MODEL SETUP I
LECTURE

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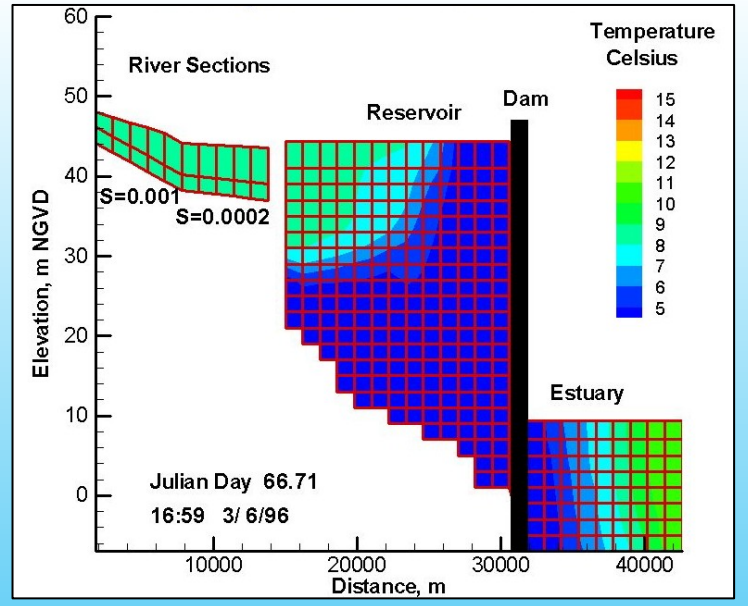
Outline

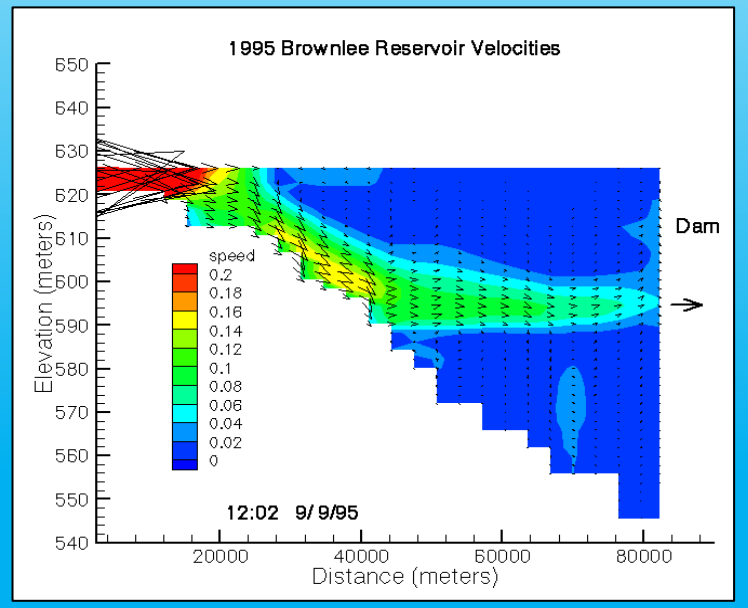
- Background
- Definition of problem
- Required Information
  - Bathymetry
  - Flow
  - Meteorology
  - Observations
  - Other
- Output

Detroit Dam, Oregon

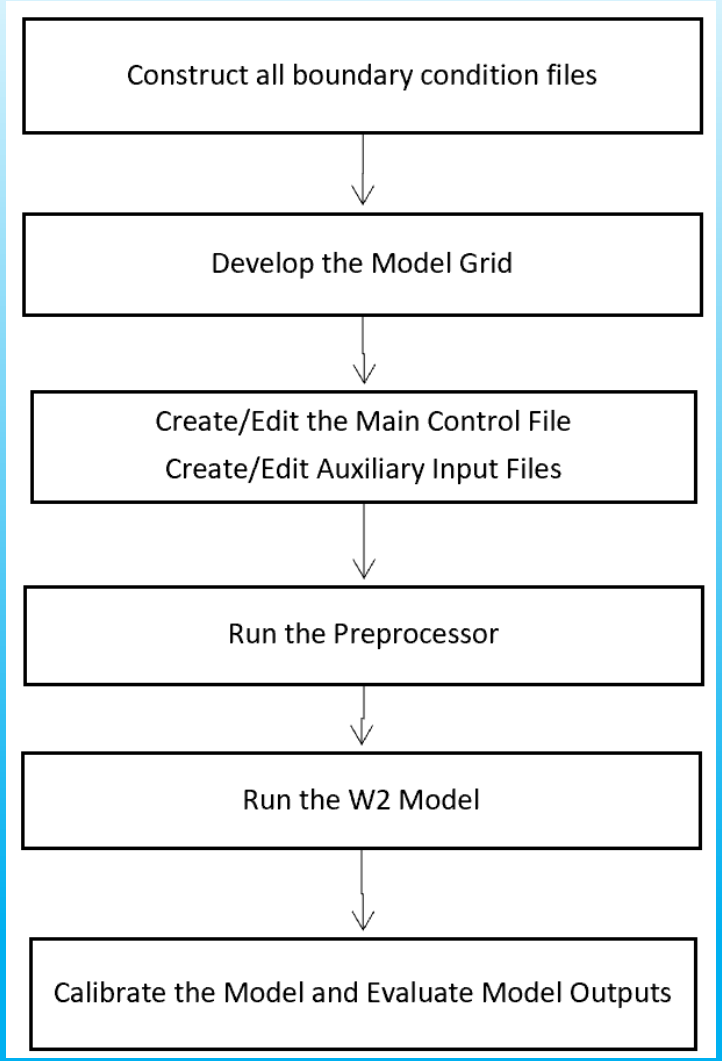
Background

- Setting up a computational model is an effort to create a computational approximation of a real system.
- A model enables one to investigate past behavior or future conditions with regard to changes in conditions.
- Approximations, simplifications, and omissions are necessary but must be balanced with regards to the model's ability to accurately capture the behavior of the real system.





How to Set Up and Run a Model Application



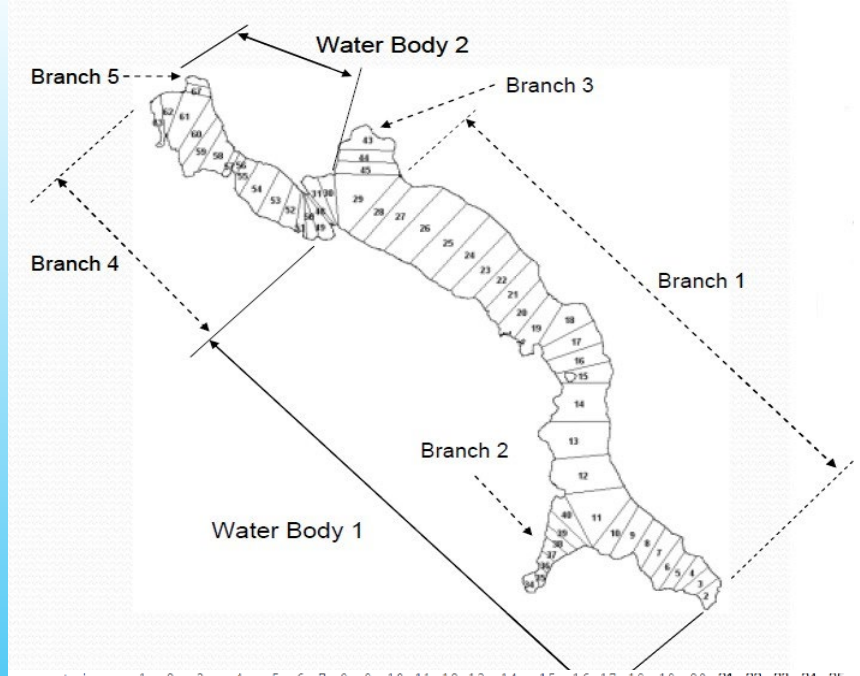
Definition of Problem

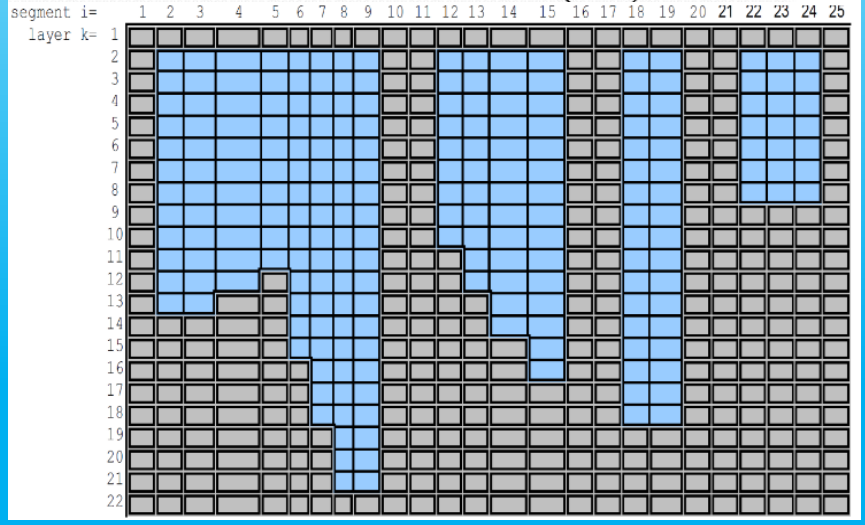
- What are water quality issues occurring in system that warrant a model?
- Are they the result of:
  - Flow alterations?
  - Operations?
  - Boundary Loadings?
  - Intermediate loadings?
  - Meteorology?
  - Altered system conditions?
  - Anticipated future changes in any of above?
  - Other?
- What information is required to set up a model to capture the behavior in question?

Source: https://www.erdc.usace.army.mil/Media/Images/igphoto/2002471 393/

Bathymetry

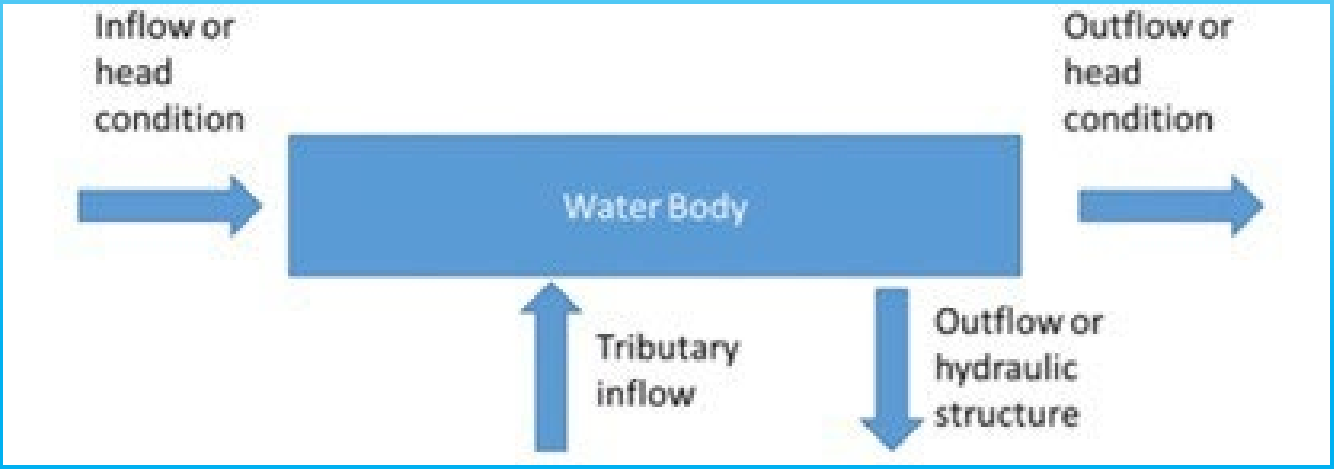
- Defines the physical structure of the natural system for the model
- **Sources**
  - Sediment range surveys
  - Cross Sections
  - Pre-impoundment surveys for reservoirs
- **Extent**
  - All of area of concern and beyond
  - Reaching upstream to control point
- **Resolution**
  - Horizontal (across system) – meters
  - Longitudinal (along system) – 10s or meters or more
  - Vertical (through water column) – meter or less

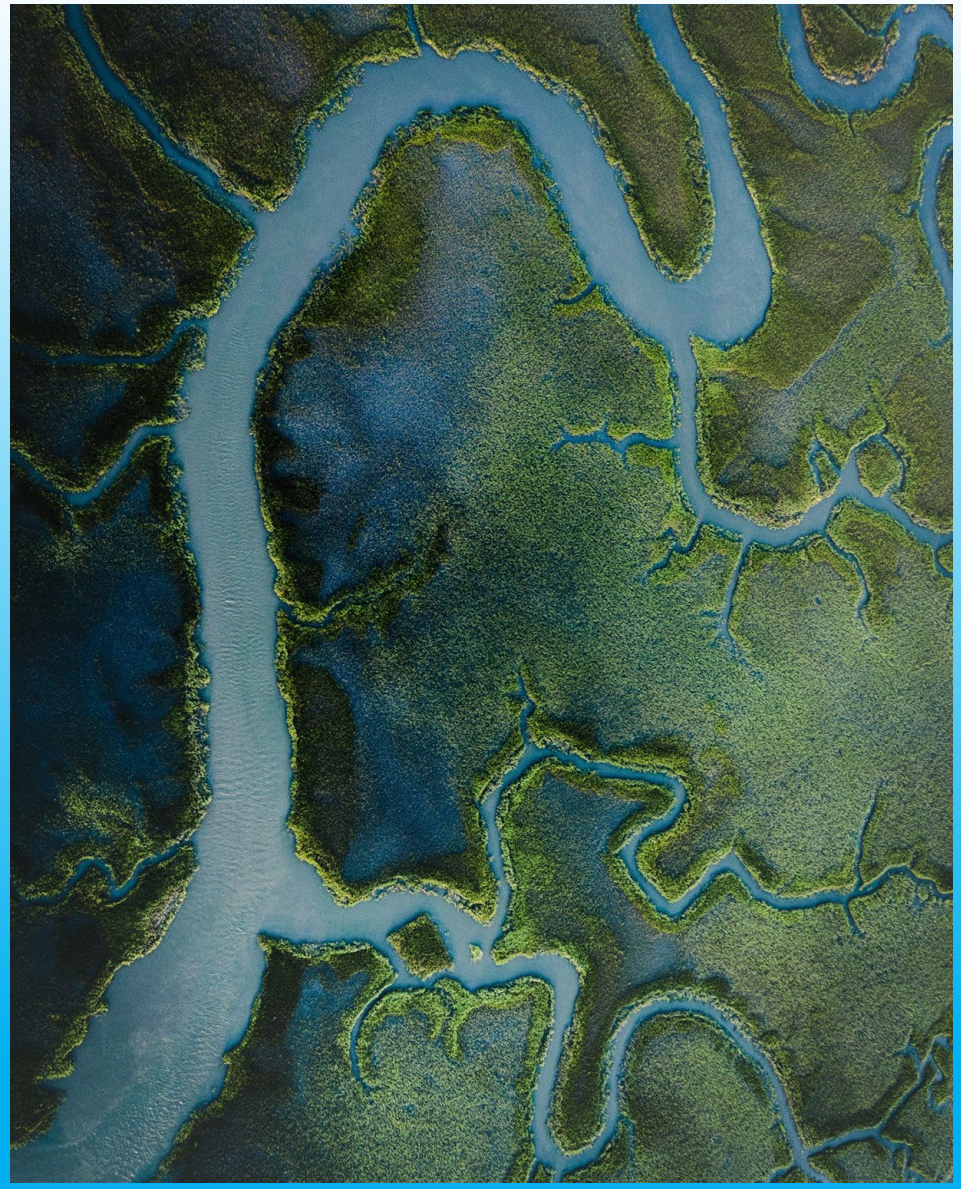




Flow

- Required
  - Headwater
  - Downstream
  - Tributary
  - Withdrawals
- Water surface elevations





Meteorology

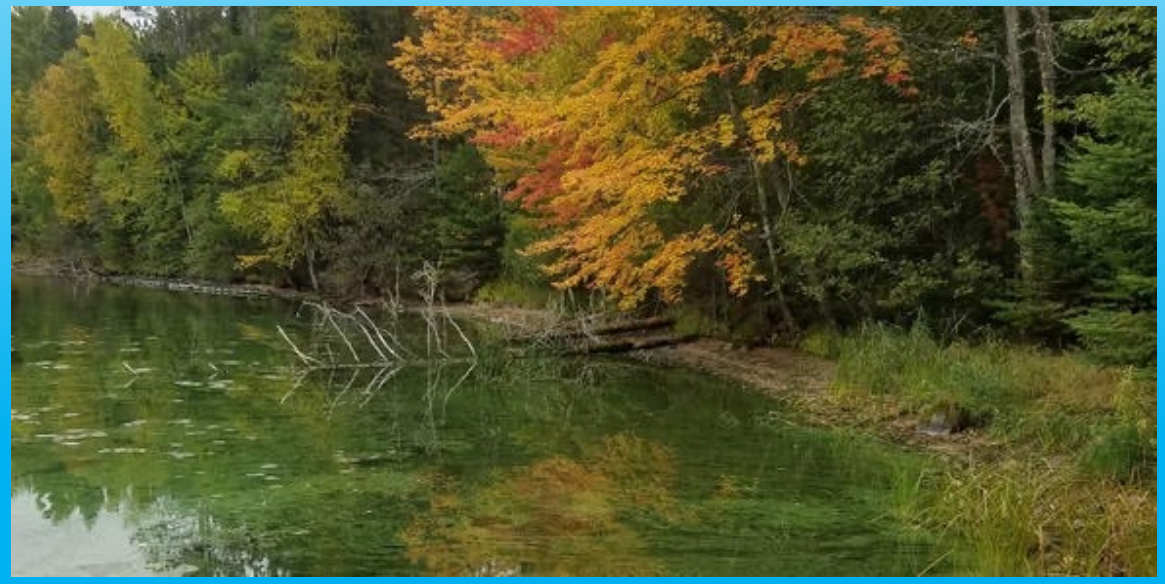
- Reliable data is essential to model performance, accuracy of model results, and validity of any concepts developed from model.
- There is no substitute for good met data.
- Typical sources are airports in vicinity of project.
- If available multiple airports may be used to evaluate model sensitivity.
- Class A
- Required information:
  - Air Temperature
  - Dew Point Temperature
  - Wind Speed
  - Wind Direction
  - Cloud Cover
  - Solar Radiation

Observations

- Observed data
  - For all water quality constituents
  - Provides Boundary conditions
  - Calibration
- Analysis provides insight as to what is occurring in system PRIOR to modeling.
- Aids in refinement of modeling approach.

Other

- Loadings
  - Point source
  - Non-point source/runoff
  - Other forms of water quality constituent loads
- Sediment
- Operations records
  - Which gates used for how long
  - Power generation
  - Spills
  - Anything else that impacts water movement



Output

- Identify what information is desired from model output.
- Ensure that it is being output at times and locations desired.
- Process and evaluate model output and compare to applicable observations.

Questions?