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Modeling: Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality

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http://scholarworks.umass.edu/fishpassage_conference/2016/June21/41
Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality

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Background

• 1D RAS solves dynamic St. Venant mass and momentum equations in one dimensions
  – User determines which direction water will flow

• 2D RAS solves dynamic St. Venant mass and momentum equations in two dimensions
  (laterally, not depth-wise)
  – Terrain determines which direction water will flow
When to Use 2D RAS

- Off-channel storage areas
- Undefined boundary between channel and banks
- Bends
- Flow direction changes at different flows/stages
- Complex ineffective areas
When Not to Use 2D RAS

• Bridges
• Salinity/temperature/water quality
• 1D modeling is sufficient
• Good topographic data not available
Ease of Use

1. Define projection
2. Develop terrain (TIN) and land coverage (shp)
3. Develop mesh
4. Define boundary conditions
5. Run model
6. View results
*(repeat from step 2 if desired)*
RASMapper

- Currently a post-processing tool
- Greater visualization capabilities
- Maps results on terrain
- Adjust terrain within RASMapper

- Developing RASMapper to do pre-processing as well
Area Background

- Canal carries the bulk of the water
- Restoration area was a golf course
- Stream historically moved through the golf course out into the bay
- Neglected tidal influences for this example
Model Setup
Restoration Area Details

• Restored area max slope: 0.1%
• Representative channel dimensions: 18 ft across, 3 ft deep
• Restoration reach length: 1 mile
• Cell size: 20 ft grid
Adjust Terrain

• Can edit terrain in 2d model using:
  – 1d cross sections within RAS
  – Terrain editors in GIS

• Adjustments
  – Step-pool sequence
  – Add sinuosity
  – Disconnect pools
  – Natural in-stream structures

• Could edit n-values as well (in GIS)
Adjust Terrain
Questions?