

Problem: *Water Balance for an Irrigation Water Supply Reservoir***Statement:**

An irrigation water supply reservoir draining flows from the Rocky Mountains has a capacity of 750,000 acre-feet. At the end of the water year, the reservoir is full. Over the next water year, the following net inflows (Q_i) into the reservoir occurred:

t (mon)	Q_i (acre-feet)
Oct	68,887
Nov	46,851
Dec	38,120
Jan	36,363
Feb	32,312
Mar	42,380
Apr	62,097
May	256,676
Jun	604,743
Jul	327,718
Aug	155,511
Sep	58,421

Predict the conditions in the reservoir for the following operating conditions. First, assume that water withdrawal demands are a constant 120,000 acre-feet each month. Also, assume that 1000 acre-feet of water must be released downstream each month to maintain sufficient river flows. Finally, if the reservoir is full, any inflow volume in excess of outflows (demands and release) is released downstream and “spilled flow” (the reservoir storage cannot exceed its capacity).

Do the following:

- Predict the reservoir storage and spilled flow volume for each month
- Plot the reservoir storage (in acre-feet) at the end of each time step.
- Does the reservoir refill and spill flows? If so, when and for how long?

Note: The net inflow is the water volume for the month and accounts for local precipitation, evaporation, and seepage. Constant demands and releases for each month are not very realistic for an irrigation reservoir (but let's keep it simple). The calculations can be easily done on a spreadsheet; the only issue to account for spilled flow when the reservoir refills (you'll need to work the logic out for that).

Solution: