



## Prep for Uncertainty for ESPAM1.0

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# Purpose and Outline

- Show preliminary evaluation of uncertainty conducted for ESPAM1.0
- Outline
  - Sources of uncertainty
  - Techniques to estimate uncertainty
  - Explanation of what was used for prelim evaluation of ESPAM1.0

# All Model Predictions Contain Uncertainty

- Sources of Uncertainty
  - Conceptual model
  - Numerical model
  - Water budget
  - Model parameters
  - Etc.

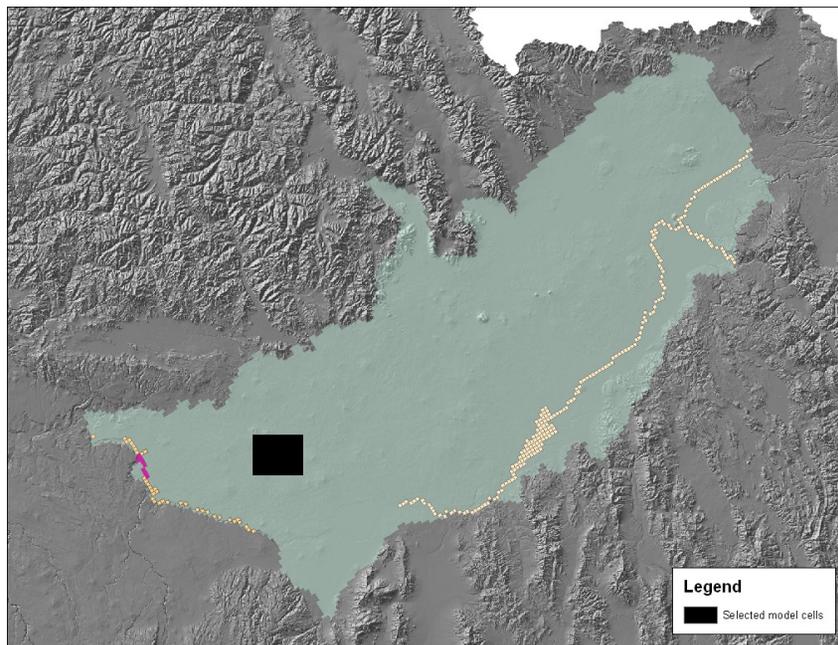
# Not Easy to Quantify Uncertainty

- Multiple model
  - Monte Carlo
    - Generate numerous models that are calibrated
- Bend but don't break
  - Dual Calibration
    - Take calibrated model and recalibrate including prediction in a calibration run

## Bend but don't break Dual Calibration

- Make prediction with calibrated model
- Incorporate prediction in a new calibration run
- Ask PEST to either increase or decrease prediction during recalibration

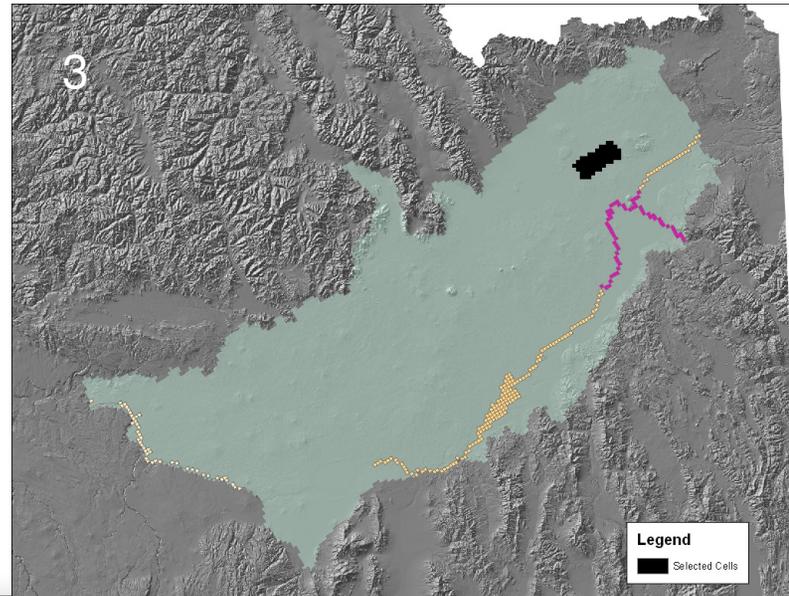
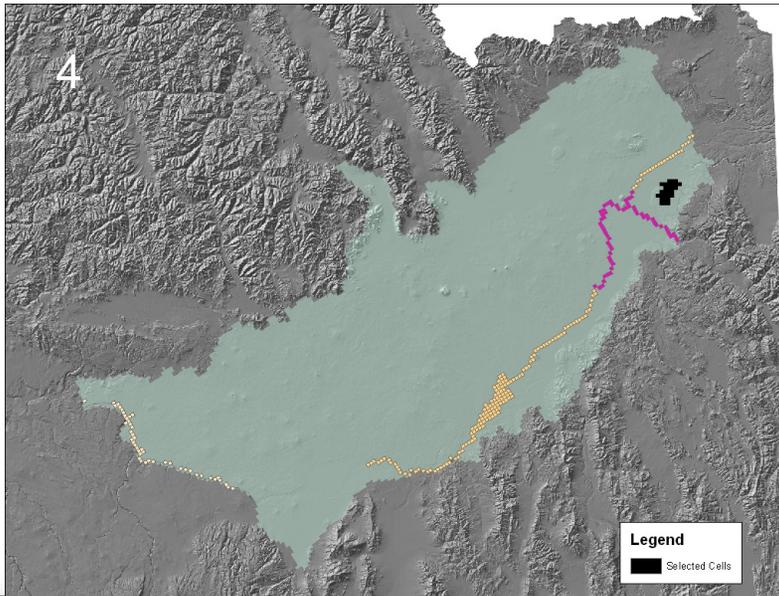
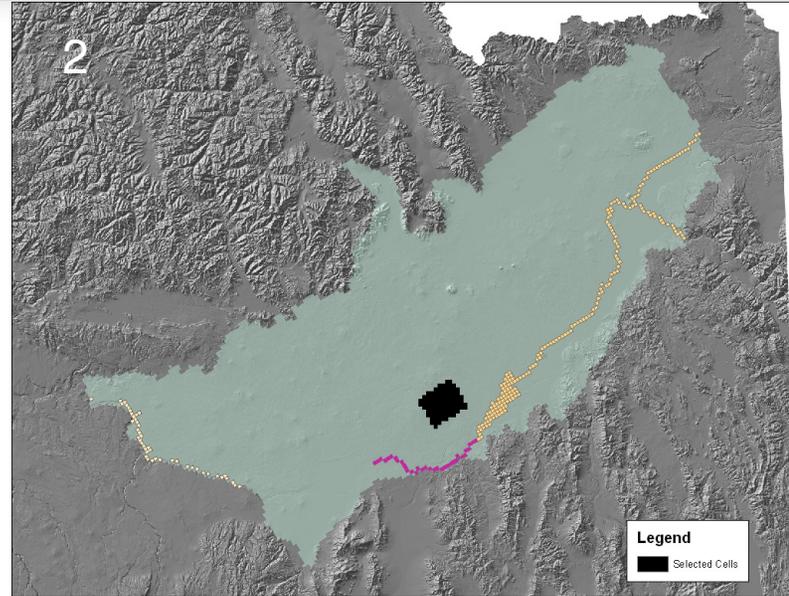
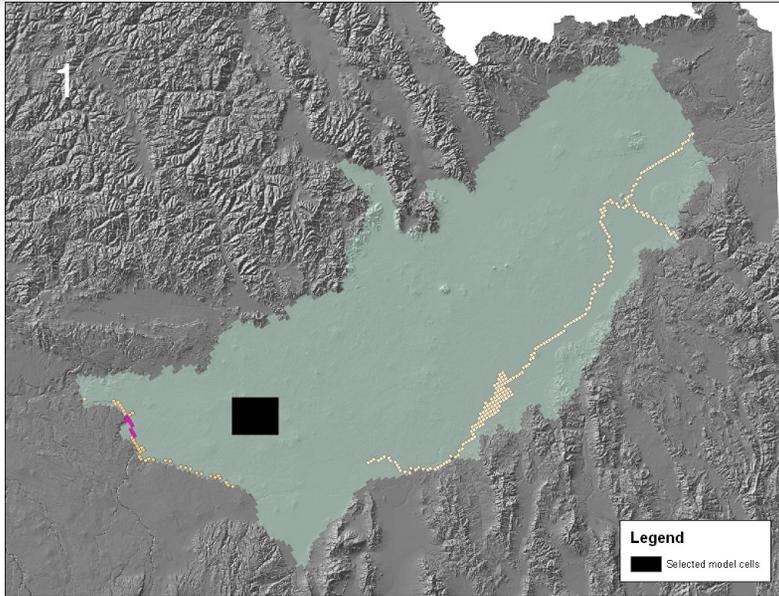
# How dual calibration break works



- With calibrated model pump selected cells at 200,000 units
- Prediction is that 20,000 units realized in target reach
- Incorporate prediction in recalibration asking PEST to increase impact to 40,000 units

# ESPAM1.0

- Designed as an example of a possible method of evaluating uncertainty for ESPAM1.0
  - 4 predictions
    - Impact of several model cells on a selected river reach



# Results

- Prediction 1
  - 10.5 % change in reach impact
- Prediction 2
  - 8.64 % change in reach impact
- Prediction 3
  - 17.2 % change in reach impact
- Prediction 4
  - 10.4 % change in reach impact



END

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