Appendix E. Additional Model Scenarios

Some of the model scenarios included in this study resulted in temperature releases from Detroit Dam that were either not very successful in matching the intended downstream target or closely matched those of another scenario. This appendix is dedicated to the archival of that set of model scenarios.

Late Refill of Detroit Lake

Delaying the time at which Detroit Lake begins to fill from February 1 to June 1 results in the operational scenario *late_refill* (fig. E1, tables 4 and 5). The thinking behind this scenario was that by keeping the lake level low during spring, it might be easier or more efficient to pass juvenile fish downstream past the dam. Insufficient streamflow was available to fill the lake after June 1, and the lake level remained well below full pool level for the rest of the summer under all three environmental scenarios. Temperatures released from existing outlets under this late-refill scenario generally did not meet the *max* temperature targets for much of the year (fig. E2). Early in the summer, power production constraints and a water level that was too low to use the spillway resulted in water releases that were cooler than the target. In autumn, the lake level was too low for existing outlets to access sufficient cool water, and the water releases were too warm.

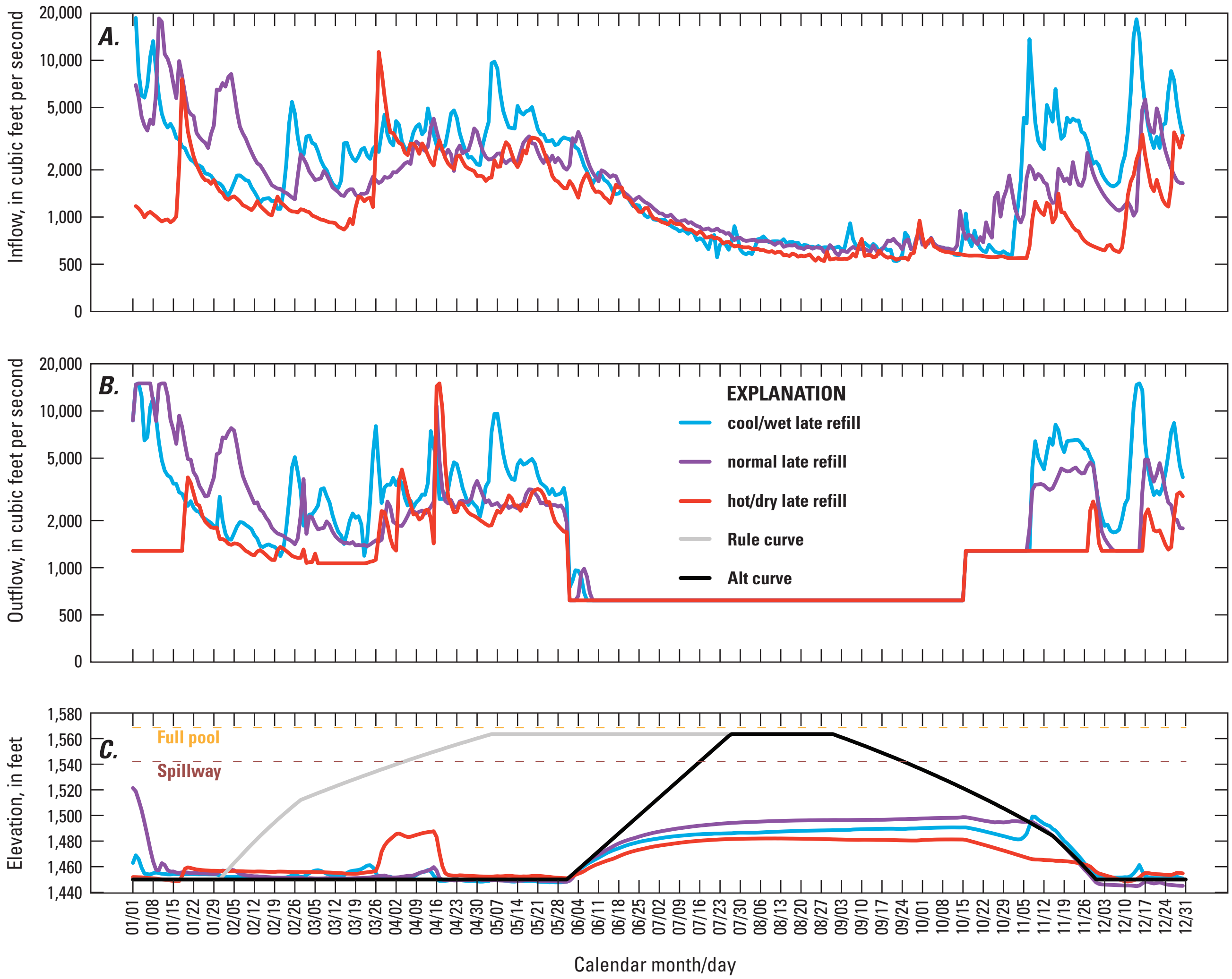

Figure E1. Comparison of *late_refill* operational scenarios (*c4*, *n4*, *h4*): (*A*) total inflows, (*B*) total outflows, and (*C*) modeled water-surface elevation.

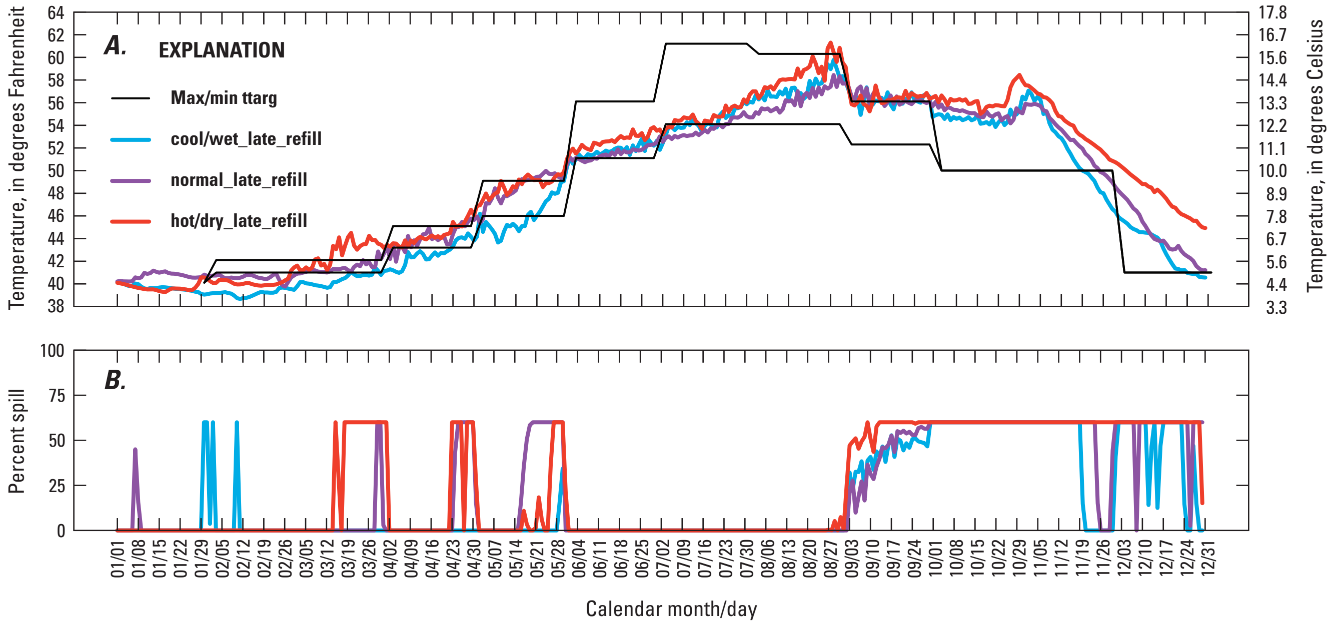

Figure E2. (*A*) Modeled water temperature and (*B*) percent spill for *existing* structural scenarios (*c4*, *n4*, *h4*) with *late_refill* operations and *max* temperature targets. The maximum and minimum temperature target established for the McKenzie River (labeled "Max/min ttarg") is shown but only the maximum was used in this simulation.

Early Drawdown of Detroit Lake

Changing the time at which the Detroit Lake level reaches its minimum conservation pool from December 1 to November 1 results in the operational scenario *early_dd* (tables 4, 5, and fig. E3). Despite the earlier drawdown, this operational scenario had little effect on the date at which the use of the spillway was no longer an option, as the lake level under base operations tended to decrease to the elevation of the spillway crest before this change occurred. However, the earlier drawdown caused the thermocline to be drawn down to the level of the available outlets sooner than in base operations, which caused the *max* temperature target generally not to be met during October and November (fig. E4).

Power Penstocks with Floating Outlet and 10 Percent Minimum Power Generation

Several model scenarios were run with the *pp-float* structural option and a combination of flow constraints. In that group, this scenario specified that a minimum of 10 percent of the total outflow be released through the power penstocks (table 7), providing another point in a continuum between a scenario with no power generation constraint (*c10*, *n10*, *h10*) and a scenario with a 20 percent power generation minimum (*c12*, *n12*, *h12*). Used with the *max* temperature targets, the results did not meet the target release temperatures in October and November for the *hot/dry* environmental scenario (compare fig. E5 with figs. 21 and 22).

Sliding-Gate and Floating Outlets with Delayed Drawdown

The combination of a sliding-gate outlet and a floating outlet (*slider1340-float*) along with delayed drawdown operations (*delay_dd2*) provided another combination that was of interest and similar to a couple of scenarios documented in the main part of this report (table 7). Results from *c18*, *n18*, and *h18* are almost identical to results from *uro-float_400fmin* scenarios *c14*, *n14*, and *h14* (fig. E6).

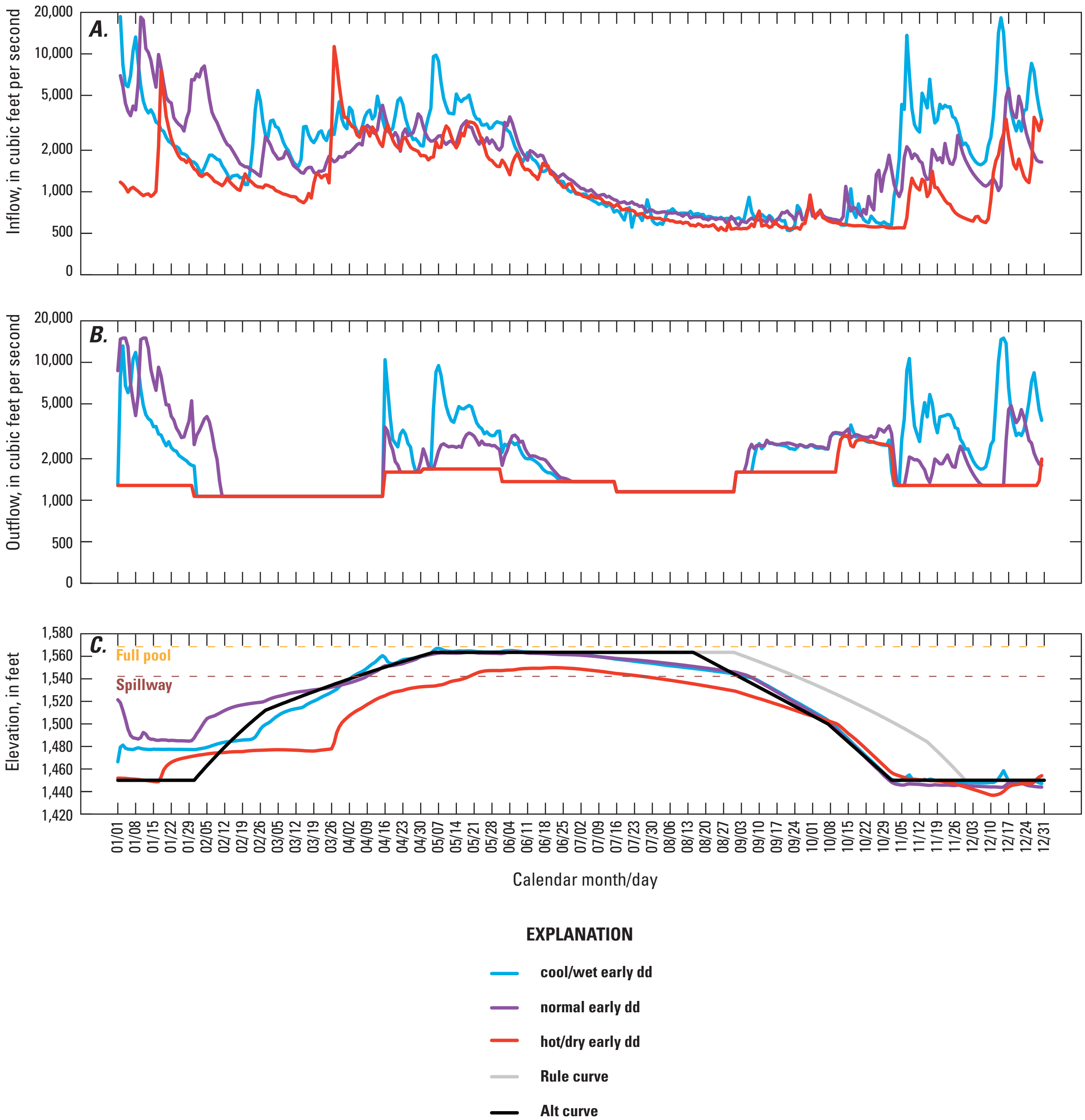

Figure E3. Comparison of *early_dd* operational scenarios (*c5*, *n5*, *h5*): (*A*) total inflows, (*B*) total outflows, and (*C*) modeled water-surface elevation.

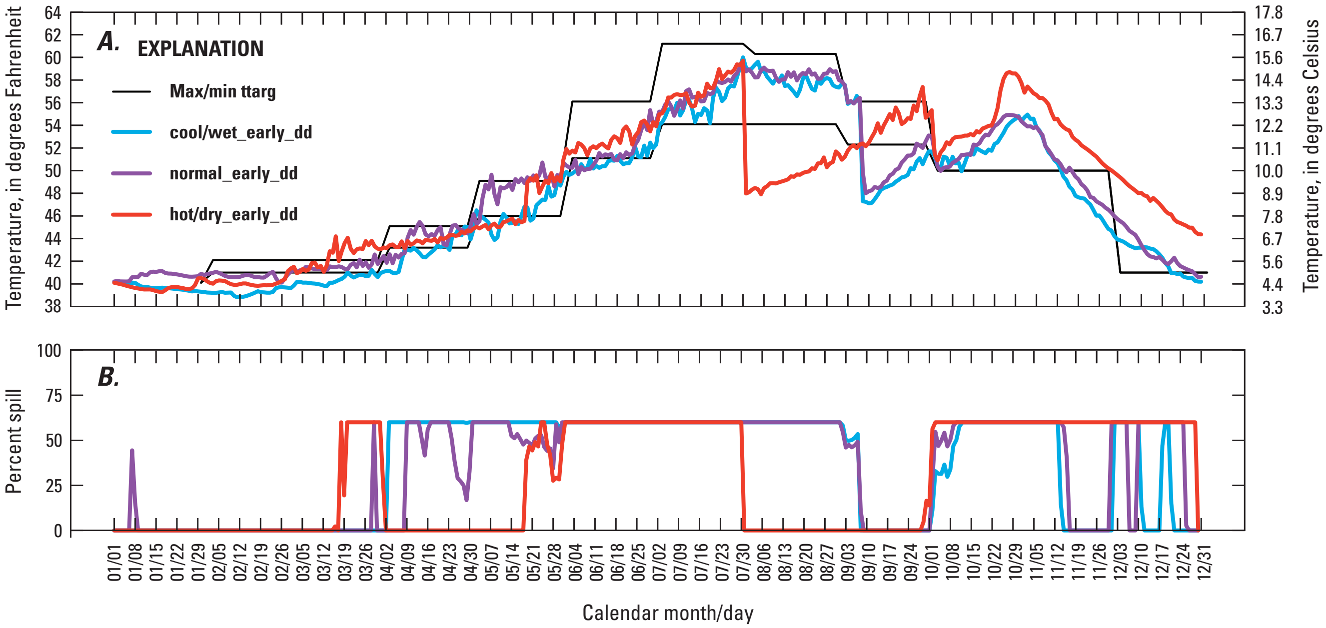

Figure E4. (*A*) Modeled water temperature and (*B*) percent spill for *existing* structural scenarios (*c5*, *n5*, *h5*) with *early_dd* operations and *max* temperature targets. The maximum and minimum temperature target established for the McKenzie River (labeled “Max/min ttarg”) is shown but only the maximum was used in this simulation.

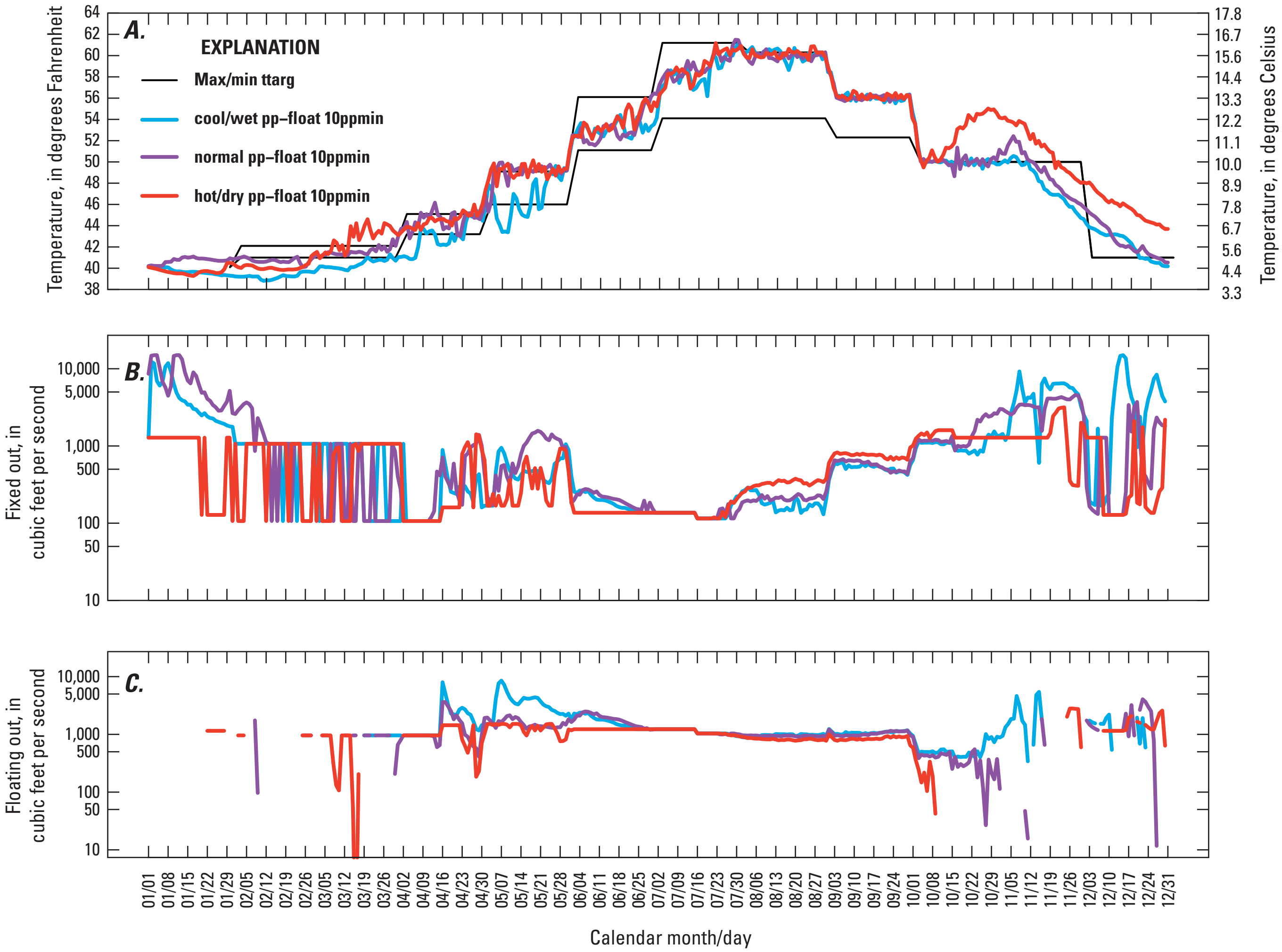

Figure E5. Results from *pp-float* structural scenarios with *10ppmin* operations and *max* temperature targets (scenarios *c11*, *n11*, *h11*): (*A*) modeled water temperature, (*B*) outflow from fixed outlet, and (*C*) outflow from floating outlet. The maximum and minimum temperature target established for the McKenzie River (labeled "Max/min ttarg") is shown but only the maximum was used in this simulation.

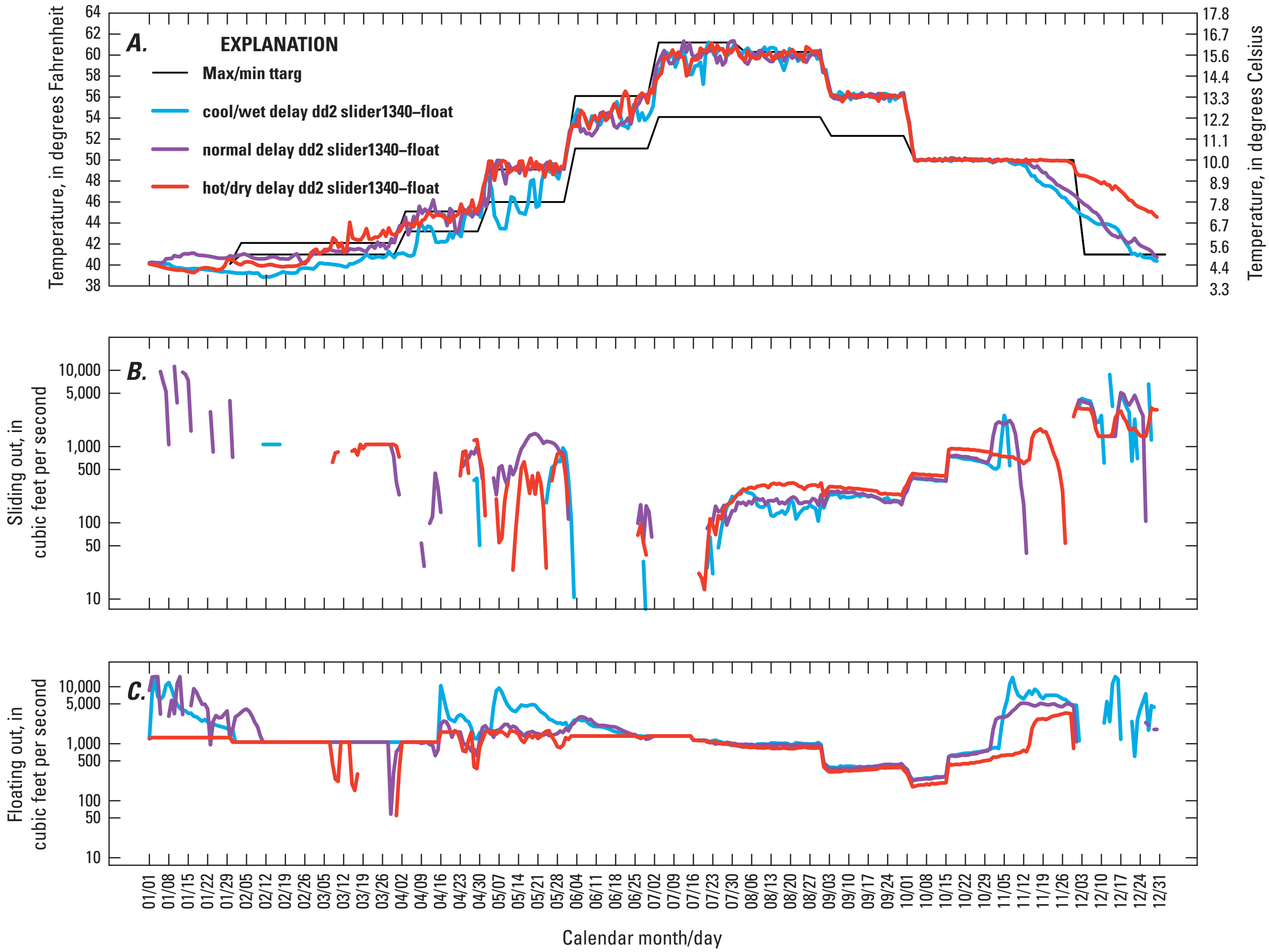

Figure E6. Results from *slider1340-float* structural scenarios with *delay_dd2* operations and *max* temperature targets (scenarios *c18*, *n18*, *h18*): (*A*) modeled water temperature, (*B*) outflow from sliding outlet, and (*C*) outflow from floating outlet. The maximum and minimum temperature target established for the McKenzie River (labeled "Max/min ttarg") is shown but only the maximum was used in this simulation.