

Yellowtail Dam Simulator

The Yellowtail Dam simulator provides an opportunity for people to obtain a basic understanding of Yellowtail Dam operations, particularly the effects of various inflows and outflows on Bighorn Lake and the Bighorn River. The simulator uses a monthly time interval and provides forecasted monthly inflows, while the user is allowed to set the desired river release. As the user steps through the simulations, both a new forecast inflow and an actual average inflow are provided by the simulator for each month. The simulator then calculates the resultant reservoir elevation and the resultant power generation for each remaining month in the simulation cycle. Here are a few more things about the simulator:

1. The simulator is a Microsoft Excel workbook.
2. Incorporated in the simulator are five years of past data to enable a range of actual inflow conditions to be experienced (the March 2008 Yellowtail forecasted inflows are also included).
3. The simulator uses monthly time steps.
4. Forecasted inflow, average inflow, and river releases are all average monthly values.
5. River release is the average flow in the Bighorn River just below Yellowtail Afterbay Dam. The simulator takes into account diversions to the irrigation canal and gains to the afterbay from local springs.
6. Power generation is the monthly total potential generation based on river releases and lake elevation.
7. Lake elevation is the end-of-month value for the specific month.
8. Graphs are included to help visualize the data. The horizontal, red line in the left graph represents a full reservoir at elevation 3640 feet (this may appear slightly off depending on your particular computer). The gray lines represent actual elevations and flows for the respective years. The blue lines are the graphical representation of data in the table located above the graphs.
9. The scorecard located in cell A18 through M25 is roughly-based on some of the criteria currently used by Reclamation. It is intended to provide some instant feedback for the simulator user to help visualize how various outflows may impact certain criteria (green is optimal, white is adequate, and red is minimal).

Instructions on how to use the simulator:

1. Open the file name [Operation Exercise.xls](#) in Microsoft Excel.
2. **Note:** All output is displayed in cells A1 to M25. You may want to zoom out to get a better view. To change the view, click on view at the top of the window then select zoom on the drop down menu.
3. End of March (except for 2008), reservoir content is a given. This data is located in cells C2 and C3.
4. There are two pieces of data that can be changed by the user:
 - a. Current Month
 1. This input is located in cell A5. There is a drop down menu that allows you to pick the allowable input into this cell.
 2. This input tells the simulator which month it is and it is always the first day of that month (selecting April in this cell tells the simulator that it is April 1). You will notice April is listed twice, (except for 2008, March is listed twice), the second listing is April of the following year. This must be selected to simulate the entire year.
 - b. River Release
 1. The user may change river releases by selecting the monthly average they desire. These inputs are located in cells B11 to M11.

To get started, select April 1, change the River Releases as desired, then change the month to update actual inflows and the forecast. You should try a variety of releases to better appreciate the resulting consequences and impacts of those decisions. This is merely a simulation and your actions won't kill any fish, flood any landowners, or dry up any recreation areas - so play to your heart's content.