0	0	0	16,089	0	0	0	34,861	0	47,542	0	0	0	0	0	0	0	0	0	0	0	98,492
1995	0	0	0	0	0	22,405	0	647	0	34,682	0	67,838	0	0	0	0	0	0	0	0	0	0	0	125,572
1996	0	0	0	0	0	28,527	0	17,632	0	37,623	0	104,894	0	0	0	0	0	0	0	0	0	0	0	188,676
1997	0	0	0	0	0	28,527	0	17,632	0	37,607	0	110,469	0	0	0	0	0	0	0	0	0	0	0	194,235
1998	0	0	0	0	0	14,662	0	17,632	0	37,563	0	130,391	0	0	0	0	0	0	0	0	0	0	0	200,248
1999	0	0	0	0	0	14,662	0	17,958	0	34,363	0	140,080	0	0	0	0	0	0	0	0	0	0	0	207,063
2000	0	0	0	0	0	14,662	0	17,958	0	34,363	0	147,145	0	0	0	0	0	0	0	0	0	0	0	214,128
2001	0	0	0	0	0	14,662	0	17,958	0	37,709	0	181,476	0	0	0	0	0	0	0	0	0	0	0	251,805
2002	0	0	0	0	0	14,662	0	17,958	0	37,709	0	171,416	0	0	0	0	0	0	0	0	0	0	0	241,745
2003	0	0	0	0	0	14,662	0	17,958	0	39,604	0	171,476	0	0	0	0	0	0	0	0	0	0	0	243,700
2004	0	0	0	0	0	14,662	0	30,511	0	38,918	0	165,929	0	0	0	0	0	0	0	0	0	0	0	250,020
2005	0	0	0	0	0	14,662	0	30,511	0	40,233	0	171,575	0	0	0	0	0	0	0	0	0	0	0	256,981
2006	0	0	0	0	0	14,662	0	30,511	0	52,632	0	176,595	1,421	4,500	0	0	0	0	0	0	0	0	0	280,321
2007	0	0	0	0	0	14,662	0	30,511	0	64,048	0	155,640	1,421	7,515	0	0	0	0	0	0	0	0	0	273,797
2008	0	0	0	0	0	14,662	0	30,511	0	46,034	0	149,090	1,421	8,235	0	0	0	0	0	0	0	0	0	249,953
2009	0	0	0	0	0	14,662	0	30,511	0	44,307	0	147,481	1,421	7,678	0	0	0	0	0	0	0	0	0	246,060
2010	0	0	0	0	0	14,662	0	30,511	0	33,324	0	162,820	5,690	8,878	0	0	0	0	0	0	0	0	0	255,885
2011	0	0	0	0	0	14,662	0	30,511	0	45,427	0	170,341	14,855	17,341	0	0	0	0	0	0	0	0	0	293,137
2012	0	0	0	0	0	14,662	0	30,511	0	46,951	0	169,291	16,527	27,082	0	0	0	0	0	0	0	0	0	305,024
2013	0	0	0	0	0	14,662	0	30,511	0	35,919	0	157,096	13,053	25,731	0	0	0	0	0	0	0	0	0	276,972
2014	0	0	0	0	0	14,662	0	30,511	0	35,919	0	153,293	7,408	18,894	0	0	0	0	0	0	0	0	0	260,687
2015	0	0	0	0	0	14,662	0	30,511	0	29,292	0	148,630	5,031	12,472	0	0	0	0	0	0	0	0	0	240,598

	Total	Kern Non-Districted Lands	Wheeler Ridge-Maricopa GSA	Westside District Water Authority GSA	West Kern Water District GSA	Tejon-Castac Water District GSA	Southern San Joaquin Municipal Utility District	7th Standard	Shafter-Wasco Irrigation District GSA	Kern National Wildlife Refuge	Semitropic Water Storage District GSA	Rosedale-Rio Bravo Water Storage District GSA	Pioneer GSA	Olcese Water District GSA	North Kern Water Storage District GSA	Kern-Tulare Water District GSA	Kern Water Bank Groundwater Sustainability Agency	Kern River GSA	Berrenda Mesa Spreading Grounds	Henry Miller Water District GSA	Eastside Water Management Area	Cawelo Water District GSA	Buena Vista Water Storage District GSA	Arvin GSA	OtherReturn Obligations
2016	208,309	0	0	0	0	0	0	0	0	0	3,641	5,031	136,335	0	29,292	0	30,511	0	3,499	0	0	0	0	0	
2017	325,537	0	0	0	0	0	0	0	2,671	0	22,233	14,582	217,724	0	34,317	0	30,511	0	3,499	0	0	0	0	0	
2018	338,203	0	0	0	0	0	0	0	3,521	0	23,017	14,875	221,492	0	41,288	0	30,511	0	3,499	0	0	0	0	0	
2019	357,874	0	0	0	0	0	0	0	4,644	0	28,803	21,253	223,163	0	46,001	0	30,511	0	3,499	0	0	0	0	0	
2020	339,992	0	0	0	0	0	0	0	301	0	25,365	16,229	218,086	0	46,001	0	30,511	0	3,499	0	0	0	0	0	
2021	317,081	0	0	0	0	0	0	0	301	0	19,479	7,612	212,570	0	43,109	0	30,511	0	3,499	0	0	0	0	0	
2022	298,850	0	0	0	0	0	0	0	0	0	12,804	3,149	207,108	0	41,779	0	30,511	0	3,499	0	0	0	0	0	
2023	318,168	0	0	0	0	0	0	0	1,965	0	14,100	20,361	206,276	0	41,456	0	30,511	0	3,499	0	0	0	0	0	
Ending Balance	318,168	0	0	0	0	0	0	0	1,965	0	14,100	20,361	206,276	0	41,456	0	30,511	0	3,499	0	0	0	0	0	
1994 Initial Account Balance	98,492	0	0	0	0	0	0	0	0	0	0	0	47,542	0	34,861	0	0	0	16,089	0	0	0	0	0	
1995-2014 Account Balance Chang	162,195	0	0	0	0	0	0	0	0	0	18,894	7,408	105,751	0	1,058	0	30,511	0	-1,427	0	0	0	0	0	
2015-2023 Account Balance Chang	57,481	0	0	0	0	0	0	0	1,965	0	-4,794	12,953	52,983	0	5,537	0	0	0	-11,163	0	0	0	0	0	

Water Banking Account Balances for GSAs with Stored Water Account Balances at Kern Subbasin Water Banks

Stored Water Account Balances in Subbasin Water Banks	Arvin GSA	Buena Vista Water Storage District GSA	Cawelo Water District GSA	Eastside Water Management Area	Henry Miller Water District GSA	Berrenda Mesa Spreading Grounds	Kern River GSA	Kern Water Bank Groundwater Sustainability Agency	Kern-Tulare Water District GSA	North Kern Water Storage District GSA	Olcese Water District GSA	Pioneer GSA	Rosedale-Rio Bravo Water Storage District GSA	Semitropic Water Storage District GSA	Kern National Wildlife Refuge	Shafter-Wasco Irrigation District GSA	7th Standard	Southern San Joaquin Municipal Utility District	Tejon-Castac Water District GSA	West Kern Water District GSA	Westside District Water Authority GSA	Wheeler Ridge-Maricopa GSA	Kern Non-Districted Lands	Total
1994	0	4,649	13,321	0	6,666	0	46,532	0	0	0	0	0	0	25,253	0	15,974	0	0	66	0	62,070	68,184	0	242,715
1995	13,010	11,732	16,371	0	15,273	0	138,108	0	0	0	0	0	7,426	31,342	0	28,000	0	10,868	3,107	0	304,744	136,179	0	716,160
1996	47,541	7,277	18,251	0	11,860	0	206,204	0	0	0	0	0	22,011	50,541	0	29,578	0	10,868	8,130	0	351,805	152,769	0	916,835
1997	65,926	11,015	18,251	0	24,788	0	216,522	0	0	0	0	0	16,219	86,580	0	40,029	0	10,868	10,294	0	436,093	172,784	0	1,109,369
1998	60,796	19,182	18,251	0	35,133	0	266,846	0	0	0	0	0	28,374	101,319	0	40,147	0	10,868	15,525	0	634,301	248,254	0	1,478,996
1999	34,230	19,182	23,542	0	37,232	0	322,785	0	0	0	0	0	28,374	118,524	0	40,621	0	10,868	15,849	0	651,730	257,176	0	1,560,113
2000	61,416	19,182	23,237	0	37,548	0	577,154	0	0	0	0	0	50,315	108,515	0	40,621	0	10,868	17,337	0	681,289	281,642	0	1,909,124
2001	59,898	19,199	8,130	0	39,326	0	286,878	0	782	0	0	0	52,248	80,704	0	39,548	0	10,868	18,017	0	606,886	249,119	0	1,471,604
2002	51,708	17,065	8,130	0	29,574	0	255,299	0	782	0	0	0	54,077	78,402	0	36,492	0	10,868	21,089	0	563,203	262,118	0	1,388,808
2003	50,488	14,284	8,451	0	29,857	0	257,797	0	782	0	0	0	62,796	91,366	0	36,245	0	10,868	21,030	0	563,105	271,926	0	1,418,995
2004	32,550	14,284	8,451	0	33,146	0	263,123	0	782	0	0	0	171,926	46,495	0	34,461	0	0	21,510	33,333	579,260	278,345	0	1,517,666
2005	71,630	36,643	8,451	0	42,863	0	308,680	0	32,811	0	0	0	268,055	150,067	0	34,461	0	0	25,003	33,333	785,001	378,080	0	2,175,078
2006	71,213	37,527	10,987	0	47,022	0	406,381	0	35,631	0	0	0	286,149	171,546	0	34,427	0	0	29,741	54,833	981,351	438,684	0	2,605,492
2007	64,162	37,527	10,161	0	48,307	0	391,559	0	25,776	0	0	0	290,371	140,975	0	27,436	0	0	31,344	54,833	798,800	361,867	0	2,283,118
2008	54,991	37,527	9,246	0	49,338	0	350,126	0	25,776	0	0	0	296,194	78,924	0	25,236	0	0	31,344	54,833	621,045	275,140	0	1,909,720
2009	53,005	37,527	8,526	0	52,874	0	327,401	0	28,013	0	0	0	299,511	69,704	0	24,243	0	0	31,292	37,866	473,251	198,480	0	1,641,693
2010	53,005	41,127	10,046	0	52,874	0	338,478	0	41,702	0	0	0	299,511	90,380	0	24,243	0	0	31,533	27,715	444,389	184,149	0	1,639,152
2011	81,669	70,376	10,977	0	53,680	0	370,963	0	45,943	0	0	0	314,957	224,971	0	24,961	0	0	38,943	27,715	680,548	287,266	0	2,232,969
2012	94,006	65,376	10,796	0	62,497	0	407,153	0	51,236	0	0	0	316,863	175,472	0	20,004	0	0	38,943	26,715	634,681	270,703	0	2,174,445
2013	84,006	65,376	9,103	0	61,499	0	370,568	0	39,836	0	0	0	342,321	144,313	0	17,964	0	0	38,943	26,715	529,303	216,326	0	1,946,273
2014	74,006	65,376	9,103	0	64,366	0	336,624	0	28,473	0	0	0	345,004	122,218	0	14,049	0	0	35,927	26,715	373,159	151,332	0	1,646,351
2015	67,143	56,490	652	0	59,367	0	316,623	0	17,936	0	0	0	345,123	128,845	0	10,881	0	0	35,927	26,715	264,211	99,580	0	1,429,492

	Arvin GSA	Buena Vista Water Storage District GSA	Cawelo Water District GSA	Eastside Water Management Area	Henry Miller Water District GSA	Berrenda Mesa Spreading Grounds	Kern River GSA	Kern Water Bank Groundwater Sustainability Agency	Kern-Tulare Water District GSA	North Kern Water Storage District GSA	Olcese Water District GSA	Pioneer GSA	Rosedale-Rio Bravo Water Storage District GSA	Semitropic Water Storage District GSA	Kern National Wildlife Refuge	Shafter-Wasco Irrigation District GSA	7th Standard	Southern San Joaquin Municipal Utility District	Tejon-Castac Water District GSA	West Kern Water District GSA	Westside District Water Authority GSA	Wheeler Ridge-Maricopa GSA	Kern Non-Districted Lands	Total
2016	57,640	53,390	652	0	59,367	0	308,955	0	11,952	0	0	0	345,173	110,050	0	12,036	0	0	33,412	21,107	225,607	99,251	0	1,338,591
2017	63,097	87,251	652	0	75,182	0	386,840	0	28,074	0	0	0	390,654	190,209	0	25,553	0	0	47,578	9,758	562,945	240,766	0	2,108,559
2018	57,527	87,251	652	0	58,182	0	379,897	0	44,618	0	0	0	393,336	201,661	0	40,674	0	6,532	52,822	6,237	552,241	214,444	0	2,096,074
2019	74,461	107,462	652	0	63,573	0	390,750	0	68,426	0	0	0	370,869	310,260	0	60,070	0	27,022	60,554	5,375	797,258	266,021	0	2,602,753
2020	64,461	101,058	0	0	70,442	0	383,783	0	59,781	0	0	0	380,929	284,058	0	63,501	0	23,992	61,108	5,375	734,753	223,175	0	2,456,416
2021	54,461	100,959	0	0	70,574	0	349,336	0	49,263	0	0	0	380,176	263,701	0	61,951	0	23,379	56,240	5,375	568,932	156,785	0	2,141,132
2022	44,707	96,597	0	0	74,928	0	325,979	0	39,546	0	0	0	367,065	245,855	0	42,908	0	27,495	52,639	5,375	434,090	104,846	0	1,862,030
2023	53,971	256,263	0	0	138,962	0	435,257	0	47,750	0	0	0	444,189	303,087	0	56,844	0	32,986	65,432	5,375	810,533	288,161	0	2,938,809
Ending Balance	53,971	256,263	0	0	138,962	0	435,257	0	47,750	0	0	0	444,189	303,087	0	56,844	0	32,986	65,432	5,375	810,533	288,161	0	2,938,809
1994 Initial Account Balance	0	4,649	13,321	0	6,666	0	46,532	0	0	0	0	0	0	25,253	0	15,974	0	0	66	0	62,070	68,184	0	242,715
1995-2014 Account Balance Chan	74,006	60,727	-4,218	0	57,700	0	290,092	0	28,473	0	0	0	345,004	96,965	0	-1,925	0	0	35,861	26,715	311,089	83,148	0	1,403,636
2015-2023 Account Balance Chan	-20,035	190,887	-9,103	0	74,596	0	98,633	0	19,277	0	0	0	99,185	180,869	0	42,795	0	32,986	29,505	-21,340	437,374	136,829	0	1,292,458