Adapt Lake Mead releases to inflow to give managers more flexibility to slow reservoir draw down

David E. Rosenberg

April 6, 2022

Description

This is an R Markdown document. This work supports the piece “Adapt Lake Mead releases to inflow to give managers more flexibility to slow reservoir draw down.” There are simulations of reservoir draw down for inflow scenarios from 7 to 14 maf per year every year. These simulations assume states and contractors do not withdraw from their conservation accounts nor convert and conservation account balances to meet mandatory conservation targets. Another plot shows the reservoir release needed to stablize reservoir level for different inflow scenarios. And a final plot shows reservoir recovery from a Lake Mead elevation of 1,050 feet. Key plots include:

1. A line graph compares the schedules of total mandatory cutbacks by 2008 Interim Guidelines and 2019 DCP. Dashed 1:1 lines show required cutbacks to avoid Dead Pool and to protect 1,025 feet (6.0 maf storage).
2. A line plot shows evolution of Lake Mead Active storage (y-axis) over time (x-axis) for mandatory conservation with different steady inflow scenarios. Pink area denotes the storage volumes/elevations of mandatory conservation target. Red area denotes lower storage. Simulations assume max DCP cutback in red area below 1,025 feet. We hope that if reservoir level gets that low the Lower Basin States and Mexico will cut back release further (depends on inflow) to stabilize reservoir level.
3. The Lake Mead release to stabilize reservoir storage at different reservoir elevations and inflows. This release is calculated by resolving the reservoir mass balance equation for release = inflow - evaporation.
4. Lake Mead recovery simulations from two elevation 1,050 feet for different reservoir inflows and additional conservation efforts beyond mandatory targets.

Data from 2019 Lower Basin Drought Contingency Plan (DCP), U.S.-Mexico Minutes 319 and 323, and CRSS.

Requested Citation

David E. Rosenberg (2021), “Add reservoir inflow as new criteria to give Lake Mead managers more flexibility and independence to conserve water.” Utah State University. Logan, Utah. https://github.com/dzeke/ColoradoRiverFutures/tree/master/MeadInflowSimulation.

TeX version

```
##                                                                    pdflatex
## "C:\\Users\\david\\AppData\\Roaming\\TinyTeX\\bin\\win32\\pdflatex.exe"
```

```
## [1] 2
```

```
## [1] 5
```

Figure 1. Mandatory Conservation Schedules by DCP and Interim Shortage Guidelines

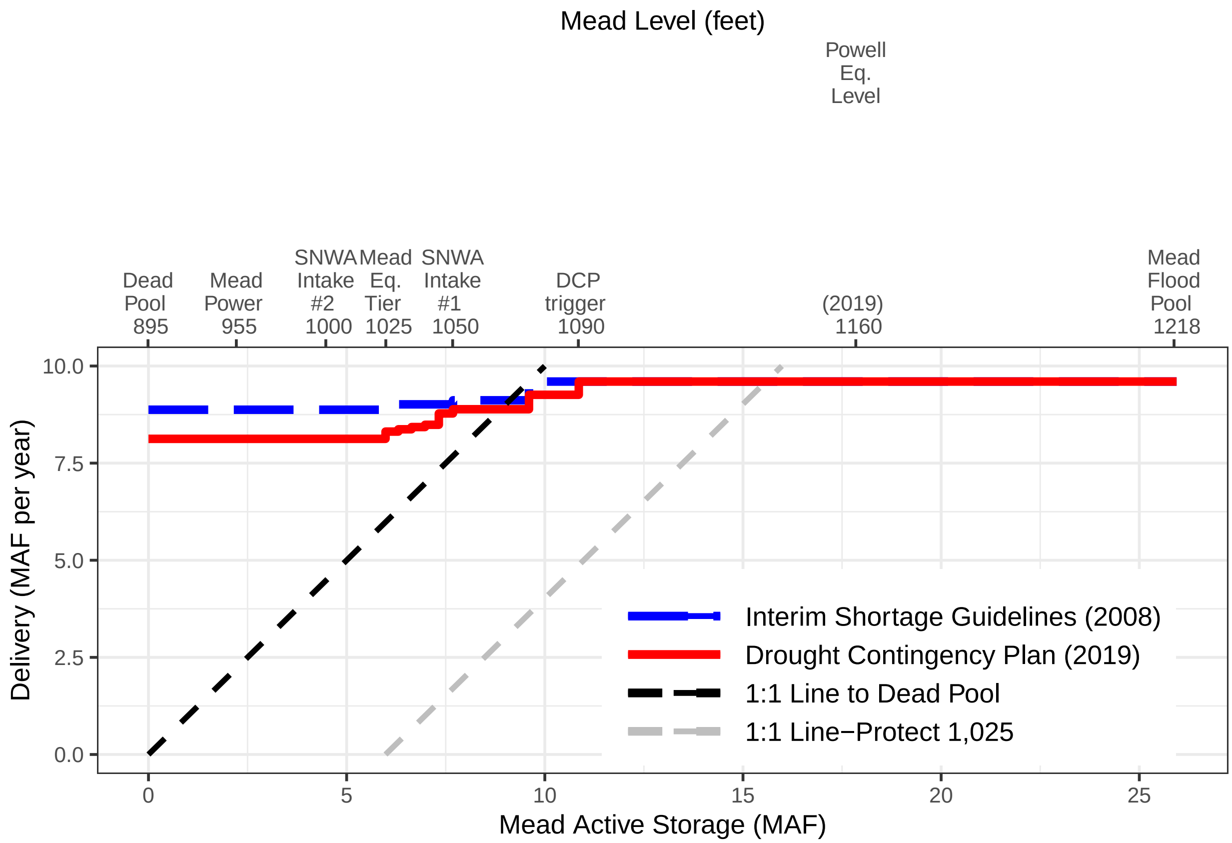

Figure 2. Simulation of Lake Mead active storage over time for different scenarios of steady reservoir inflow (blue contours and white boxes, million acre-feet per year).

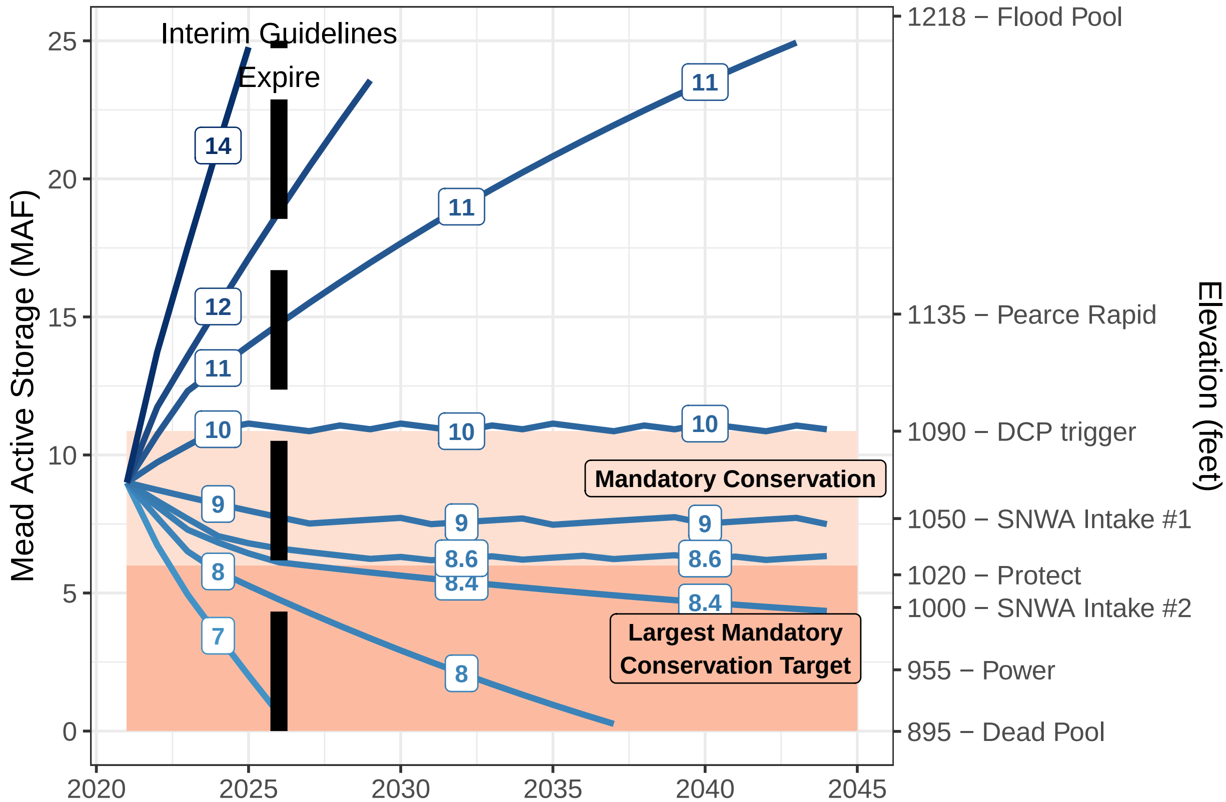

Figure 3. Lake Mead releases to stabilize reservoir level for different inflows.

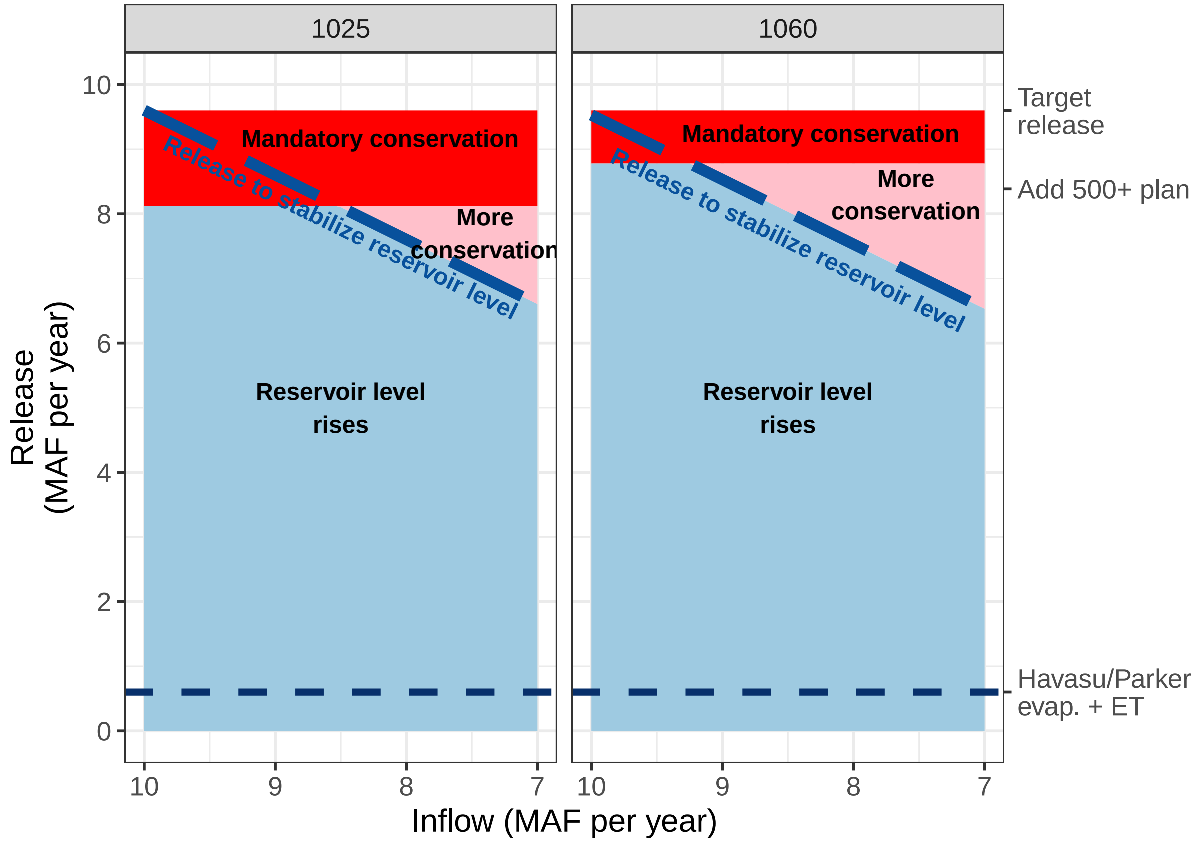

Figure 4. Lake Mead recovery from elevation 1,050 feet. Numeric line labels (maf per year) indicate the sum of reservoir inflow and additional conservation beyond mandatory targets.