

Appendix B. Keswick Reservoir Model Results and Model Performance Statistics (Years 2000-2019)

Appendix B includes graphical and tabular results comparing simulated versus measured data, as well as tabulated model performance statistics for the Keswick Reservoir model. Specifically, a) Keswick Reservoir stage, b) Keswick Reservoir outflow, c) Keswick Reservoir temperature profiles, and d) Keswick Reservoir outflow temperature. The last section presents summary statistics of Keswick Reservoir elevation (stage), outflow, and outflow temperature for the period from May to October.

B.1. Reservoir Elevation (Stage)

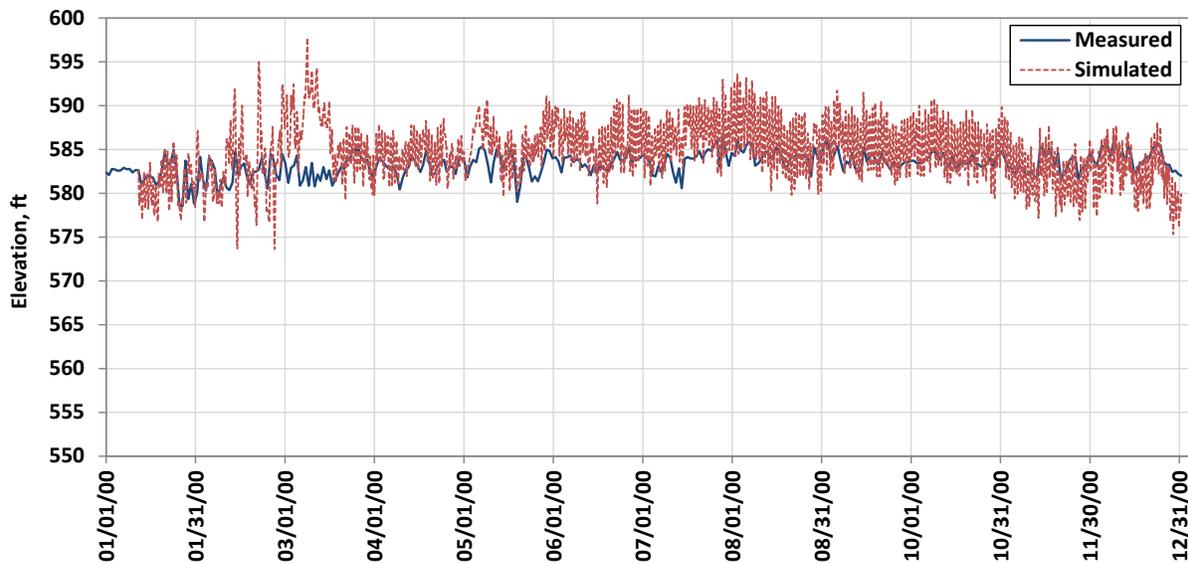


Figure B - 1. Keswick Reservoir simulated versus measured stage: 2000.

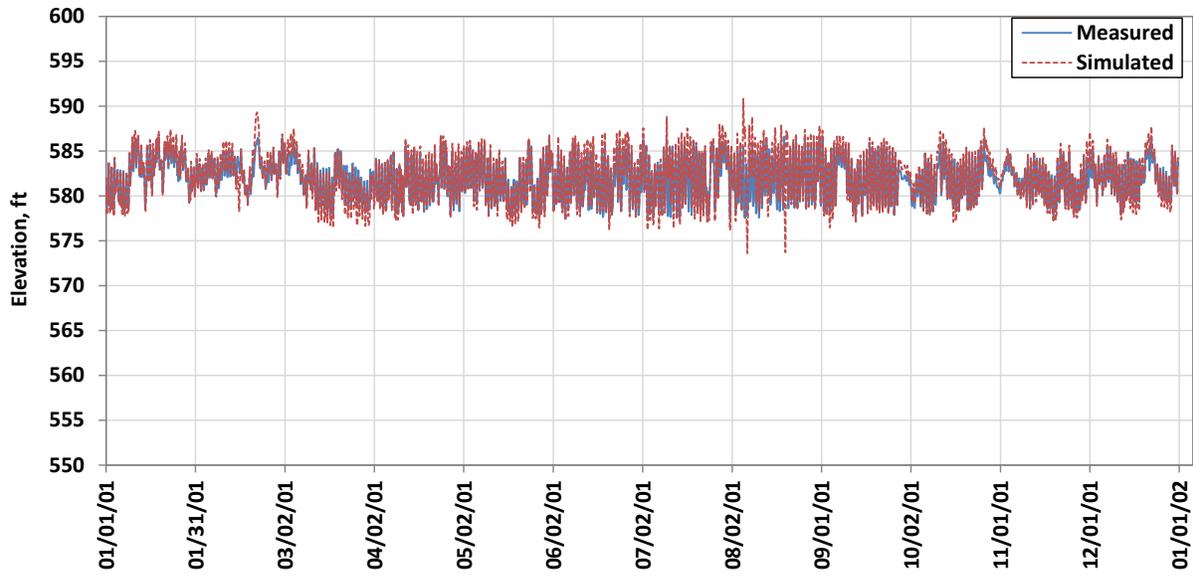


Figure B - 2. Keswick Reservoir simulated versus measured stage: 2001.

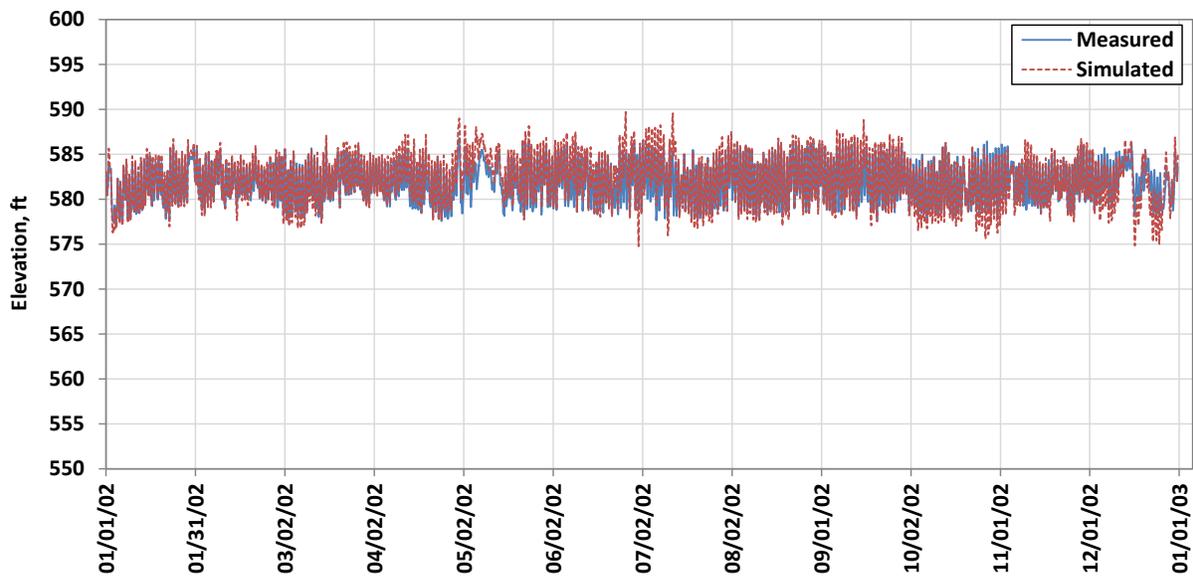


Figure B - 3. Keswick Reservoir simulated versus measured stage: 2002.

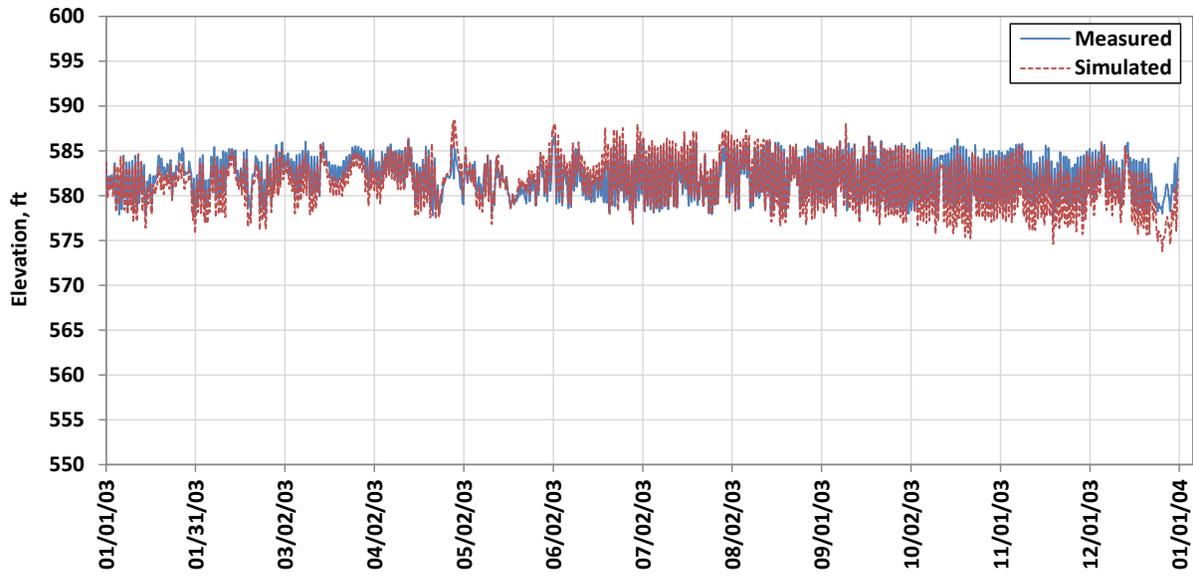


Figure B - 4. Keswick Reservoir simulated versus measured stage: 2003.

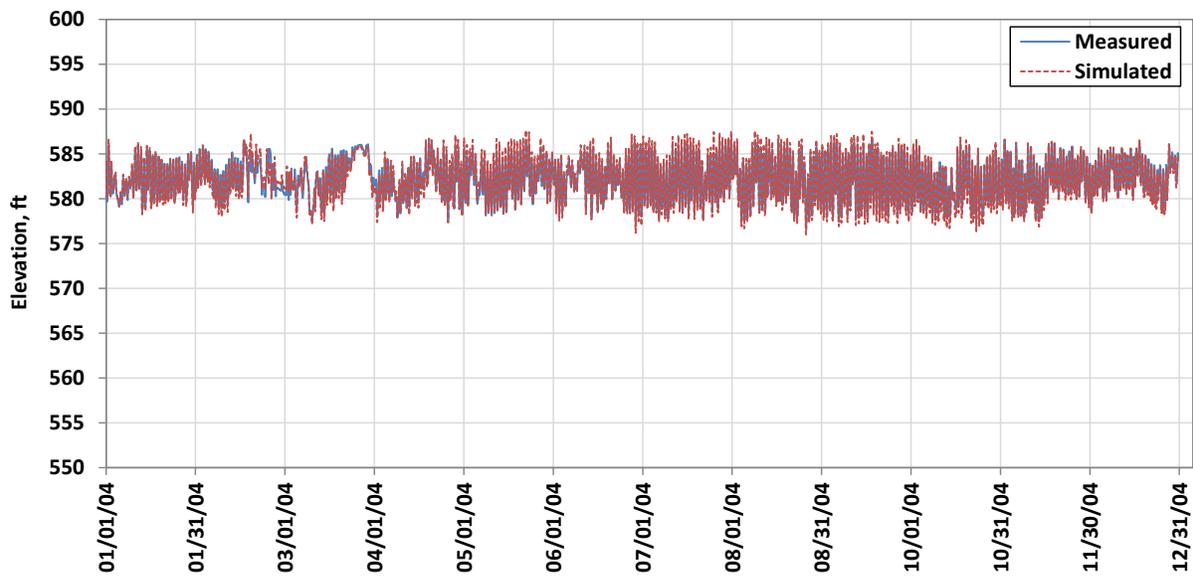


Figure B - 5. Keswick Reservoir simulated versus measured stage: 2004.

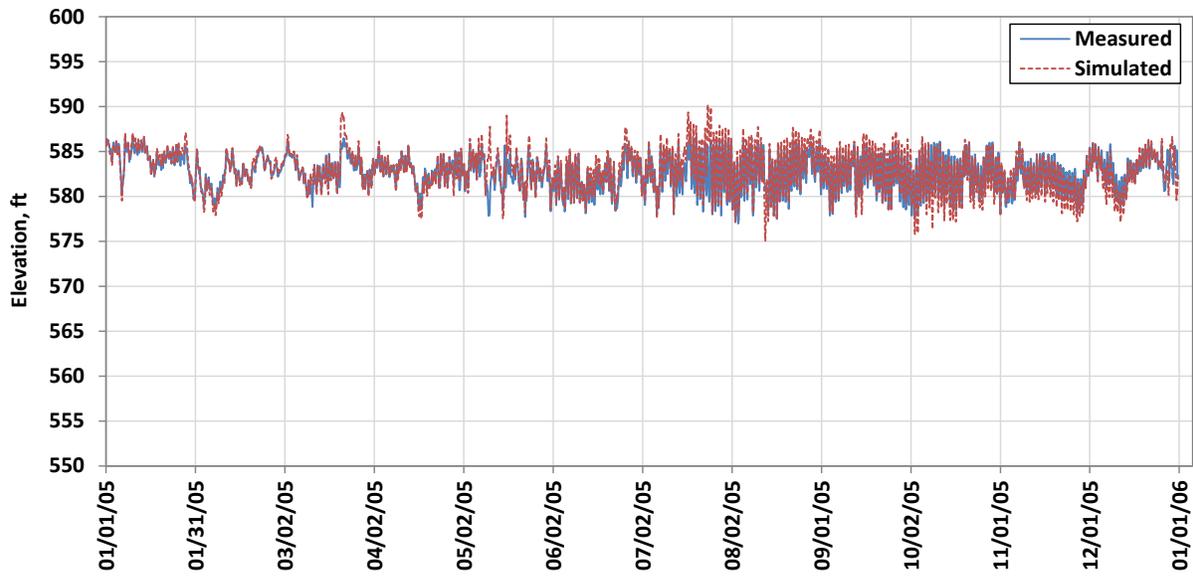


Figure B - 6. Keswick Reservoir simulated versus measured stage: 2005.

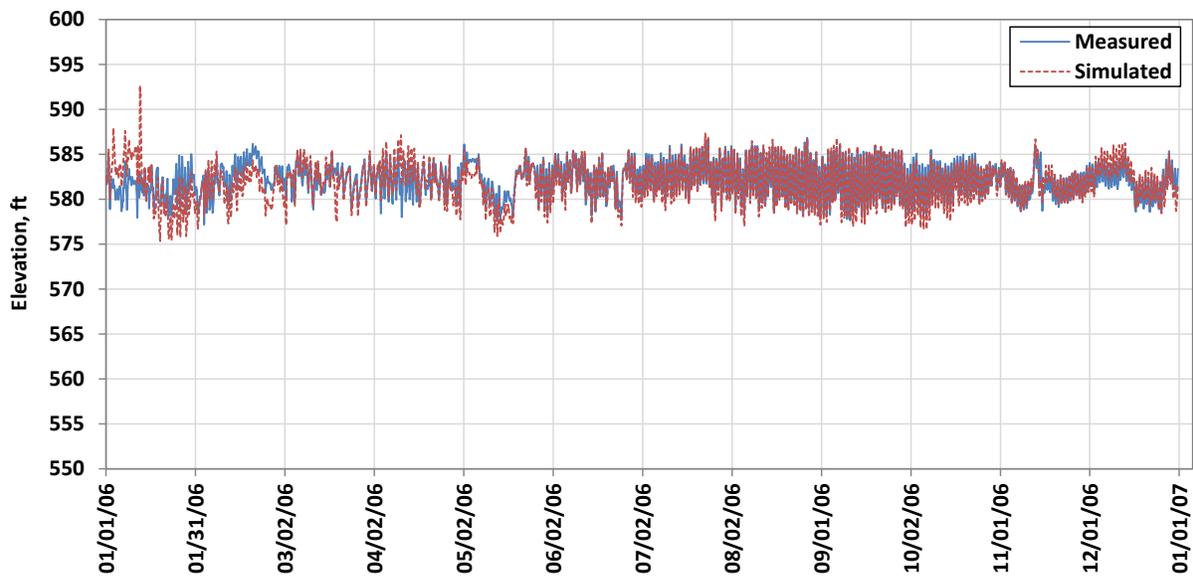


Figure B - 7. Keswick Reservoir simulated versus measured stage: 2006.

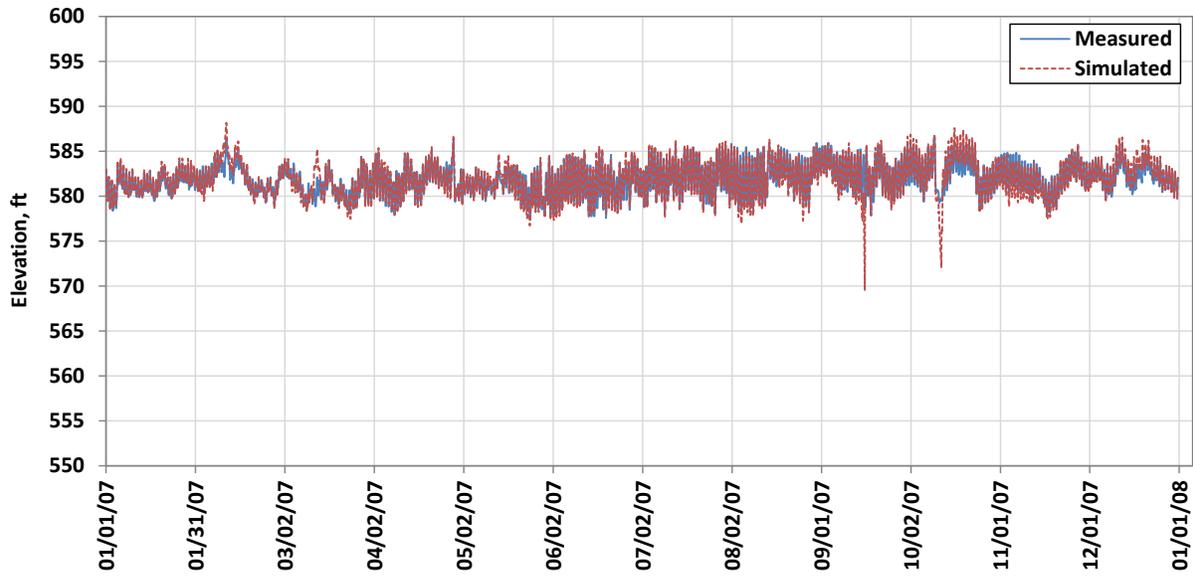


Figure B - 8. Keswick Reservoir simulated versus measured stage: 2007.

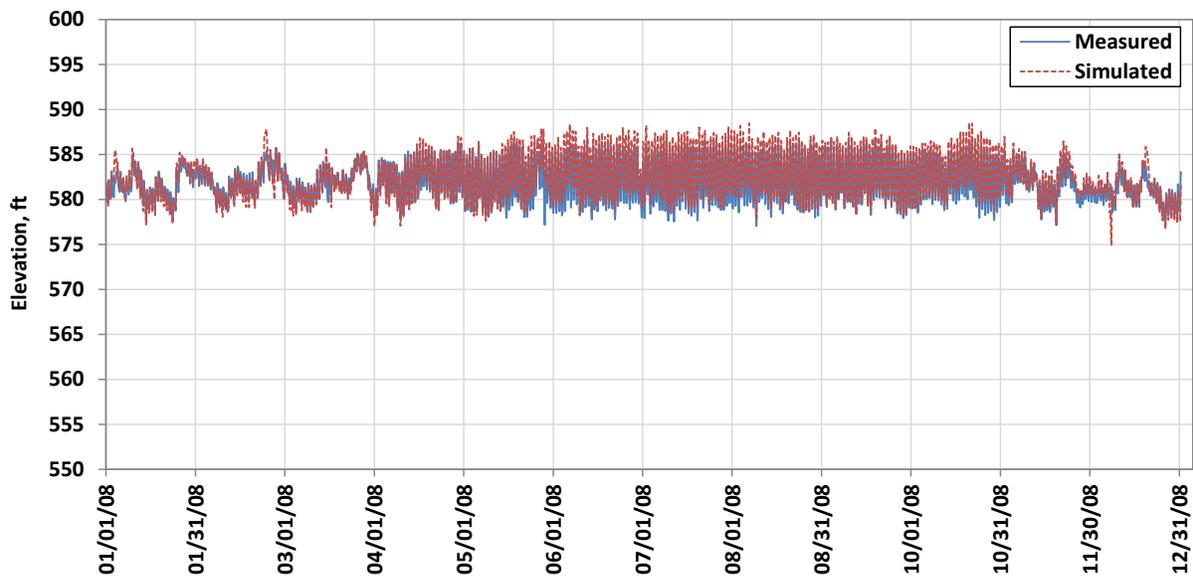


Figure B - 9. Keswick Reservoir simulated versus measured stage: 2008.

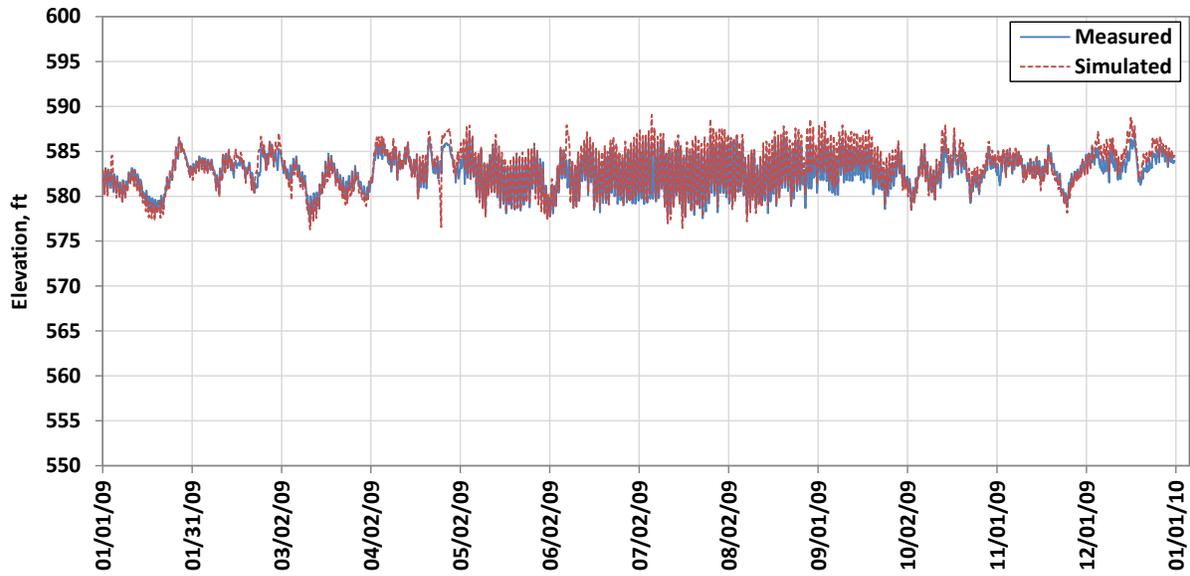


Figure B - 10. Keswick Reservoir simulated versus measured stage: 2009.

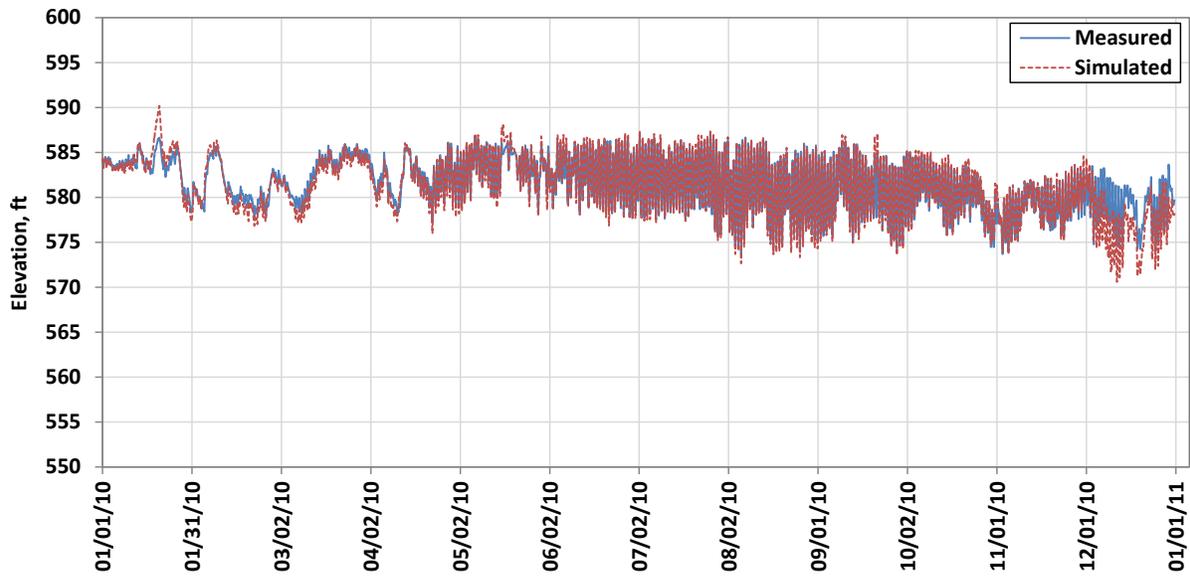


Figure B - 11. Keswick Reservoir simulated versus measured stage: 2010.

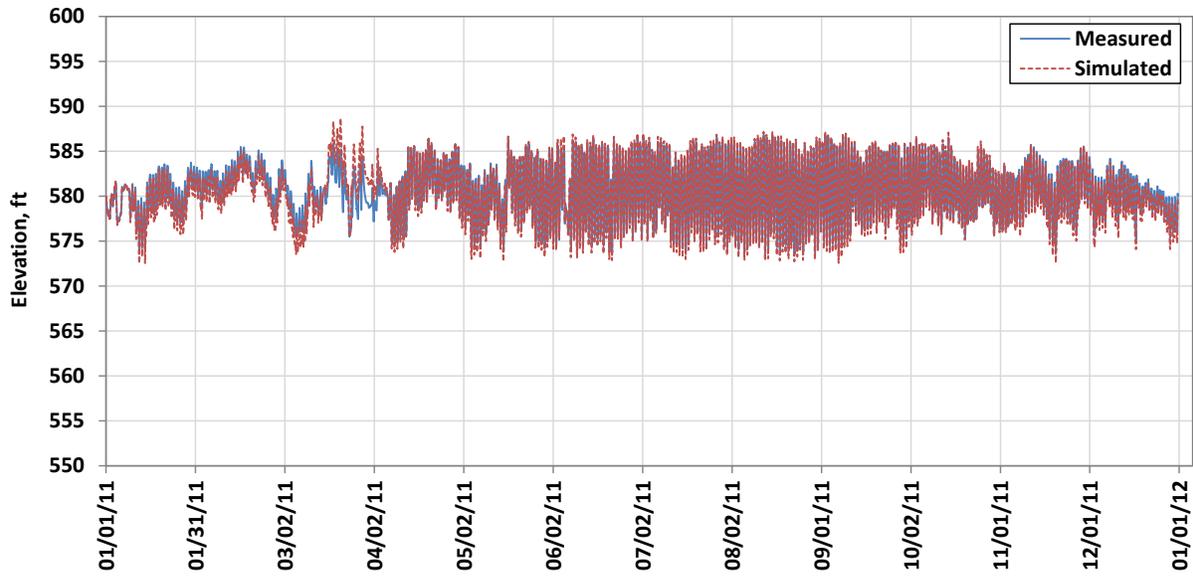


Figure B - 12. Keswick Reservoir simulated versus measured stage: 2011.

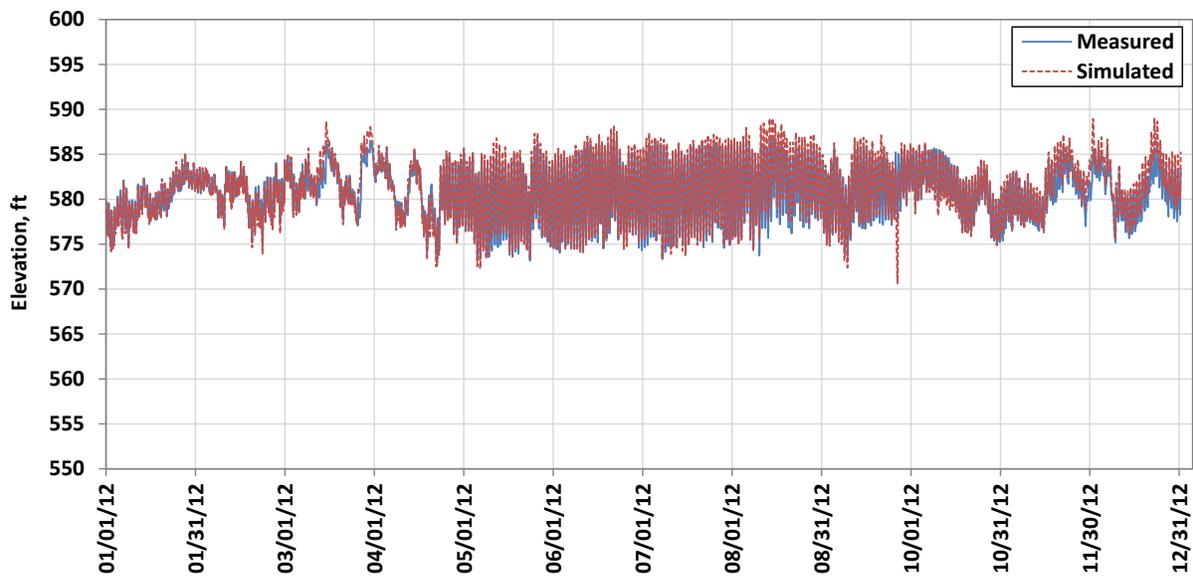


Figure B - 13. Keswick Reservoir simulated versus measured stage: 2012.

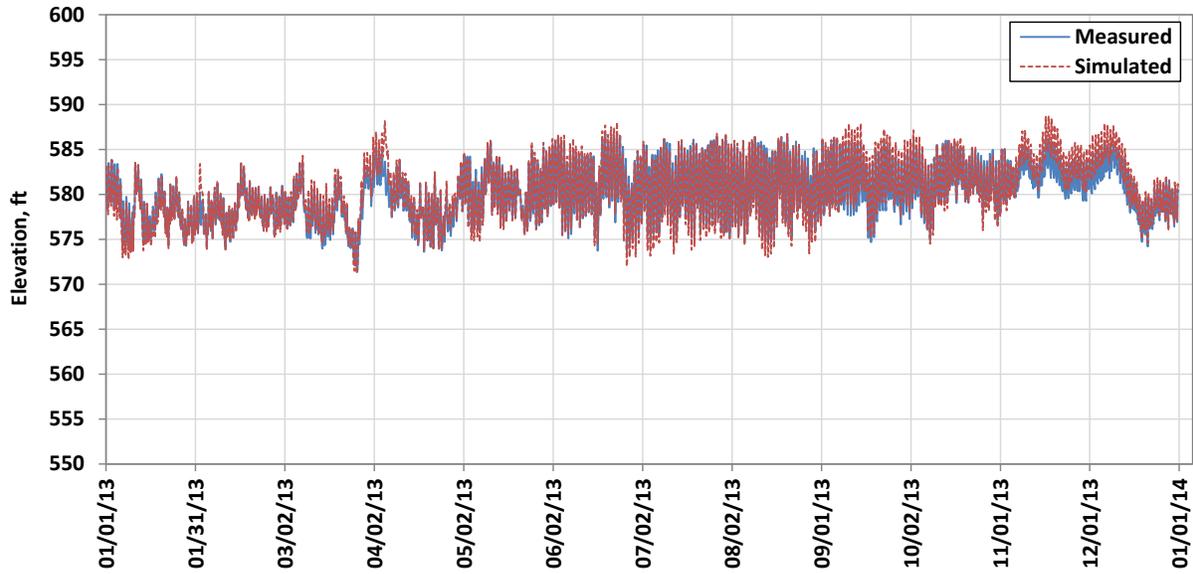


Figure B - 14. Keswick Reservoir simulated versus measured stage: 2013.

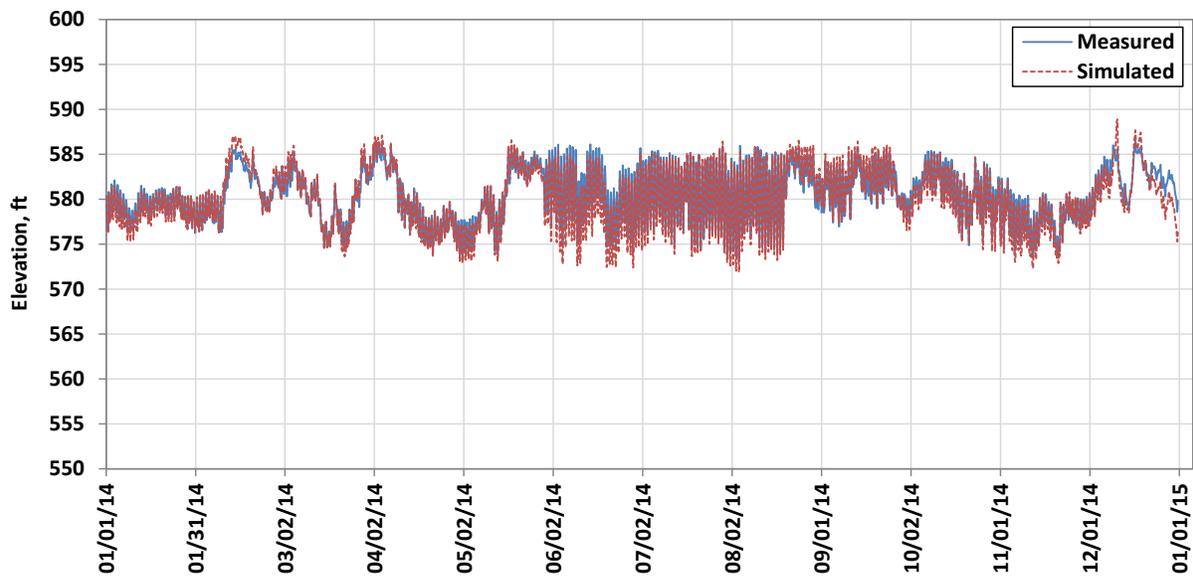


Figure B - 15. Keswick Reservoir simulated versus measured stage: 2014.

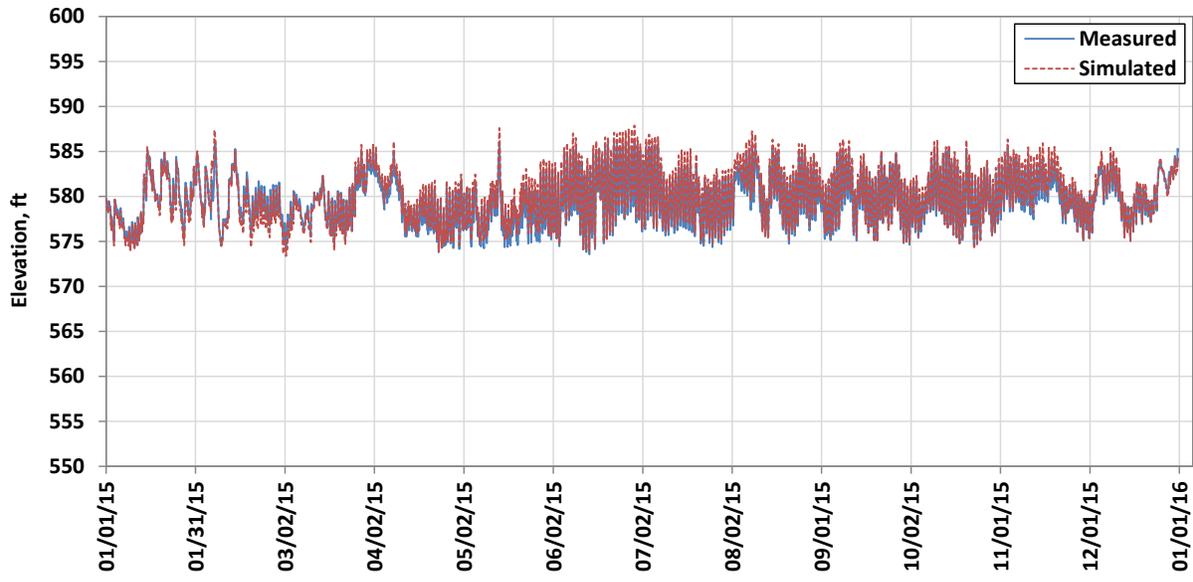


Figure B - 16. Keswick Reservoir simulated versus measured stage: 2015.

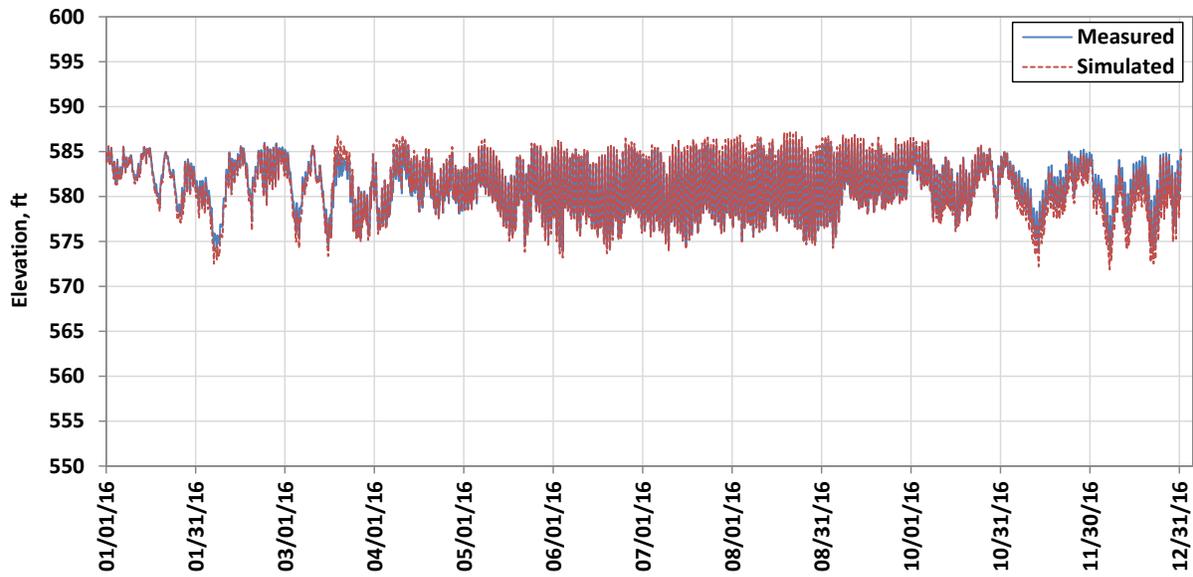


Figure B - 17. Keswick Reservoir simulated versus measured stage: 2016.

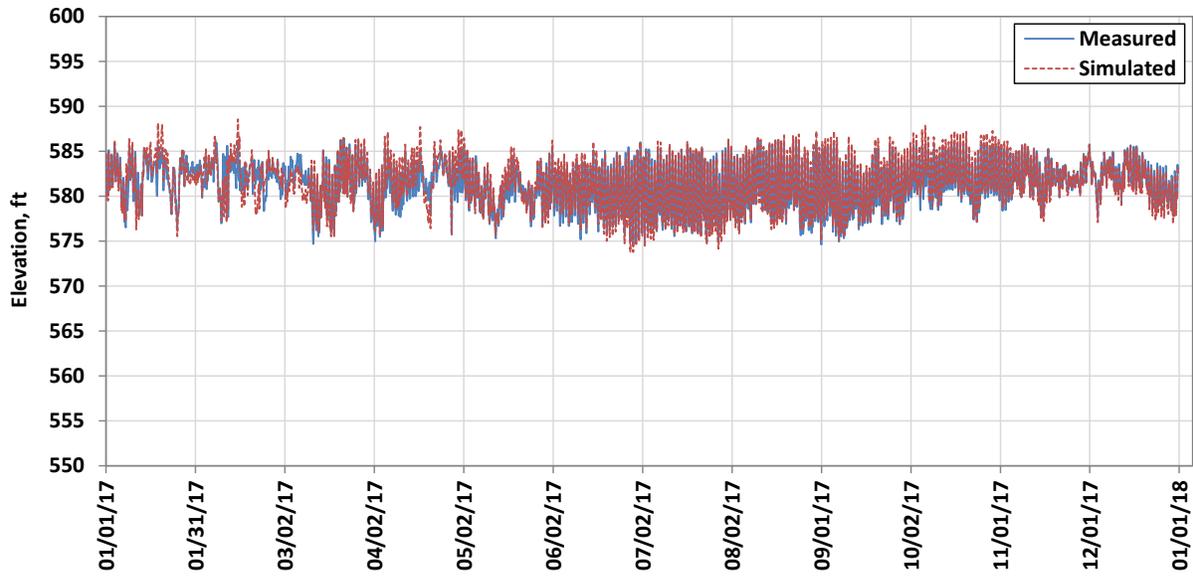


Figure B - 18. Keswick Reservoir simulated versus measured stage: 2017.

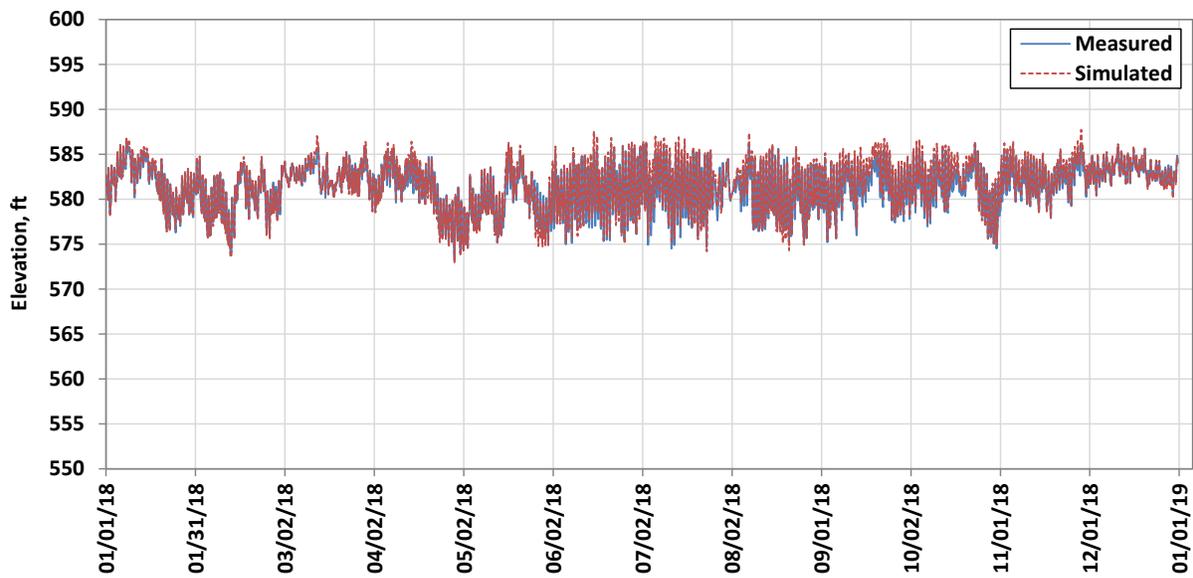


Figure B - 19. Keswick Reservoir simulated versus measured stage: 2018.

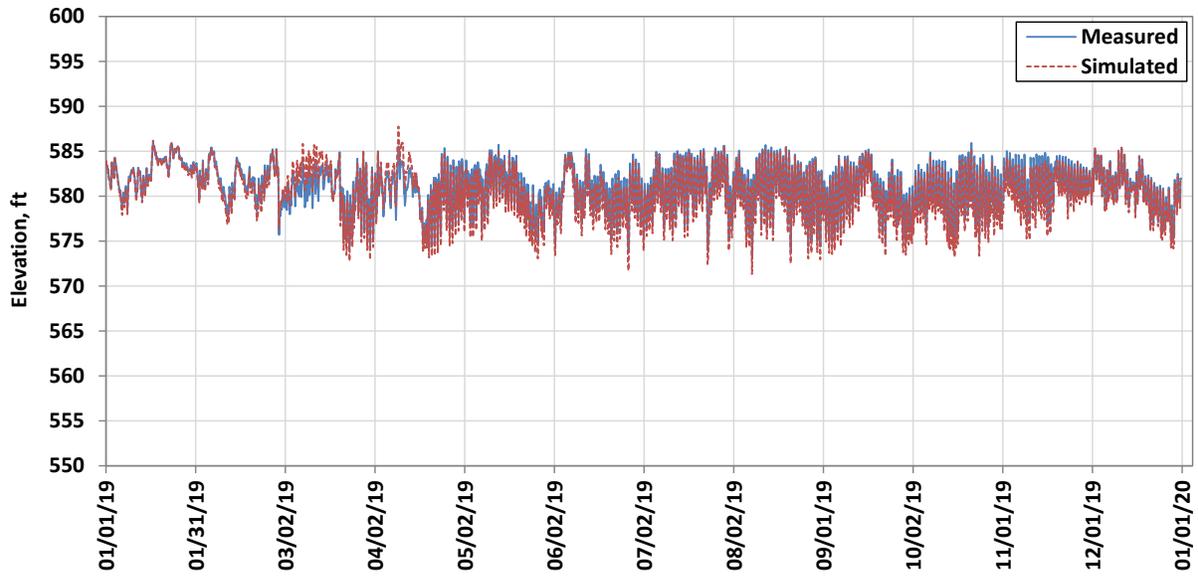


Figure B - 20. Keswick Reservoir simulated versus measured stage: 2019.

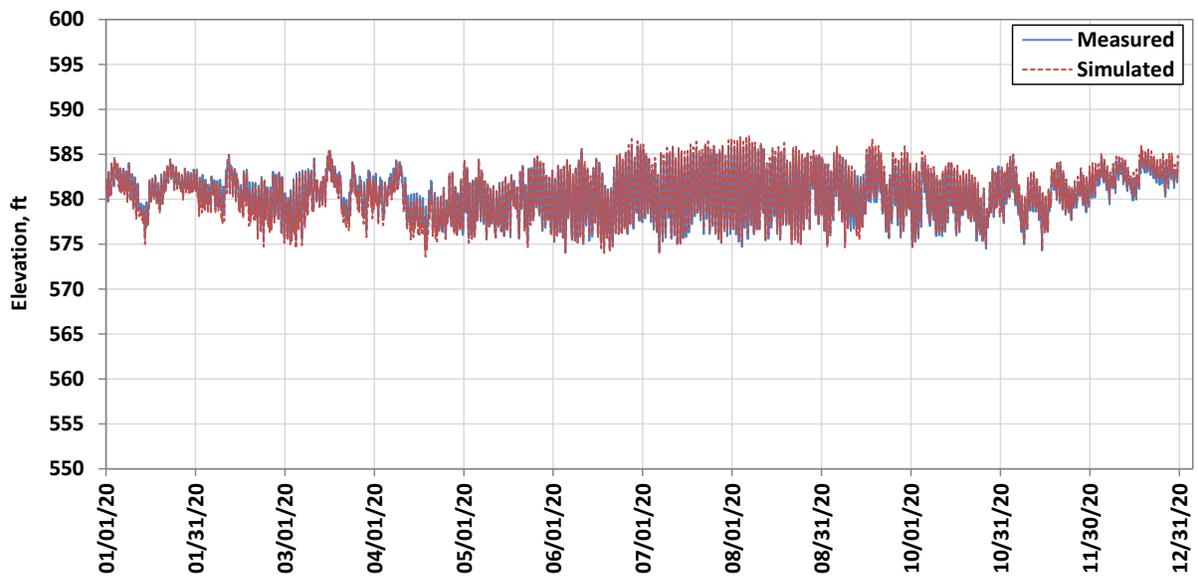


Figure B - 21. Keswick Reservoir simulated versus measured stage: 2020.

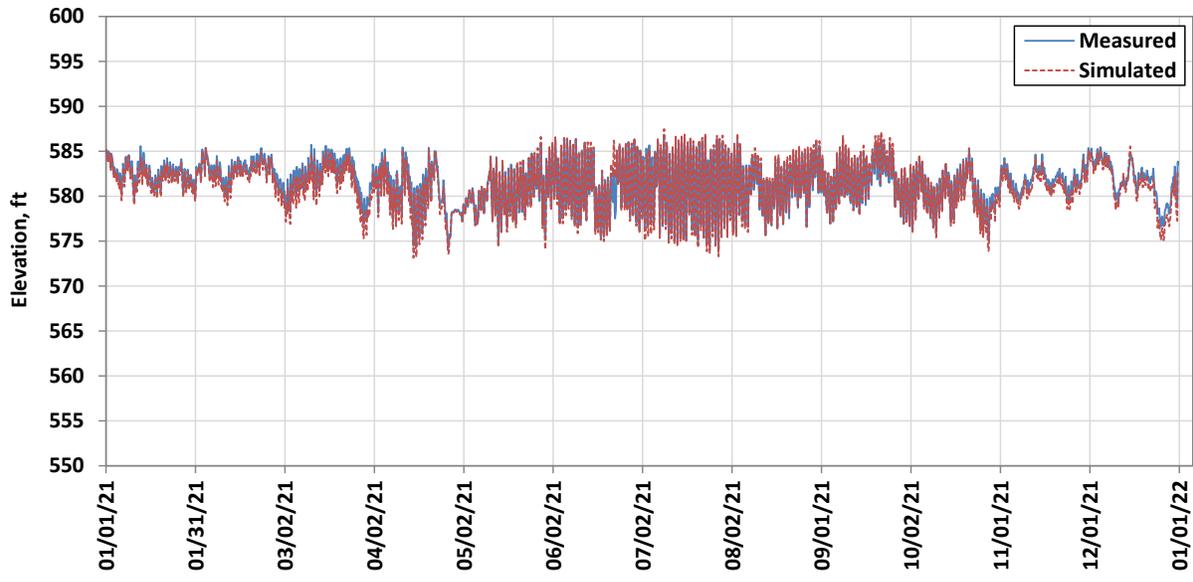


Figure B - 22. Keswick Reservoir simulated versus measured stage: 2021.

Table B - 1. Summary statistics of Keswick Reservoir elevation (stage): 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (ft)	--	0.21	0.25	-0.60	-0.04	0.21	-0.22	0.02	0.50
MAE (ft)	--	0.65	0.80	1.09	0.49	0.66	0.84	0.42	0.72
RMSE (ft)	--	0.95	1.10	1.32	0.58	0.97	1.19	0.71	0.93
Nash-Sutcliffe (NSE)	--	0.78	0.71	0.54	0.91	0.72	0.52	0.81	0.78
COUNT	--	8,760	8,760	8,760	8,784	8,760	8,760	8,760	8,784

Table B - 2. Summary statistics of Keswick Reservoir elevation (stage): 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (ft)	0.38	-0.23	-0.29	0.39	0.24	-0.32	0.38	-0.23	0.18
MAE (ft)	0.68	0.64	1.07	0.77	0.75	0.67	0.62	0.55	0.68
RMSE (ft)	0.91	0.99	1.27	1.03	1.00	0.87	0.74	0.69	0.88
Nash-Sutcliffe (NSE)	0.75	0.87	0.79	0.86	0.88	0.91	0.92	0.93	0.86
COUNT	8,760	8,760	8,760	8,784	8,760	8,760	8,760	8,784	8,760

Table B - 3. Summary statistics of Keswick Reservoir elevation (stage): 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (ft)	0.26	-0.56	0.04	-0.35	--	--	--	--	--
MAE (ft)	0.61	0.80	0.39	0.54	--	--	--	--	--
RMSE (ft)	0.81	0.96	0.47	0.67	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.89	0.83	0.96	0.91	--	--	--	--	--
COUNT	8,760	8,760	8,784	8,760	--	--	--	--	--

B.2. Outflow

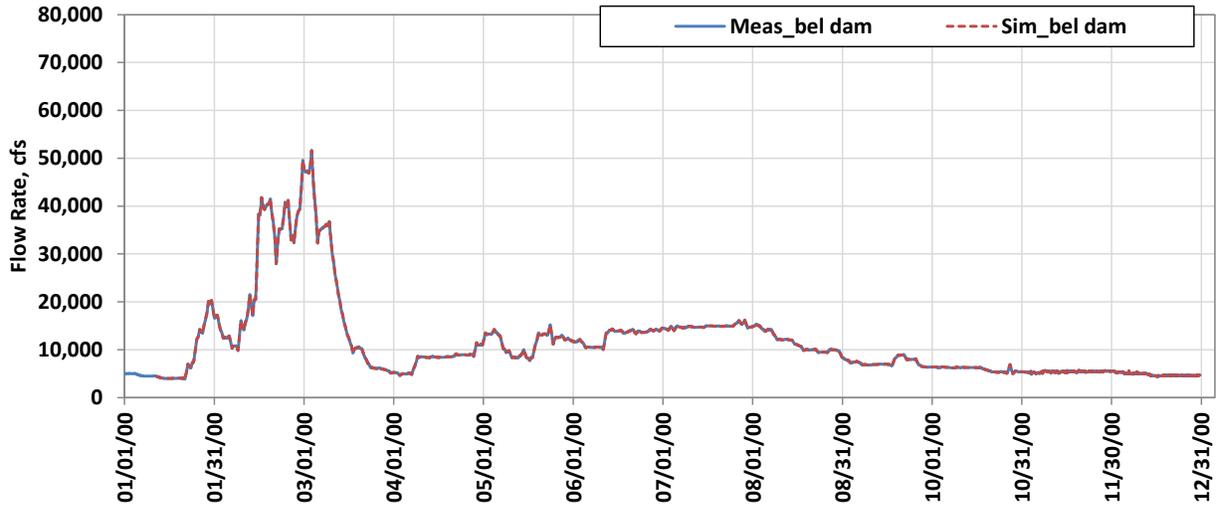


Figure B - 23. Keswick Reservoir simulated versus measured outflow: 2000.

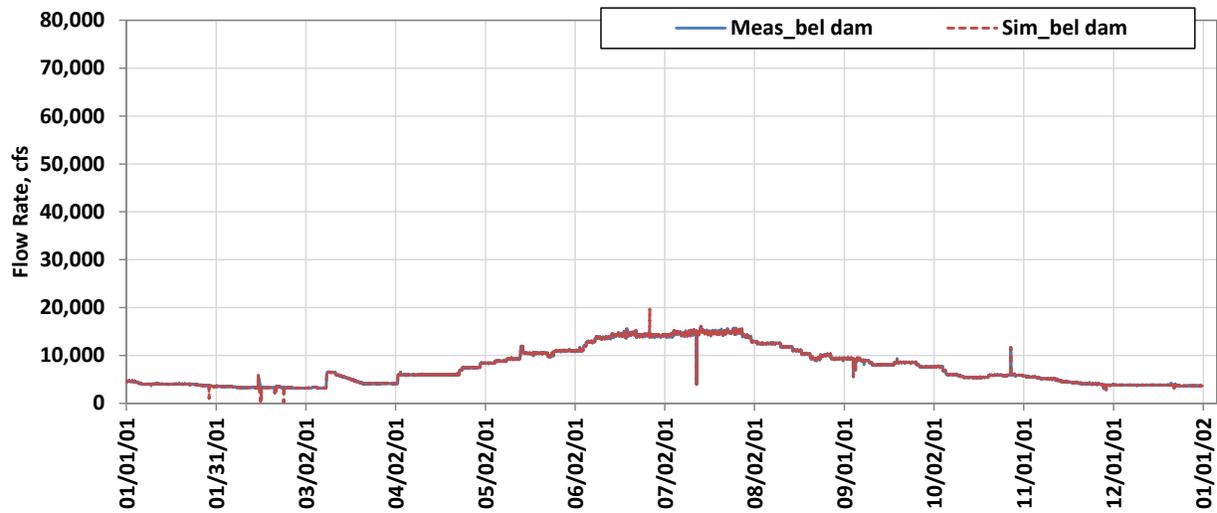


Figure B - 24. Keswick Reservoir simulated versus measured outflow: 2001.

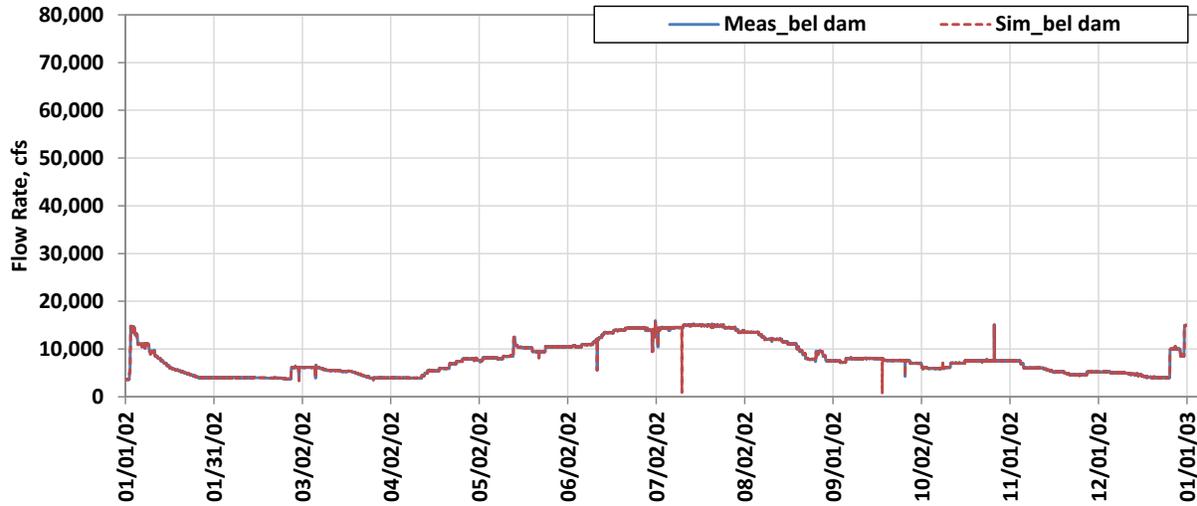


Figure B - 25. Keswick Reservoir simulated versus measured outflow: 2002.

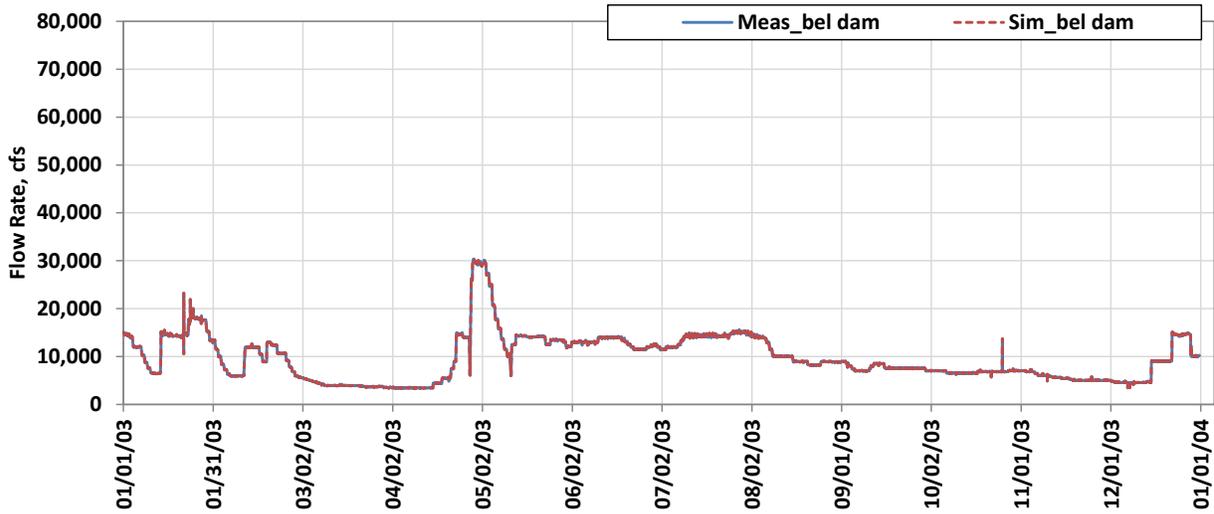


Figure B - 26. Keswick Reservoir simulated versus measured outflow: 2003.

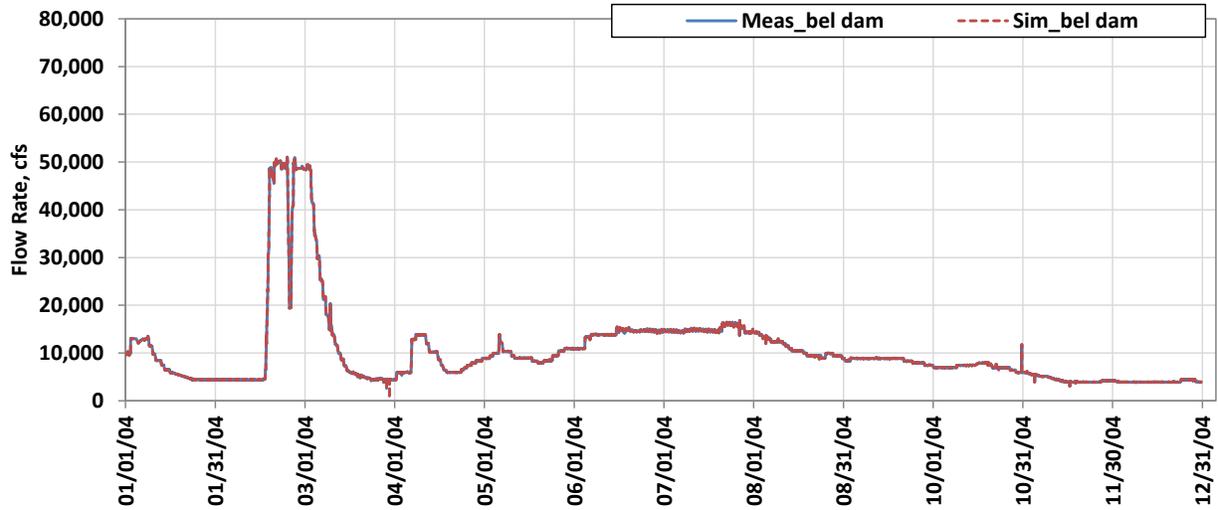


Figure B - 27. Keswick Reservoir simulated versus measured outflow: 2004.

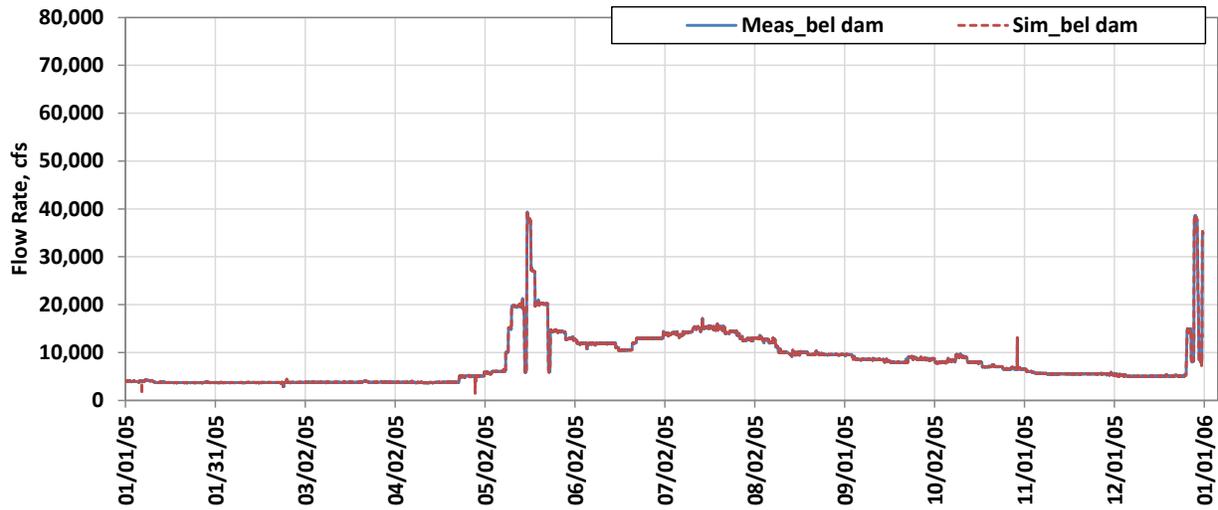


Figure B - 28. Keswick Reservoir simulated versus measured outflow: 2005.

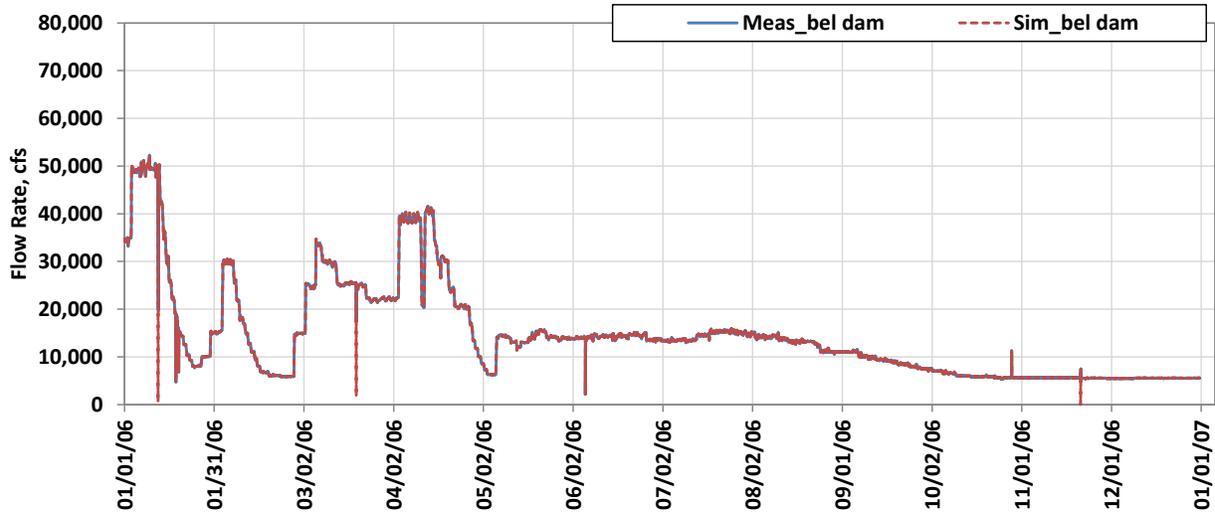


Figure B - 29. Keswick Reservoir simulated versus measured outflow: 2006.

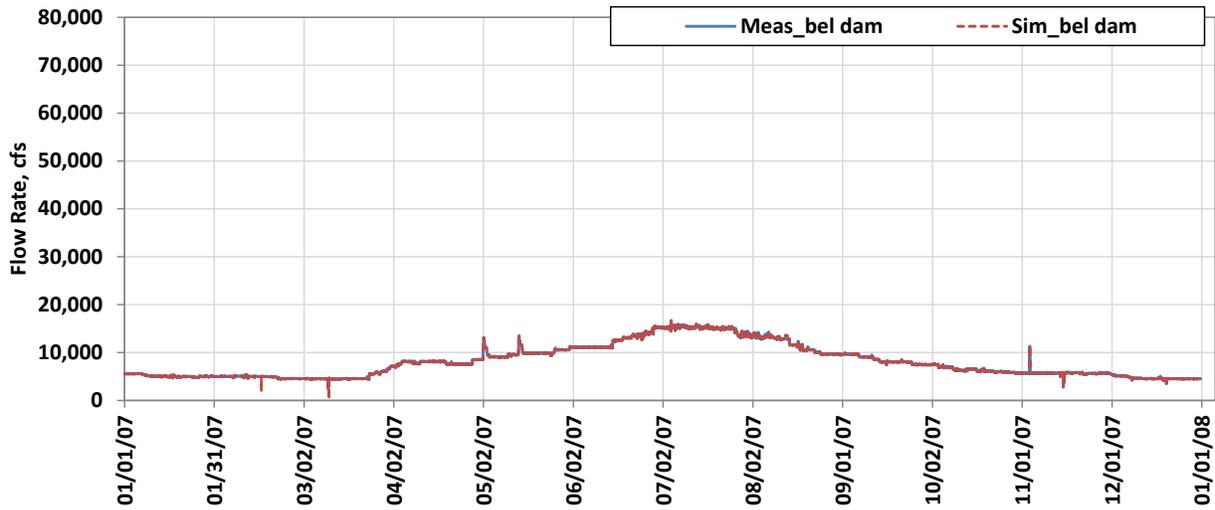


Figure B - 30. Keswick Reservoir simulated versus measured outflow: 2007.

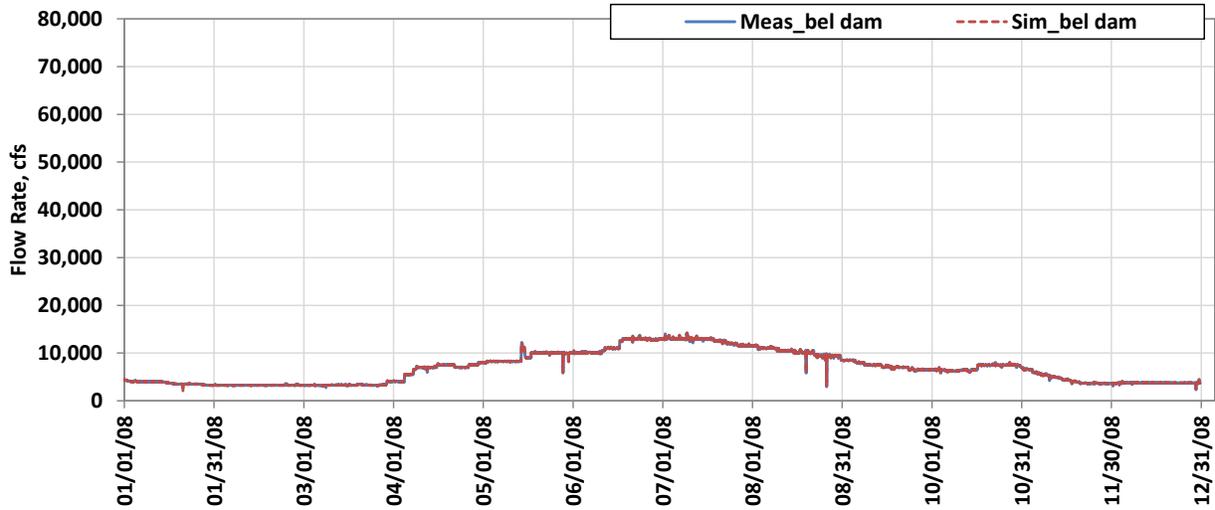


Figure B - 31. Keswick Reservoir simulated versus measured outflow: 2008.

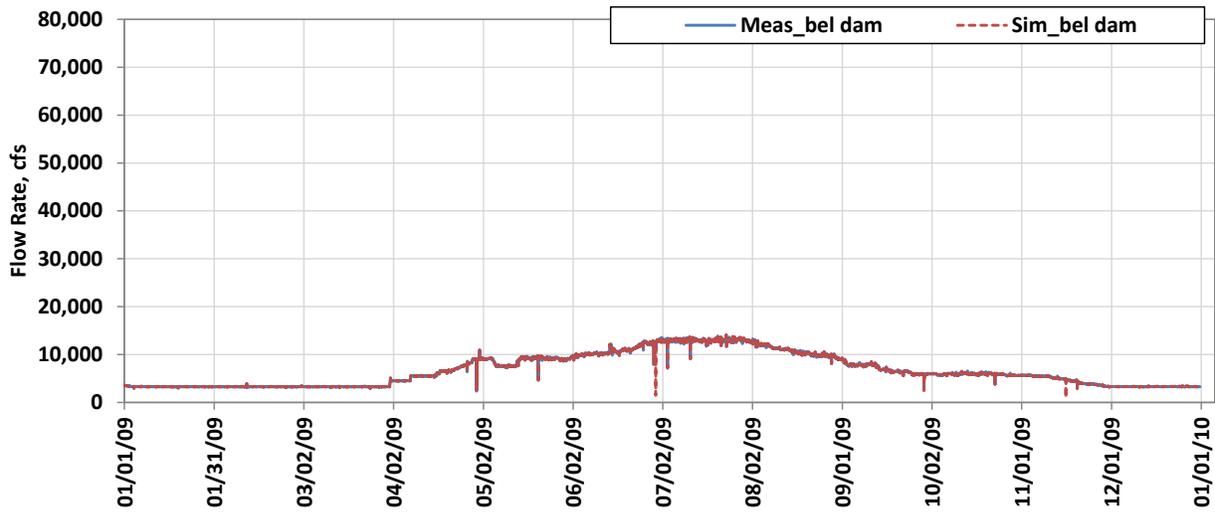


Figure B - 32. Keswick Reservoir simulated versus measured outflow: 2009.

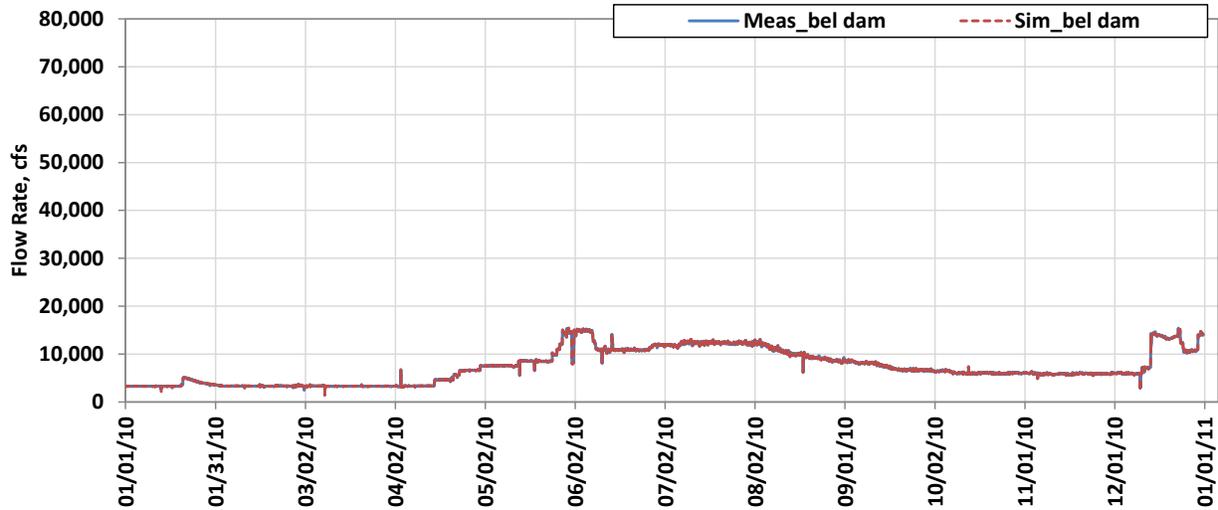


Figure B - 33. Keswick Reservoir simulated versus measured outflow: 2010.

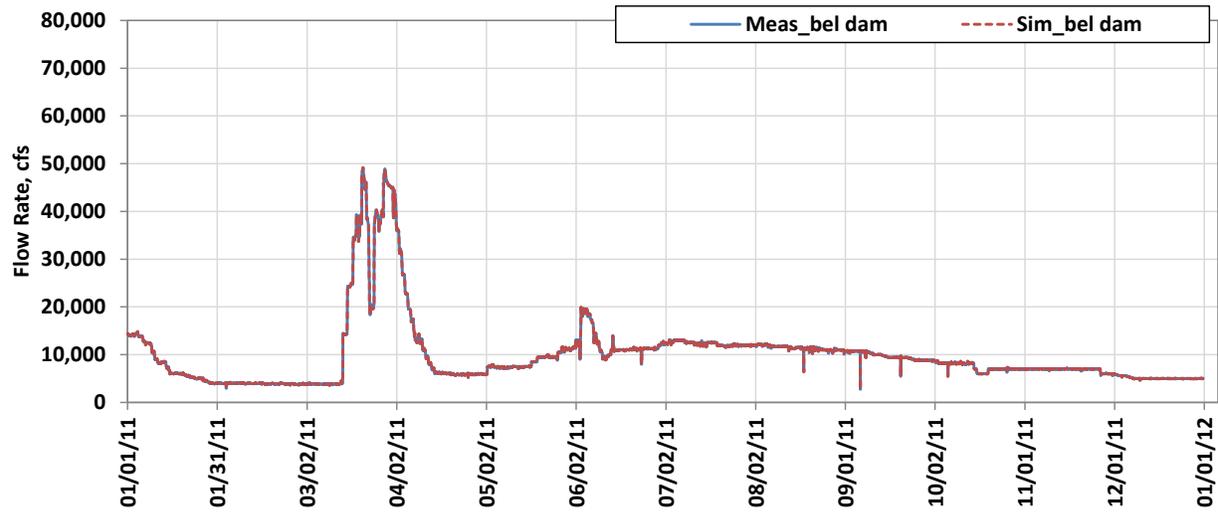


Figure B - 34. Keswick Reservoir simulated versus measured outflow: 2011.

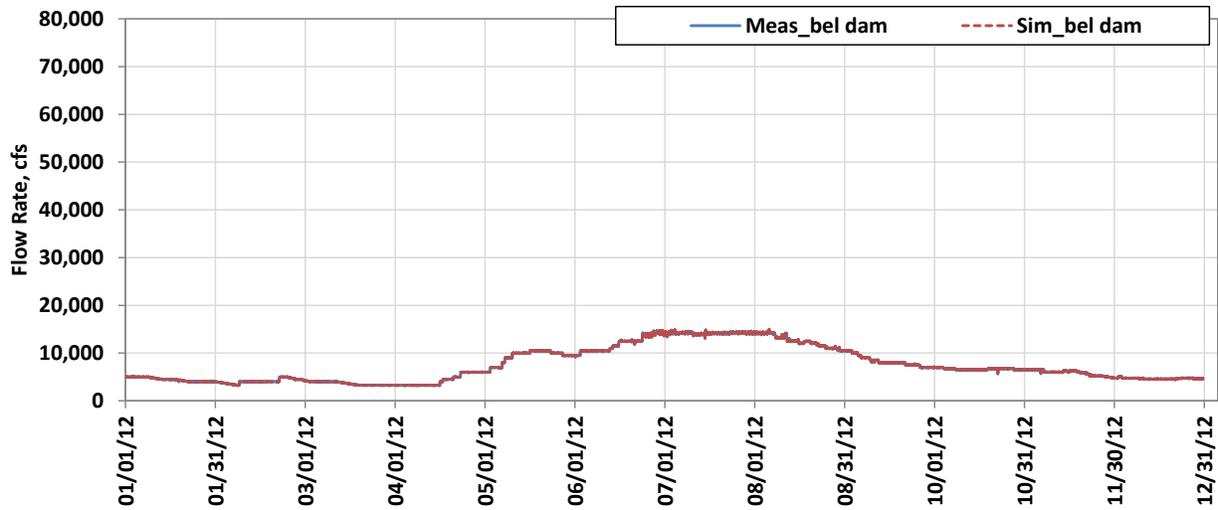


Figure B - 35. Keswick Reservoir simulated versus measured outflow: 2012.

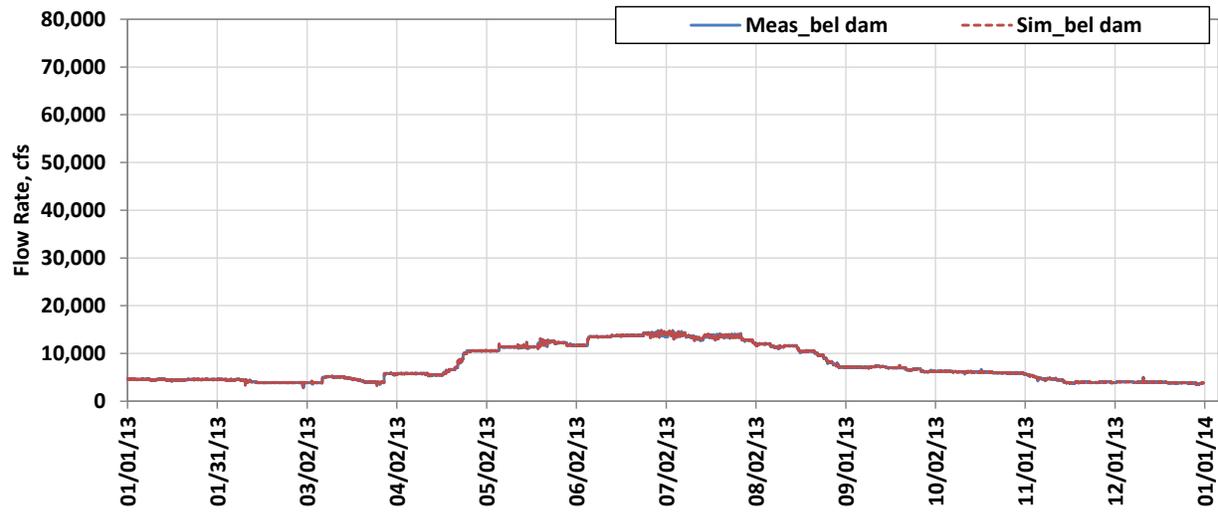


Figure B - 36. Keswick Reservoir simulated versus measured outflow: 2013.

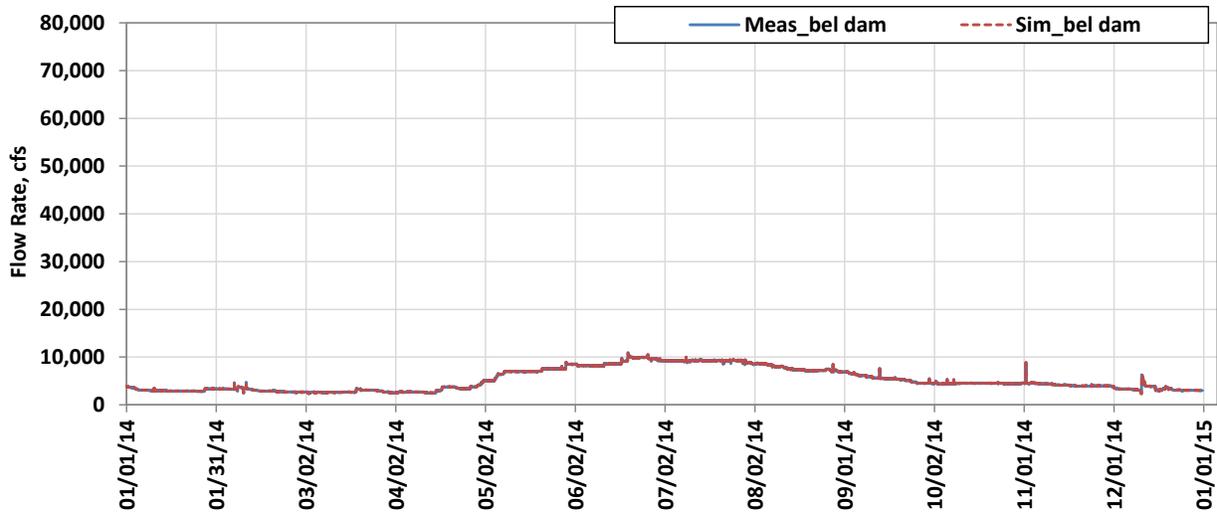


Figure B - 37. Keswick Reservoir simulated versus measured outflow: 2014.

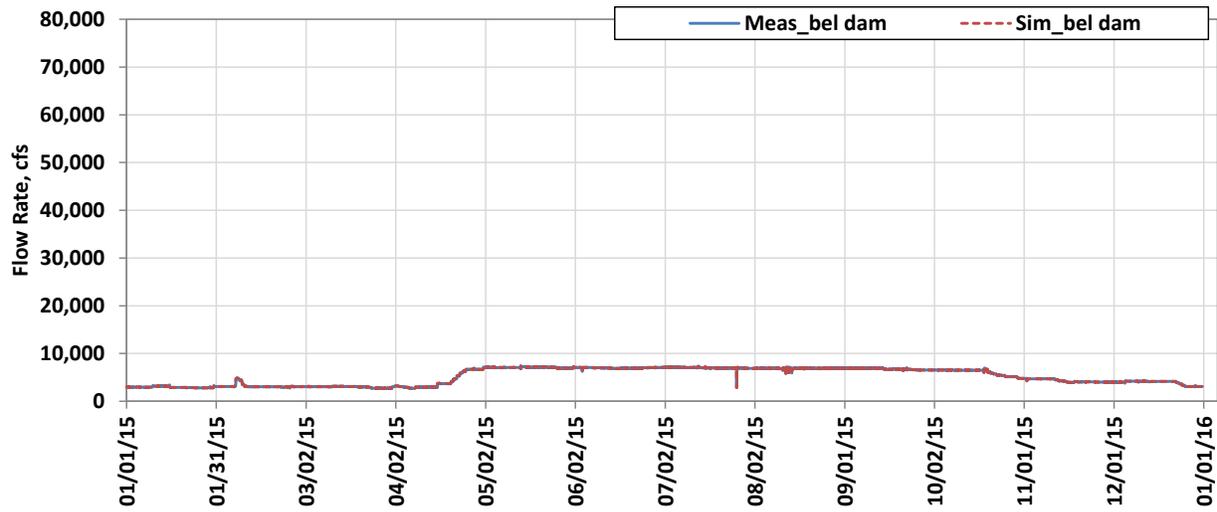


Figure B - 38. Keswick Reservoir simulated versus measured outflow: 2015.

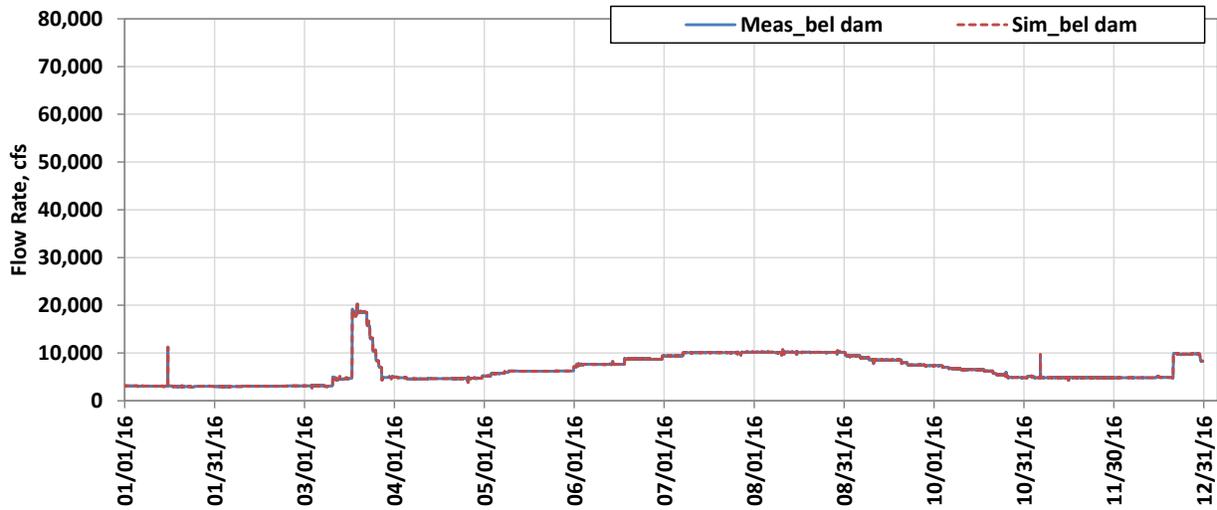


Figure B - 39. Keswick Reservoir simulated versus measured outflow: 2016.

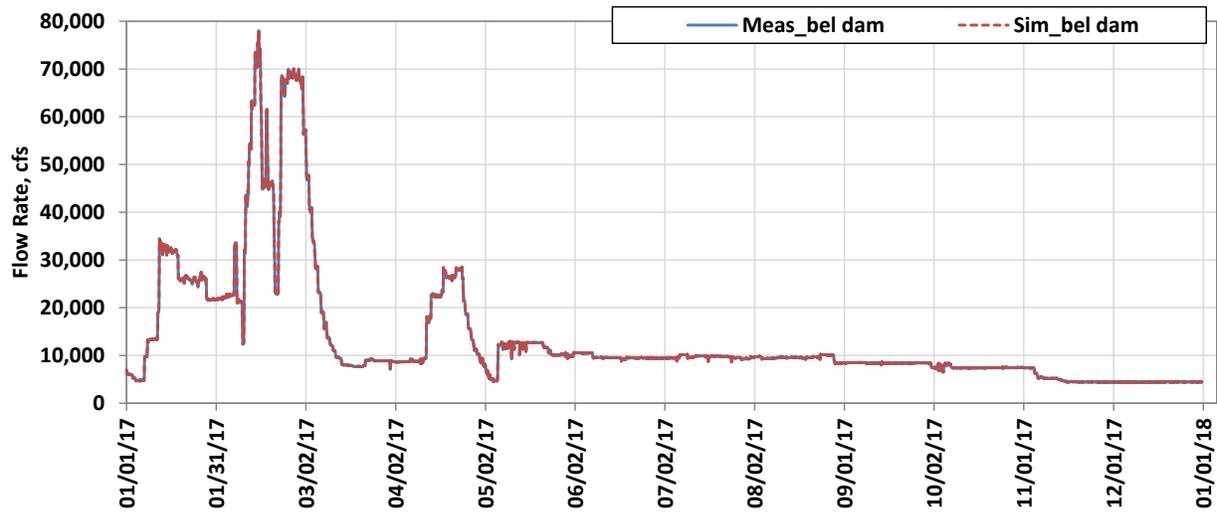


Figure B - 40. Keswick Reservoir simulated versus measured outflow: 2017.

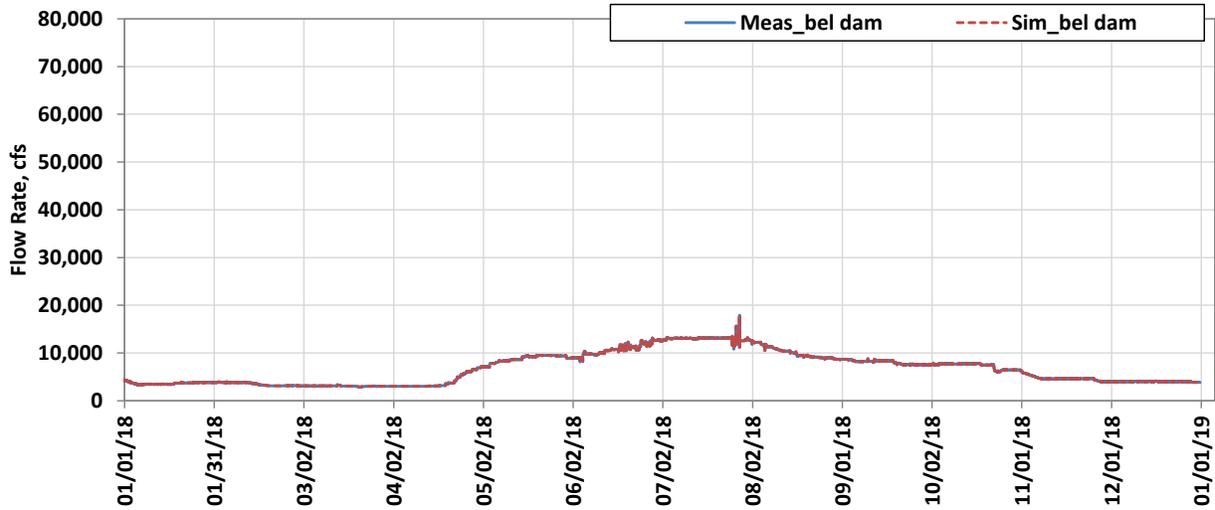


Figure B - 41. Keswick Reservoir simulated versus measured outflow: 2018.

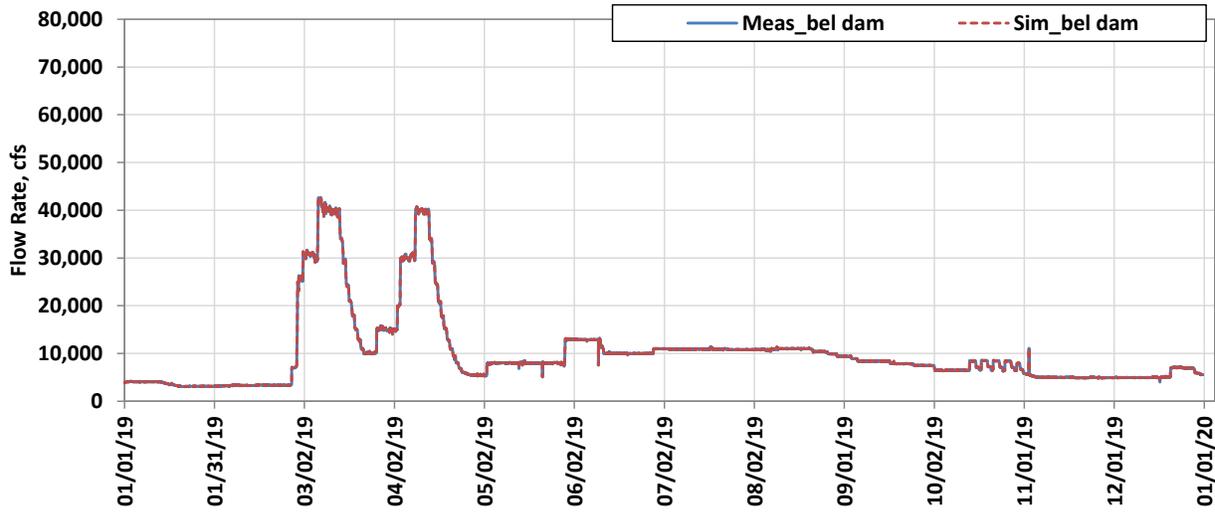


Figure B - 42. Keswick Reservoir simulated versus measured outflow: 2019.

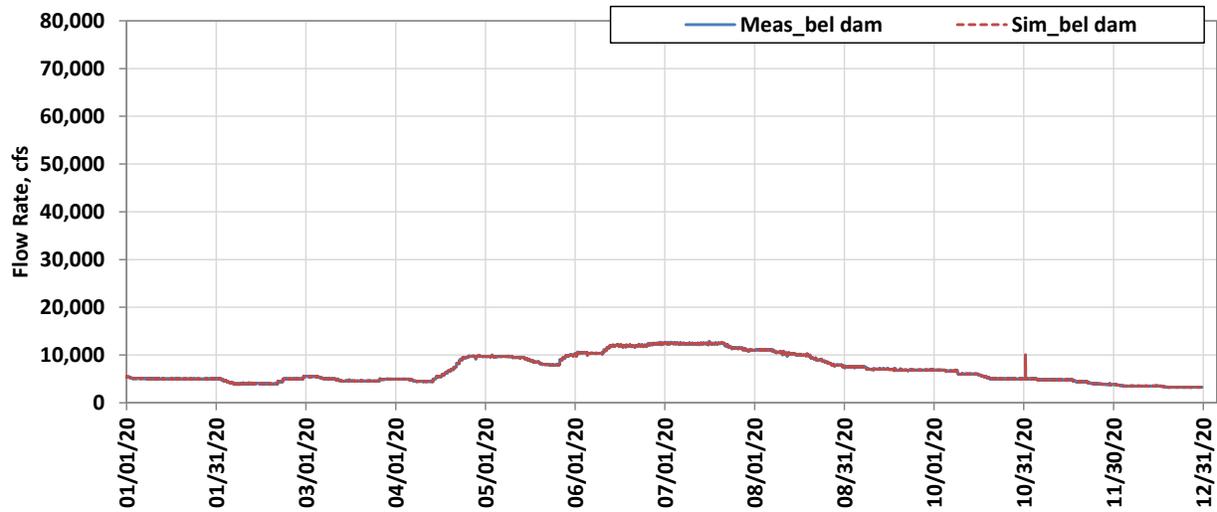


Figure B - 43. Keswick Reservoir simulated versus measured outflow: 2020.

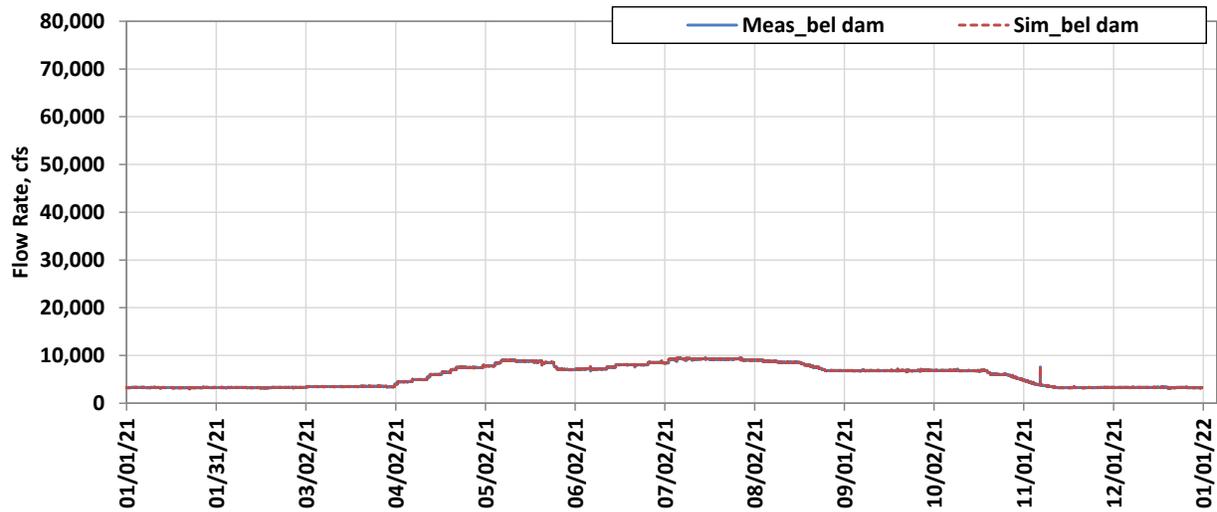


Figure B - 44. Keswick Reservoir simulated versus measured outflow: 2021.

Table B - 4. Summary statistics of Keswick Reservoir outflow: 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (cfs)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0
MAE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
RMSE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nash-Sutcliffe (NSE)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
COUNT	8,520	8,662	8,620	8,725	8,601	8,674	8,745	8,753	8,778

Table B - 5. Summary statistics of Keswick Reservoir outflow: 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MAE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
RMSE (cfs)	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1
Nash-Sutcliffe (NSE)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
COUNT	8,740	8,755	8,757	8,778	8,754	8,759	8,758	8,783	8,759

Table B - 6. Summary statistics of Keswick Reservoir outflow: 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (cfs)	0.1	0.1	0.0	0.0	--	--	--	--	--
MAE (cfs)	0.1	0.1	0.1	0.1	--	--	--	--	--
RMSE (cfs)	0.1	0.1	0.1	0.1	--	--	--	--	--
Nash-Sutcliffe (NSE)	1.0	1.0	1.00	1.00	--	--	--	--	--
COUNT	8,752	8,760	8,775	8,756	--	--	--	--	--

B.3. Temperature Profiles

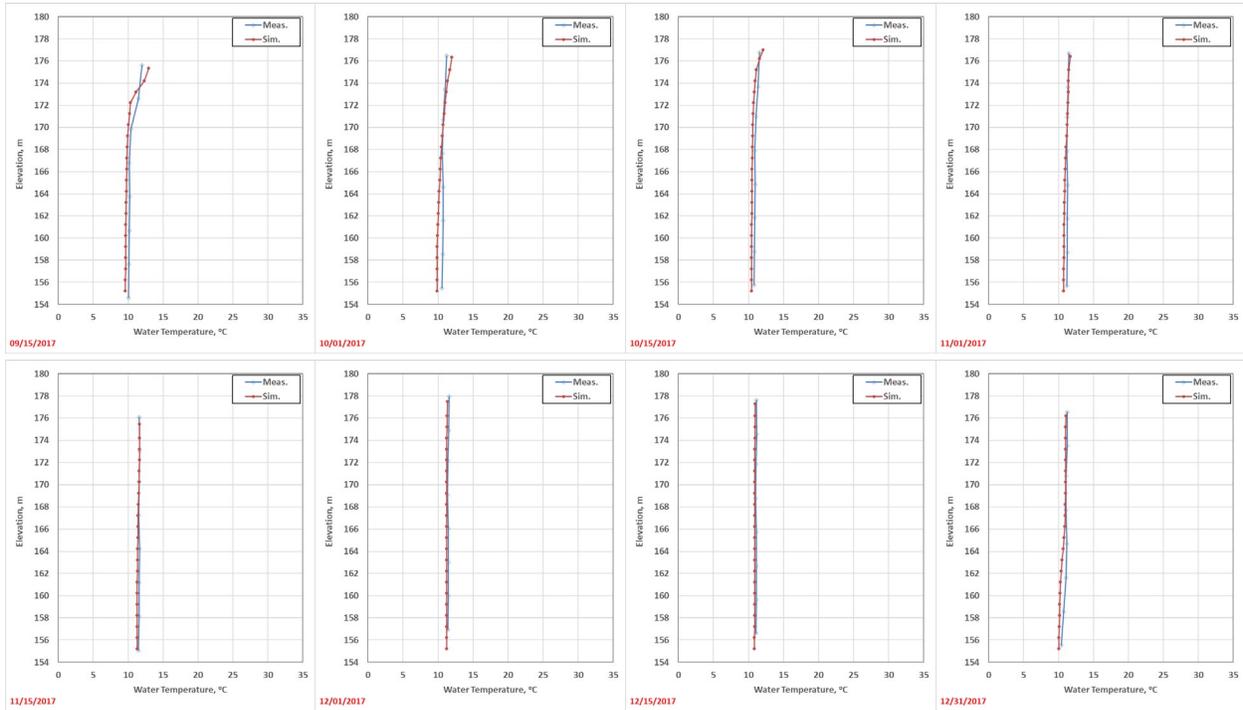


Figure B - 45. Keswick Reservoir simulated versus measured temperature profiles: 2017.

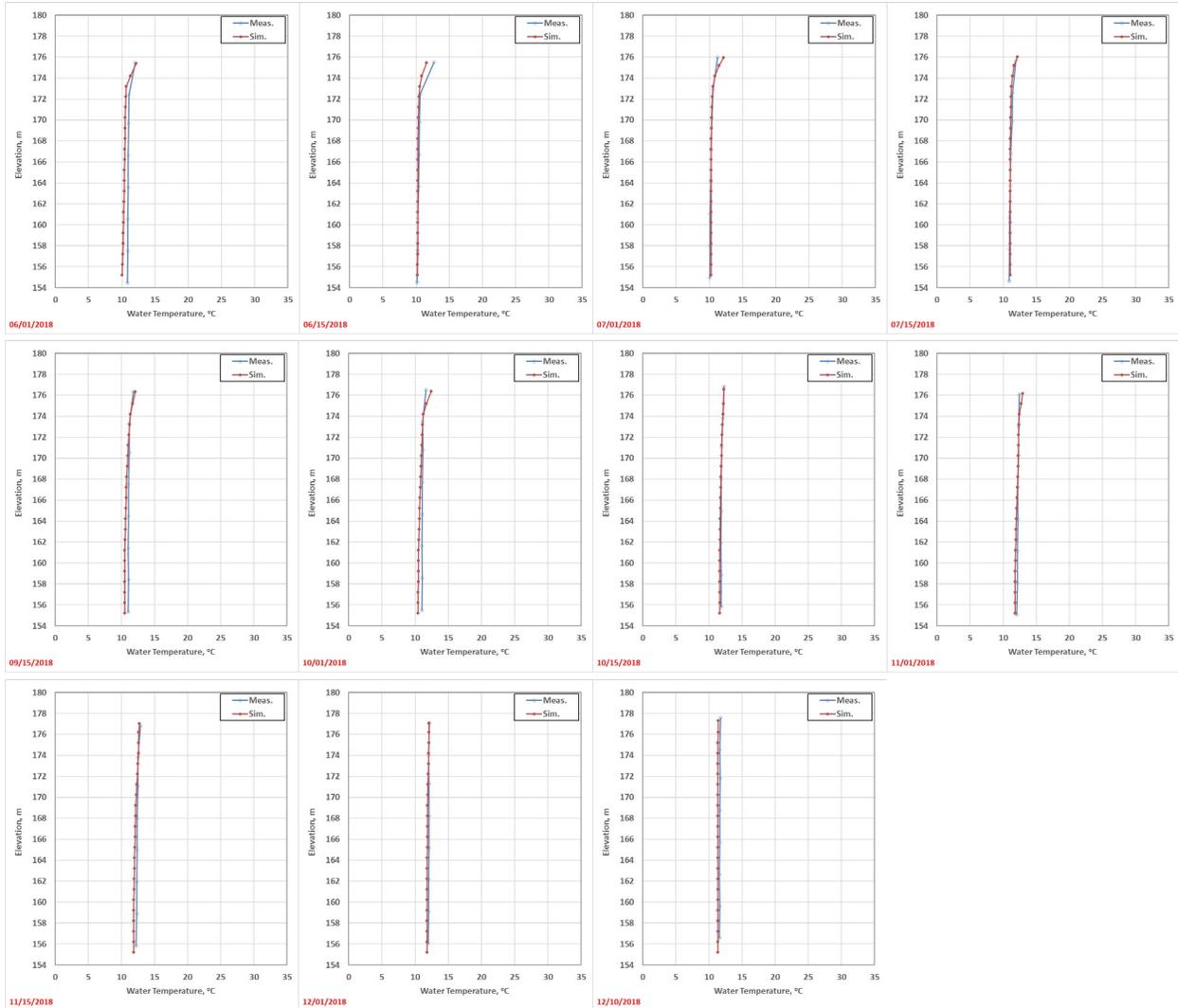


Figure B - 46. Keswick Reservoir simulated versus measured temperature profiles: 2018.

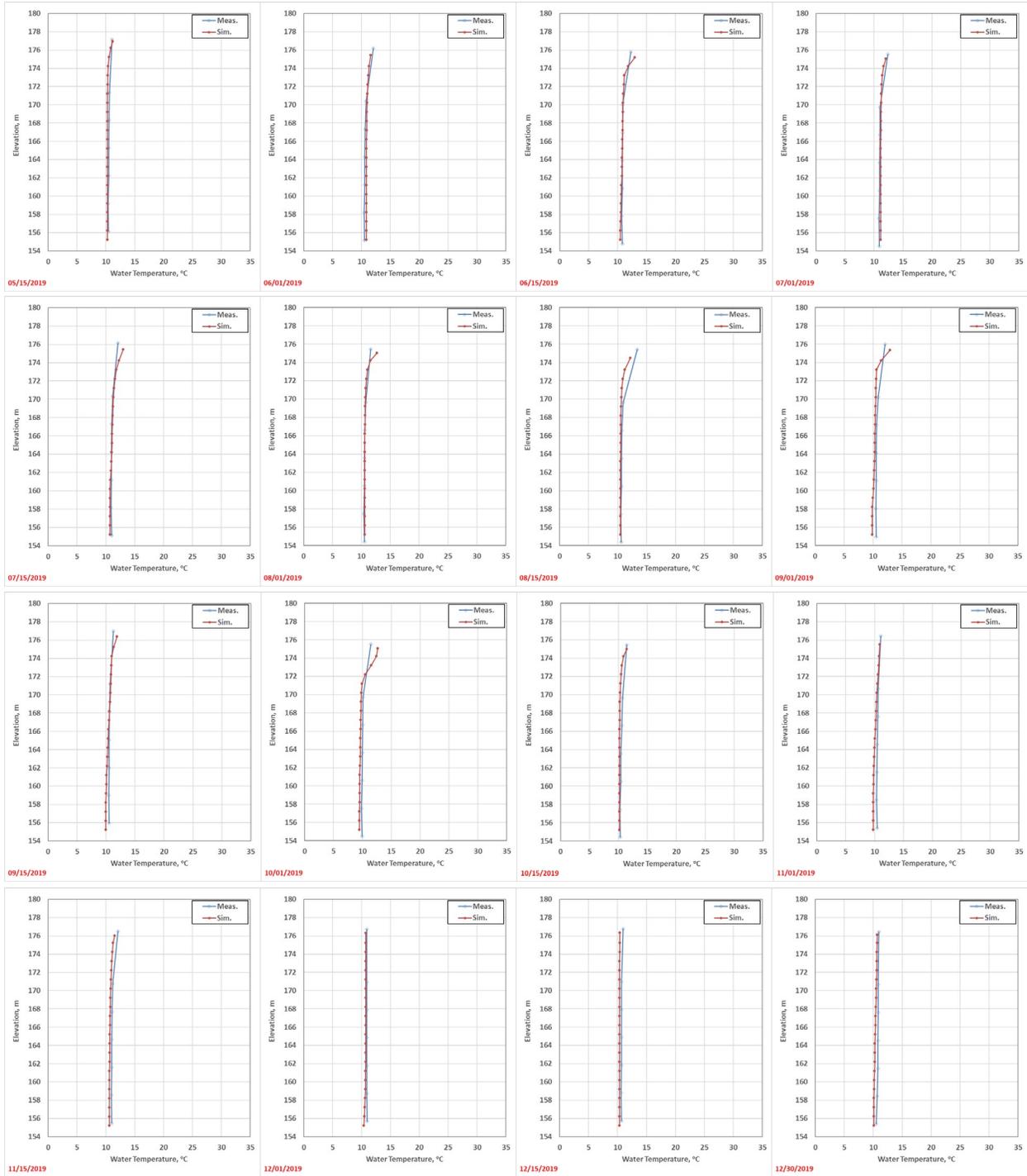


Figure B - 47. Keswick Reservoir simulated versus measured temperature profiles: 2019.

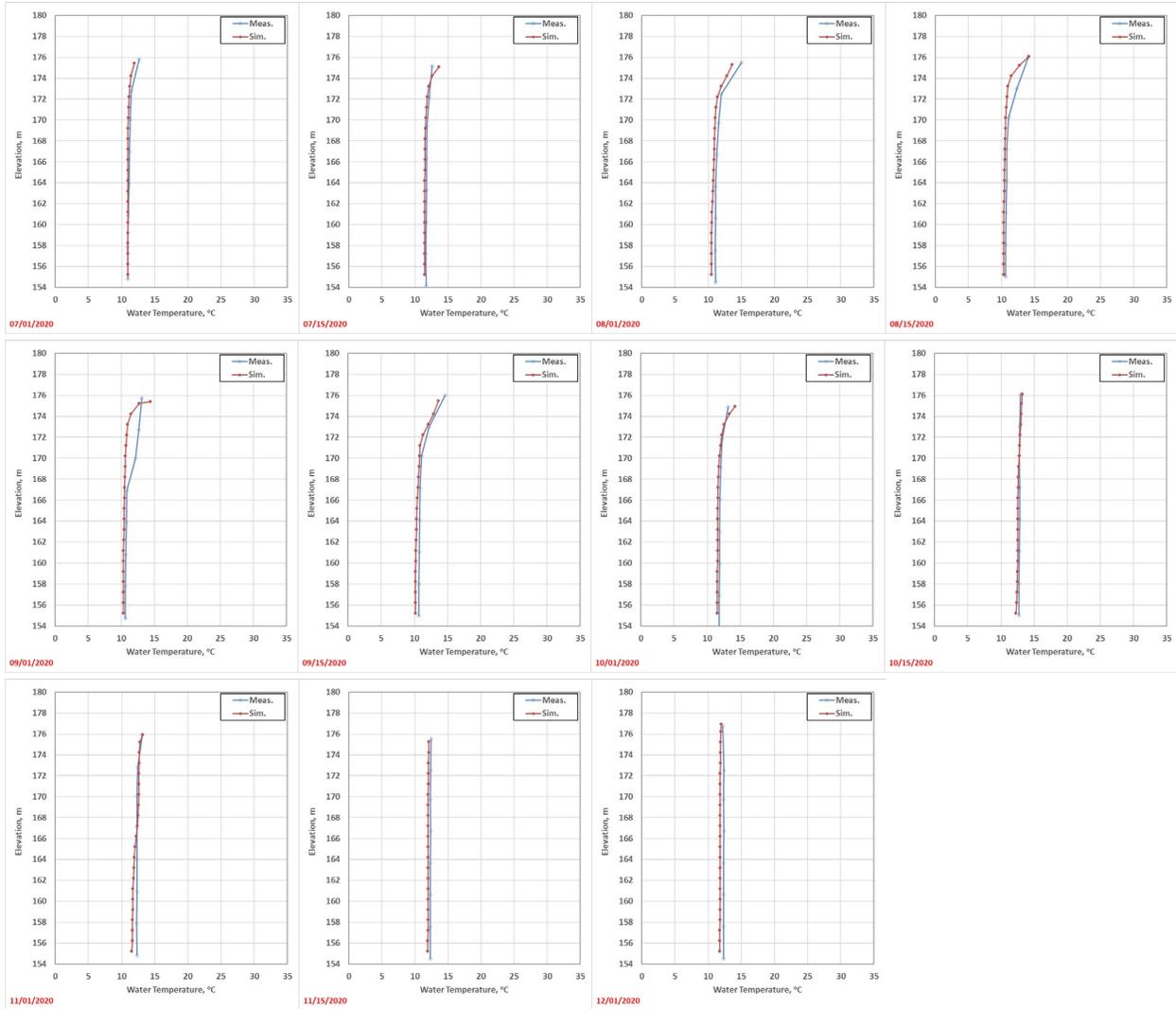


Figure B - 48. Keswick Reservoir simulated versus measured temperature profiles: 2020.

Table B - 7. Summary Statistics of temperature profiles for Keswick Reservoir above Keswick Dam (Mean Bias, MAE, and RMSE are in °C): 2017.

Statistic	09/15	10/01	10/15	11/01	11/15	12/01	12/15	12/31	--	--	--	--
Mean Bias	-0.34	-0.25	-0.35	-0.21	-0.13	-0.19	-0.20	-0.35	--	--	--	--
MAE	0.53	0.47	0.38	0.27	0.14	0.19	0.20	0.35	--	--	--	--
RMSE	0.55	0.54	0.39	0.33	0.17	0.19	0.20	0.42	--	--	--	--
NSE	0.23	-5.89	-1.52	-18.18	-15.99	-10.79	-23.25	-1.73	--	--	--	--
COUNT	23	23	23	23	23	23	23	23	--	--	--	--

Table B - 8. Summary Statistics of temperature profiles for Keswick Reservoir above Keswick Dam (Mean Bias, MAE, and RMSE are in °C): 2018.

Statistic	04/01	04/15	05/01	05/15	06/01	06/15	07/01	07/15	09/15	10/01	10/15	11/01
Mean Bias	-0.67	-0.54	-0.44	-0.09	-0.55	-0.23	0.13	-0.04	-0.29	-0.24	-0.09	-0.09
MAE	0.67	0.54	0.46	0.18	0.56	0.25	0.15	0.13	0.34	0.39	0.11	0.20
RMSE	0.69	0.57	0.49	0.21	0.59	0.41	0.23	0.16	0.38	0.44	0.13	0.24
NSE	0.27	0.39	-2.86	0.11	-2.60	0.63	0.47	0.72	-1.84	-6.48	-0.29	-3.62
COUNT	23	23	23	23	23	23	23	23	23	23	23	23

Statistic (continued)	11/15	12/01	12/10	--	--	--	--	--	--	--	--	--
Mean Bias	-0.27	-0.16	-0.29	--	--	--	--	--	--	--	--	--
MAE	0.28	0.16	0.29	--	--	--	--	--	--	--	--	--
RMSE	0.31	0.18	0.29	--	--	--	--	--	--	--	--	--
NSE	-2.60	-15.07	-70.23	--	--	--	--	--	--	--	--	--
COUNT	23	23	23	--	--	--	--	--	--	--	--	--

Table B - 9. Summary Statistics of temperature profiles for Keswick Reservoir above Keswick Dam (Mean Bias, MAE, and RMSE are in °C): 2019.

Statistic	05/15	06/01	06/15	07/01	07/15	08/01	08/15	09/01	09/15	10/01	10/15	11/01
Mean Bias	-0.24	0.13	-0.08	0.08	0.11	0.11	-0.40	-0.32	-0.13	-0.12	-0.26	-0.37
MAE	0.26	0.29	0.19	0.22	0.25	0.19	0.40	0.51	0.29	0.47	0.26	0.37
RMSE	0.27	0.31	0.27	0.23	0.36	0.35	0.57	0.54	0.36	0.55	0.32	0.42
NSE	-0.76	0.65	0.65	0.74	0.17	0.06	0.59	-0.06	-1.41	-0.24	0.27	-2.65
COUNT	23	23	23	23	23	23	23	24	23	23	23	23

Statistic (continued)	11/15	12/01	12/15	12/30	--	--	--	--	--	--	--	--
Mean Bias	-0.42	-0.24	-0.34	-0.42	--	--	--	--	--	--	--	--
MAE	0.42	0.24	0.34	0.42	--	--	--	--	--	--	--	--
RMSE	0.43	0.26	0.35	0.43	--	--	--	--	--	--	--	--

NSE	-0.49	-316.27	-13.84	-12.69	--	--	--	--	--	--	--	--
COUNT	23	23	23	23	--	--	--	--	--	--	--	--

Table B - 10. Summary Statistics of temperature profiles for Keswick Reservoir above Keswick Dam (Mean Bias, MAE, and RMSE are in oC): 2020.

Statistic	07/01	07/15	08/01	08/15	09/01	09/15	10/01	10/15	11/01	11/15	12/01	--
Mean Bias	-0.23	-0.11	-0.59	-0.51	-0.61	-0.44	-0.25	-0.14	-0.25	-0.35	-0.51	--
MAE	0.24	0.29	0.59	0.51	0.73	0.44	0.28	0.22	0.38	0.35	0.51	--
RMSE	0.30	0.37	0.63	0.64	0.92	0.45	0.28	0.24	0.44	0.35	0.51	--
NSE	0.53	-0.46	0.66	0.60	-0.01	0.81	0.03	-18.03	-8.52	-69.81	-279.08	--
COUNT	22	22	22	21	22	22	20	22	21	22	22	--

B.4. Outflow Temperature

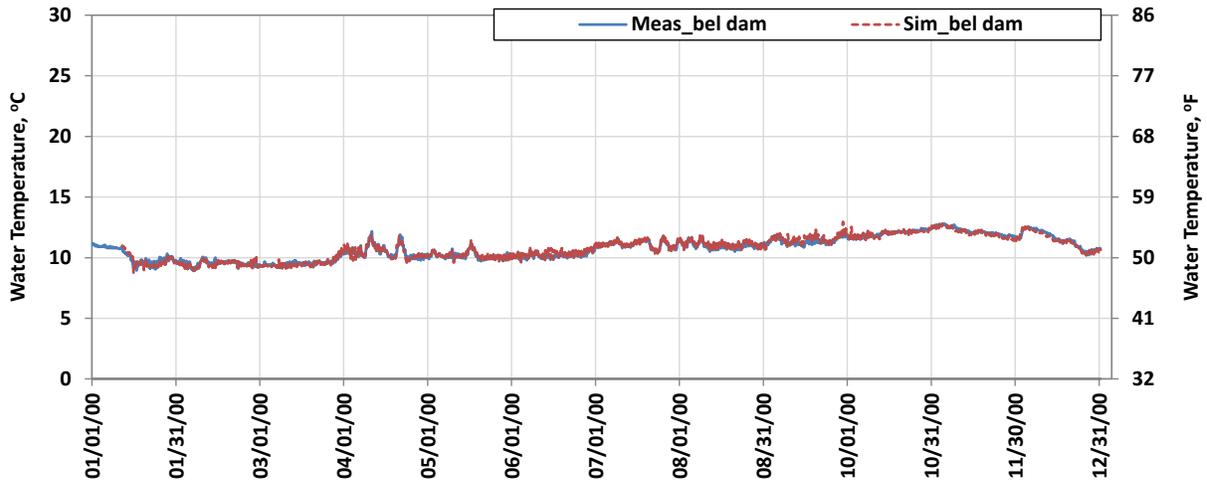


Figure B - 49. Keswick Reservoir simulated versus measured outflow temperature: 2000.

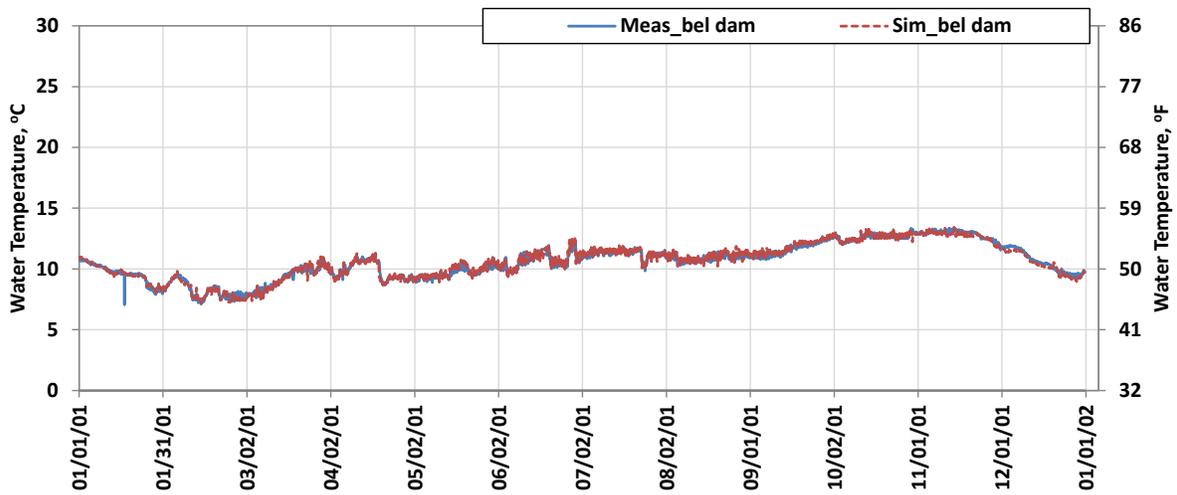


Figure B - 50. Keswick Reservoir simulated versus measured outflow temperature: 2001.

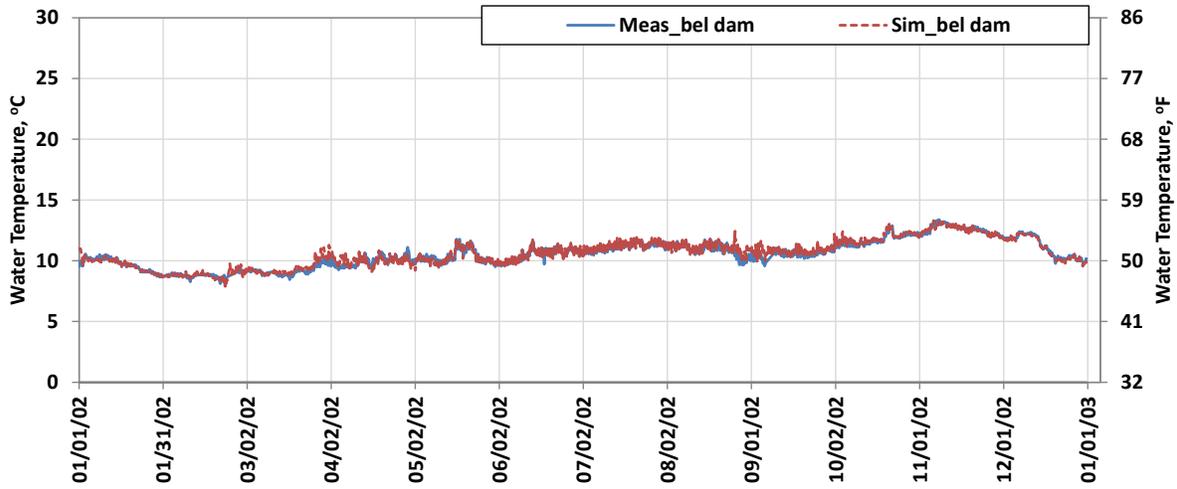


Figure B - 51. Keswick Reservoir simulated versus measured outflow temperature: 2002.

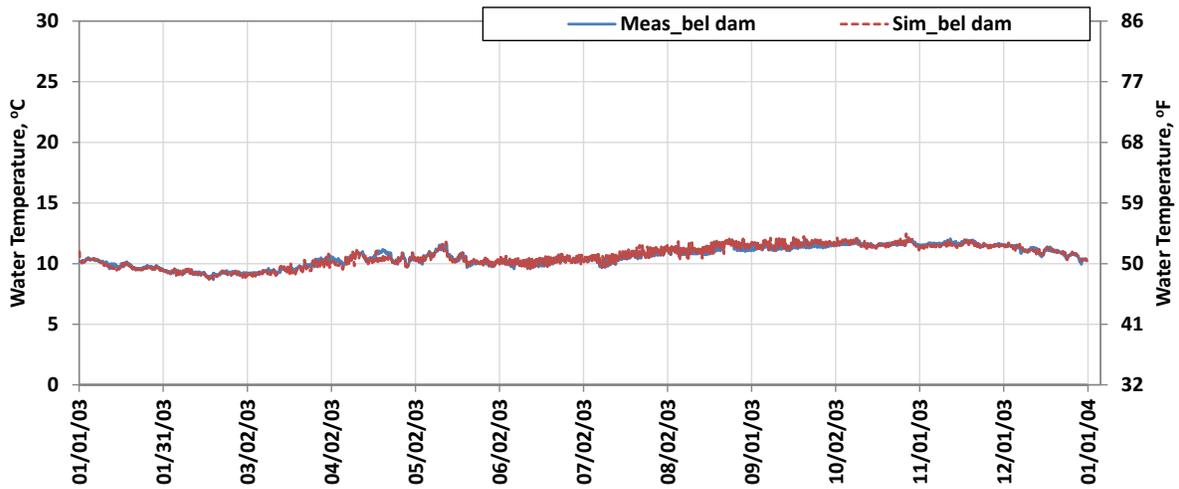


Figure B - 52. Keswick Reservoir simulated versus measured outflow temperature: 2003.

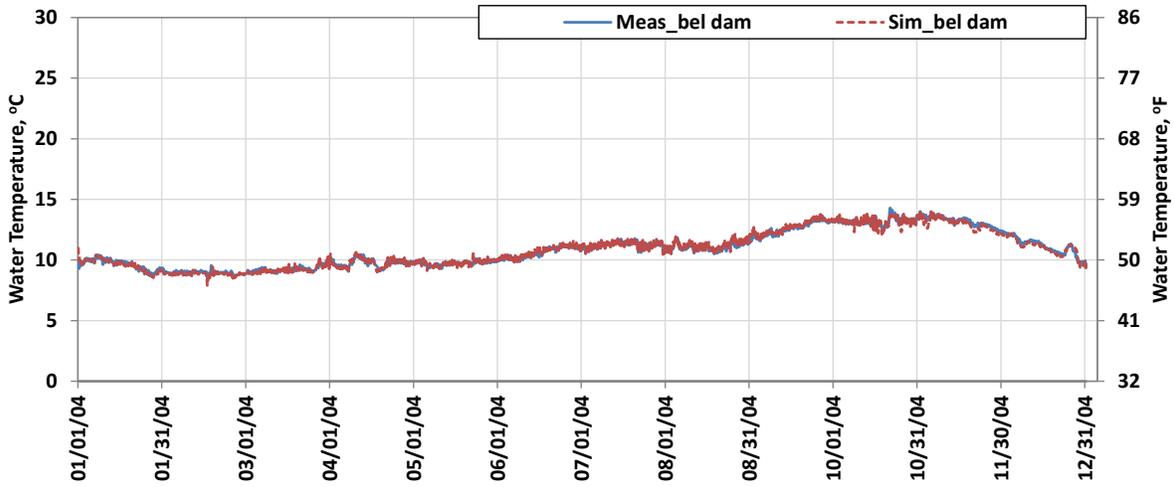


Figure B - 53. Keswick Reservoir simulated versus measured outflow temperature: 2004.

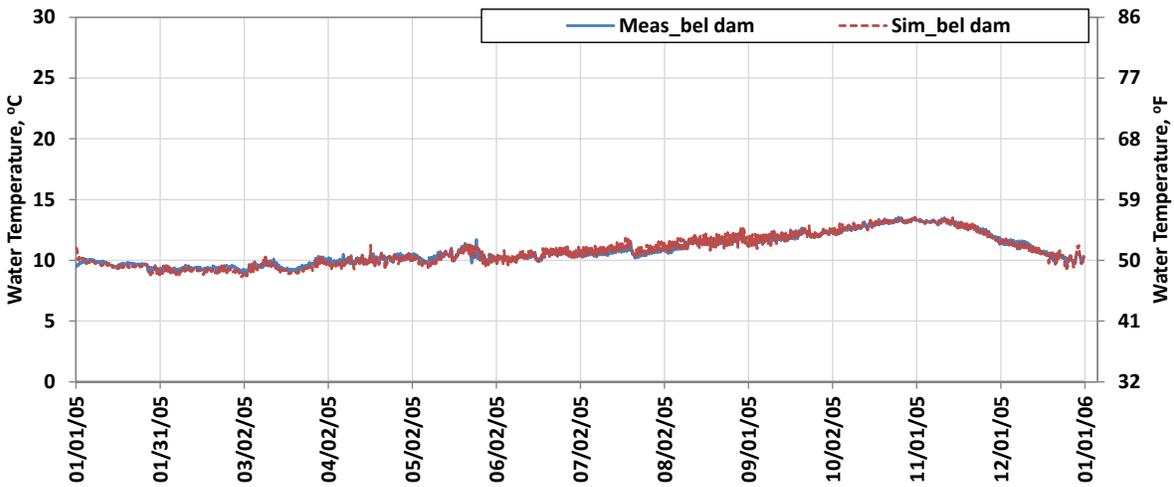


Figure B - 54. Keswick Reservoir simulated versus measured outflow temperature: 2005.

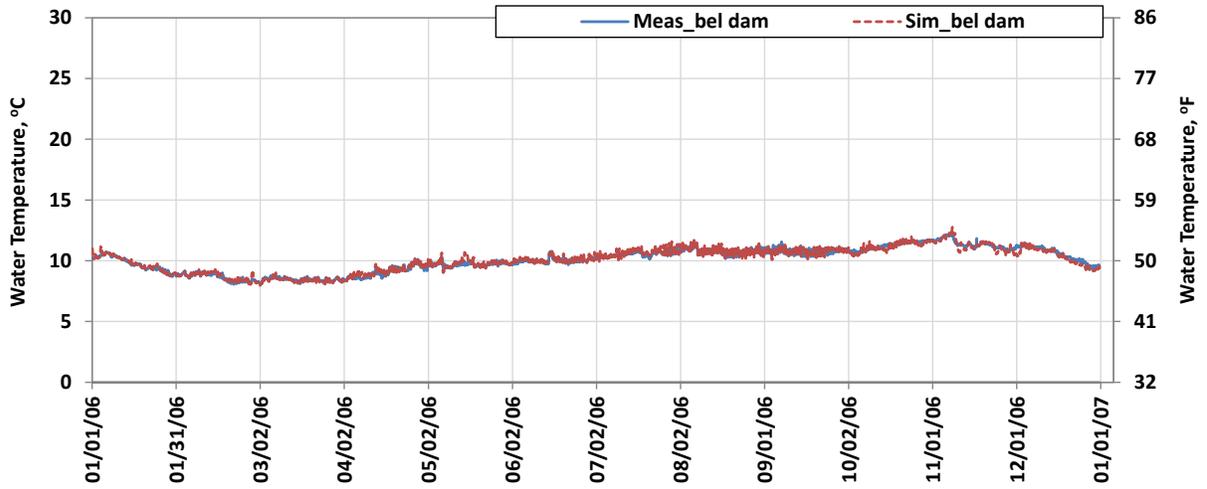


Figure B - 55. Keswick Reservoir simulated versus measured outflow temperature: 2006.

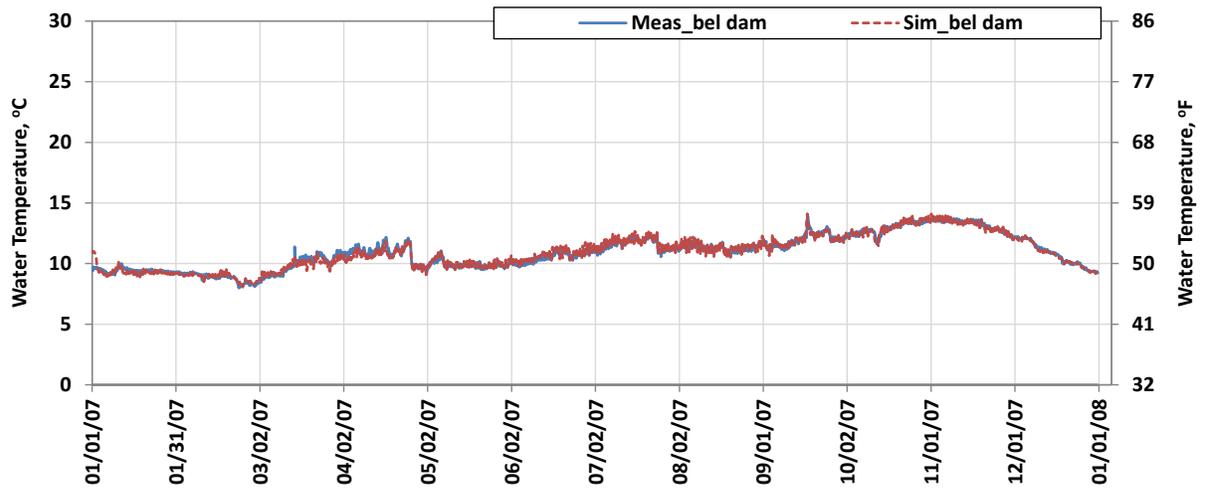


Figure B - 56. Keswick Reservoir simulated versus measured outflow temperature: 2007.

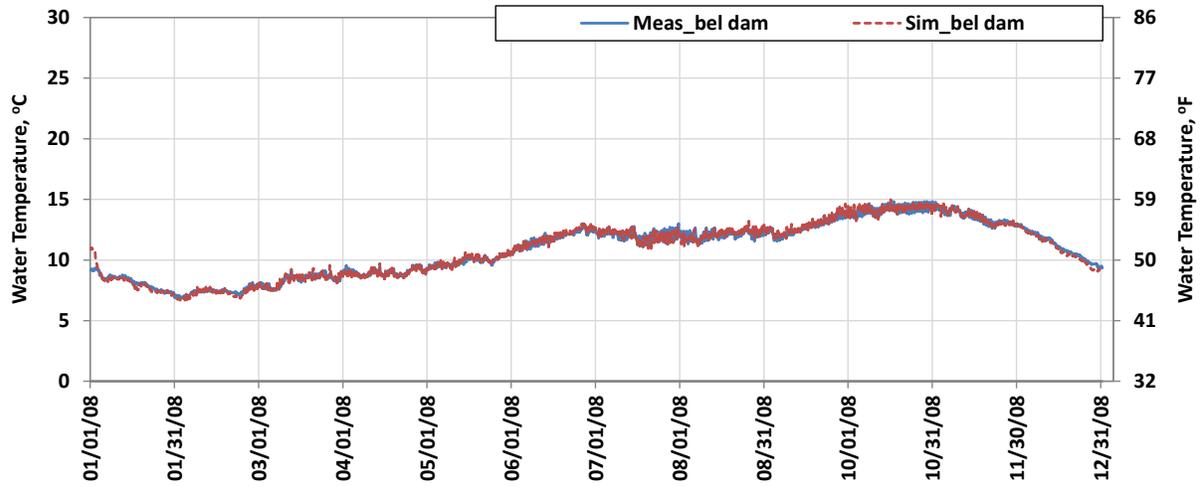


Figure B - 57. Keswick Reservoir simulated versus measured outflow temperature: 2008.

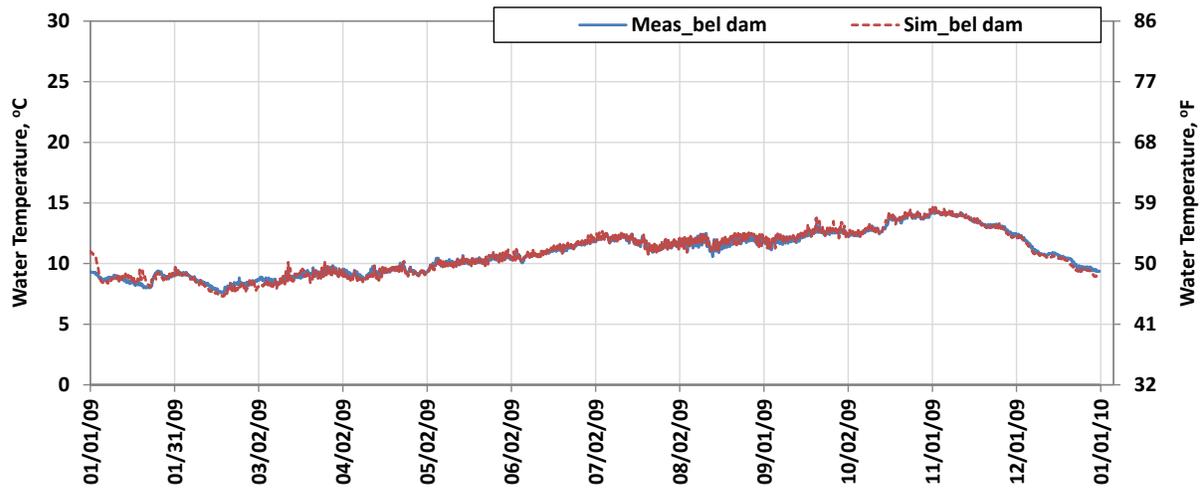


Figure B - 58. Keswick Reservoir simulated versus measured outflow temperature: 2009.

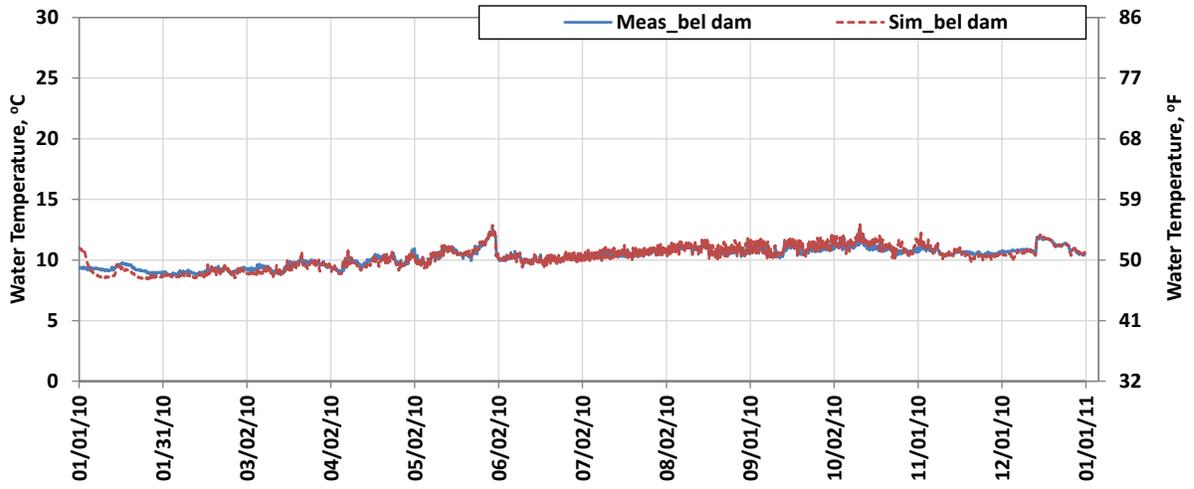


Figure B - 59. Keswick Reservoir simulated versus measured outflow temperature: 2010.

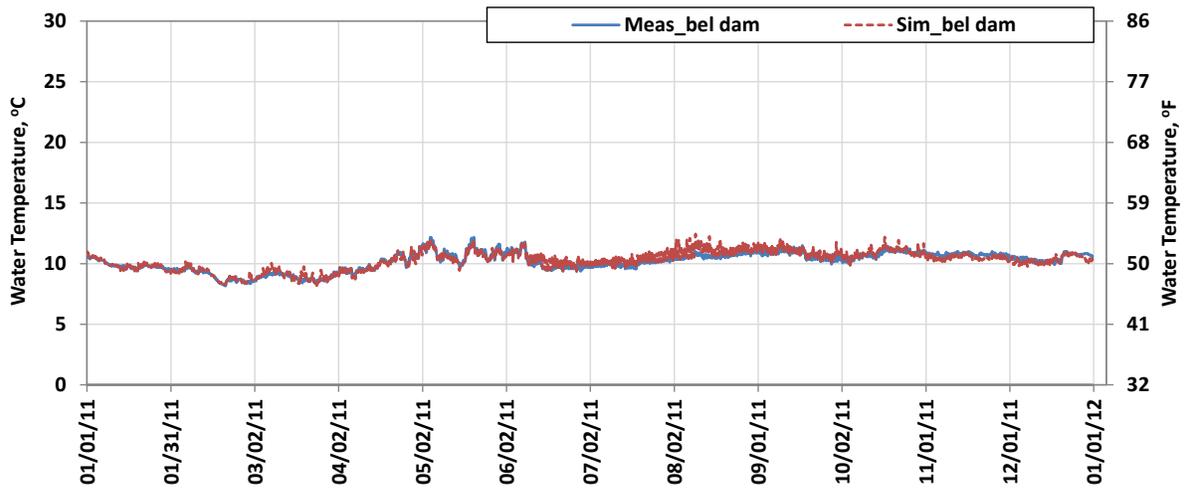


Figure B - 60. Keswick Reservoir simulated versus measured outflow temperature: 2011.

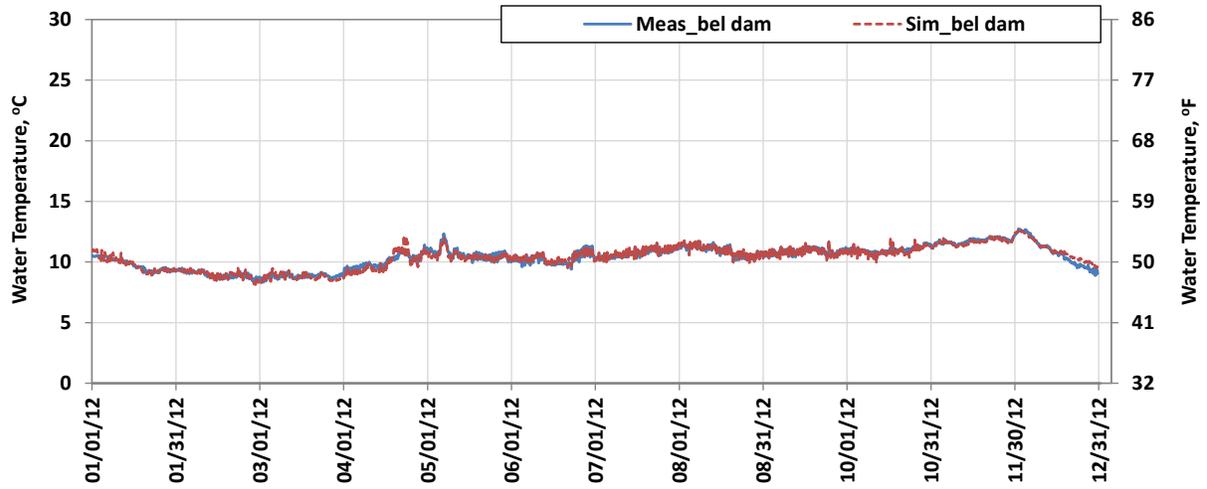


Figure B - 61. Keswick Reservoir simulated versus measured outflow temperature: 2012.

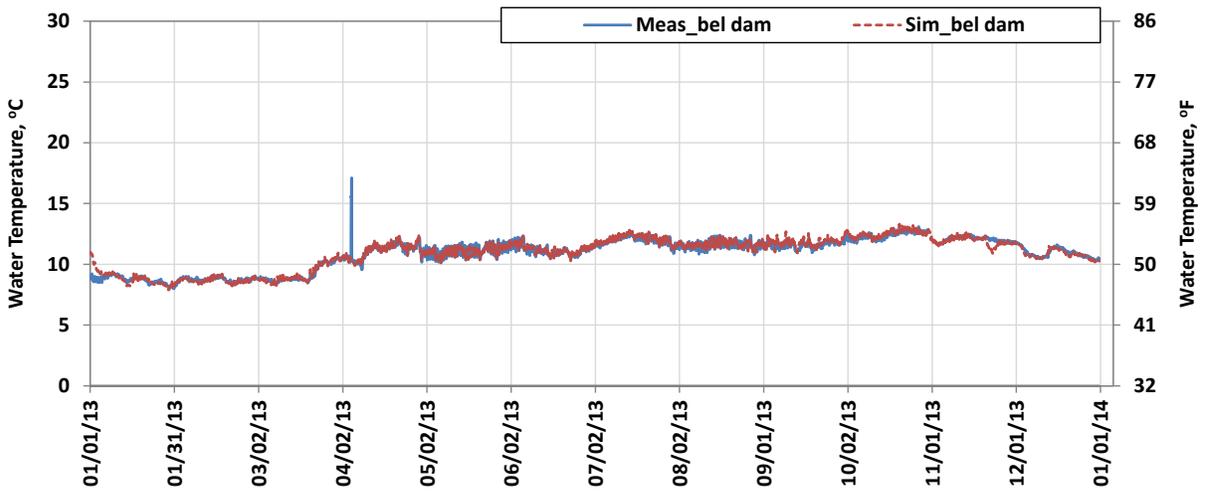


Figure B - 62. Keswick Reservoir simulated versus measured outflow temperature: 2013.

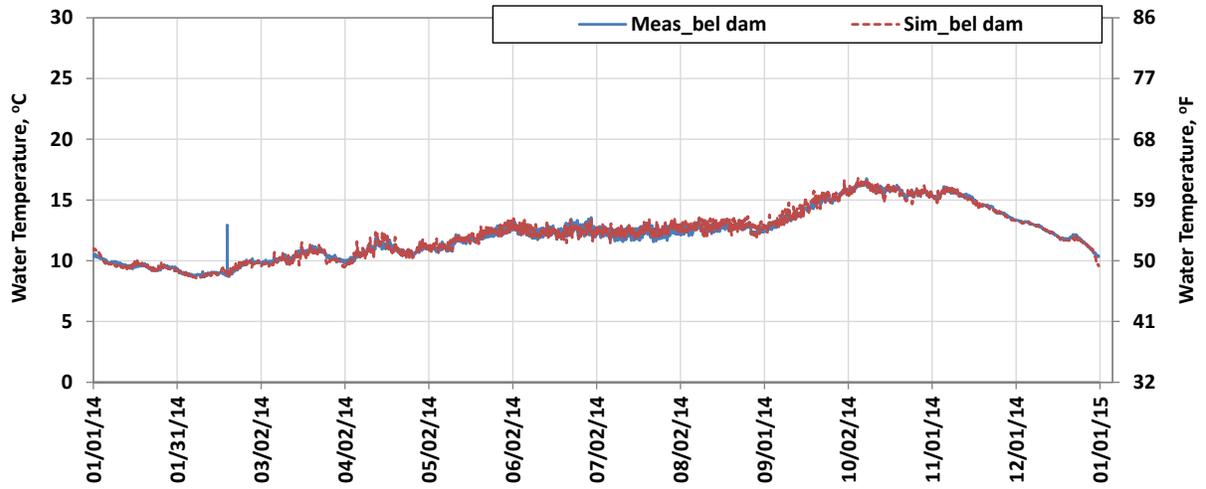


Figure B - 63. Keswick Reservoir simulated versus measured outflow temperature: 2014.

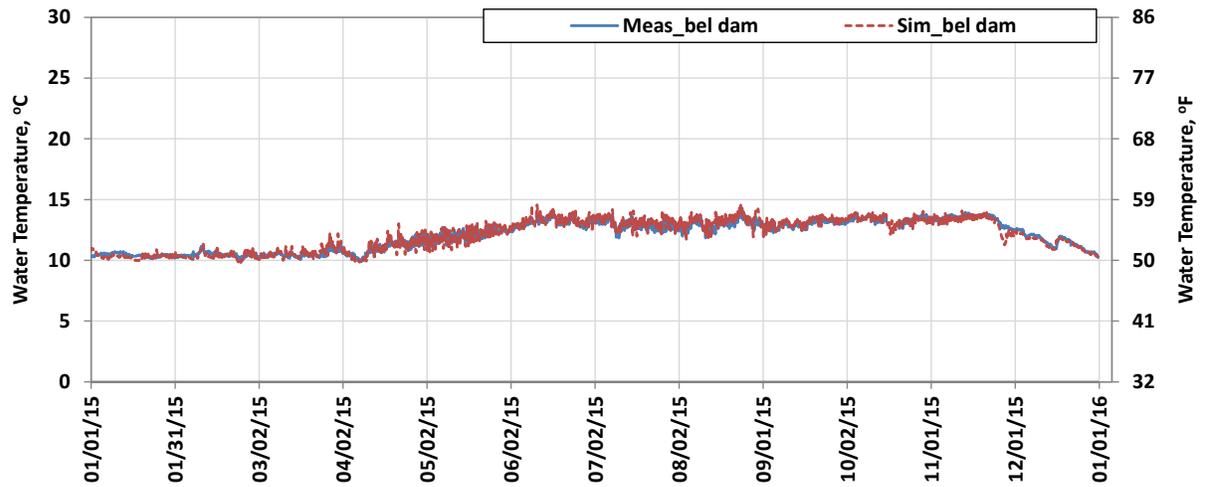


Figure B - 64. Keswick Reservoir simulated versus measured outflow temperature: 2015.

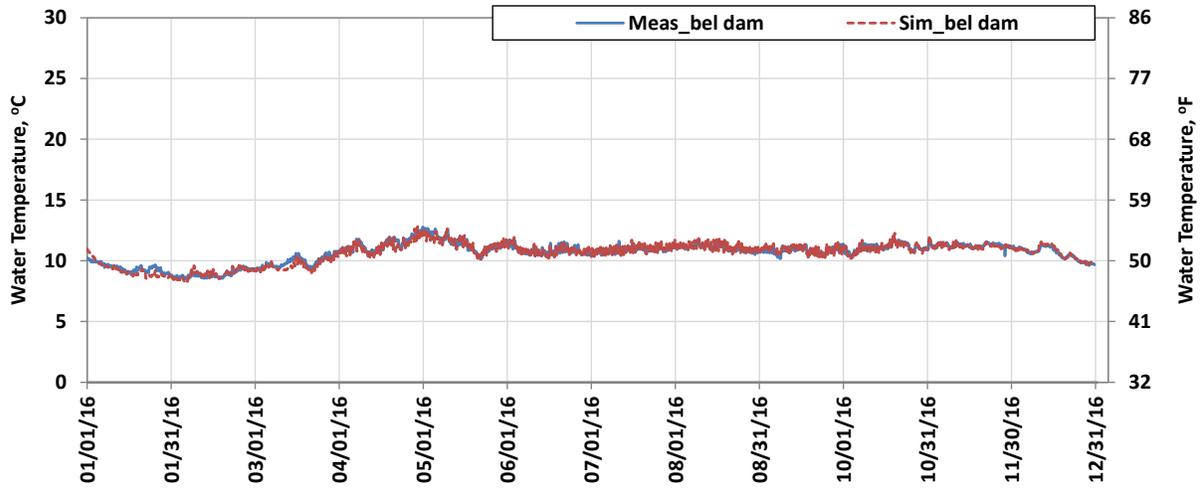


Figure B - 65. Keswick Reservoir simulated versus measured outflow temperature: 2016.

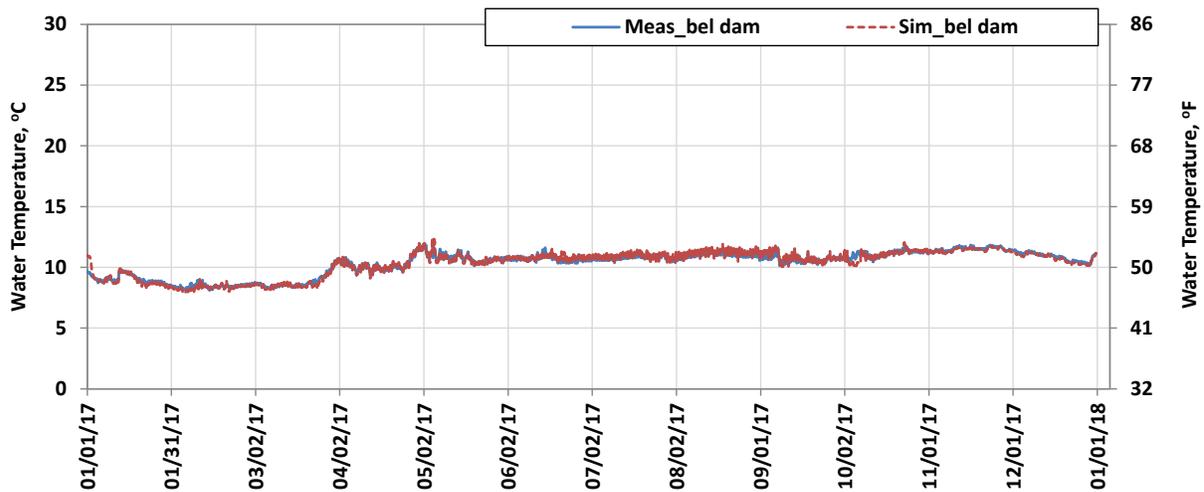


Figure B - 66. Keswick Reservoir simulated versus measured outflow temperature: 2017.

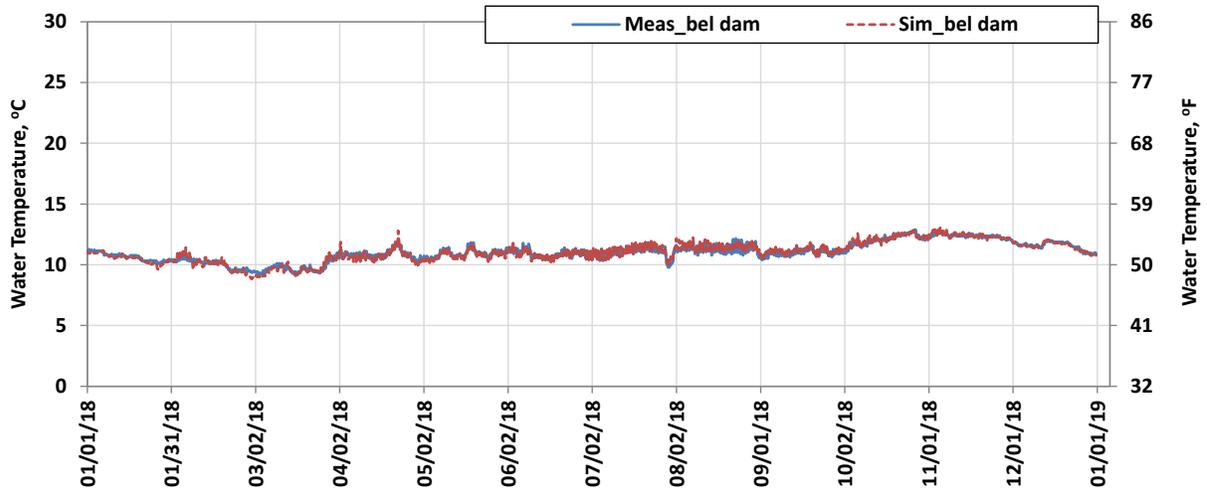


Figure B - 67. Keswick Reservoir simulated versus measured outflow temperature: 2018.

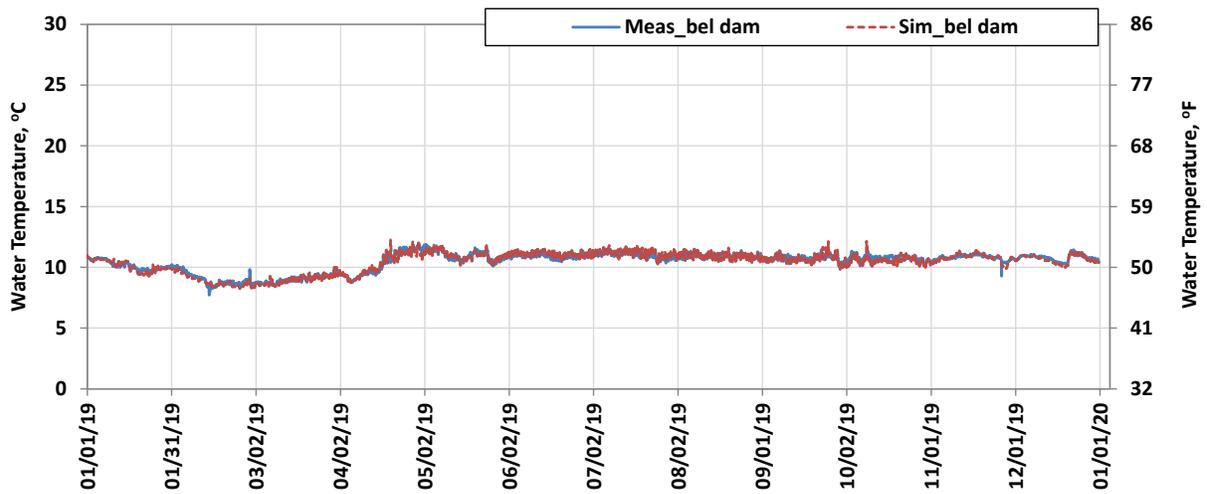


Figure B - 68. Keswick Reservoir simulated versus measured outflow temperature: 2019.

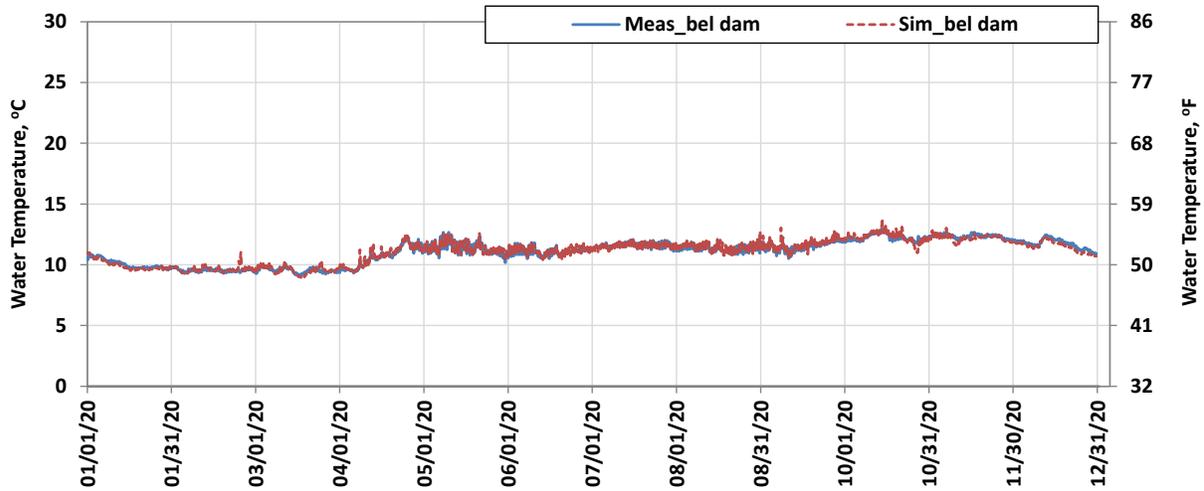


Figure B - 69. Keswick Reservoir simulated versus measured outflow temperature: 2020.

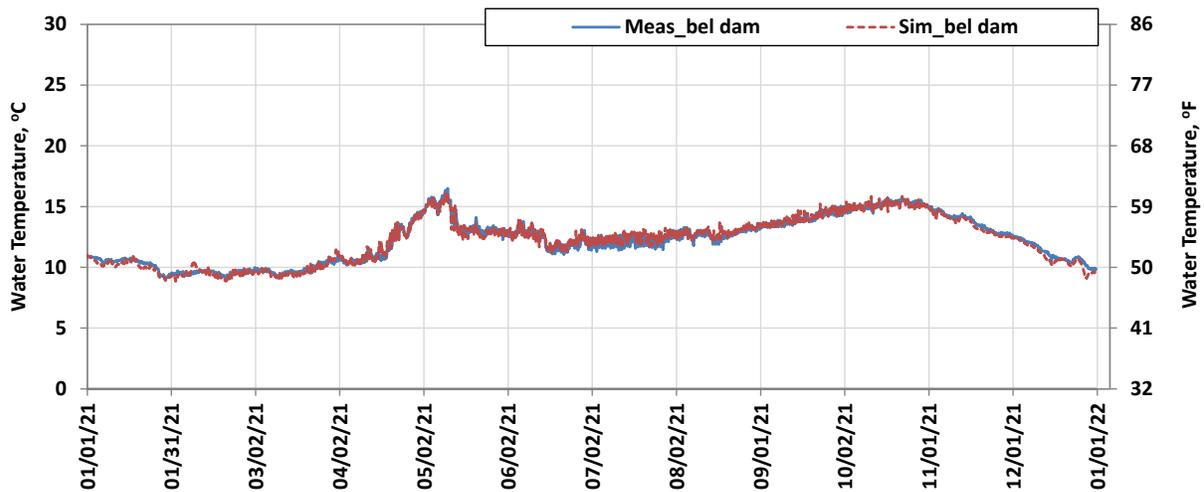


Figure B - 70. Keswick Reservoir simulated versus measured outflow temperature: 2021.

Table B - 11. Summary statistics of Keswick Reservoir outflow temperature: 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	0.01	0.01	0.07	0.00	-0.01	-0.03	0.01	0.00	0.00
MAE (°C)	0.15	0.18	0.20	0.15	0.16	0.19	0.14	0.19	0.21
RMSE (°C)	0.19	0.24	0.28	0.19	0.21	0.24	0.20	0.26	0.29
Nash-Sutcliffe (NSE)	0.96	0.97	0.94	0.94	0.98	0.96	0.96	0.96	0.98
COUNT	8,268	8,568	8,239	8,365	8,018	8,665	8,717	8,619	8,465

Table B - 12. Summary statistics of Keswick Reservoir outflow temperature: 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (°C)	0.02	-0.01	0.08	-0.01	0.04	0.03	0.03	-0.03	0.00
MAE (°C)	0.21	0.24	0.24	0.17	0.22	0.22	0.26	0.18	0.15
RMSE (°C)	0.29	0.32	0.32	0.23	0.33	0.29	0.34	0.23	0.21
Nash-Sutcliffe (NSE)	0.97	0.82	0.82	0.94	0.94	0.98	0.92	0.93	0.96
COUNT	8,739	8,668	8,735	8,739	8,639	8,731	8,642	8,762	8,745

Table B - 13. Summary statistics of Keswick Reservoir outflow temperature: 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (°C)	0.00	0.00	0.01	-0.03	--	--	--	--	--
MAE (°C)	0.16	0.18	0.17	0.23	--	--	--	--	--
RMSE (°C)	0.20	0.23	0.23	0.29	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.93	0.92	0.95	0.97	--	--	--	--	--
COUNT	8,730	8,696	8,679	8,720	--	--	--	--	--

B.5. Summary Statistics for May - October

Table B - 14. Summary statistics of Keswick Reservoir elevation (stage) (May-October(incl.) period): 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (ft)	--	0.36	0.44	-0.03	0.08	0.49	-0.45	-0.03	0.89
MAE (ft)	--	0.74	0.89	0.84	0.50	0.82	0.56	0.44	0.92
RMSE (ft)	--	1.11	1.23	1.05	0.60	1.17	0.71	0.79	1.08
Nash-Sutcliffe (NSE)	--	0.74	0.67	0.73	0.92	0.63	0.52	0.81	0.76
COUNT	--	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416

Table B - 15. Summary statistics of Keswick Reservoir elevation (stage) (May-October(incl.) period): 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (ft)	0.63	0.04	-0.21	0.42	-0.03	-0.43	0.66	0.01	0.34
MAE (ft)	0.76	0.39	1.23	0.88	0.75	0.72	0.68	0.43	0.61
RMSE (ft)	0.98	0.56	1.41	1.11	0.96	0.89	0.78	0.52	0.72
Nash-Sutcliffe (NSE)	0.74	0.96	0.80	0.87	0.88	0.90	0.92	0.96	0.92
COUNT	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416

Table B - 16. Summary statistics of Keswick Reservoir elevation (stage) (May-October(incl.) period): 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (ft)	0.40	-0.87	0.22	-0.01	--	--	--	--	--
MAE (ft)	0.85	0.88	0.36	0.37	--	--	--	--	--
RMSE (ft)	1.02	1.00	0.51	0.54	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.83	0.83	0.97	0.95	--	--	--	--	--
COUNT	4,416	4,416	4,416	4,416	--	--	--	--	--

Table B - 17. Summary statistics of Keswick Reservoir outflow (May-October(incl.) period): 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (cfs)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
MAE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
RMSE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nash-Sutcliffe (NSE)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
COUNT	4,416	4,369	4,408	4,396	4,352	4,362	4,414	4,416	4,415

Table B - 18. Summary statistics of Keswick Reservoir outflow (May-October(incl.) period): 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (cfs)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
MAE (cfs)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
RMSE (cfs)	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1
Nash-Sutcliffe (NSE)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
COUNT	4,401	4,416	4,416	4,416	4,415	4,416	4,415	4,416	4,416

Table B - 19. Summary statistics of Keswick Reservoir outflow (May-October(incl.) period): 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (cfs)	0.1	0.0	0.0	0.0	--	--	--	--	--
MAE (cfs)	0.1	0.1	0.1	0.1	--	--	--	--	--
RMSE (cfs)	0.2	0.1	0.1	0.1	--	--	--	--	--
Nash-Sutcliffe (NSE)	1.0	1.0	1.0	1.0	--	--	--	--	--
COUNT	4,412	4,416	4,415	4,413	--	--	--	--	--

Table B - 20. Summary statistics of Keswick Reservoir outflow temperature (May-October(incl.) period): 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	0.08	0.08	0.12	0.08	0.06	0.05	0.03	0.07	0.08
MAE (°C)	0.15	0.19	0.22	0.16	0.17	0.18	0.15	0.20	0.24
RMSE (°C)	0.20	0.25	0.30	0.21	0.22	0.23	0.21	0.25	0.31
Nash-Sutcliffe (NSE)	0.92	0.94	0.79	0.89	0.97	0.94	0.87	0.96	0.95
COUNT	4,223	4,247	4,181	4,150	3,930	4,365	4,390	4,352	4,099

Table B - 21. Summary statistics of Keswick Reservoir outflow temperature (May-October(incl.) period): 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (°C)	0.11	0.11	0.21	-0.01	0.10	0.10	0.13	0.03	0.06
MAE (°C)	0.20	0.23	0.30	0.16	0.24	0.27	0.30	0.17	0.18
RMSE (°C)	0.25	0.30	0.39	0.20	0.30	0.34	0.38	0.22	0.24
Nash-Sutcliffe (NSE)	0.97	0.56	0.48	0.78	0.71	0.95	0.47	0.72	0.39
COUNT	4,401	4,350	4,414	4,392	4,395	4,397	4,313	4,416	4,415

Table B - 22. Summary statistics of Keswick Reservoir outflow temperature (May-October(incl.) period): 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (°C)	0.06	0.05	0.07	0.07	--	--	--	--	--
MAE (°C)	0.18	0.21	0.18	0.22	--	--	--	--	--
RMSE (°C)	0.22	0.26	0.27	0.29	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.83	0.13	0.76	0.94	--	--	--	--	--
COUNT	4,389	4,385	4,311	4,390	--	--	--	--	--

Table B - 23. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation: 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	0.04	0.23	0.20	0.05	-0.15	0.08	-0.08	0.00	0.08
MAE (°C)	0.22	0.38	0.34	0.20	0.37	0.26	0.29	0.34	0.33
RMSE (°C)	0.31	0.54	0.45	0.25	0.47	0.32	0.36	0.44	0.43
Nash-Sutcliffe (NSE)	0.89	0.86	0.84	0.90	0.90	0.93	0.87	0.90	0.96
COUNT	8,220	8,568	8,239	8,365	8,018	8,665	8,717	8,619	8,465

Table B - 24. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation: 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (°C)	0.41	0.14	0.23	0.13	0.17	0.29	0.31	0.27	0.18
MAE (°C)	0.49	0.37	0.29	0.25	0.41	0.40	0.45	0.38	0.33
RMSE (°C)	0.67	0.47	0.37	0.36	0.57	0.52	0.60	0.53	0.40
Nash-Sutcliffe (NSE)	0.85	0.62	0.76	0.86	0.81	0.93	0.76	0.61	0.84
COUNT	8,739	8,668	8,735	8,739	8,639	8,731	8,642	8,762	8,745

Table B - 25. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation: 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (°C)	-0.02	0.30	0.08	-0.03	--	--	--	--	--
MAE (°C)	0.31	0.51	0.29	0.42	--	--	--	--	--
RMSE (°C)	0.39	0.66	0.38	0.52	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.76	0.32	0.85	0.92	--	--	--	--	--
COUNT	8,730	8,696	8,679	8,720	--	--	--	--	--

Table B - 26. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation (May-October(incl.) period): 2000-2008.

Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	0.14	0.45	0.40	0.21	0.09	0.25	0.15	0.21	0.19
MAE (°C)	0.19	0.47	0.44	0.24	0.26	0.27	0.23	0.35	0.38
RMSE (°C)	0.24	0.65	0.55	0.29	0.33	0.33	0.28	0.45	0.46
Nash-Sutcliffe (NSE)	0.88	0.58	0.29	0.78	0.93	0.89	0.75	0.82	0.89
COUNT	4,223	4,247	4,181	4,150	3,930	4,365	4,390	4,352	4,099

Table B - 27. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation (May-October(incl.) period): 2009-2017.

Statistic	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean Bias (°C)	0.65	0.42	0.37	0.29	0.40	0.46	0.53	0.50	0.31
MAE (°C)	0.66	0.44	0.40	0.34	0.43	0.52	0.57	0.52	0.35
RMSE (°C)	0.83	0.52	0.48	0.45	0.56	0.64	0.71	0.66	0.43
Nash-Sutcliffe (NSE)	0.40	-0.33	0.21	-0.12	0.00	0.82	-0.85	-1.63	-1.06
COUNT	4,401	4,350	4,414	4,392	4,395	4,397	4,313	4,416	4,415

Table B - 28. Summary statistics of Keswick Reservoir outflow temperature for the coupled Shasta Lake – Keswick Reservoir model simulation (May-October(incl.) period): 2018-2021.

Statistic	2018	2019	2020	2021	--	--	--	--	--
Mean Bias (°C)	0.17	0.58	0.26	0.32	--	--	--	--	--
MAE (°C)	0.28	0.59	0.31	0.37	--	--	--	--	--
RMSE (°C)	0.36	0.75	0.47	0.46	--	--	--	--	--
Nash-Sutcliffe (NSE)	0.54	-5.99	0.33	0.86	--	--	--	--	--
COUNT	4,389	4,385	4,311	4,390	--	--	--	--	--