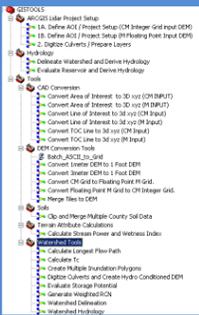


MN NRCS Hydrology Tool

Peter Mead
Cartographic Technician
MinnesotaUSDA/NRCS



.... Part of a growing collection of Conservation related GIS tools and models



- Setup File and Geodatabase structure
- Extract Area of Interest, Create Primary Terrain attributes
- Burn Culverts, Create Hydro Conditioned DEM
- Delineate Watershed and Derive Hydrology
- Evaluate Reservoir and Derive Hydrology
- Extract and Convert LIDAR to CAD Formats
- Profile / Cross Section Tools
- Clip / Merge Multi-county Soil Data
- Stream Power Index
- Compound Topographic Wetness Index
- Estimate Storage Potential
- Create Multiple Inundation Polygons
- Generate Runoff Curve Number
- Calculate Time of Concentration
- Convert Grid Formats and z-units.

Multiple versions and variable inputs accommodate all LIDAR Elevation Grid Formats

Project Setup and Hydrology Toolset

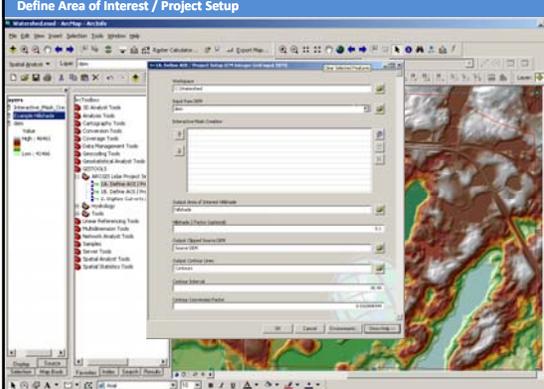


- Clip LIDAR Elevation Data to Area of Interest, Create Hillshade, Contours, set up file and geodatabase structure
- Digitize Culverts, Create Hydro-Conditioned DEM, Flow Accumulation, Flow Direction, Slope, and Stream Layer
- Two Options:
Delineate Watershed and Derive Hydrology, or Evaluate Reservoir and Derive Hydrology

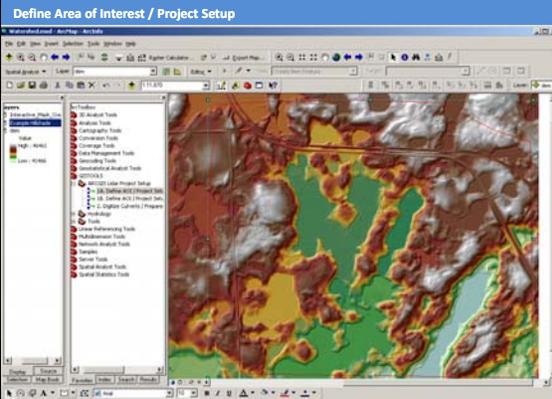
Delineate Watershed and Derive Hydrology Output:
Drainage Area, Weighted RCN, Average Slope, Longest Flow Path, Time of Concentration

Evaluate Reservoir and Derive Hydrology Output:
Drainage Area, Weighted RCN, Average Slope, Longest Flow Path, Time of Concentration
Volume-Elevation Curve, Inundation Polygons and storage in WS inches / Acre Ft.

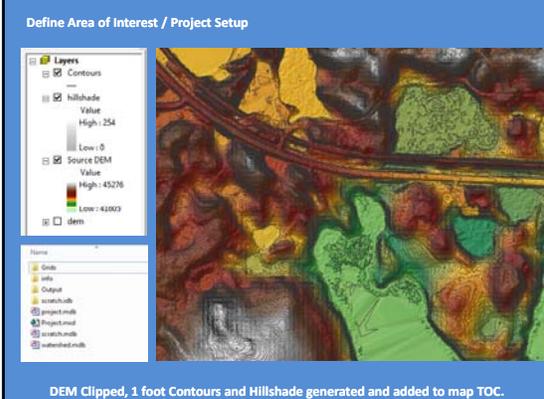
Define Area of Interest / Project Setup



Define Area of Interest / Project Setup



Define Area of Interest / Project Setup



DEM Clipped, 1 foot Contours and Hillshade generated and added to map TOC.

Digitize Culverts / Prepare Layers

The screenshot shows the ArcGIS Tools palette with the 'Digitize Culverts / Prepare Layers' tool selected. The tool's interface includes fields for 'Input' and 'Output' layers. To the right, a DEM map shows a culvert digitized as a red line across a stream. Below the map, a small diagram shows a red line with a blue arrow indicating flow direction.

Digitize Culverts / Prepare Layers

Tool extracts lowest z value crossed by the drawn features

Values are assigned to a new DEM

DEM Aggregated to 3 meter Horizontal Resolution

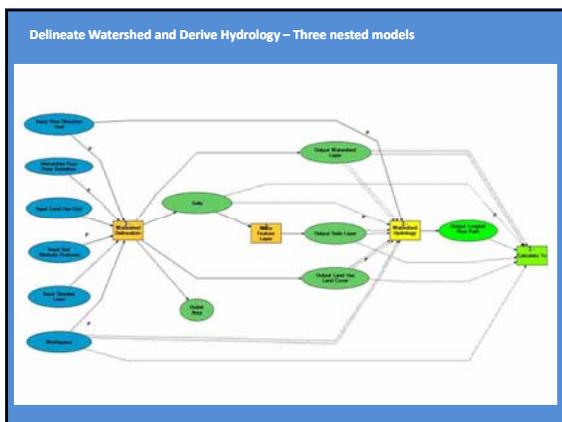
Flow Accumulation Grid

Flow Direction Grid

Slope Grid (In percent rise)

Strahler Ordered Stream Network

The map shows a DEM with a culvert digitized as a red line. The culvert is shown as a vertical line crossing a stream.



Delineate Watershed and Derive Hydrology

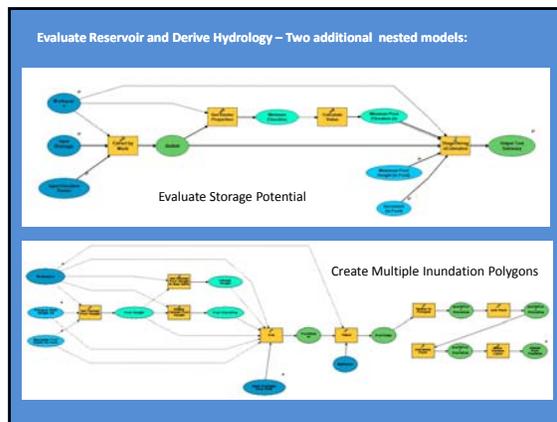
The screenshot shows the ArcGIS interface with a watershed delineated on a DEM. The watershed boundary is shown as a blue line on the map. The tool's interface is visible on the left.

Delineate Watershed and Derive Hydrology

The screenshot shows the ArcGIS interface with a watershed delineated on a DEM. A table of attributes is displayed, showing the following data:

Area	SQ_MILES	BCR	Avg_Slope	Long_Path	Tc
150.737519	0.248027	69	10.94	9910.621644	1.615561

The tool's interface is visible on the left, and a map of the watershed is shown on the right.



Evaluate Reservoir and Derive Hydrology

Evaluate Reservoir and Derive Hydrology

Area	SQ Miles	RCN	Avg Slope	Long Path	Ea
1	123.45678	0.1234	0.5	4503.64729	1.23456

Evaluate Reservoir and Derive Hydrology

Macro-enabled Excel Sheet

Imports Stage-Storage Output, Watershed attributes, and project map.

Allows User to select Principal, Emergency, and Freeboard elevations

Provides WS Inches and acre feet of storage

Plots Volume-Elevation curve

All Tool Elements also included as stand alone processes

Questions?

peter.mead@mn.usda.gov