

Hourly Model Assumptions

- The hourly model is dependent upon the daily solution. The primary purpose of the hourly model is to reshape daily volume of water according to consumptive demands, flow requirements, ramping rates, recreation requests and power demands. Daily volumes are preserved everywhere in the system above Ralston Afterbay. The hourly model can reoperate daily volumes below the Afterbay.
- Ramping rates can be entered as separate up and down rates. Ramping rates are entered in terms of ft/hr and converted internally to cfs/hr using the Foresthill gage site rating table. Ramping rates are applied to the Oxbow powerhouse flow. The model can accept a minimum ramping rate of 0.5 ft/hr up to a maximum rate equivalent to the Oxbow PH capacity within an hour.
- Ralston Afterbay is subject to four elevation bounds. All elevation bounds are entered in the constants table and apply to the daily and hourly runs.
 - *Abay_Maximum_Operating_Level* is the level where the spill gates are opened and is the maximum operational elevation.
 - *Abay_Normal_Max_Operating_Level* provides a small buffer from encroaching on the maximum operating level. Oxbow powerhouse will generate as much as possible to keep Ralston Afterbay elevation below this level.
 - *Abay_Minimum_Operating_Level* is the typical minimum operating level in Ralston Afterbay. The operators typically do not go below this level because of issues with vortexing, debris entrainment, and turbidity.
 - *Abay_Normal_Min_Operating_Level* provides a small buffer from encroaching on the minimum operating level. Oxbow powerhouse will not generate such that Ralston Afterbay elevation falls below this level.
 - The baseline runs are set with the following elevation limits:

Elevation Limit	Storage, AF	Elevation, Ft
<i>Abay_Maximum_Operating_Level</i>	2616	1177
<i>Abay_Normal_Max_Operating_Level</i>	2455	1175
<i>Abay_Normal_Min_Operating_Level</i>	1930	1168
<i>Abay_Minimum_Operating_Level</i>	1860	1167

- The hourly model has end of week storage targets (weekly optimization). Without the use of end of week storage targets, the model will end each week at the bottom of the available storage range, due to the increased generation resulting from this operation. An end of week storage target prevents this. When rafting requests are in effect (rafting season is set as May through September), there is an end of week storage target that targets Ralston Afterbay Storage to be at *Abay_Normal_Max_Operating_Level* at the end of the week. This ensures that a full rafting day is available at the beginning of the next week, and the day of week that the model starts on should be coincident with the highest priority rafting day. During the remainder of the year (during periods outside of the rafting season) there is an end of week storage target that targets Ralston afterbay storage to be halfway between *Abay_Normal_Max_Operating_Level* and *Abay_Normal_Min_Operating_Level*.

- Minimum flow through Oxbow powerhouse by default is set equal to the minimum flow in the daily model, although it can be set to a flow different from the minimum flow in the daily model.
- Powerhouse flows are reshaped according to the Energy Demand Index, set in lookup tables, which prioritizes the hours in the day according to our Peak Hour Definitions. This results in a peaking shape for hourly powerhouse flows.
- Rafting requests are set in two different ways. The daily prescription is set in the lookup table *Rafting_Request_Patt*. This is a table of 24 hours, and you prescribe the flow in cfs for each hour of the day. The number of days of rafting requested is set in the constants table. The user can set which days of the week this number of requested days represent by revising the rafting days priority. Currently the priority of rafting days is: Sat, Sun, Fri, Mon, Thu, Tue, Wed.
- Currently rafting requests are four hours of flow starting at 9am. The Peak of the Energy Demand Index is around 4pm in the summer. During periods of low supply, imposing the two demands results in a double-peaked demand curve. The default operation bridges the gap by continuing to generate after meeting the rafting request until all the day's generation is complete. An optional operation will shut down the Oxbow powerhouse after meeting the rafting request, then begin generation a few hours later to generate in the most valuable hours of the day. This results in a double-peaked generation trace, and can be attained by setting a double-peaked generation flag in the model.
- When the user enters the start and end date for an hourly model run, the GUI will change each date such that the hourly model starts on a Saturday and ends on a Friday. The day of the week the model starts on can be user defined, and is set in *gui.ini*.
- The reach from the Foresthill gage to Folsom has 2.5 mph travel time, rounded to the nearest hour at each node. Some oasis nodes are geographically in the same place, and there is no travel time between these nodes.