Selecting the Right Model

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Importance of Model Selection

- Project Management
  - Appropriate use of available budget
  - Schedule management

- Data Needs
  - Input
  - Output

- Risks
  - Hydraulics represent huge risks
  - Lack of detail may not identify risks
  - Simplifications can overestimate risk
  - Wrong analysis can be more costly
Importance of Model Selection

- Finding the right tool
  - Leverage the tools capabilities
  - Proprietary vs Open Source
  - Future Users

- Available Programs
  - Not an endorsement or recommendation

- Comments/Improvements
  - Email us
Normal Depth

- Irregular Geometry
- Unsteady Flow
- Hydraulic losses
- Backwater Impacts
- Structures
- Spatially varied H&H
- Spatial flow change
- Irrigation channels
- Roadside ditches
- Curb & gutters
- Gutter pans
- Sidewalk chases
- Simple input
- Simple output
**Culvert**

- Multiple, non-uniform openings
- Disconnected culverts
- Unsteady Flow
- Unknown downstream WSEL
- Need more than simple upstream/downstream hydraulic result
- Single Barrel
- Multiple Barrel
- Standard culvert shape
- Simplistic Overtopping
• Simple Input
• Simple Output
1D Steady State

- Natural or constructed flood storage
- Unsteady flow
- Diverging flow paths
- Varied WSEL at bridges/culverts
- Flow redirection
- Rapidly varied flow
- Need for sediment transport results
• Channels with varying vegetation/roughness
• Multiple channel reaches
• Bridges
• Culverts
• Parallel Floodplains
• Wide range of applications
  • Bridge analysis
  • Scour analysis
  • Channel design
  • FEMA Permitting
  • Simple prismatic channels
  • Complex channel section geometry
1D Unsteady State

- Braided Streams
- Diverging flow paths
- Varied WSE at bridges/culverts
- Highly skewed bridges
• Flood routing (Volume!)
  • Floodplain storage
  • Looped hydrograph
  • Split flow timing
• Storm durations
• Sediment transport
• Tides or Reservoir operations
• More complex analysis
  • Hydrographs
  • Computational stability
  • Model run times
• More output data
  • Animated WSE
  • Durations of flow
  • Volumes of flow
• More experience needed
2D

- Vertical velocity distribution
- Complex hydraulic losses
- Vertical sediment profiles
- Need dynamic hydraulic loads on structures
• Split flow paths
  • Bridges
  • Braided systems
  • Complex floodplains
• Non-uniform WSE
• Highly skewed bridges
• Floodplain storage
• More spatial detail
  • More terrain data
• Great for visualizations
  • Easy to understand
• Informative for 1D models
• Requires experience
Questions

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