DISSOLVED OXYGEN CASE STUDY

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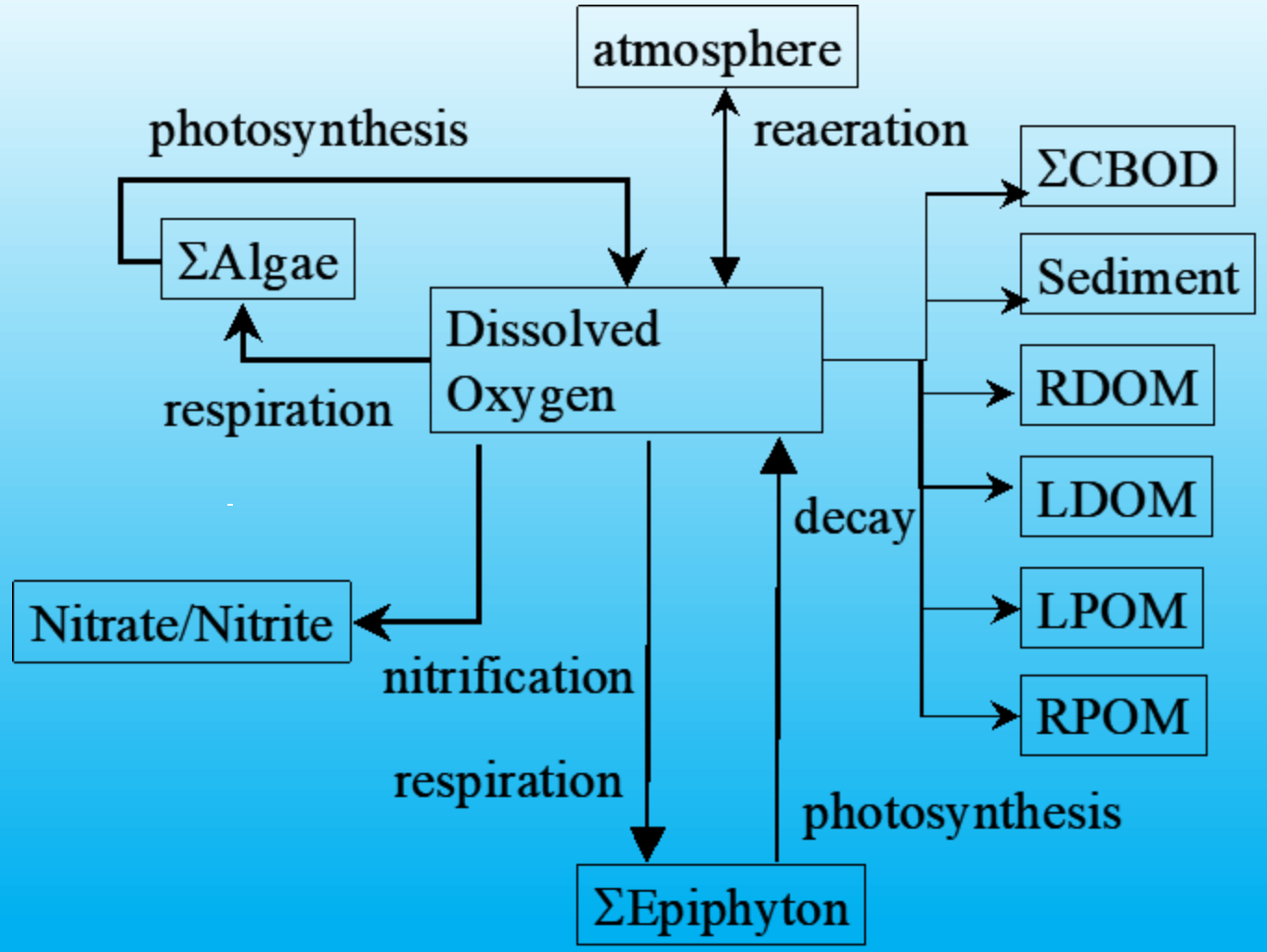
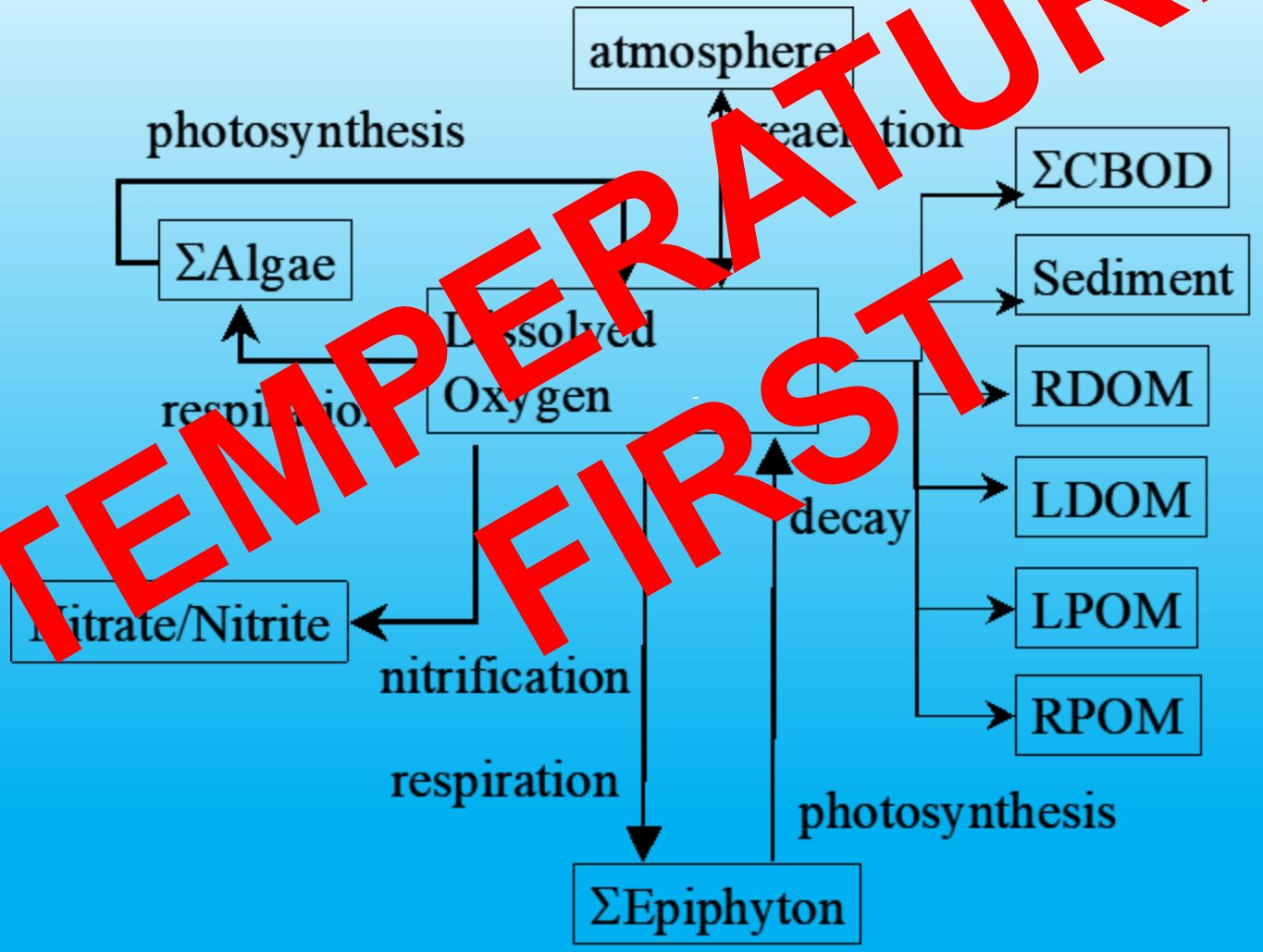
ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER

CE-QUAL-W2 DO

- Complete model DO process
- Typically reduced suite of variables and processes
- Minimum required:
  - Dissolved Oxygen
  - Reaeration
  - Oxygen demand



CE-QUAL-W2 DO



TEMPERATURE FIRST

DO Modeling Requirements

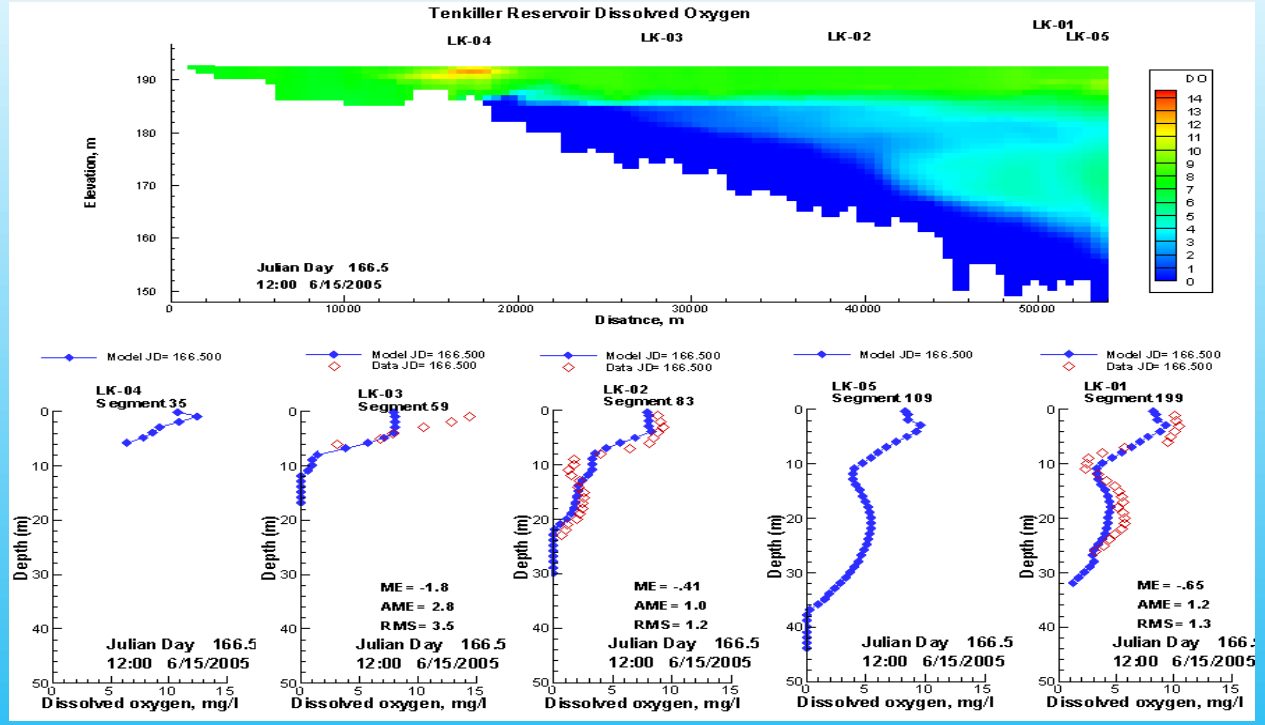
- Typical Sources:
  - Boundary Conditions for all inflows
  - Initial Conditions for water body
  - Reaeration
- Typical Sinks
  - Water quality variables that utilize DO in their kinetic processes
  - CBOD, DOM, POM, SOD, etc…
- Interactions in the DO cycle are temperature dependent.
- Efforts to model DO without reasonable temperature model are futile.

DO Modeling Requirements (cont.)

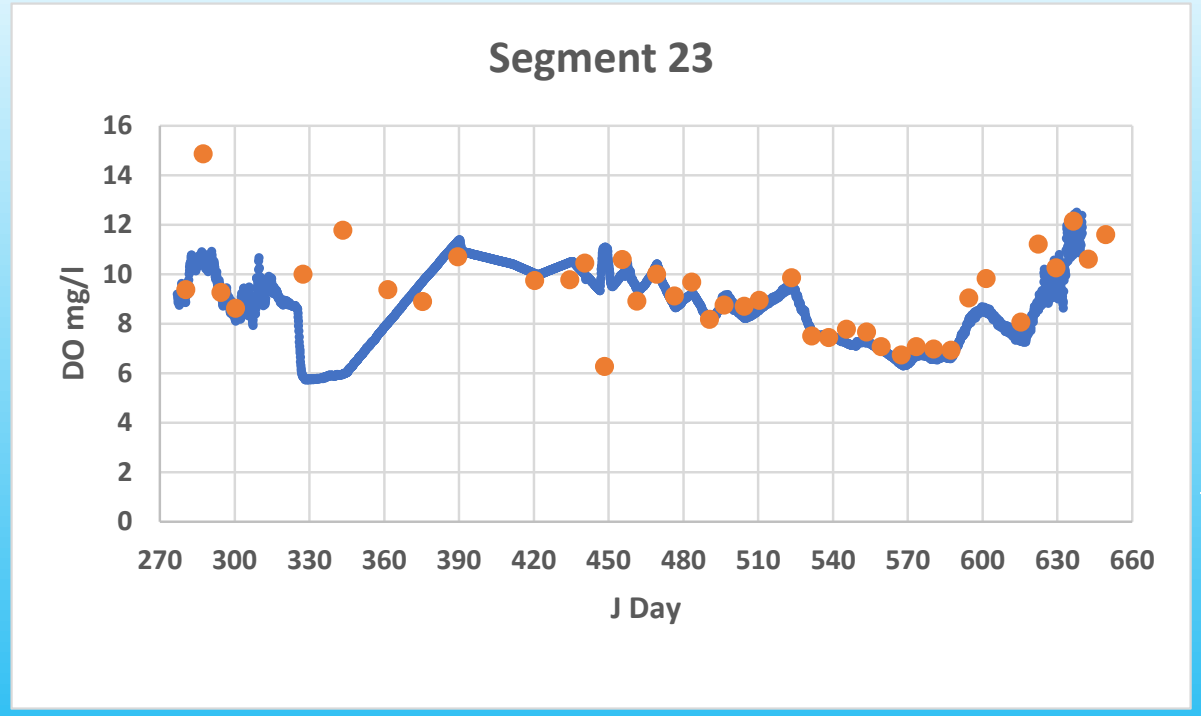
- Dissolved Oxygen Observed Data
  - Boundary conditions
  - Estimates of initial conditions
  - In-situ comparisons with model predictions for Calibration/Validation
  - Understanding of system behavior and model performance
- Oxygen Sinks
  - Boundary conditions and in-situ values
  - External loadings (Point and Non-point source)
  - Sediments
- Meteorological Data

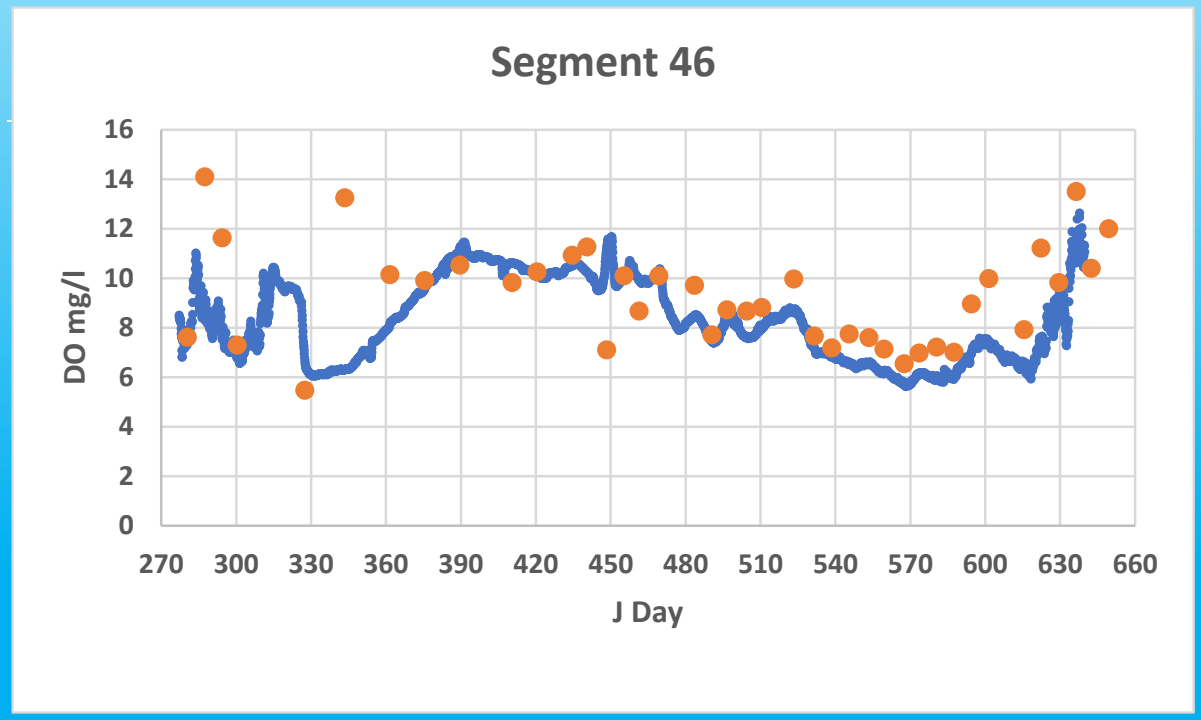
Model DO Performance

- Compare Model output with observations
- Evaluate Model DO performance using:
  - Time Series
  - Water Column Profiles
  - Statistics
- Incorporate model Temperature performance in assessment, aka does it look right?

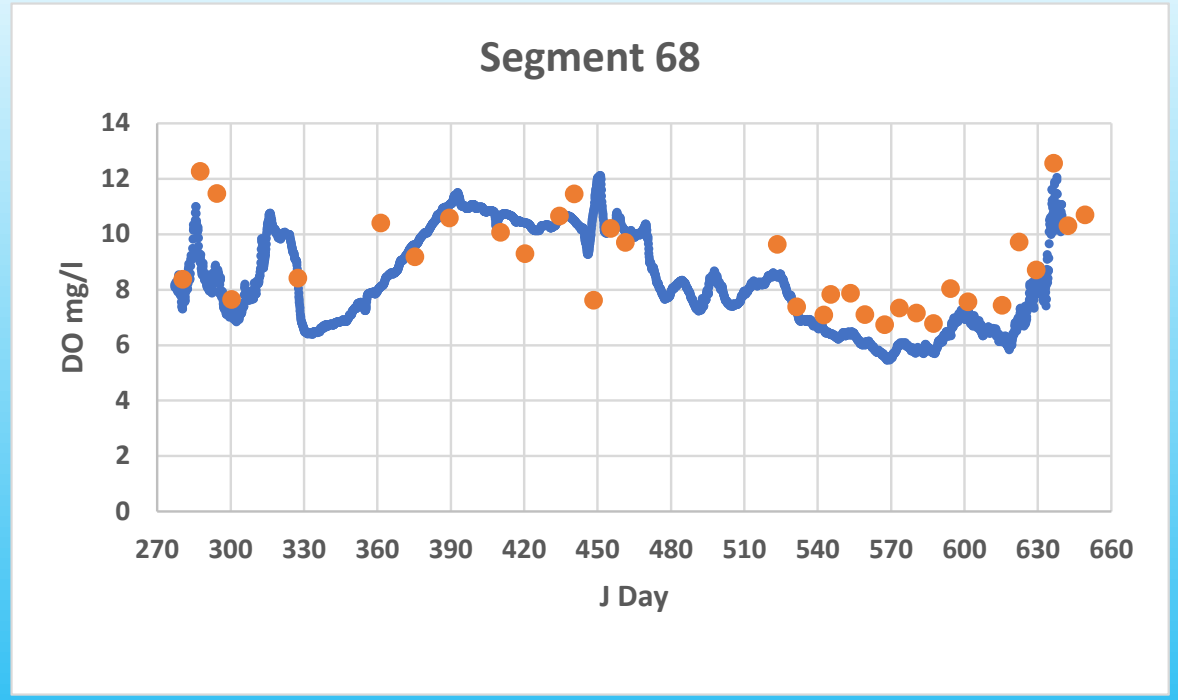


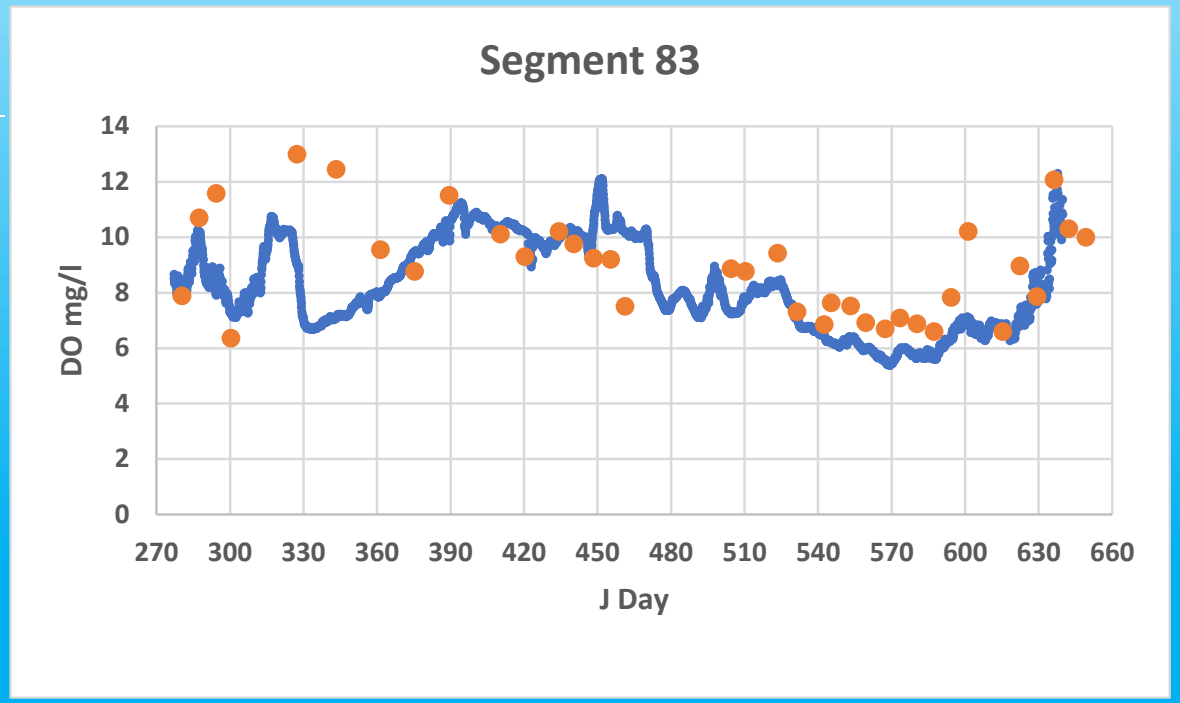
Minnesota River DO





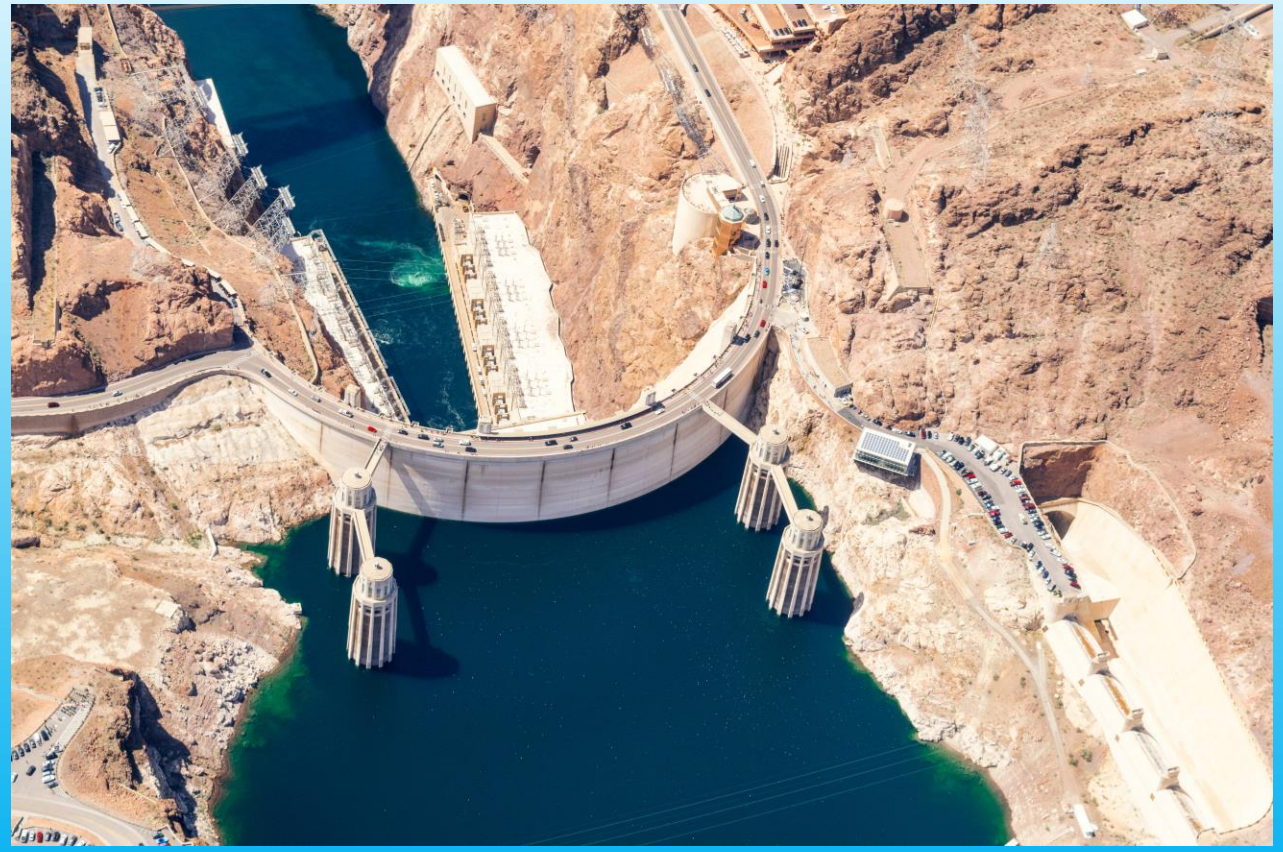
Minnesota River DO (cont.)





Evaluating Model DO Performance

- DO is culmination of all other processes occurring in model.
- DO Predictions *sensitive* or *insensitive* depending upon location and conditions in model.
- Proceed slowly



Questions?