

UW-Madison Flood Modeling Project

Monroe County Climate Change Task Force
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Eric Booth, PhD
Associate Scientist, Hydroecology
University of Wisconsin - Madison

National Science Foundation grant

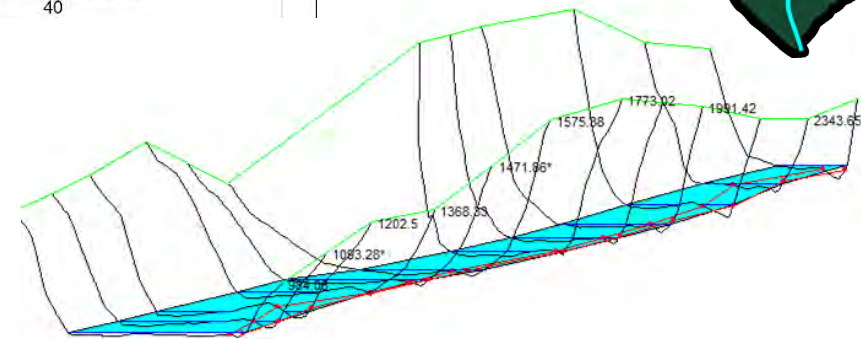
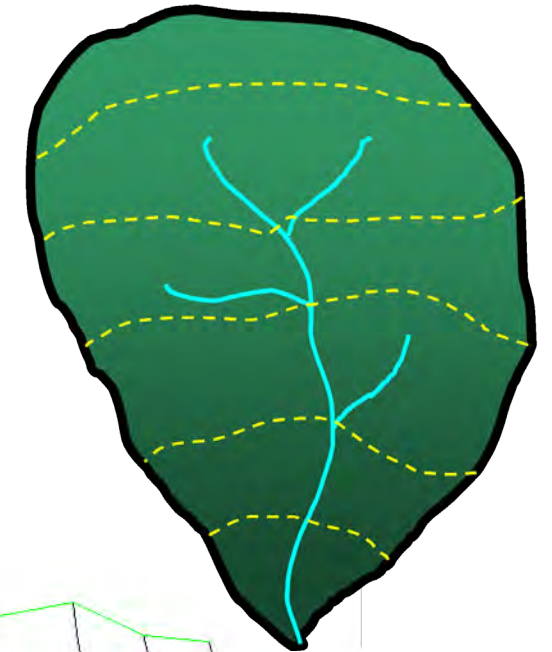
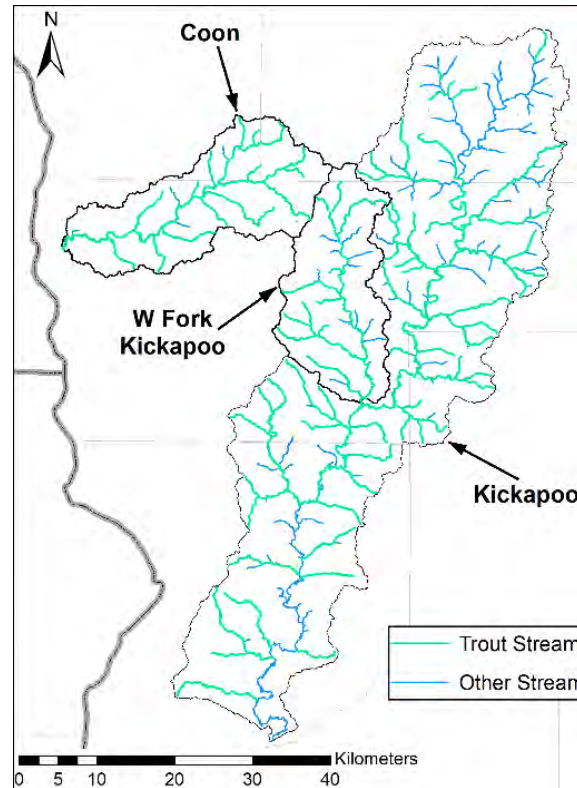
- Interactive Dynamics of Stream Restoration and Flood Resilience in a Changing Climate



Photo: Tim Hundt

Leveraging PLAN-EIS project and models

- Hydrologic model
 - Rainfall → Runoff response
 - HEC-HMS
- Hydraulic model
 - Stream network flood dynamics
 - Runoff → Flood levels
 - HEC-RAS



What can modeling do to help?

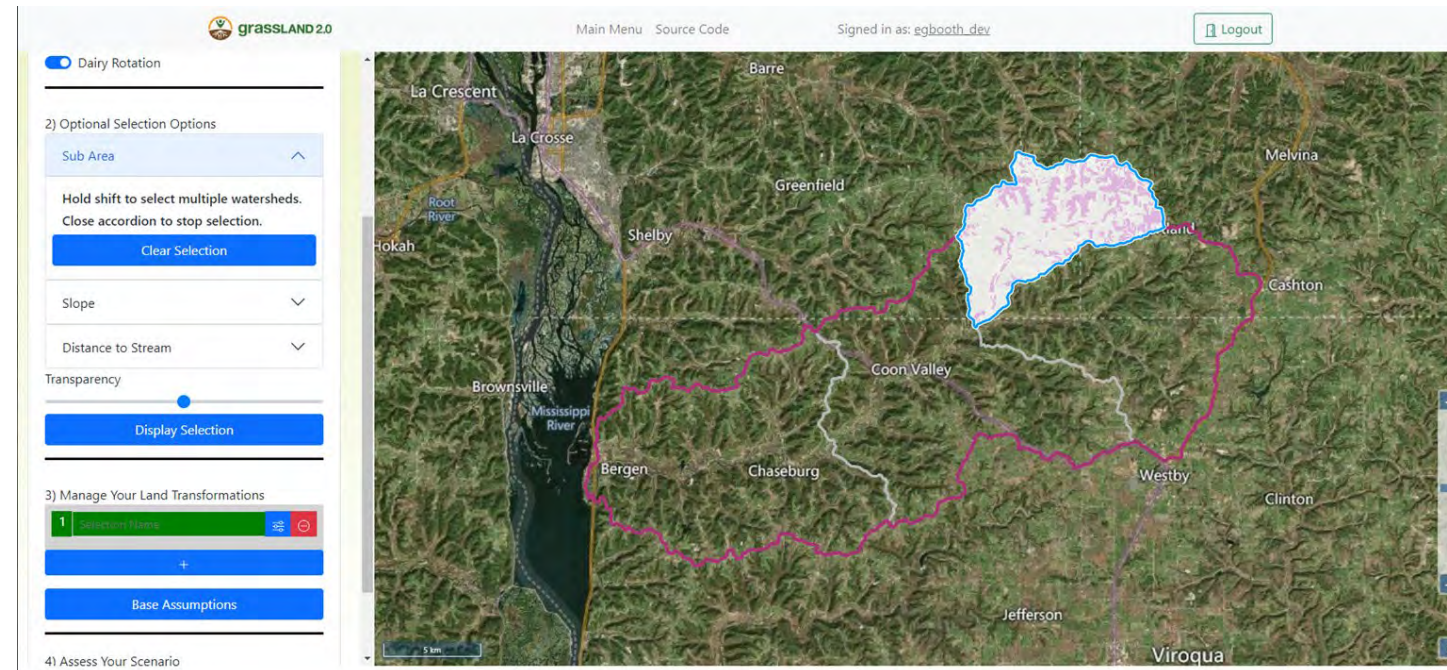
- Investigate and compare the impacts of these different strategies (implemented in different places) on downstream flooding
- Explore “what-if” scenarios
- Help quantify benefits of projects
 - Open opportunities for funding





FloodScape Web-Based Tool

- How can the public **DRIVE** these powerful models?
- Imagine land and stream management scenarios
 - Managed grazing, cover crops, stream-floodplain restoration
- Assess and visualize impacts of scenarios on flooding
- Developed through community workshops
- Will be available publicly on the web in summer 2023



QUESTIONS??

- Contact info
 - Eric Booth
 - egbooth@wisc.edu
 - Ericbooth.org

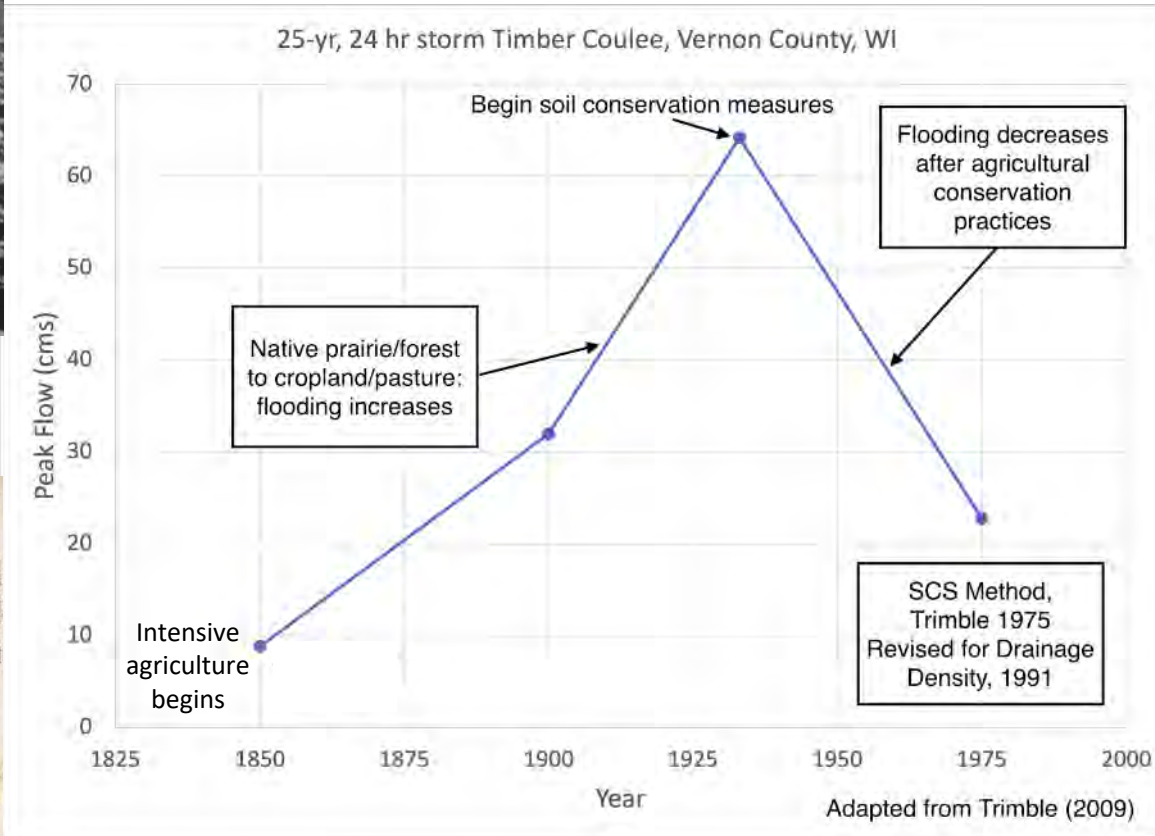




Flood Risk

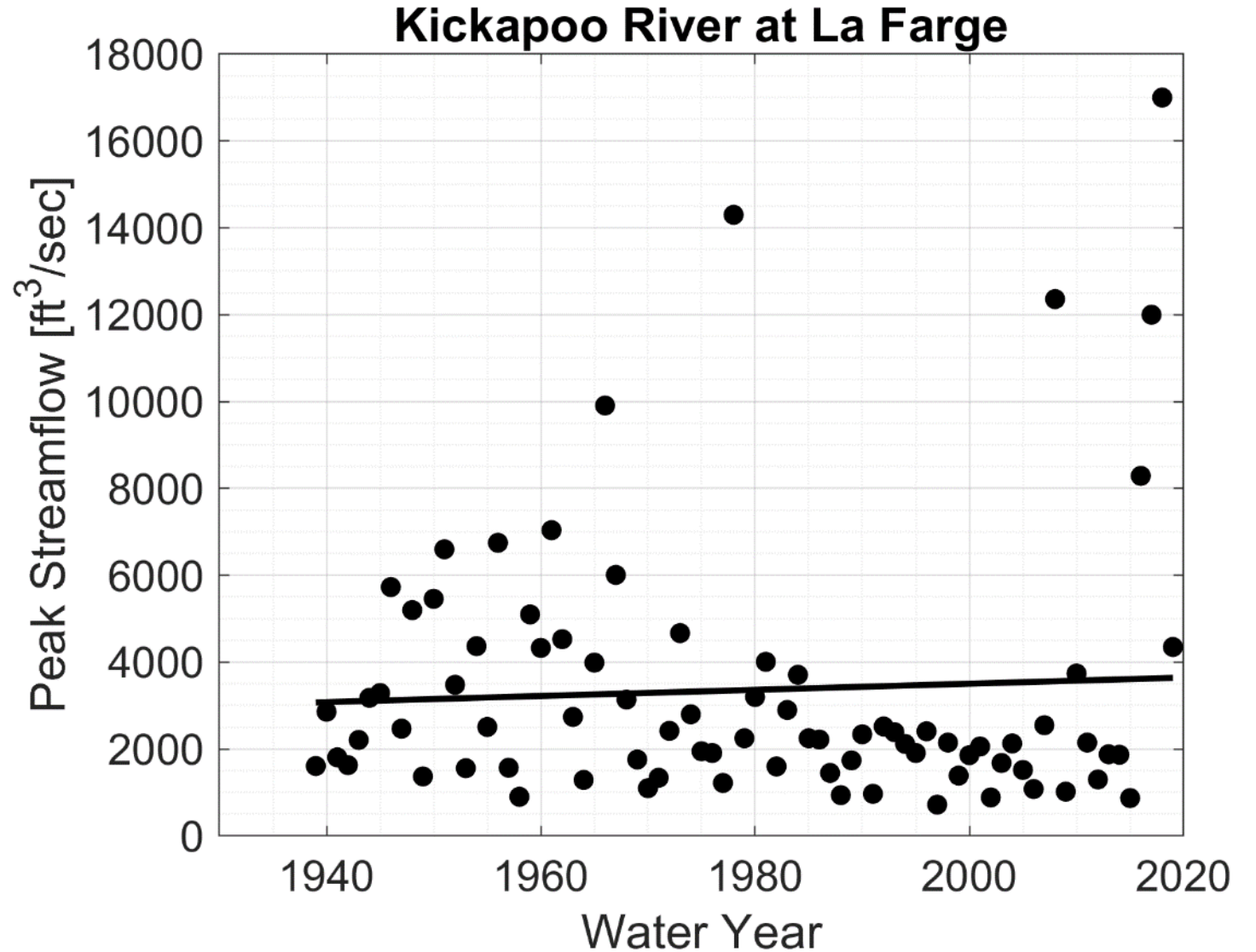
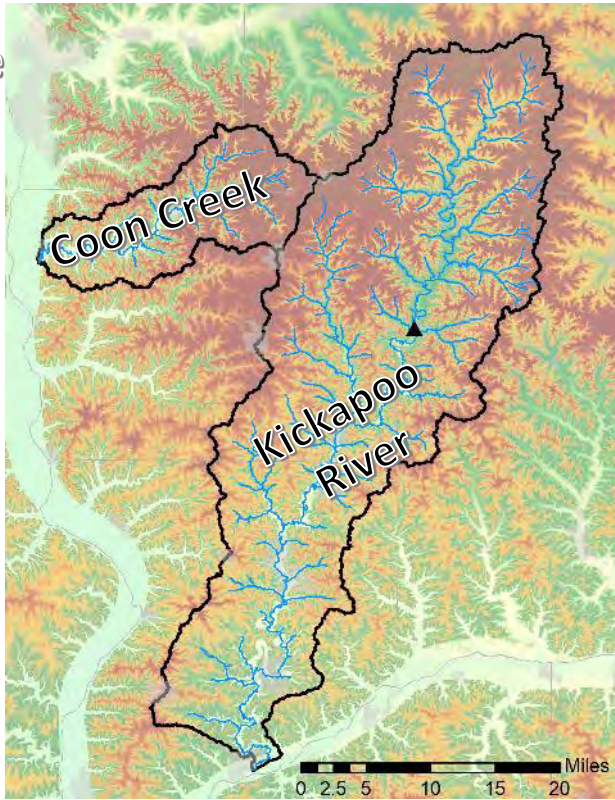
1. **Hazard**: the phenomenon with potential to cause harm (i.e. unusually high water levels)
 2. **Exposure or Values**: the people or assets in harm's way; the values at risk
 3. **Vulnerability**: the susceptibility of people and property to loss when exposed to a hazard; the lack of resistance to damaging/destructive forces
- **Project context**: The modeling that we are doing is squarely focused on reducing flood ***hazard*** but the interviews and workshops will certainly engage with the exposure/values and vulnerability dimensions as well.

Reducing flood hazard through land and stream management



Recent Extreme Floods

La Crosse



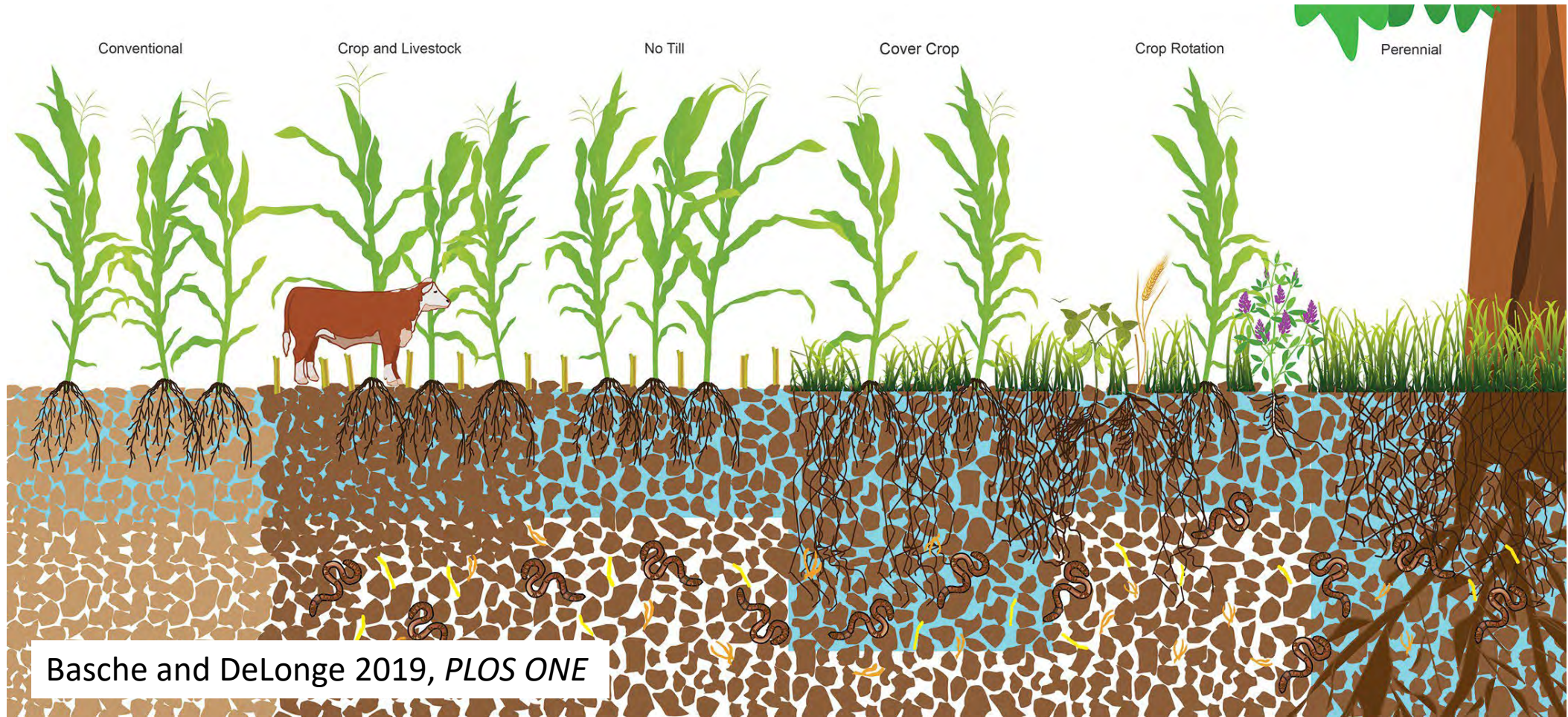
Flood Hazard Reduction Categories

or ways in which land management may influence flooding

1. Infiltration
2. Watershed storage
3. Connectivity
4. Network conveyance

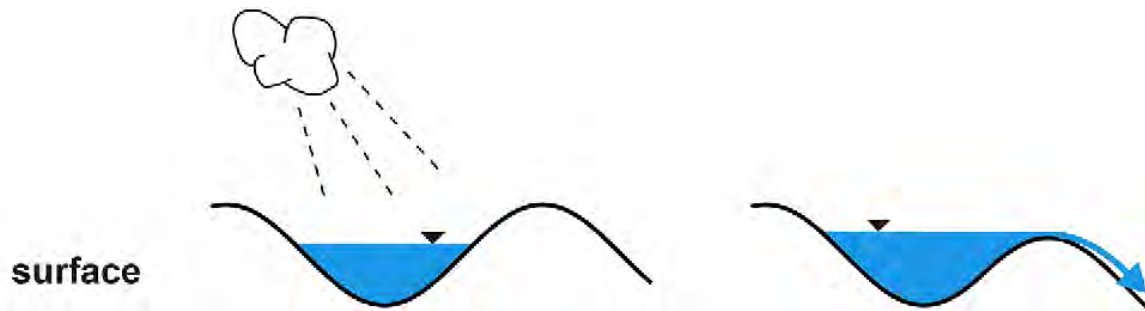
Infiltration

- the effects of management upon the separating of rainfall between rapid surface and slower subsurface flow



Watershed storage

- the effects of management upon landscape storage of water during storm events (from small depressions to large reservoirs)



Connectivity

- the effects of management upon the ease with which water is delivered from hillslopes to the stream network



Rachael Sodeman



Monroe Co., 1937 – WI Historical Society

Network conveyance

- the effects of management upon the conveyance of water within the stream channel-floodplain corridor



STREAM-FLOODPLAIN RECONNECTION

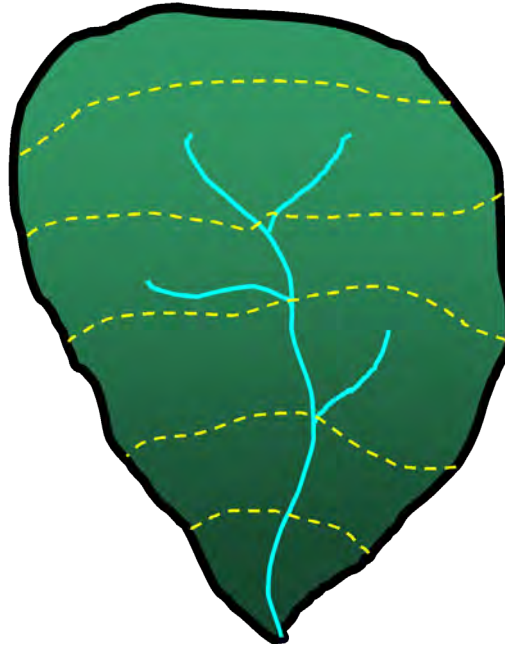


Upper East Branch Pecatonica River

Hydrologic Model (Rainfall → Runoff)

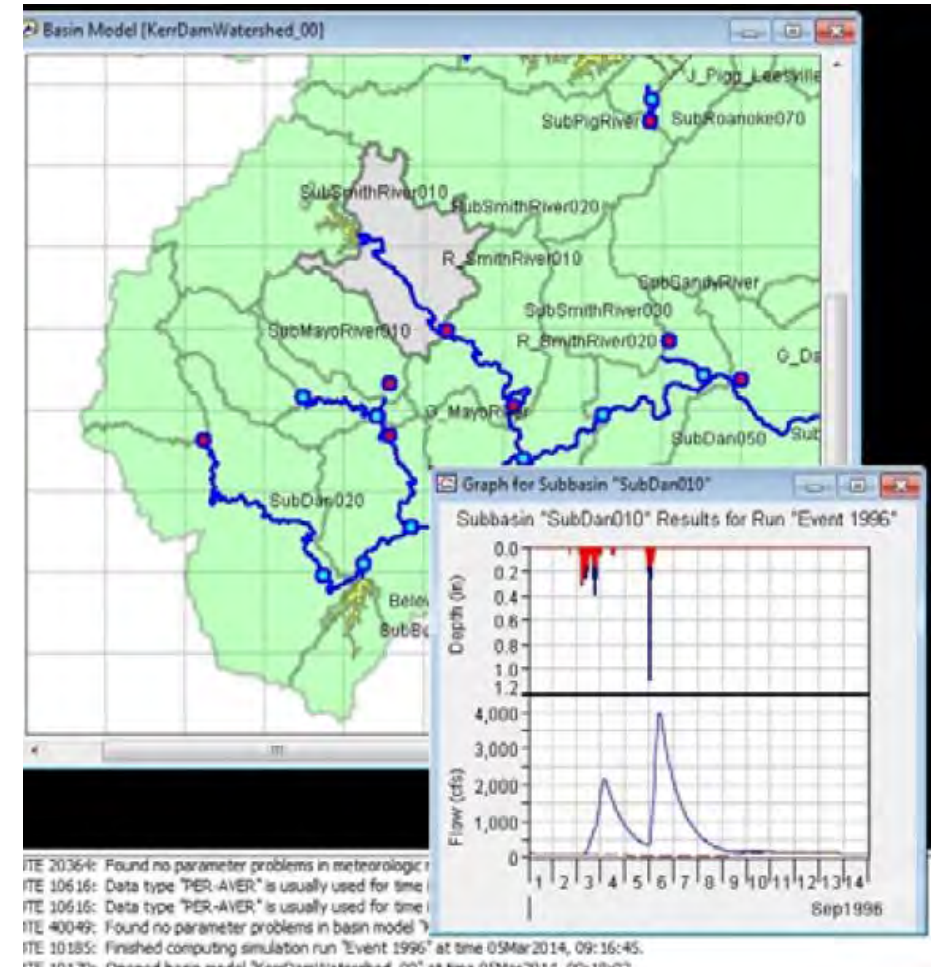
- Inputs

- **Rainfall**
- **Watershed properties**
 - Watershed area & shape
 - Slope
 - Soils
 - Land use / management



- Output

- **Storm runoff** at watershed outlet



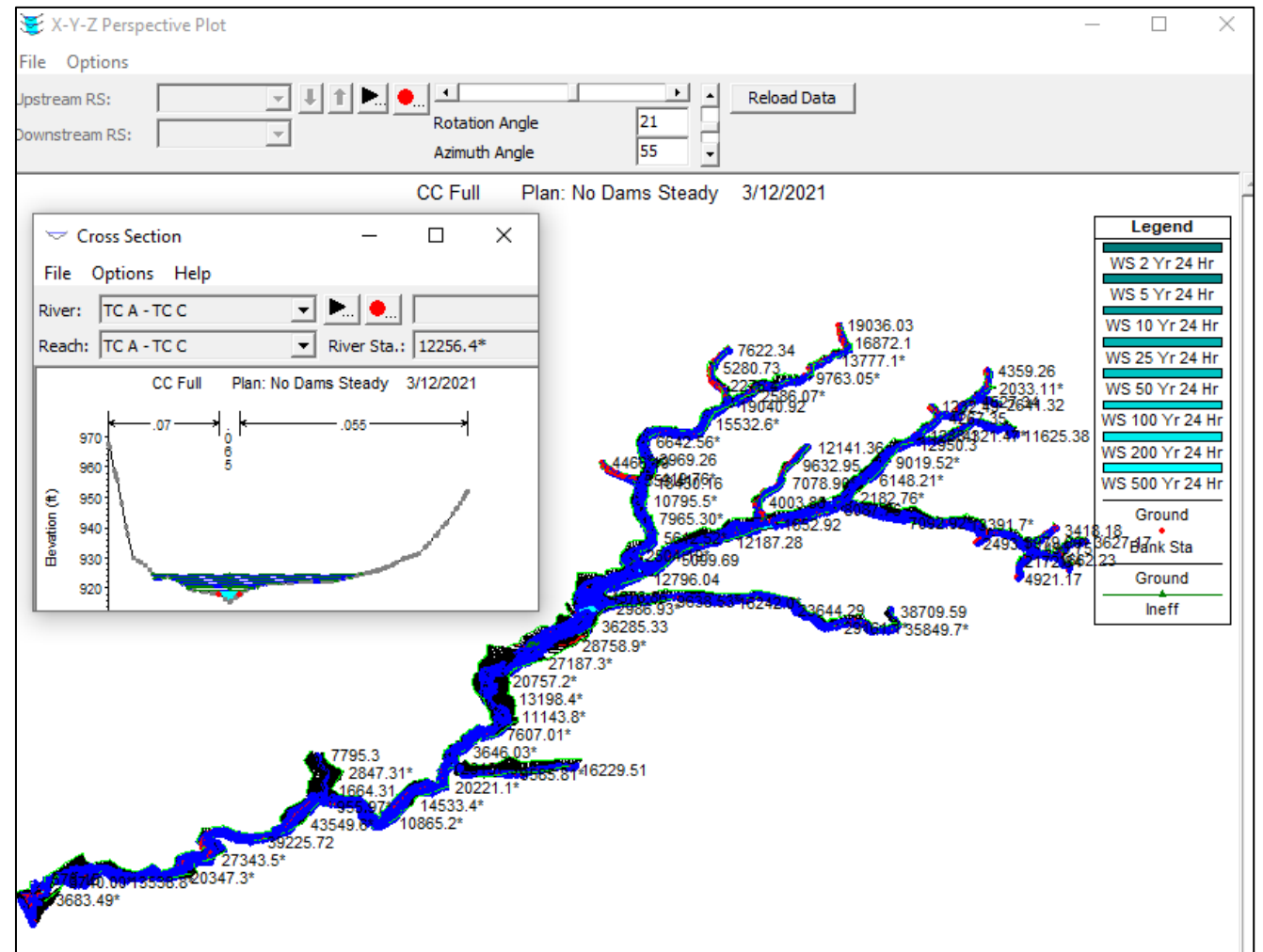
Hydraulic Model (Runoff → Flood Levels)

- Inputs

- **Runoff from sub-watersheds**
- **Channel network properties**
 - Slope
 - Channel geometry
 - Roughness
 - Sinuosity

- Outputs

- **Flood levels (elevations)**
- **Flooded area**
- **Velocity**



Flood Hazard Reduction Categories

or Ways in which land management may influence flooding

1. Infiltration
 2. Watershed storage
 3. Connectivity
 4. Network conveyance
- } **HYDROLOGIC MODEL (HEC-HMS)**
- HYDRAULIC MODEL (HEC-RAS)**

- Project context: The PLAN-EIS models will be capable of representing each of these categories (some more directly than others) so that we can compare their relative impacts on reducing flood peaks. One important modeling activity will be to create a large suite of scenarios that implement unique combinations of these strategies across different parts of the watershed.

<https://nelson.wisc.edu/graduate/water-resources-management/flood-resilience-in-the-coon-creek-watershed/>