

Water Resources Planning Game – Is data about uncertainty useful?

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Fig. 1. Lake Diefenbaker <http://www.usask.ca/water/Research%20Sites/Prairies.php>

You are the manager of a hypothetical reservoir. At any given time you know the water level in the reservoir, you have a forecast for the inflows in that year, and each year you must make a single decision: how much withdrawal from the reservoir will you allow. The larger the withdrawal, the more money you get. The reservoir capacity is 10 units, and you receive \$2 million dollars for every unit you allow to be withdrawn, up to a maximum of \$10 million in any year. If your reservoir gets too full (more than 10 units), it will flood and you will be fined \$100 million. If the reservoir gets too low (2 units or less), fish will die and you will be fined \$50 million. The reservoir level calculation is given by:

$$\text{Final storage} = \text{Initial storage} + \text{Actual Inflow} - \text{Withdrawals}$$

To manage the system, you employ two hydrological modelers to produce forecasts of inflows for you. One modeler provides you with a prediction of what his model says the inflow will be. The other modeler provides you with an upper and lower limit of the forecast, which she says is the 95% confidence interval.

Run through 10 years using the forecasts from each modeler. Which forecast is better?