Photo credit: John Hannon, Reclamation

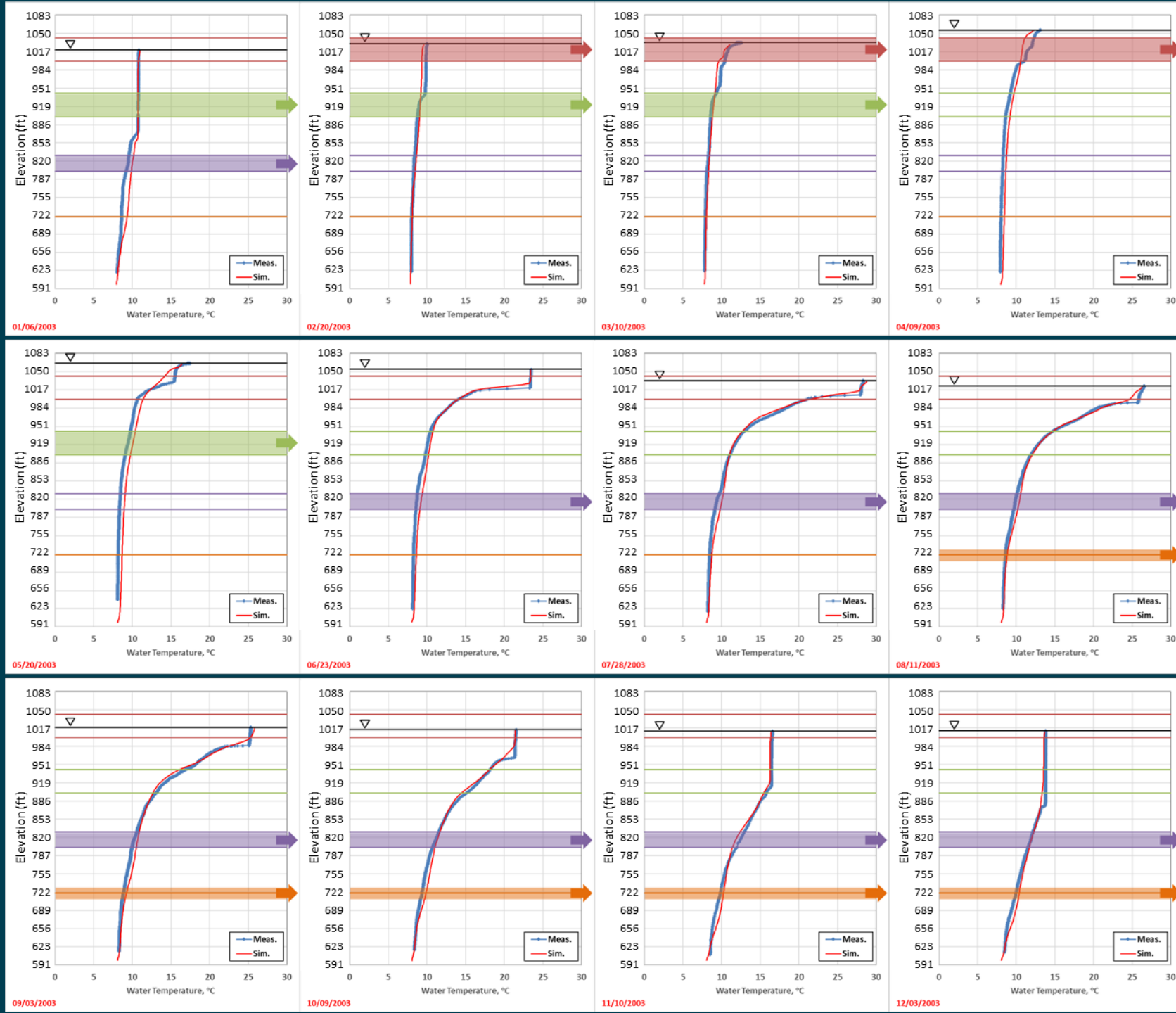# Calibration, Validation and Sensitivity Performance

Randi Field, Hydrologic Engineer

Reclamation, Central Valley Operations Office

Sacramento River Basin - Shasta Lake (Part I)

- CE-QUAL-W2
- 2003 Shasta Lake water temperature profile as an example
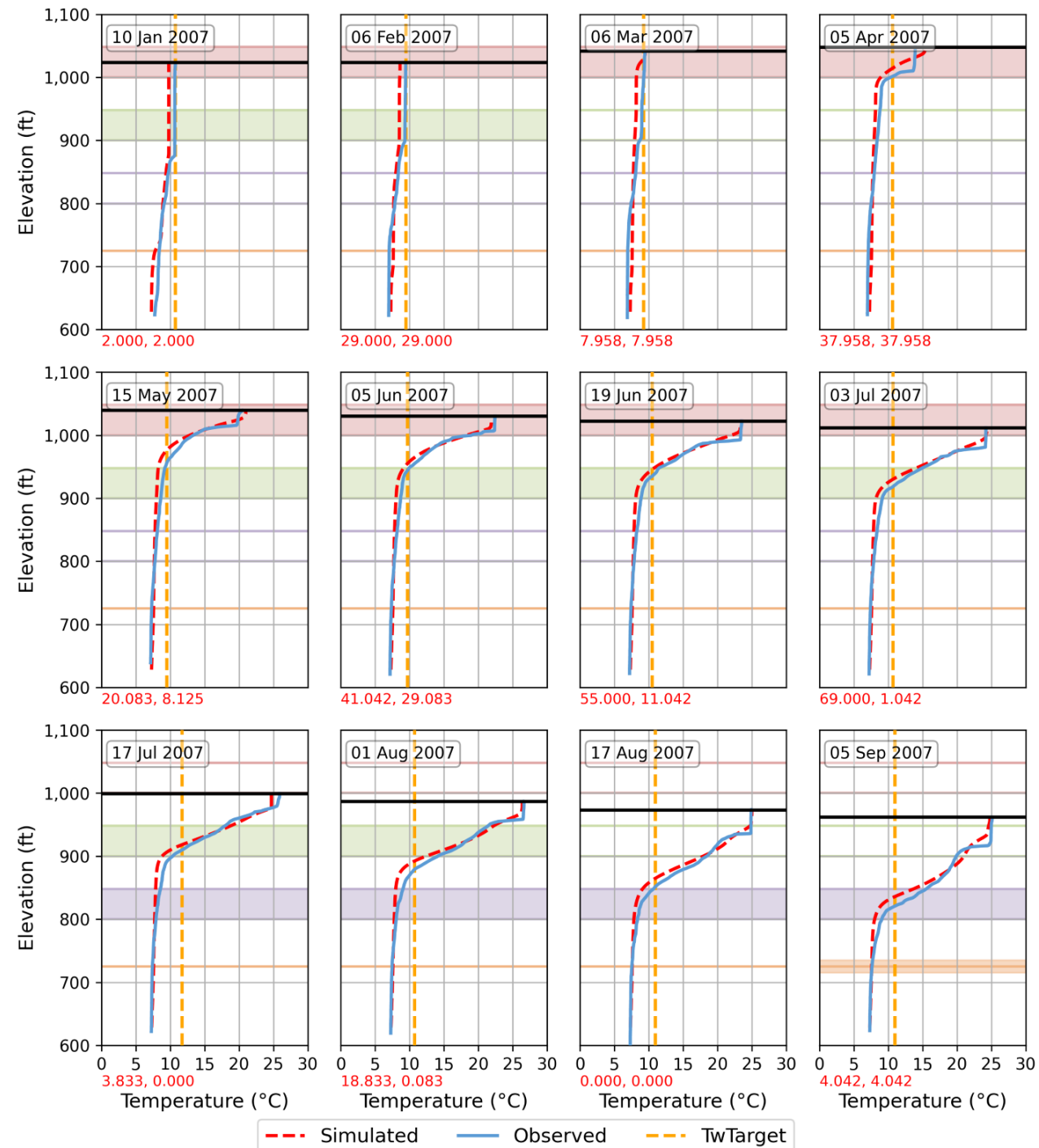
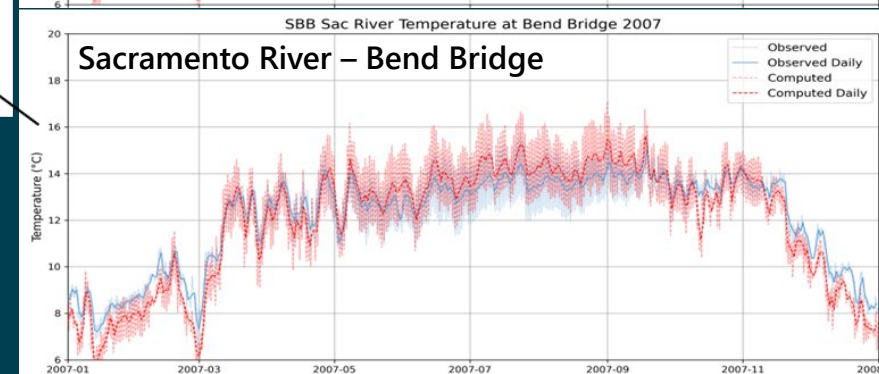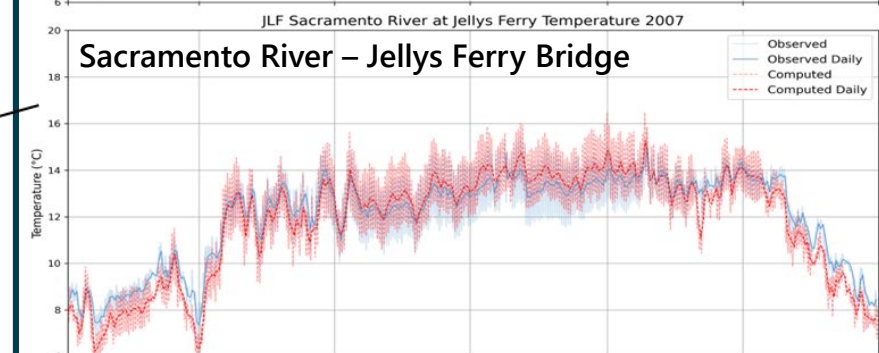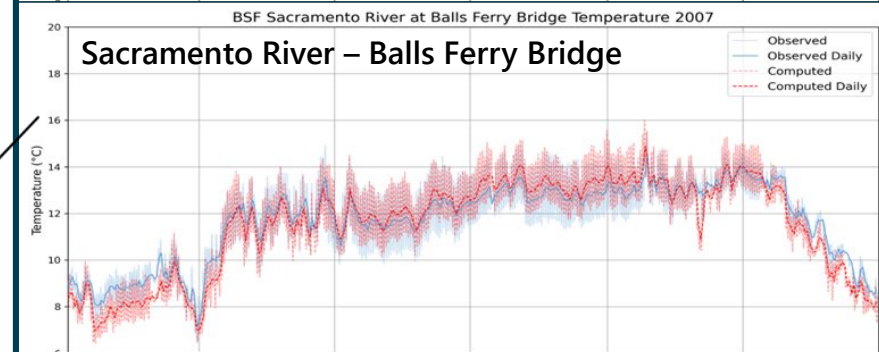# Sacramento River Basin - Shasta Lake (II)

- CE-QUAL-W2
- 2003 Shasta Lake water temperature profile as an example

Statistic	01/06	02/20	03/10	04/09	05/20	06/23	07/28	08/11	09/03	10/09	11/10	12/03
Mean Bias (°C)	0.33	-0.04	0.02	0.27	0.43	0.25	0.11	0.16	0.12	0.07	-0.03	0.07
MAE (°C)	0.36	0.23	0.23	0.50	0.62	0.40	0.37	0.31	0.39	0.32	0.30	0.28
RMSE (°C)	0.48	0.30	0.28	0.53	0.66	0.59	0.51	0.40	0.48	0.40	0.35	0.33
NSE	0.79	0.82	0.91	0.83	0.90	0.98	0.99	0.99	0.99	0.99	0.99	0.97

Sacramento River Basin - Shasta Lake (III)

- CE-QUAL-W2
- 2003 reservoir outflow temperature as an example
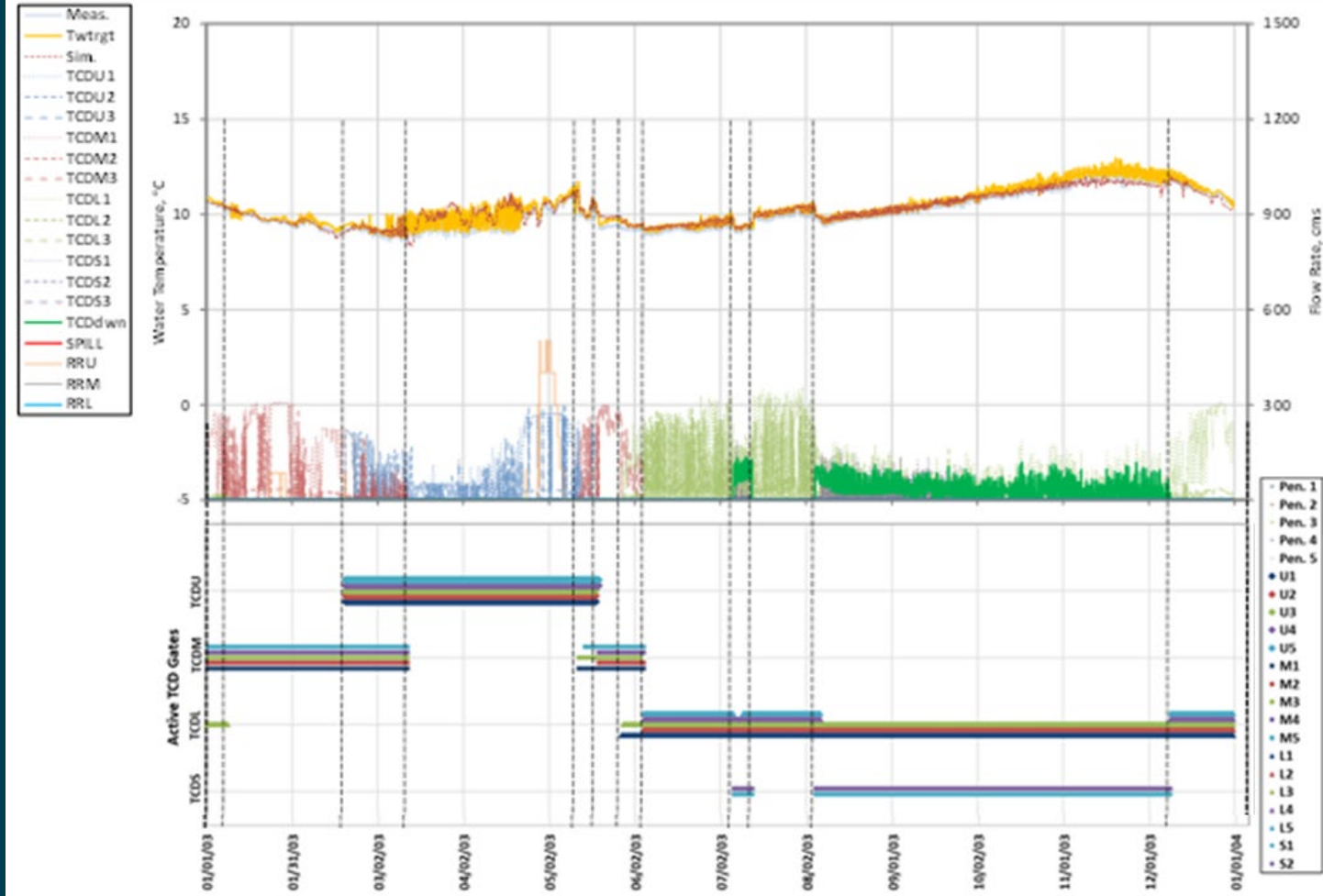
Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	-0.09	0.09	-0.01	**-0.11**	-0.42	-0.06	-0.31	-0.29	-0.25
MAE (°C)	0.61	0.36	0.31	**0.20**	0.47	0.15	0.33	0.38	0.37
RMSE (°C)	0.75	0.59	0.45	**0.31**	0.73	0.25	0.47	0.64	0.68
NSE	**0.53***	0.85	0.88	**0.88**	0.85	0.97	0.78	0.82	0.92

Sacramento River Basin - Shasta Lake (IV)

- HEC-ResSim
- 2007 Shasta Lake water temperature profile as an example
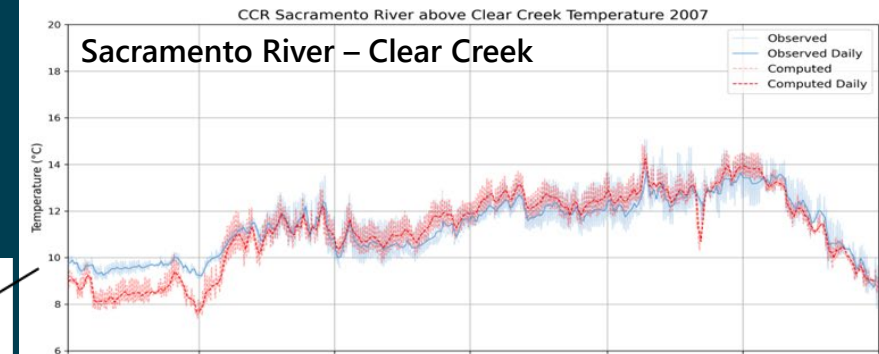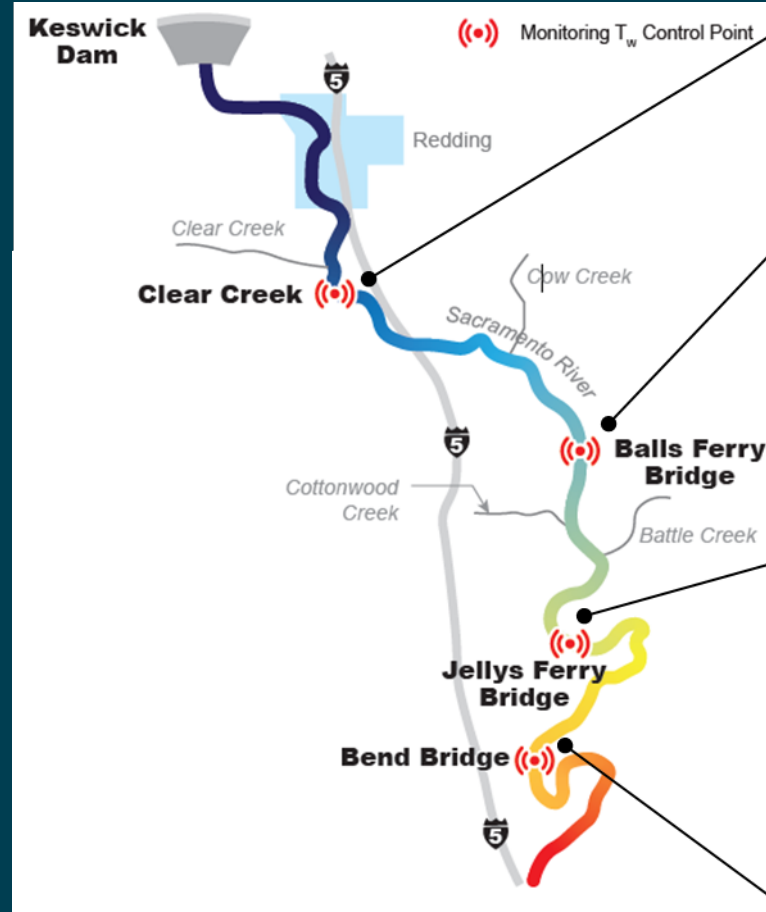
Sacramento River Basin - Shasta Lake (V)

- HEC-ResSim
- 2007 Shasta Lake water temperature profile as an example
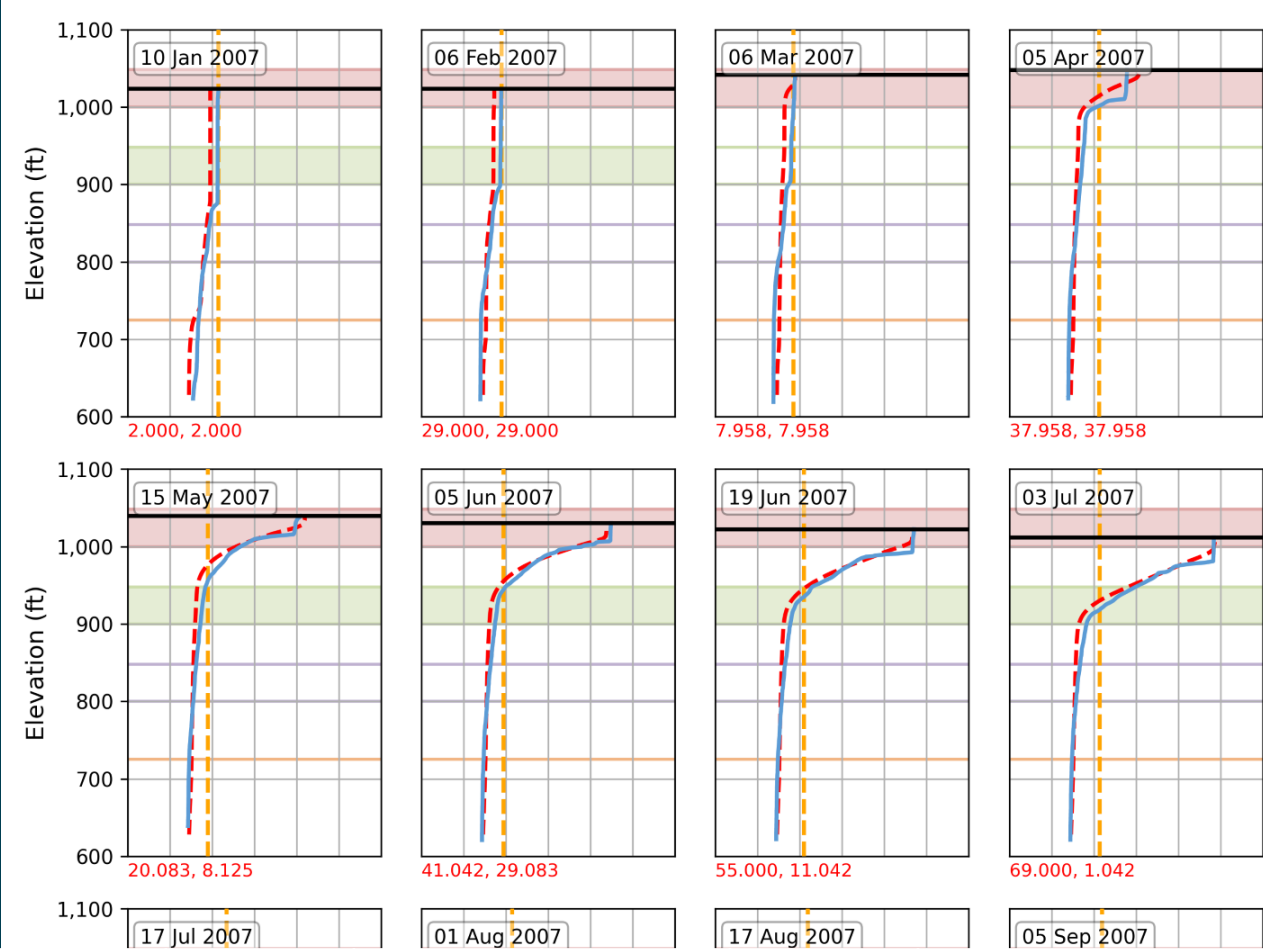
Statistic	1/10	2/6	3/6	4/5	5/15	6/5	7/17	8/1	9/5	9/17	10/2	10/24
Mean Bias (°C)	-0.60	-0.22	-0.12	-0.12	-0.24	-0.31	-0.30	-0.39	-0.51	-0.52	**-0.96***	**-1.3***
MAE (°C)	0.61	0.53	0.56	0.57	0.46	0.44	0.50	0.55	0.69	0.84	1.0	**1.3 ***
RMSE (°C)	0.69	0.59	0.63	0.76	0.59	0.59	0.70	0.82	1.0	1.3	**1.7***	**2.1***
NSE	**0.56***	**0.64***	**0.56***	0.85	0.97	0.98	0.98	0.98	0.98	0.96	0.89	0.69

Sacramento River Basin – Sacramento River (VI)

- HEC-ResSim
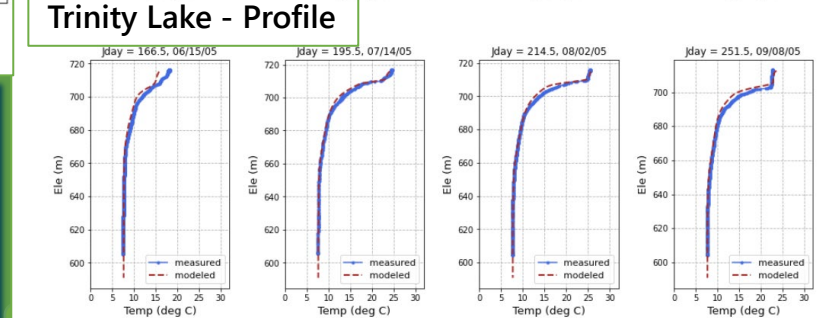- 2007 Sacramento River water temperature at four control points as an example

Sacramento River – Clear Creek

Sacramento River – Balls Ferry Bridge

Sacramento River – Jellys Ferry Bridge
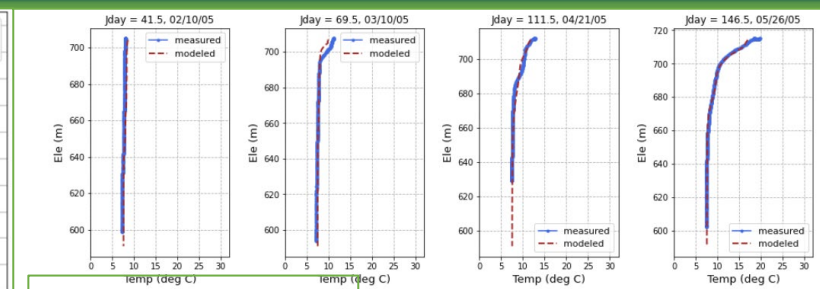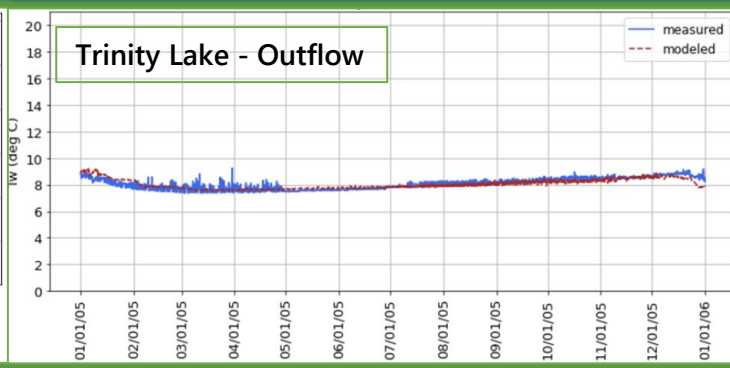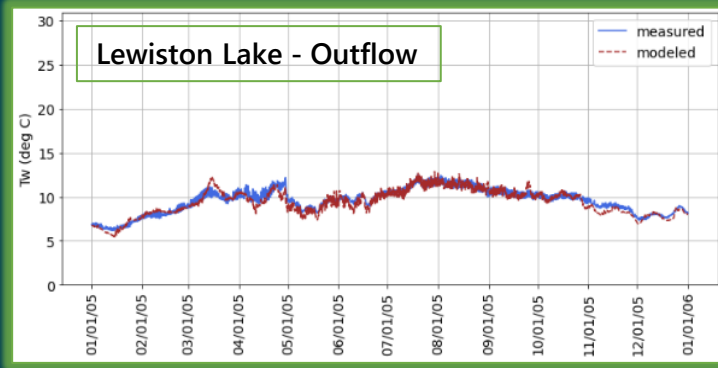
Sacramento River – Bend Bridge

Sacramento River Basin - Shasta Lake (VII)

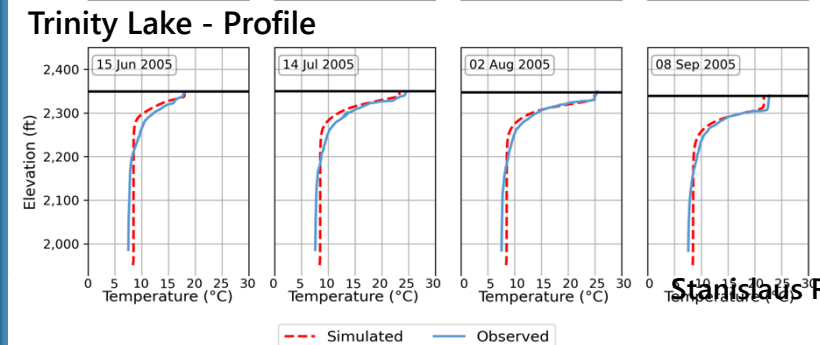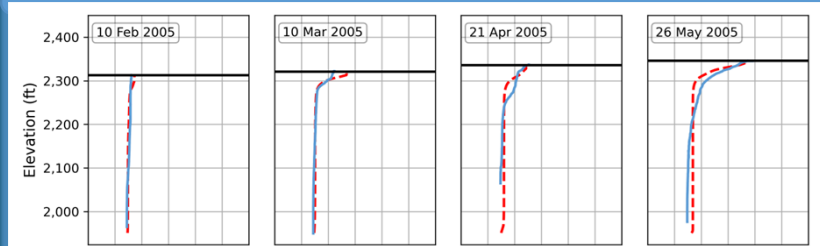- HEC-ResSim
- 2007 Shasta Lake outflow temperature as an example
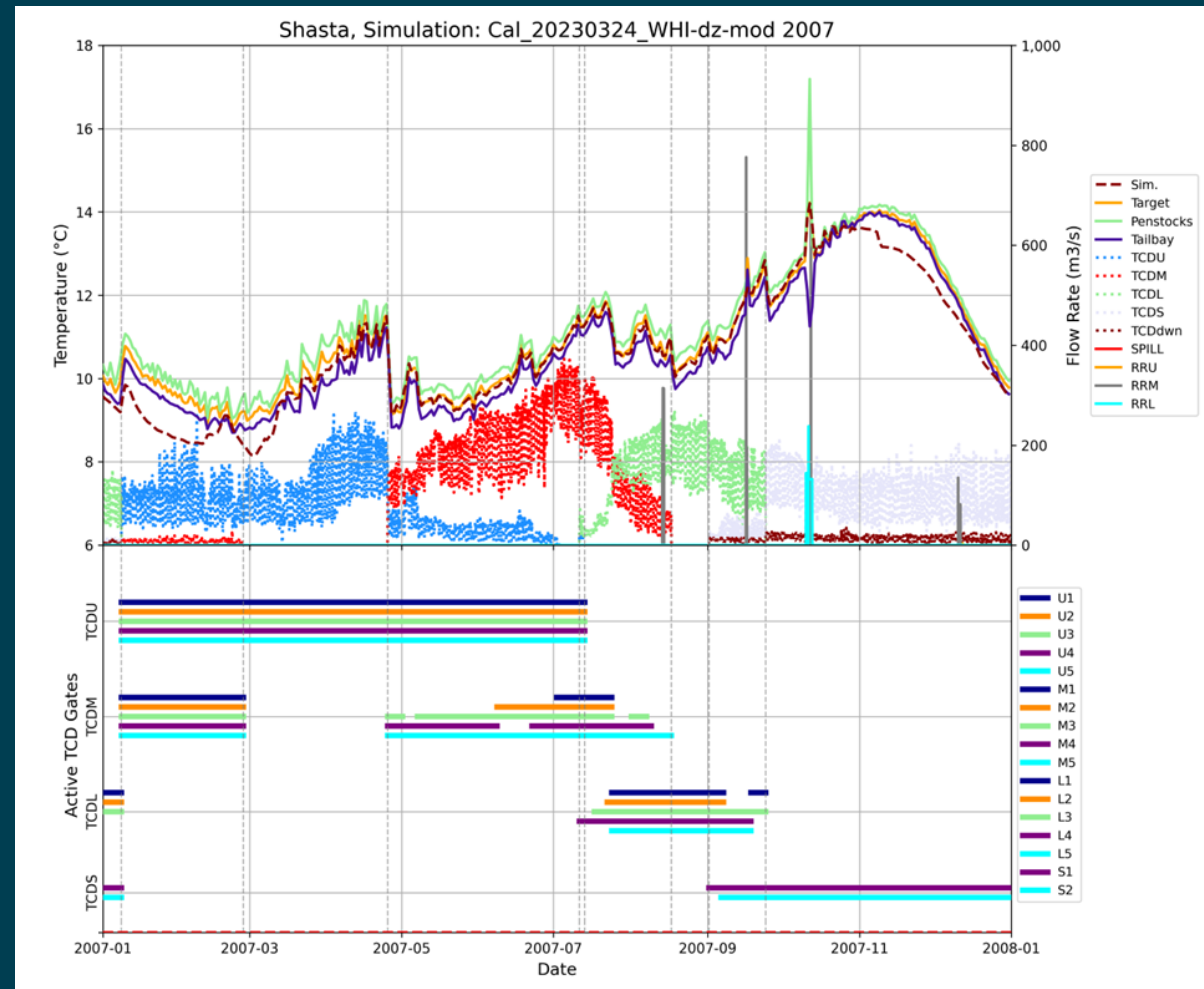
Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean Bias (°C)	-0.02	-0.25	-0.26	-0.31	-0.20	-0.44	-0.33	**-0.25**	-0.27
MAE (°C)	0.09	0.27	0.27	0.32	0.22	0.44	0.33	**0.28**	0.30
RMSE (°C)	0.19	0.46	0.46	0.51	0.40	0.63	0.49	**0.46**	0.54
NSE	0.97	0.91	0.88	0.70	0.95	0.79	0.77	**0.90**	0.95

Trinity River Basin — 2005 results for an example

HEC-ResSim

Trinity Lake - Profile

Lewiston Lake - Outflow

Trinity Lake - Outflow

CE-QUAL-W2

Trinity Lake - Profile

Trinity Lake - Outflow

Lewiston Lake - Outflow

Stanislaus River at Ripon

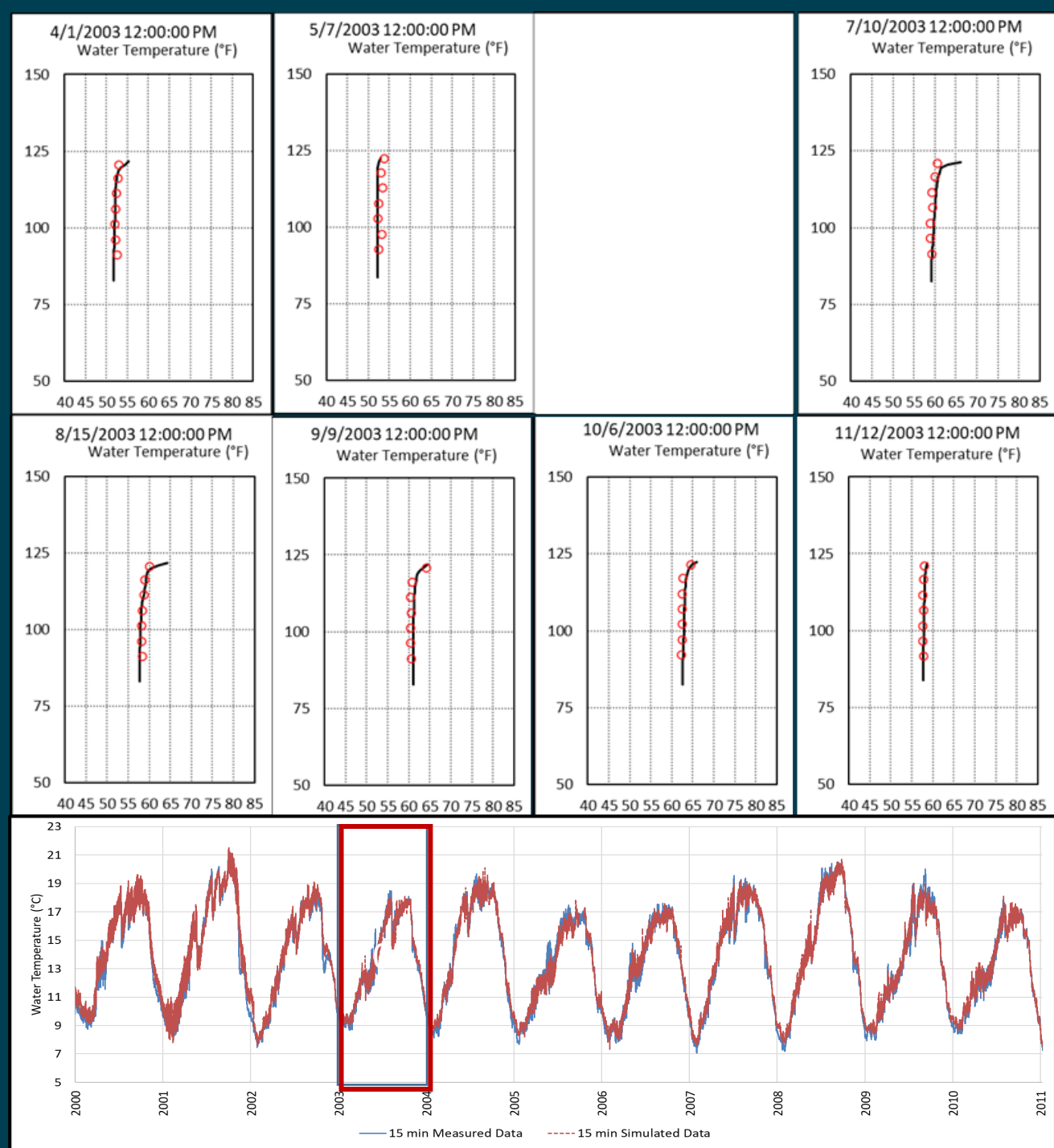Trinity River – Douglas City

Trinity River – Lime Kiln Gulch

Trinity River – above NF Trinity River
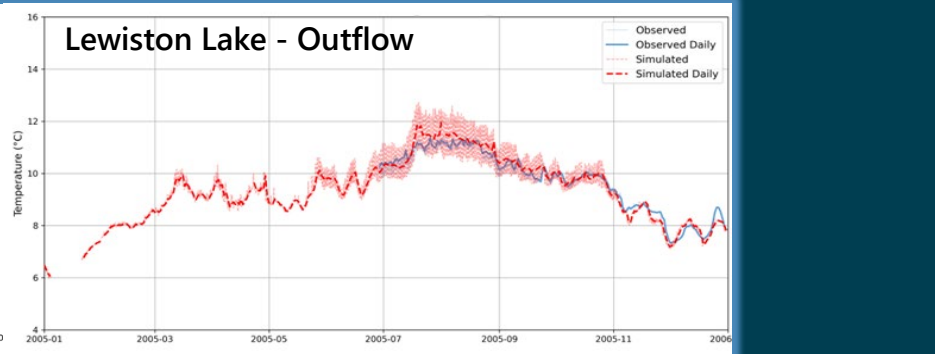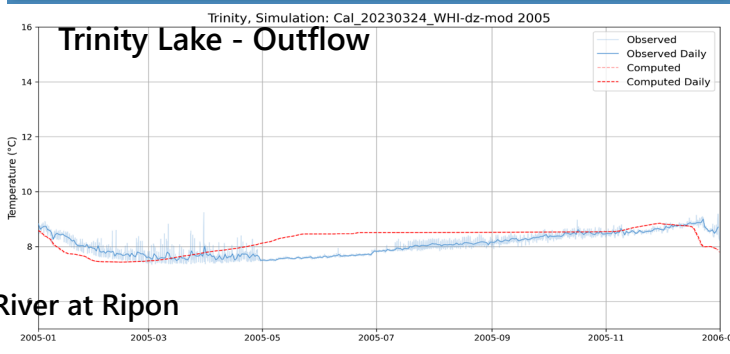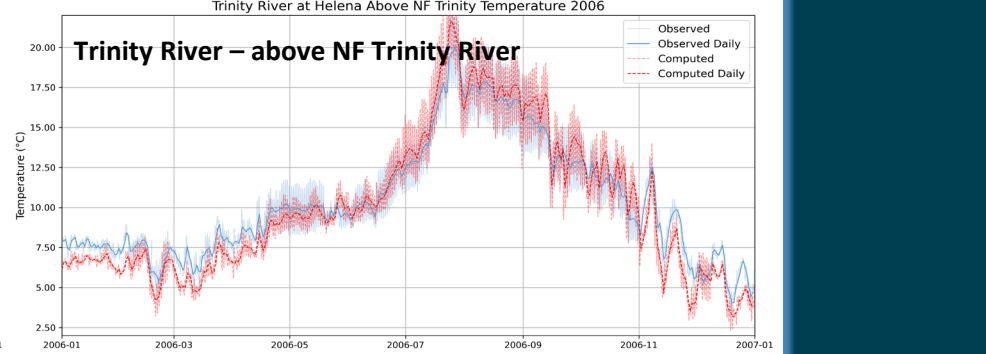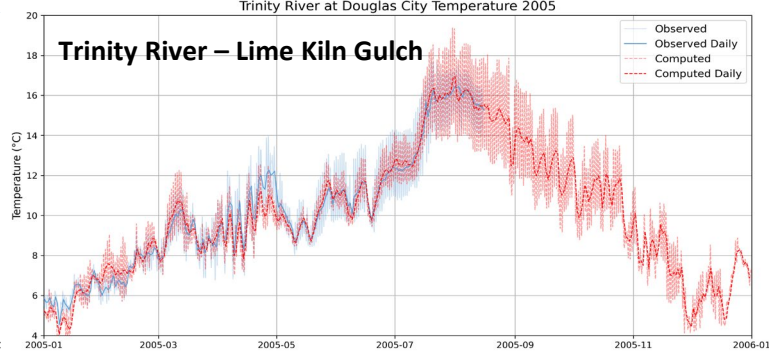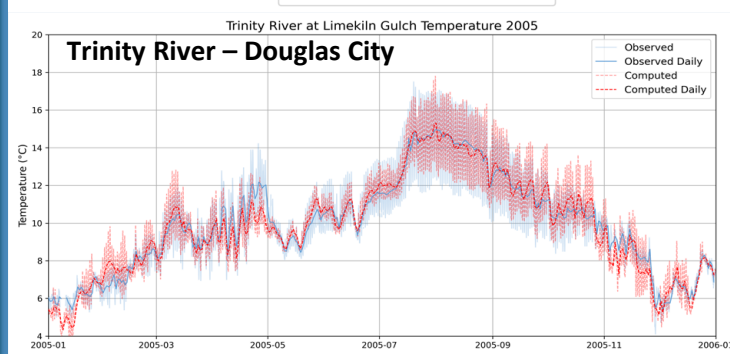
American River Basin - Folsom Lake

- CE-QUAL-W2
- 2003 Folsom Lake water temperature profile and outflow temperatures as an example
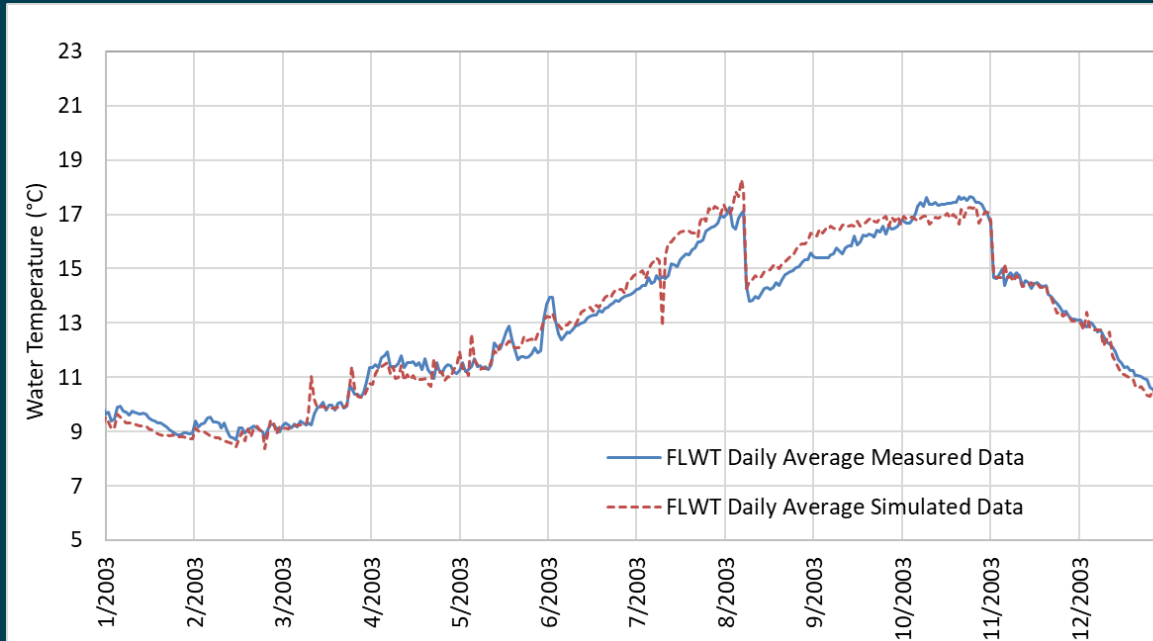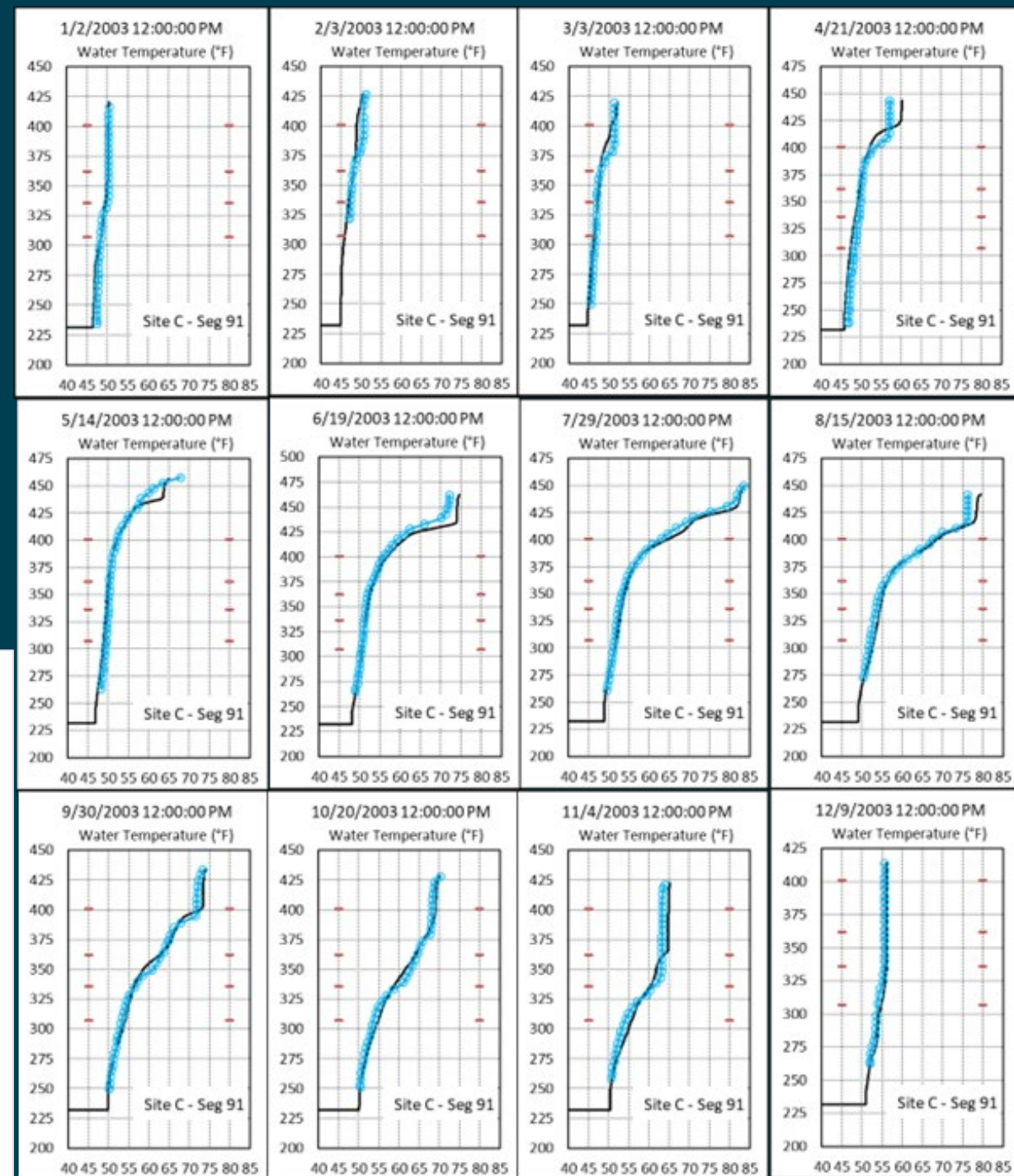
American River Basin - Lake Natoma

- CE-QUAL-W2
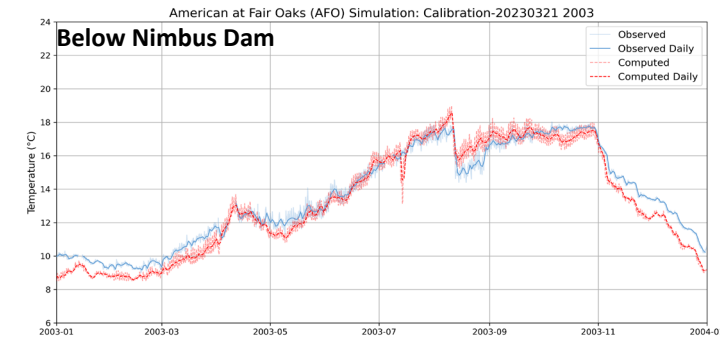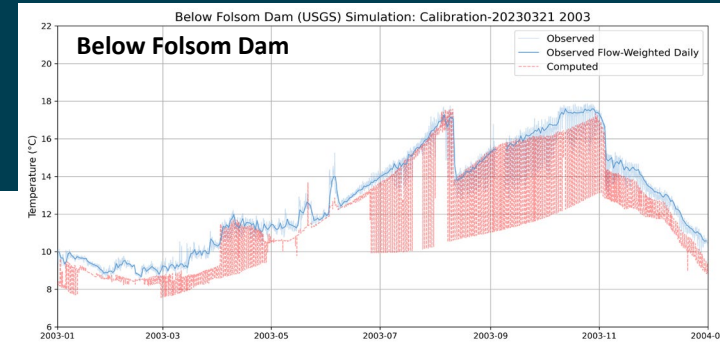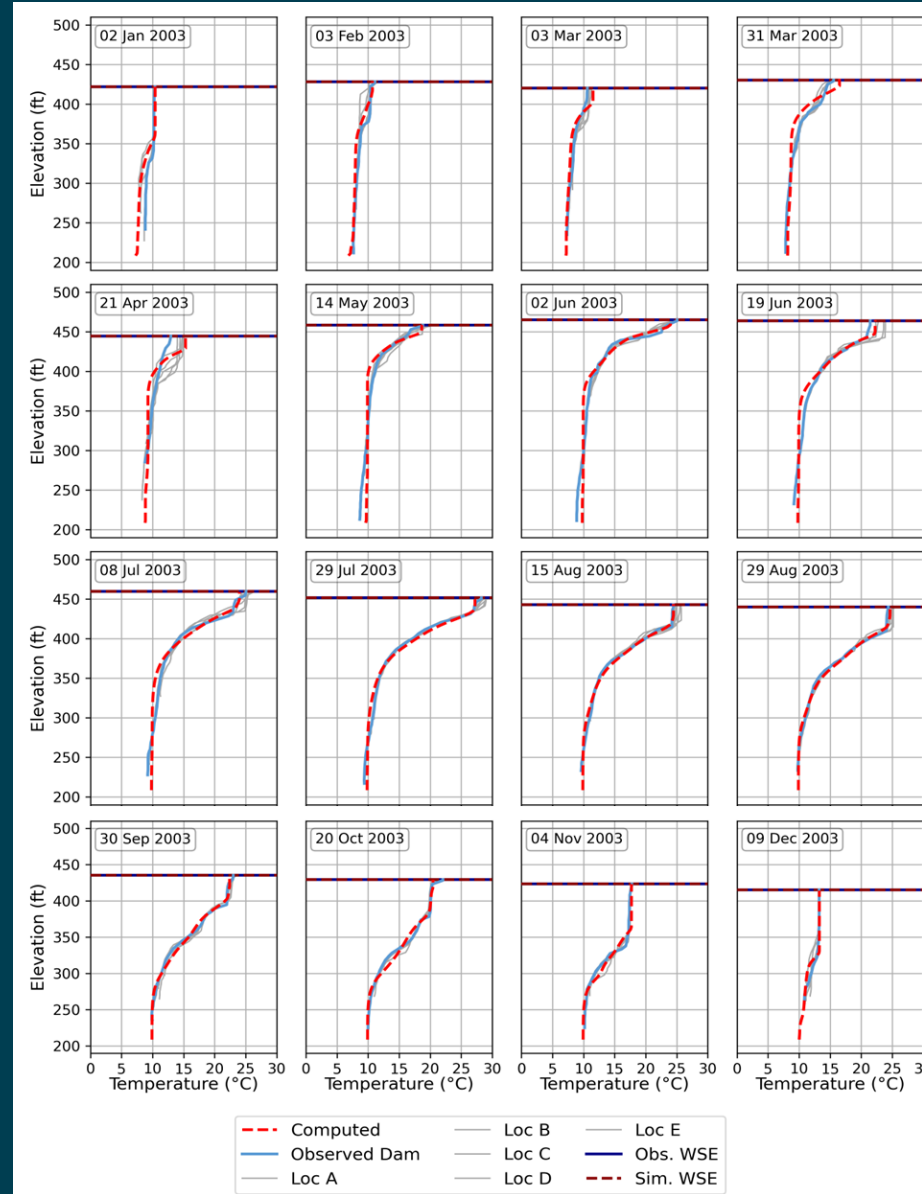- 2003 Folsom Lake water temperature profile and outflow temperature as an example
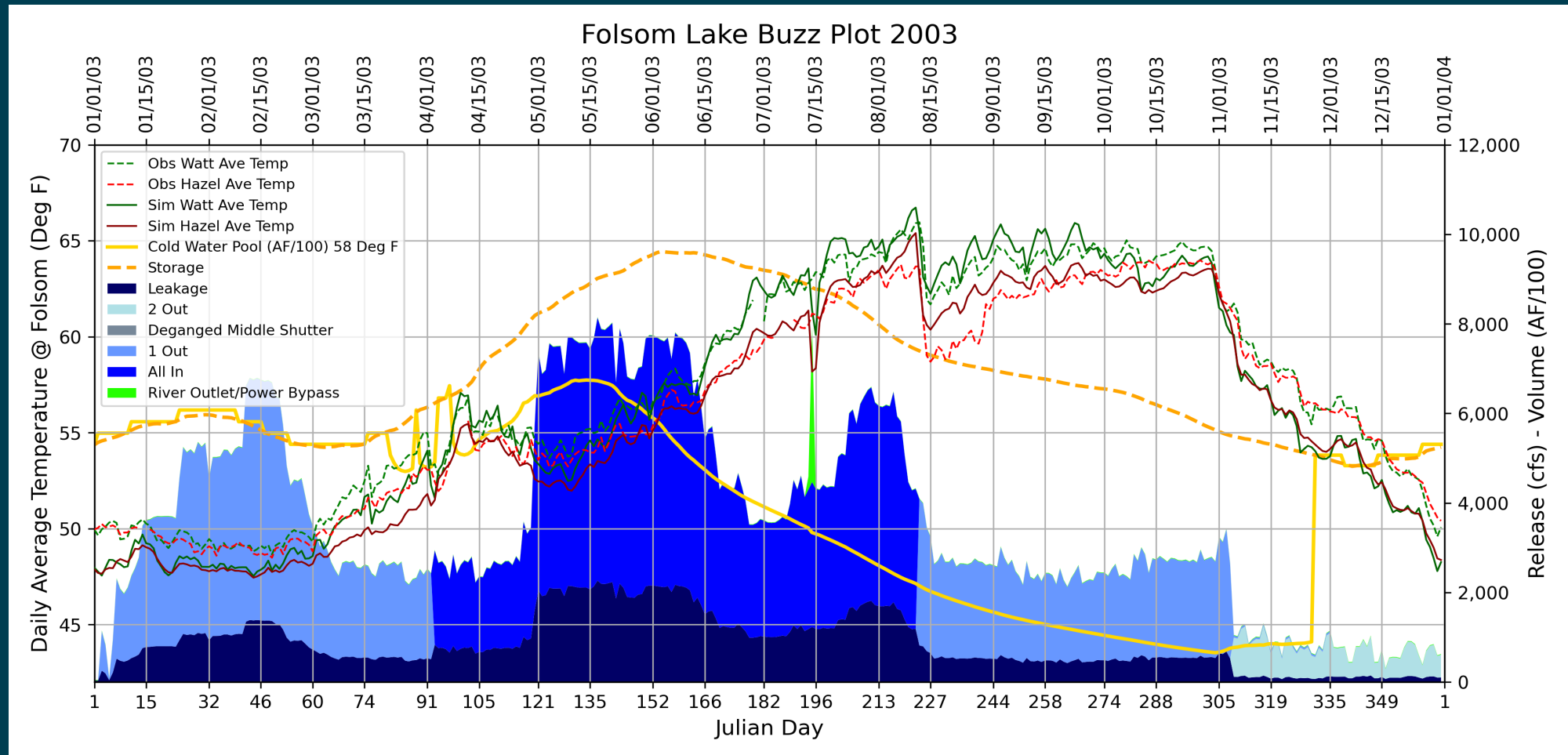
American River Basin – American River

- HEC-ResSim
- Folsom Lake
  - Water temperature profile
  - Outflow temperature
- Nimbus Dam
- American River
  - At William Pond
  - At Watt Avenue
- 2003 results as an example
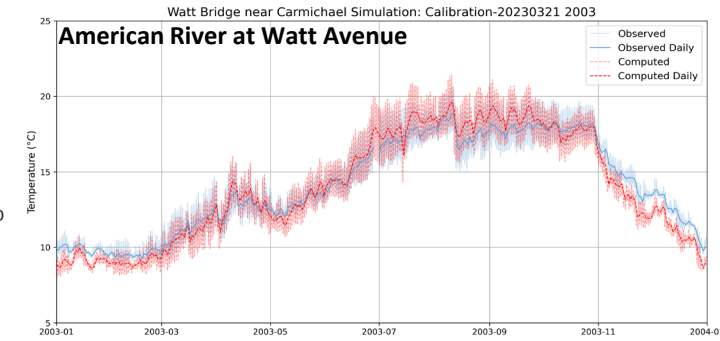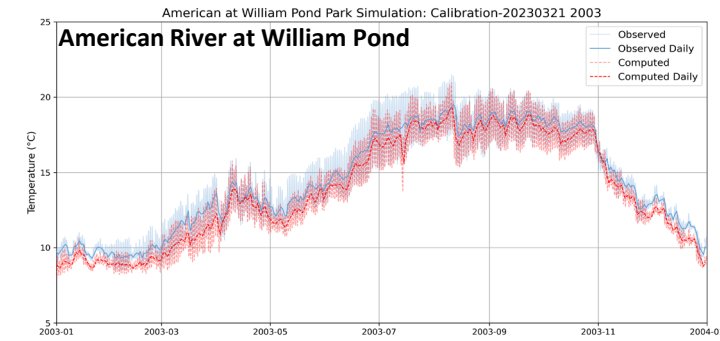
American River Basin – Customized Plots
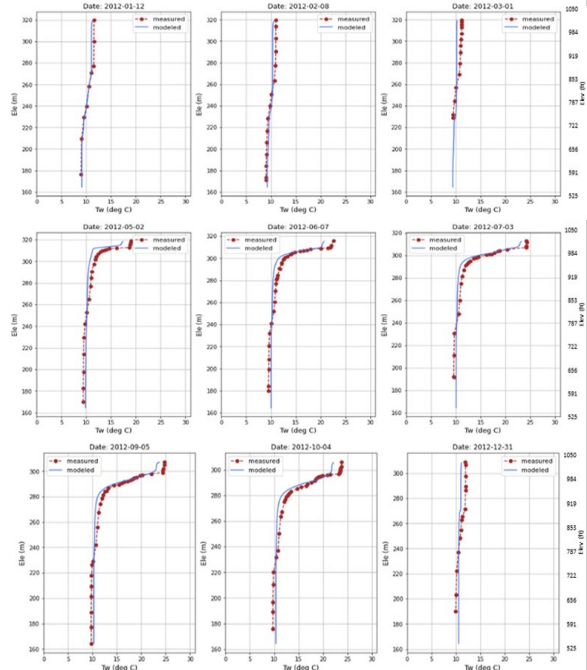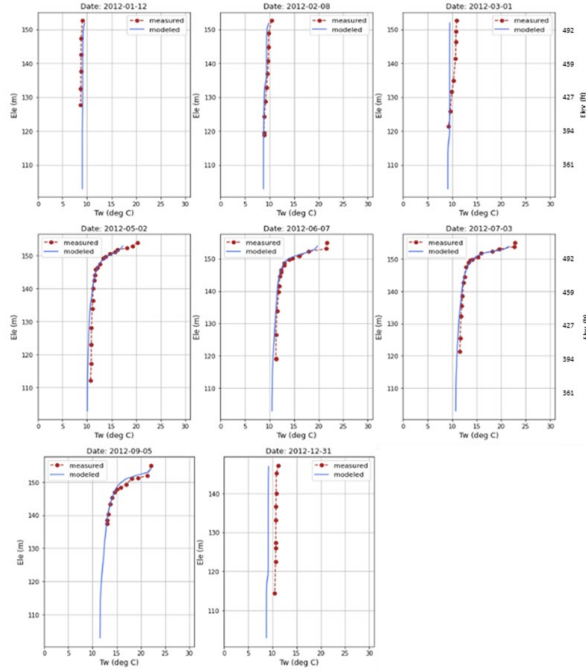
- 2003 results as an example

Folsom Lake Buzz Plot 2003

Stanislaus River Basin

- 2012 results as an example