Unit 06:
Future System Enhancements

WEB-BASED FLOOD INUNDATION MODELING WITH DSS-WISE WEB: A SHORT COURSE ON RECENT UPDATES WITH HANDS-ON TRAINING

For
FEDERAL EMERGENCY MANAGEMENT AGENCY
FEMA

Technical Workshop

September 26th, 2024

Colorado Convention Center, Meeting Room 403
700 14th St, Denver, CO 80202

Developed by

NATIONAL CENTER FOR COMPUTATIONAL HYDROSCIENCE AND ENGINEERING
THE UNIVERSITY OF MISSISSIPPI

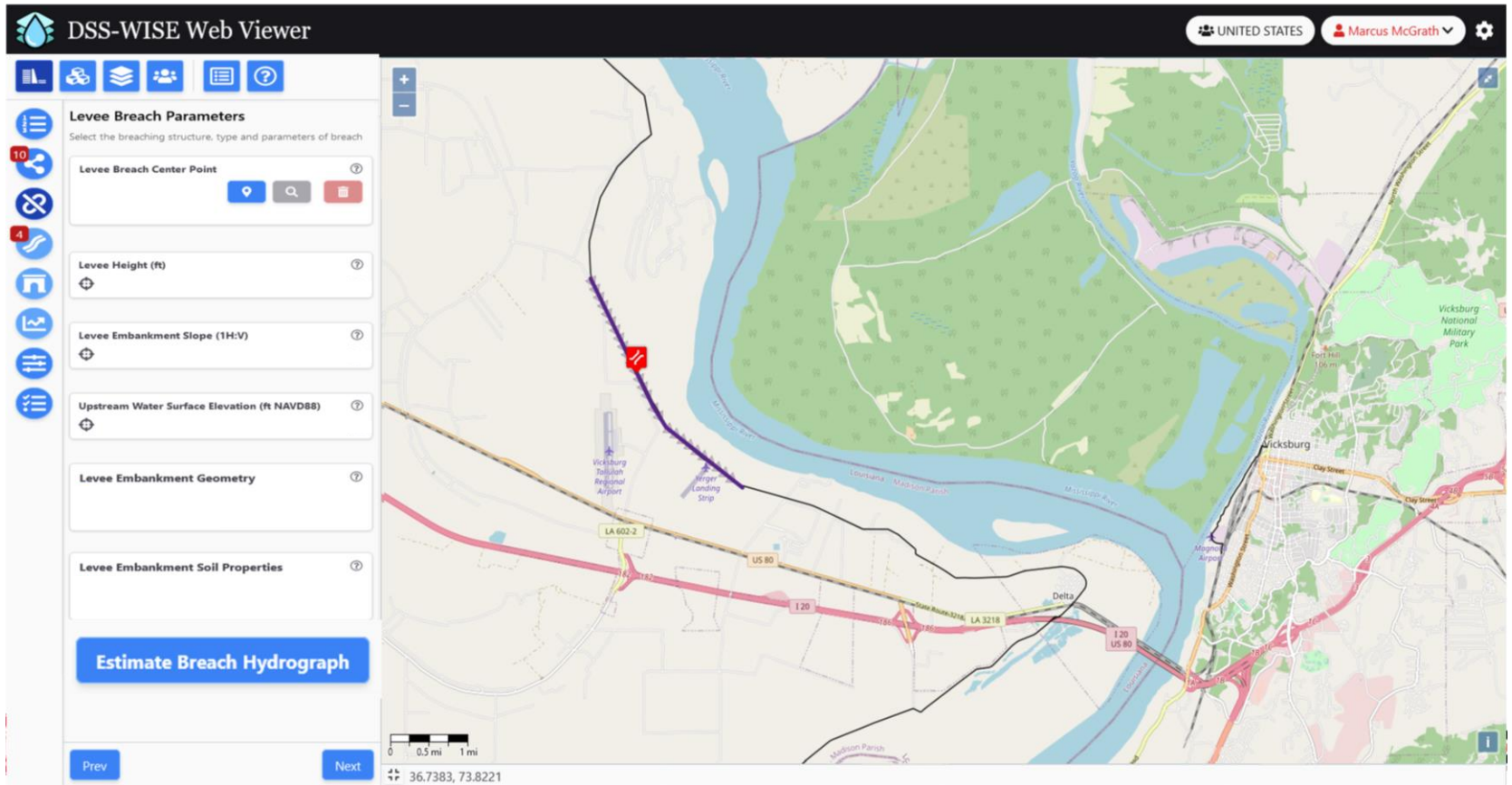
Upcoming Enhancements and Improvements

6.1

Acknowledgements

- This new development work is currently funded through an inter-agency agreement between ERCD, DHS S&T, and FEMA NDSP

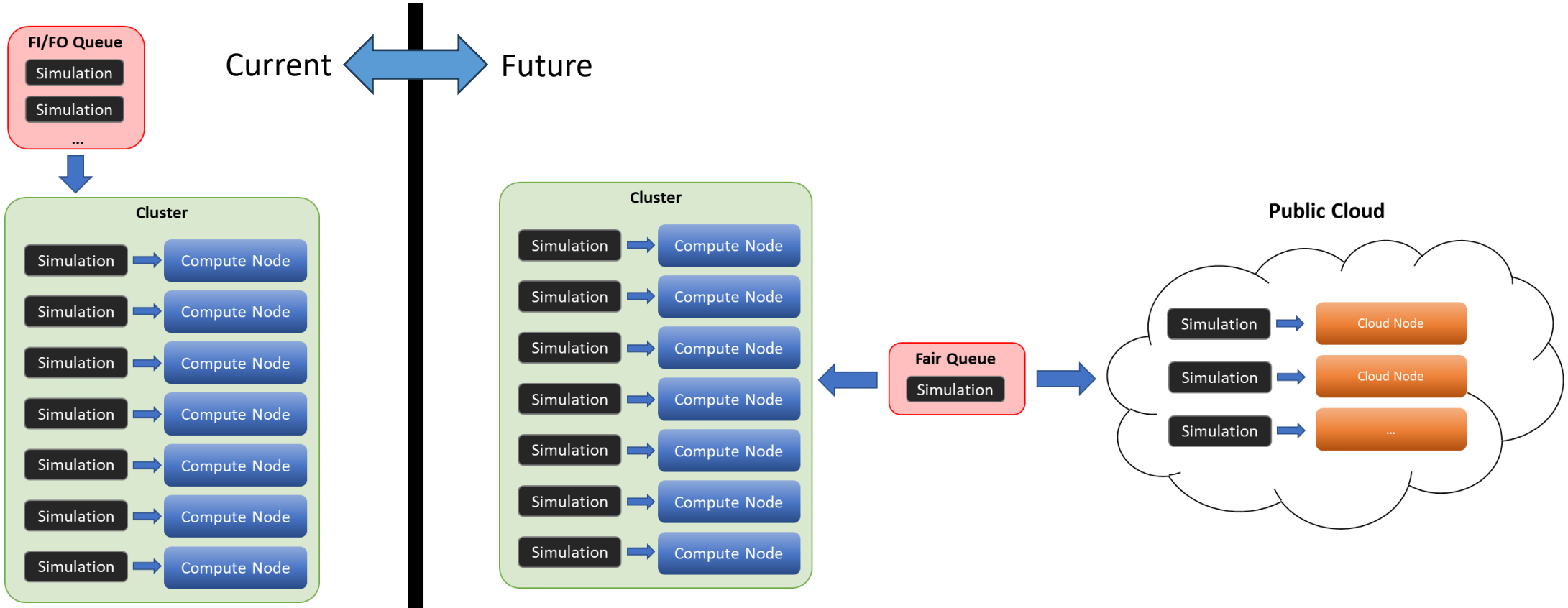
Upcoming enhancements: Levee Breach Calculator



- Uses and Artificial Neural Network (ANN) to estimate levee breach outflow from soil properties, embankment geometry, and flood conditions
- Resulting hydrograph is released downstream of the selected breach location

Upcoming enhancements: Hybrid cloud compute capability, current and future systems

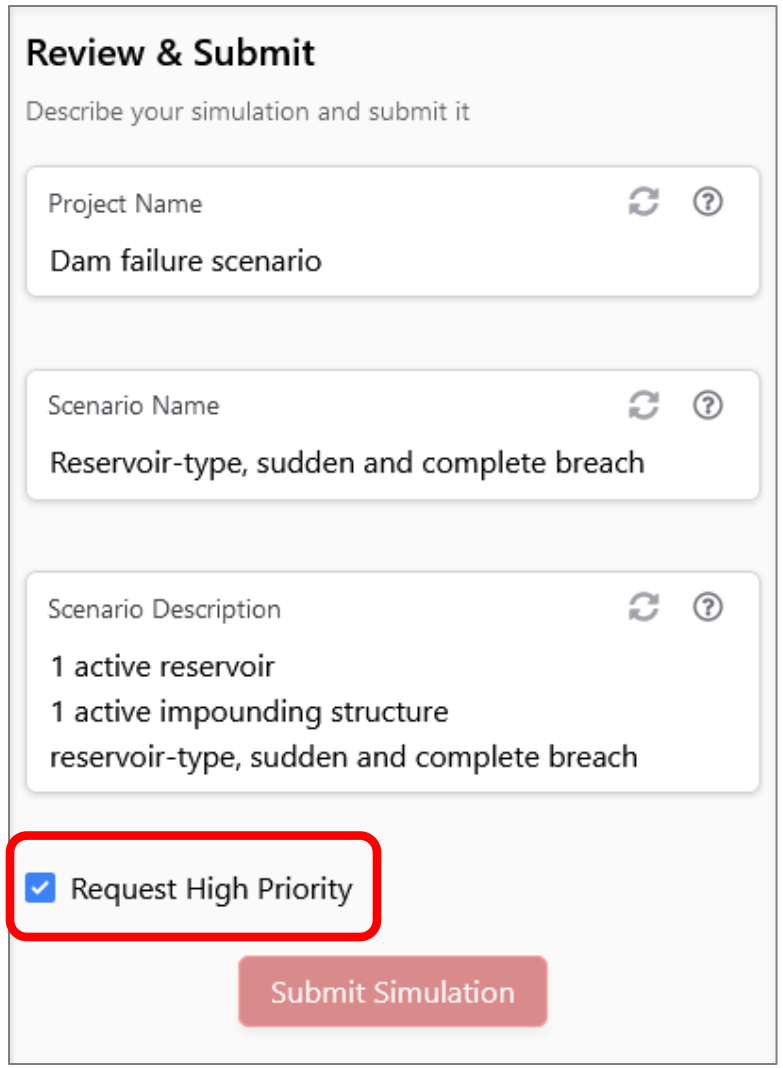
Develop the capability to utilize a hybrid cloud solution for DSS-WISE Lite simulations



Currently, simulations wait in a queue until resources become available

- Cloud nodes will be created on-demand to minimize queue wait time.
- High-priority simulations are assigned to fastest possible instances.
- Fair queueing via dynamic reordering and heuristics

Upcoming enhancements: High-priority simulations



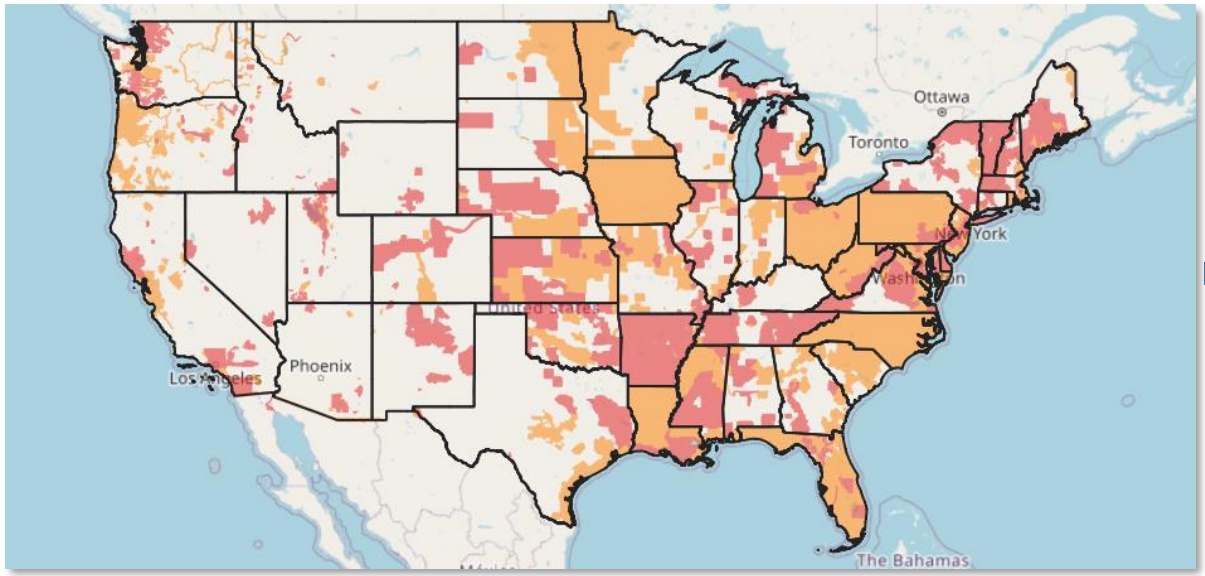
Develop the ability for privileged users to submit high-priority simulations that run in the cloud on the fastest available compute nodes

- Users will be able to request high-priority status for emergencies without requiring administrator intervention
- Simulation request is then routed to the fastest available cloud compute node

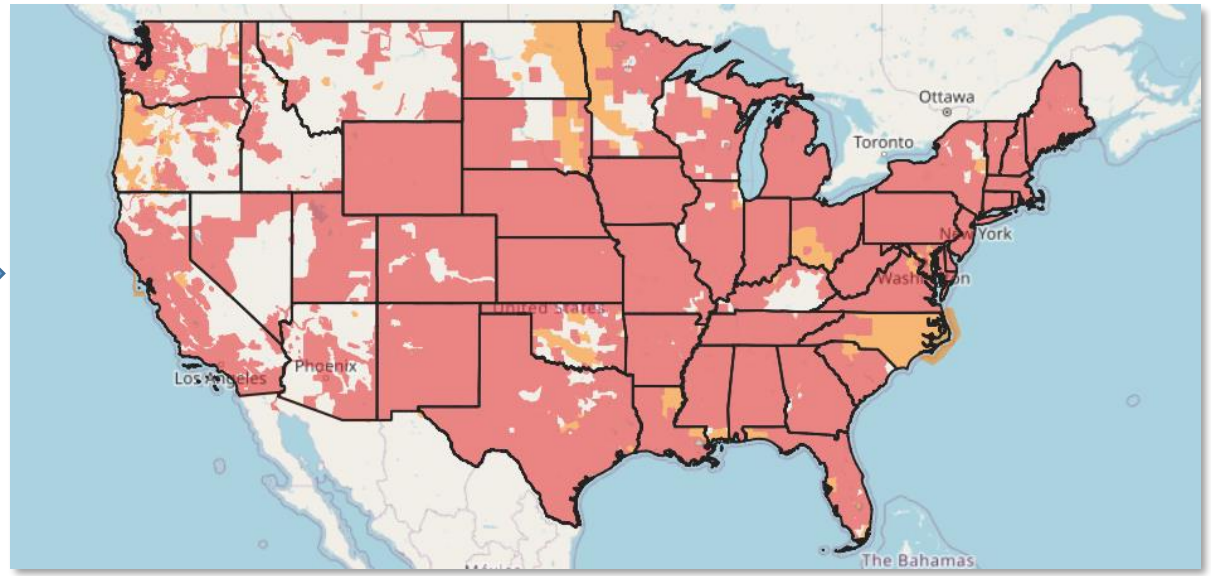
Upcoming enhancements: Improved USGS 3DEP Data and Processing

Develop the capability to better utilize the USGS 3D Elevation Program's (3DEP) 1-meter DEM dataset to generate the base level DEMs for simulations on the fly

Current high-resolution DEM data



Available high-resolution DEM data



Current 1m data released: **93,003** tiles totaling **23+ TB**

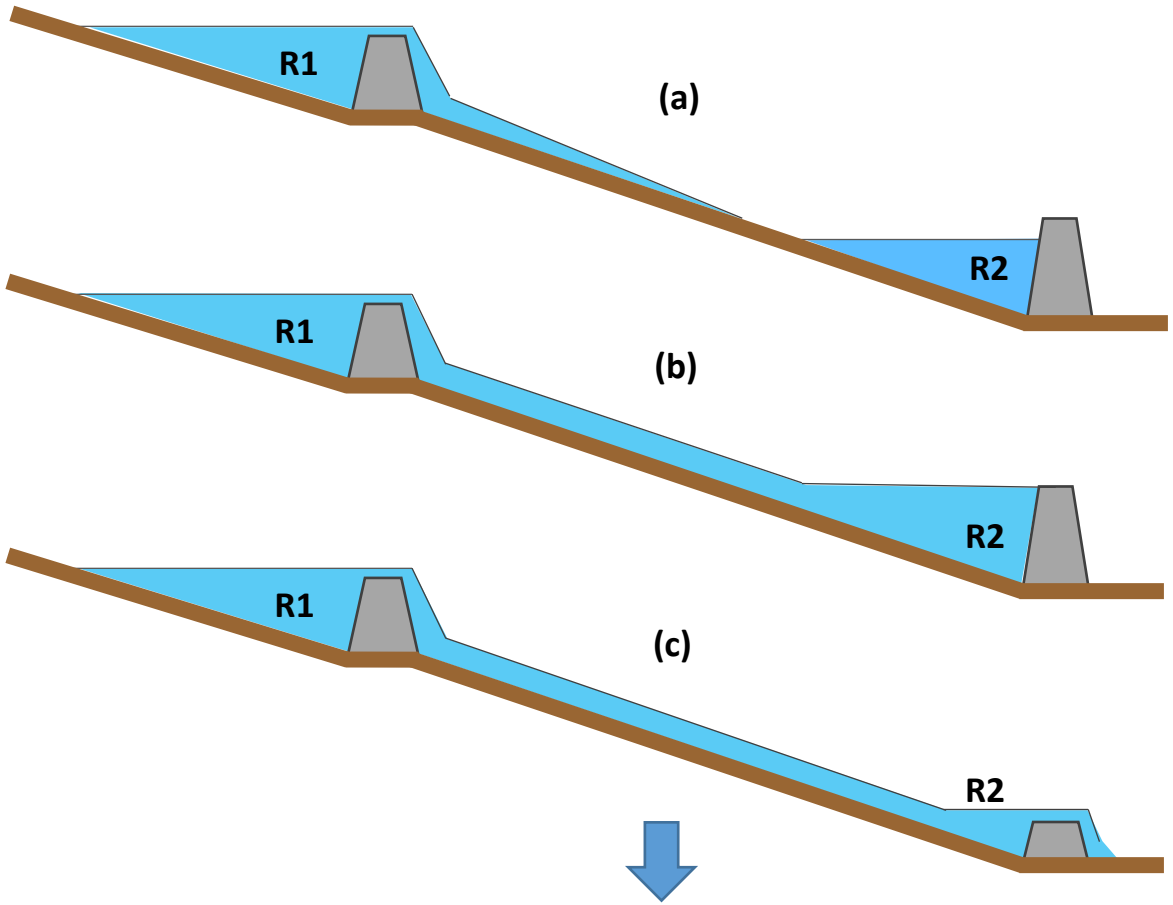
1/9 arc-second

1-meter

- Newly-added 1-meter USGS 3DEP data will be processed and imported to the system on a frequent basis
- A Web Coverage Service (WCS) endpoint will be set up to enable hybrid cluster integration and modular decoupling of system components

Upcoming enhancements: Cascading dam failures

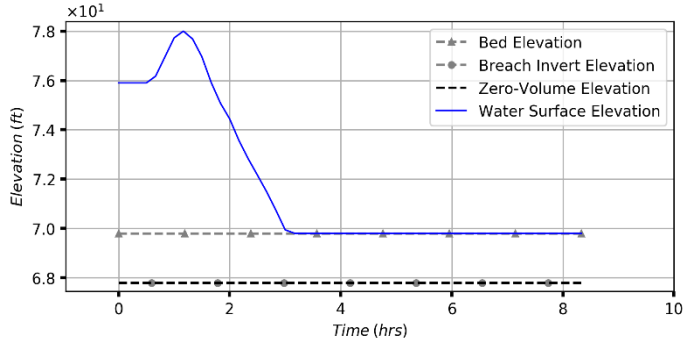
Develop the ability to model cascading dam failures

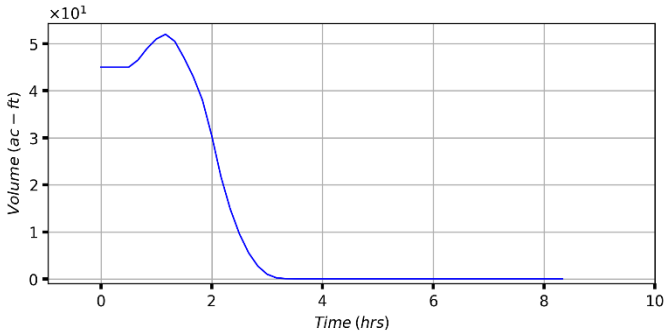


(a) Dam 1 breaches

(b) Dam 2 breach triggered by overtopping

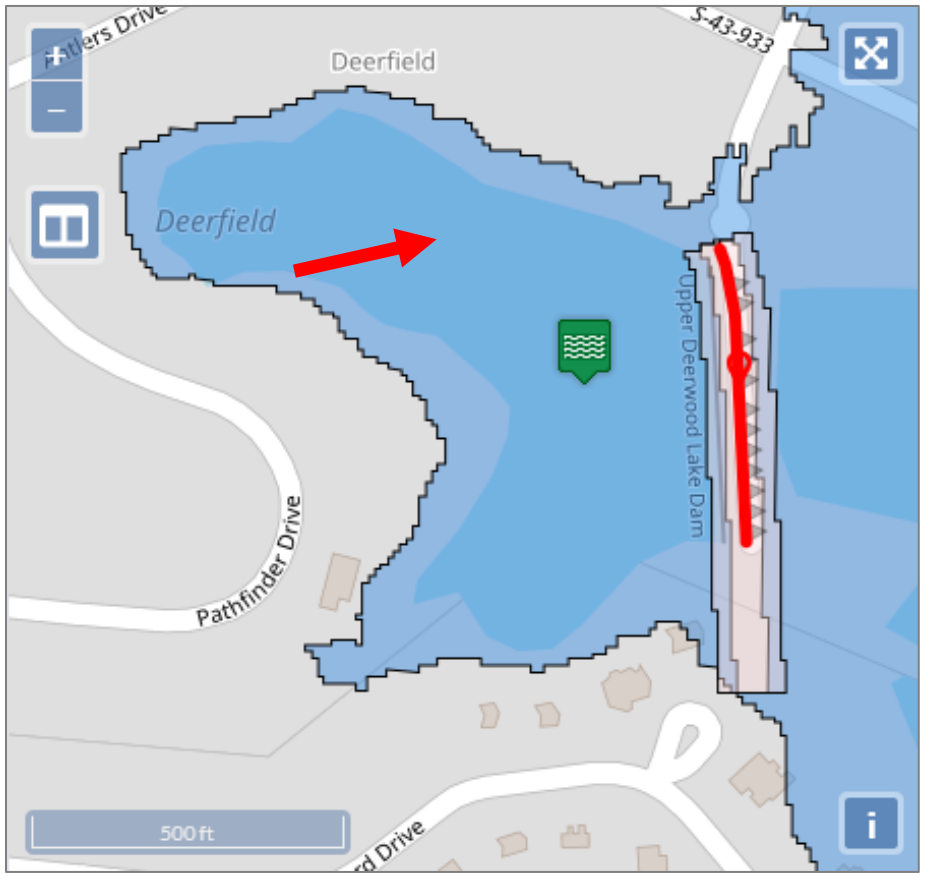
(c) Dam 2 breaches

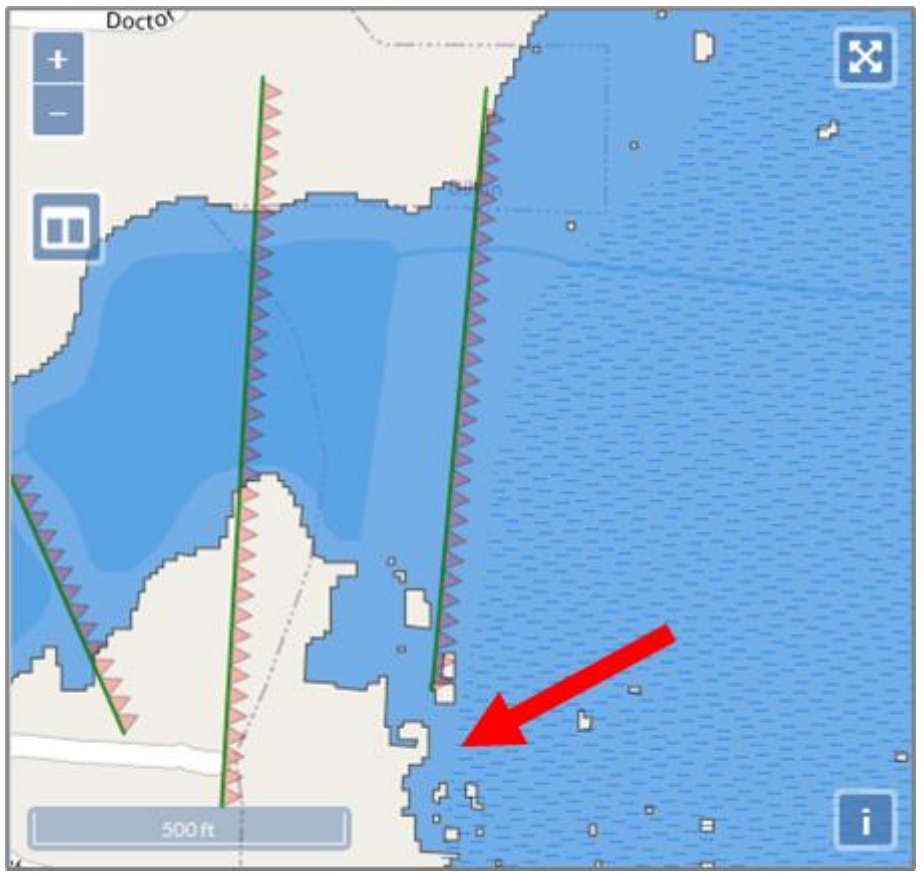




Upcoming enhancements: Load the results of a previous simulation on the Viewer

Develop the ability for a user to load the results of a previous simulation on the Viewer during setup.



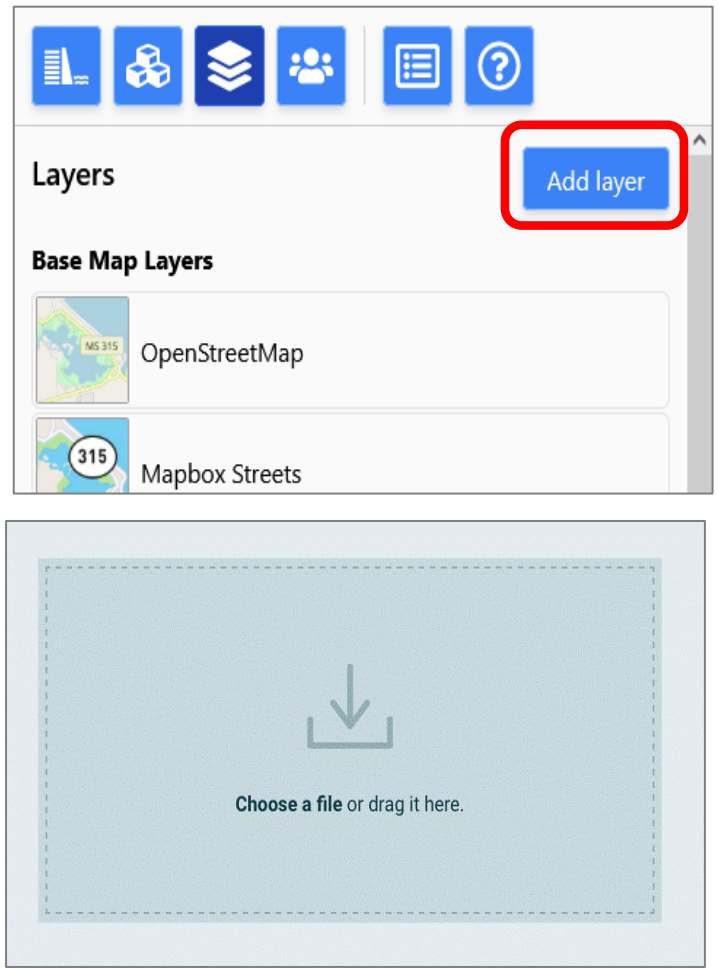


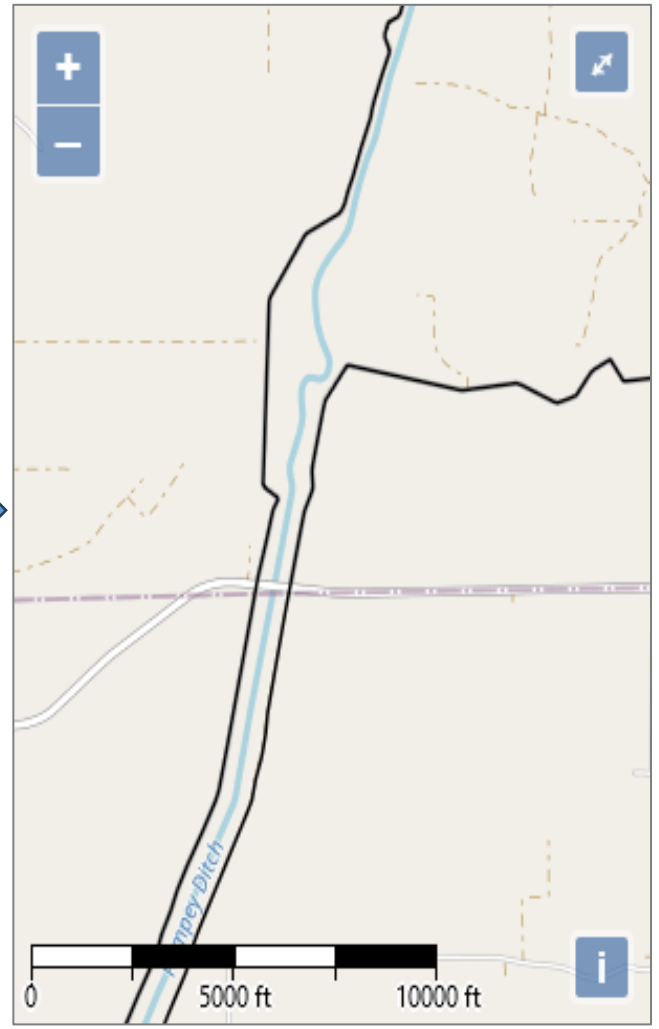
- Results/errors from previous simulations will be visible during setup
- Improves user awareness/understanding of the model
- Reduces user frustration
- Empowers users to extract the most value from their simulation results

Upcoming enhancements: User-supplied data overlays during simulation setup

Develop the capability for users to upload their own GIS overlay data onto the Viewer during simulation setup.

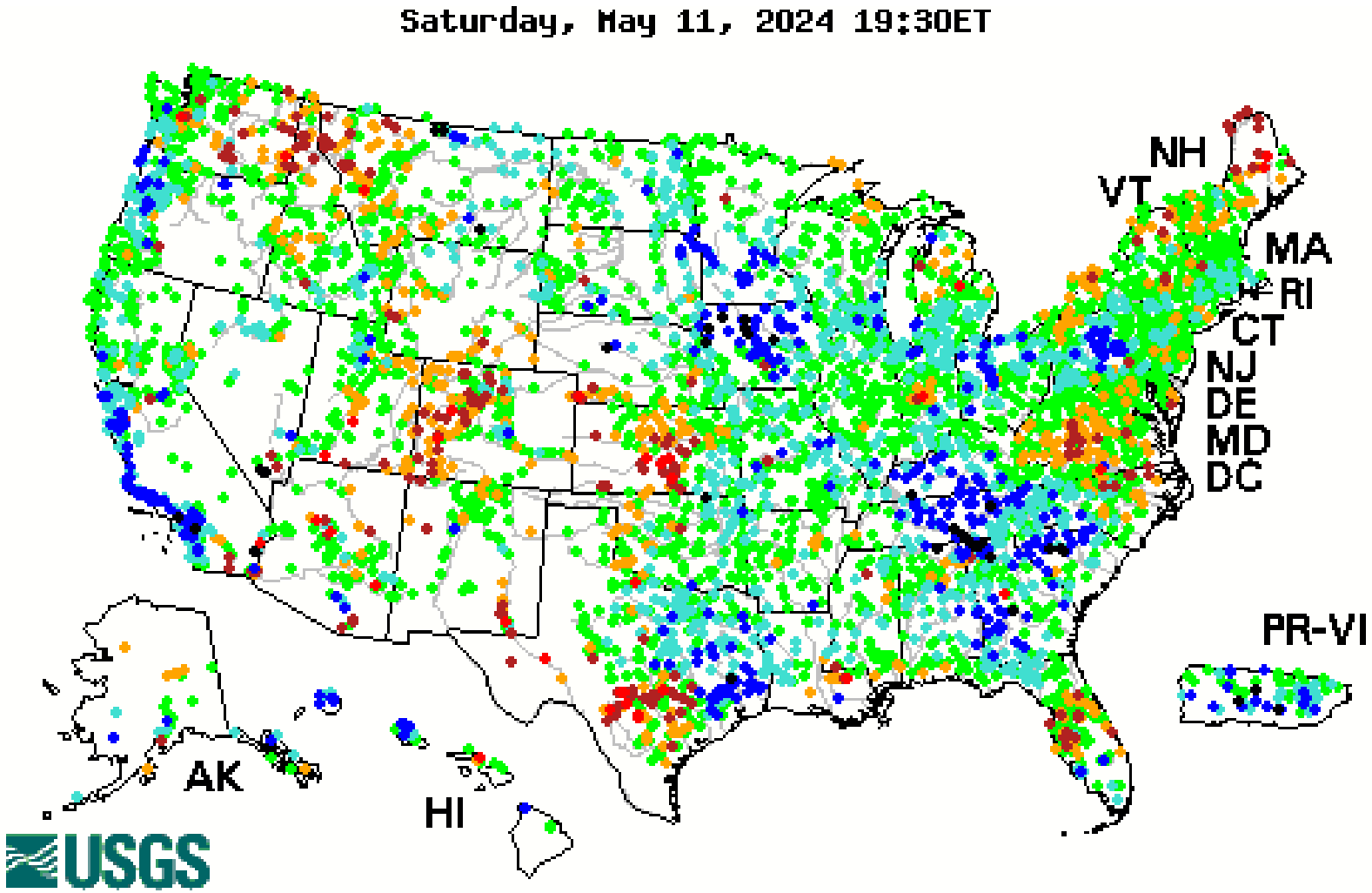
- "Bring your own data" approach
- Enhance awareness and understanding





Upcoming enhancements: User-supplied inflow hydrographs for wet-day scenarios, Integration of USGS stream gauge data

Develop the capability for users to automatically import this USGS stream gage data for use in their simulations instead of having to obtain it manually.

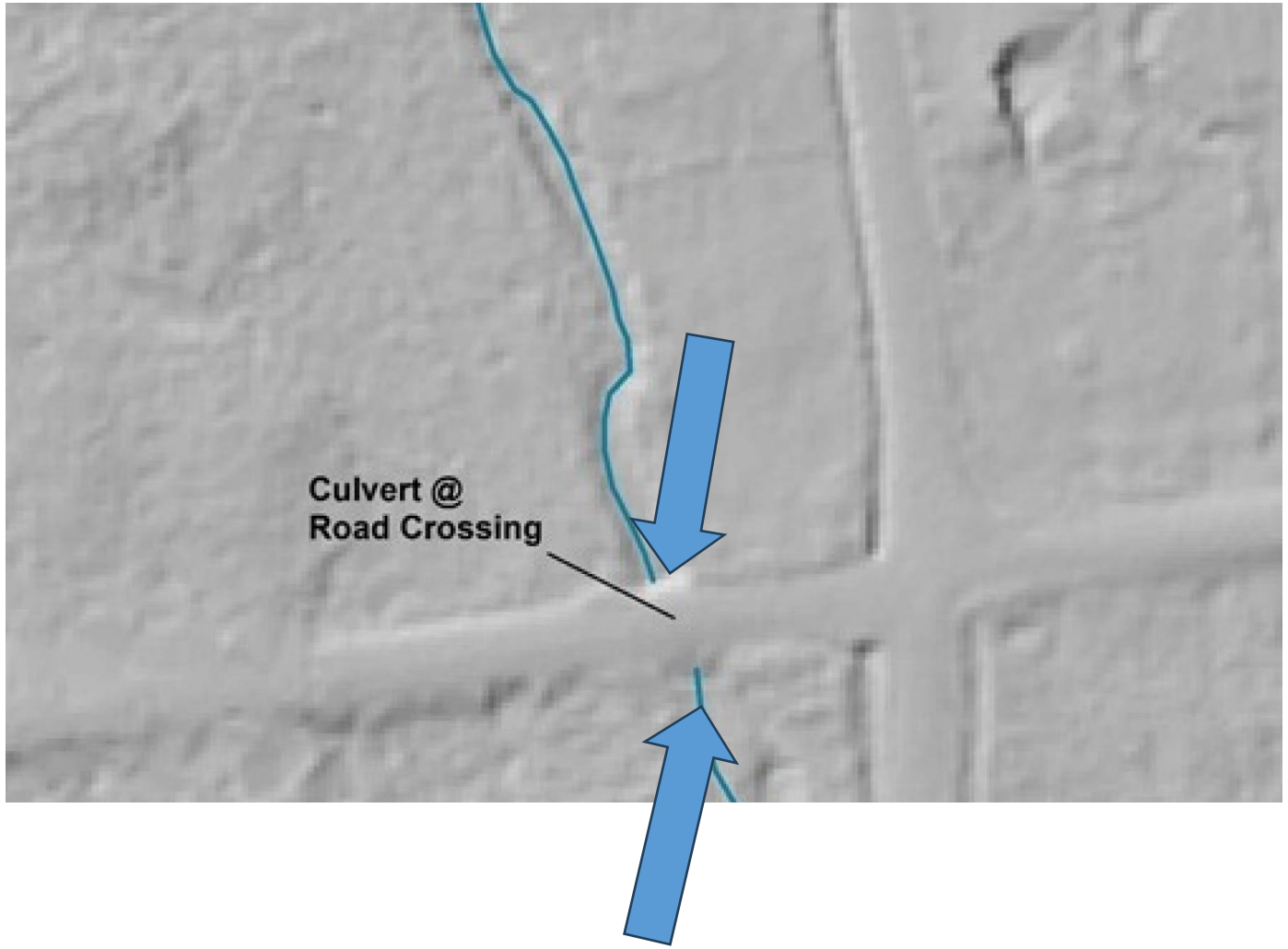


User will be able to

- search for the stream gauge
- view and select a window of time for historical discharge data
- import it as a new inflow hydrograph

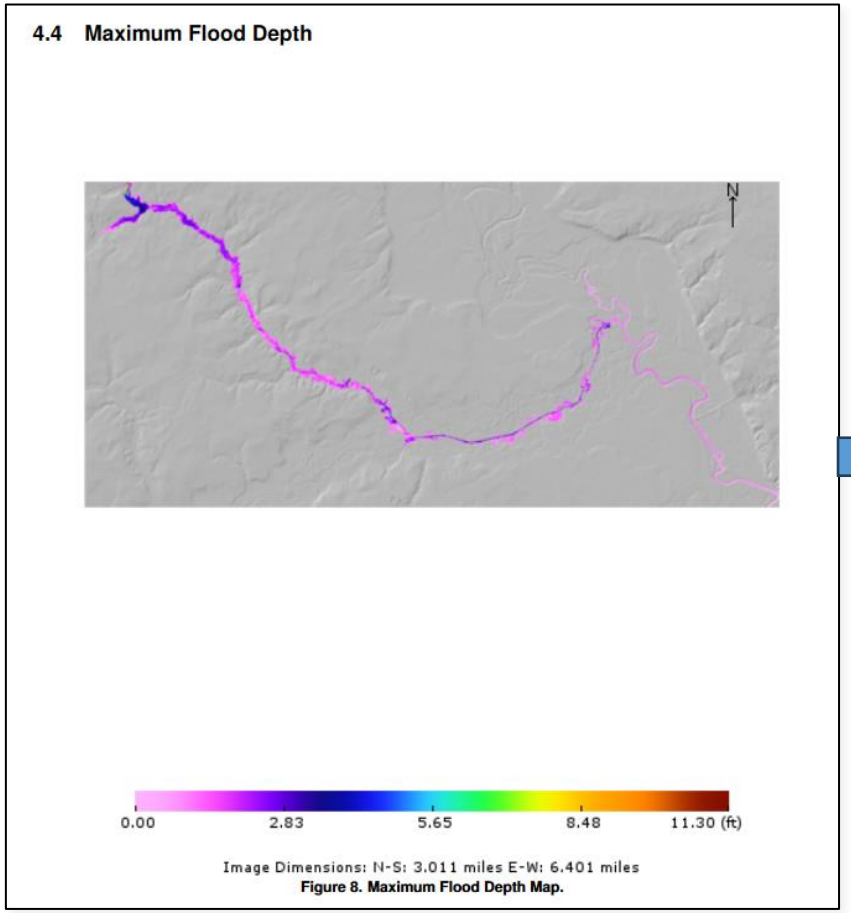
Upcoming enhancements: Modeling flow through culverts

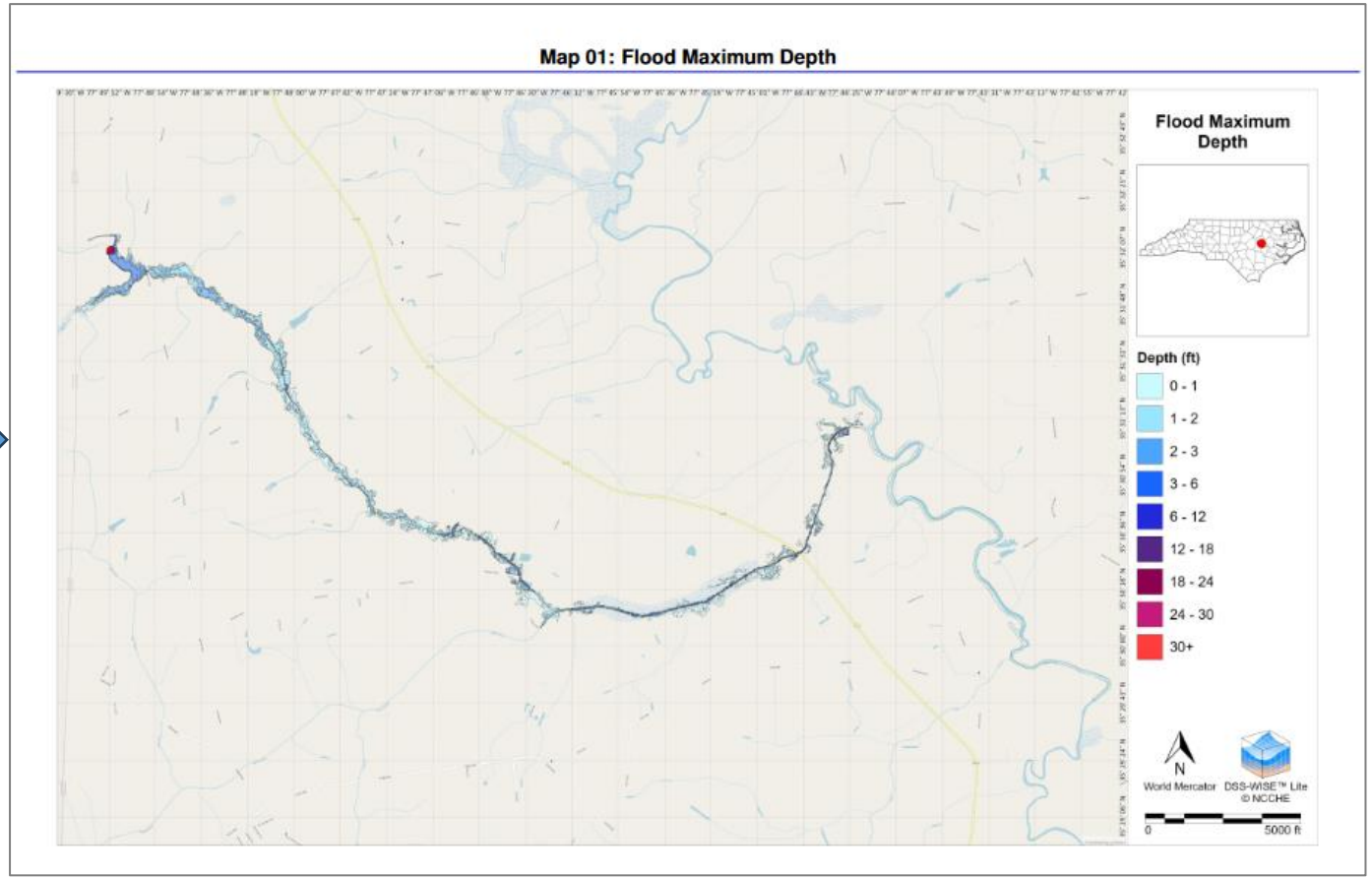
Enhance the way simulations model culverts by using a new method.



- User can select upstream and downstream locations for hydraulic connectivity
- Culvert parameters govern flow between the two sides

Upcoming enhancements: Improvements to maps in simulation report product

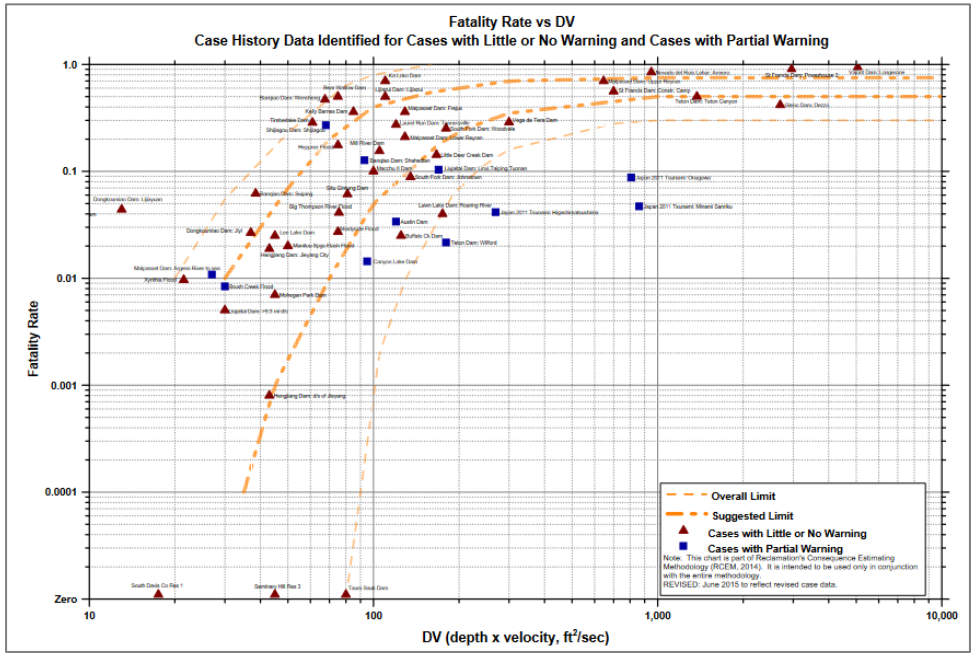


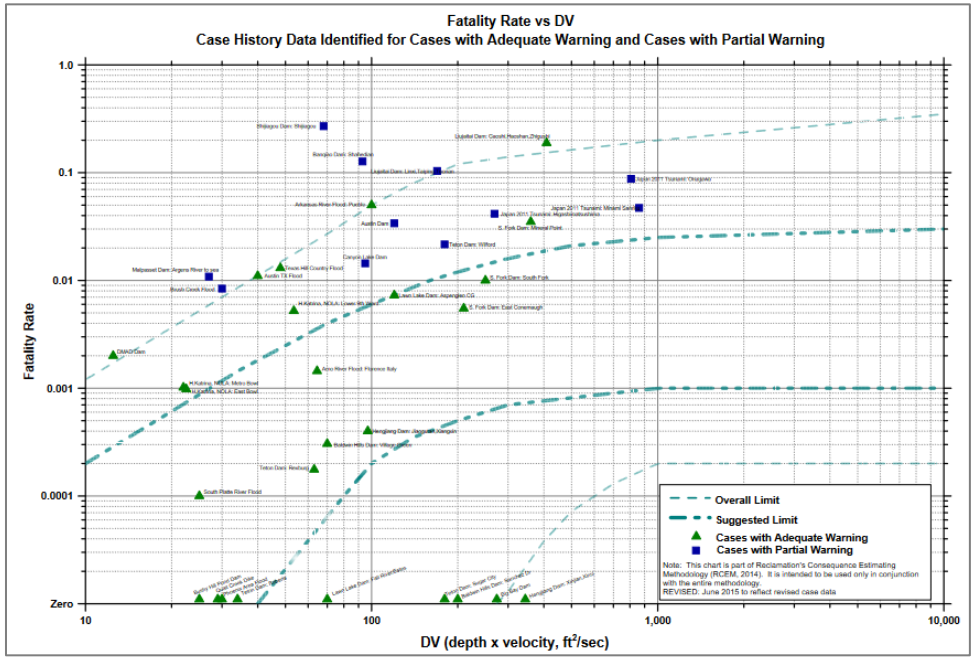


Improve map image outputs for PDF report for increased spatial awareness and fidelity.

Develop the HCOM module to include potential Loss of Life calculations

- USBR (2015) methodology
- Users will receive a range of estimated fatality rate and potential Loss of Life (LOL) information for a variety of severity and warning times





Thank you!

Questions?