Simulating ESP – Code Fest Group Takeaways and Next steps

Notes:

1. There are multiple ways to “simulate” a forecast in ways that would be useful to a VOI study of farmer production.
   1. Apply linear algebra routines available in the literature to recreate the entire evolution of forecast error and uncertainty: Jeremy Diaz interested in possible translating some of this work into workable models for class…
      1. The forecasts are evolutions, whereby both error rates and uncertainties decrease over time as the ultimate streamflow is realized.
      2. There are both parametric and non-parametric methods of characterizing the evolution of variance and error of an ESP.
      3. Some research suggests that the assumptions required for parametric simulation are not often met.
      4. There is one paper in particular (Zhao et al. 2014) that uses non-parametric modeling techniques and a “coefficient of prediction” to simulate ESP’s according to overall skill levels.
   2. For a farmer who makes planting decisions at a certain point the process will be much simpler (see 2), will the ultimate water availability fall below a certain threshold?
2. When a farmer is faced with water shortages there are three major adjustments that can be made:
   1. Adjust acreage planted to compensate for limited water availability
   2. Plant entire field and adjust irrigation rates accordingly
   3. Diversify chosen crops by drought tolerance, more dynamic
3. Also, are there planting decisions (more water intensive plants) that could be affected by forecasts of high-water years?
4. Initial production simple model results suggest that planting all acres regardless of the forecast results in more revenue than any adjustment strategy does in most years. It is only when the forecast of available water is severe that adjustment strategies have value.
   1. Therefore, it is important to quantify the point at which there is value in adaptation. When this is known it will be possible to choose a decision point in the year, before planting, grab the original CBRFC forecast and the ultimate streamflow and, in years where the forecast is below that threshold, quantify the probability of realized streamflow actually falling below that threshold. Then, the improved forecast can be made by simply increasing the probability of correctly forecasted threshold exceedance.
5. Conversely, in years that severe streamflows are realized, it is possible that forecast skill is much lower, or at least it appears as though this is true. It will be important to check for this, and distinguish forecast skill improvements for these years from more normal years.
6. There are “official forecasts”, that are somewhat qualitative and appear to be increasingly influenced by the purely quantitative ensemble. Future research will need to determine if these “official forecasts” are used in reservoir management operation plans and, if so, how to get them, because we couldn’t find them.
7. It will be important to know if the forecasts are based on natural flow modeling or if upstream diversions are incorporated.
8. Perhaps most importantly, there is reason to believe that the current snow-melt dependent model may break down as temperature rises, complicating estimations of the value of forecast improvements.