

Carson River Flood Hazard Mapping

Carson River Watershed Forum

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CARSON WATER
SUBCONSERVANCY
DISTRICT



FEMA

Outline

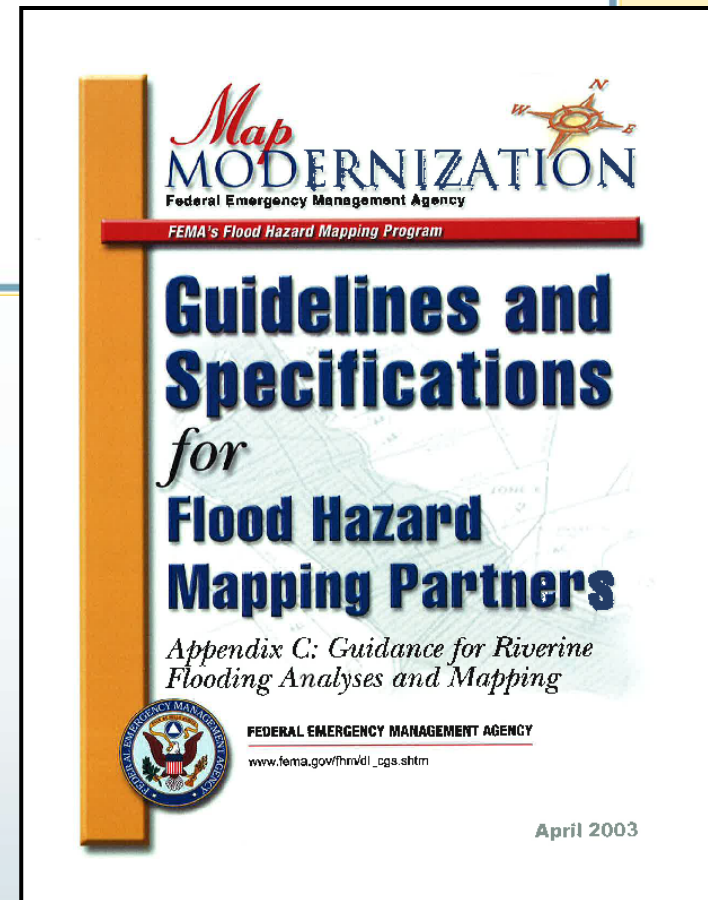
- Physical Map Revision
 - The Process
- Carson River Floodplain
 - Why Re-mapping
- Study Area
 - Mapping Activity Statements (MAS) 1 - 4
- Analyses
 - New Data, New Tools
- Results
 - Hydrology
 - Flood Hazard Maps
 - Watershed Scale Tool
- Status
 - Project Completion

FEMA Physical Map Revision

The Process

Physical Map Revision (PMR)

- Local equivalent of FEMA Flood Insurance Study
 - Cooperating Technical Partner (CTP)
 - Work is done locally with community input
 - FEMA process
- More extensive than LOMR



Carson River Floodplain

Why Re-mapping

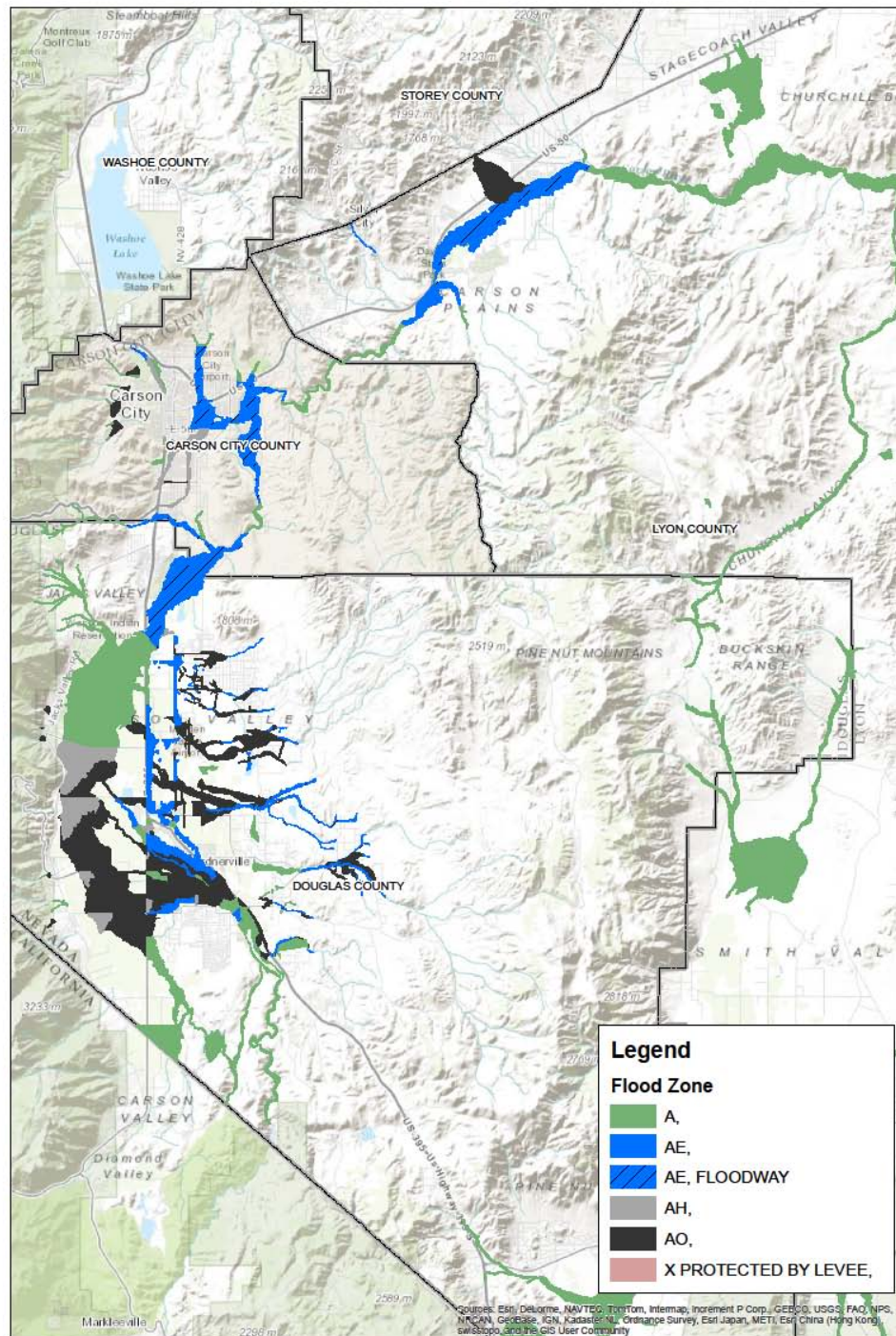
Carson River Floodplain

“The Carson River is unique in that we have no flood control structures and have extremely limited upstream storage capability. However, we have the best flood control mechanisms available - open floodplain lands.”

-Regional Floodplain Management Plan

Effective FEMA Flood Hazard Maps

- Lyon County, NV
 - Restudy 1992
 - DFRIM 2009
- Carson City, NV
 - Hydrology 1982
 - Hydraulics & Mapping 1993
 - DFIRM 2009
- Douglas County, NV
 - Hydrology 1989
 - 1994(work done in 1991)
 - East Fork 1997



Objectives

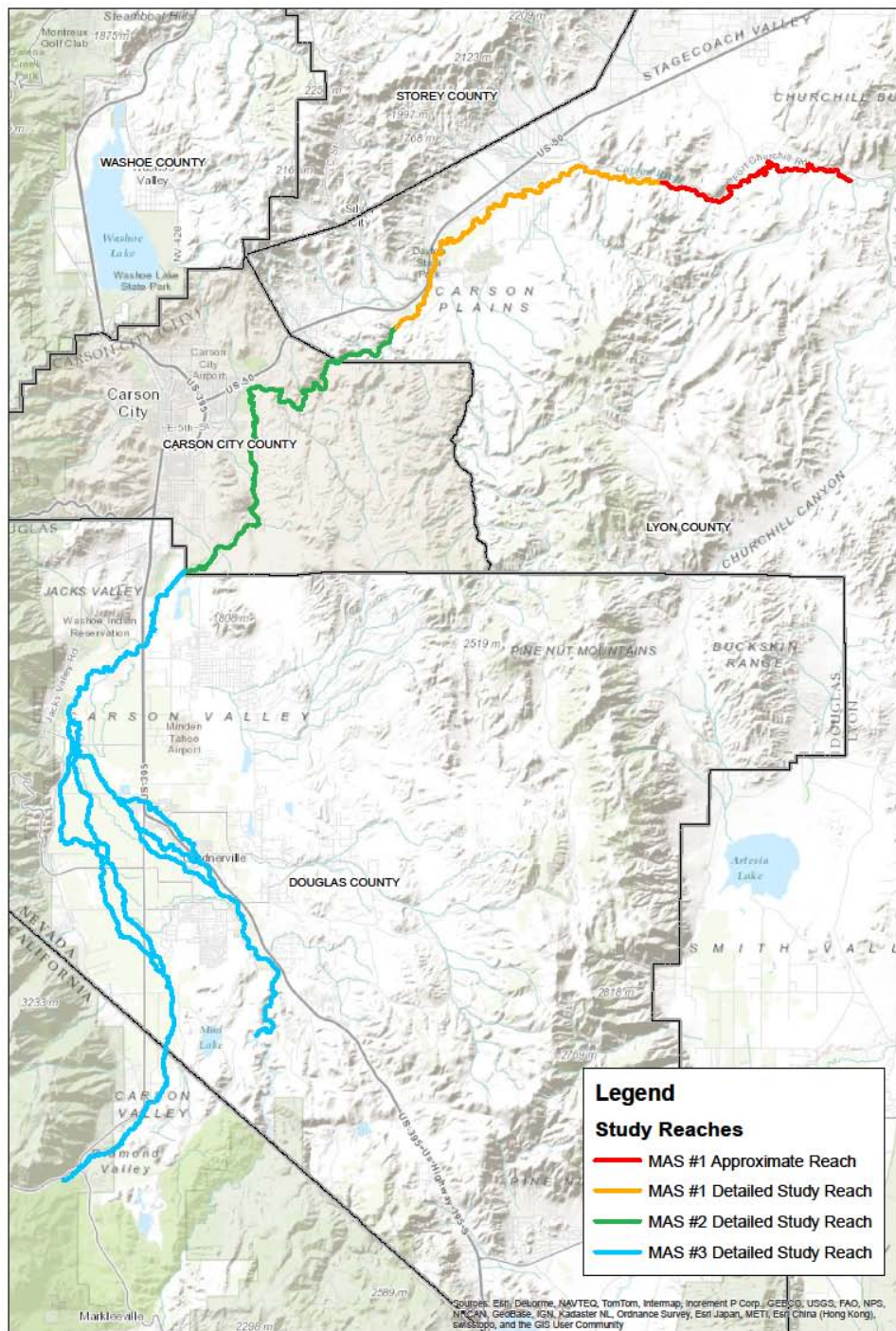
- Detailed, Up-to-date Carson River Flood Hazard Mapping (Carson City; Lyon, Douglas, and Alpine Counties).
- Tool for Assessing Watershed Scale Floodplain Impacts
- Consistency in Modeling and Mapping.

Study Area

Phases 1-4

Study Area

- MAS 1 - Lyon County
- MAS 2 - Carson City
- MAS 3 - Douglas/Alpine County Modeling
- MAS - 4 Douglas/Alpine County Mapping



Analyses

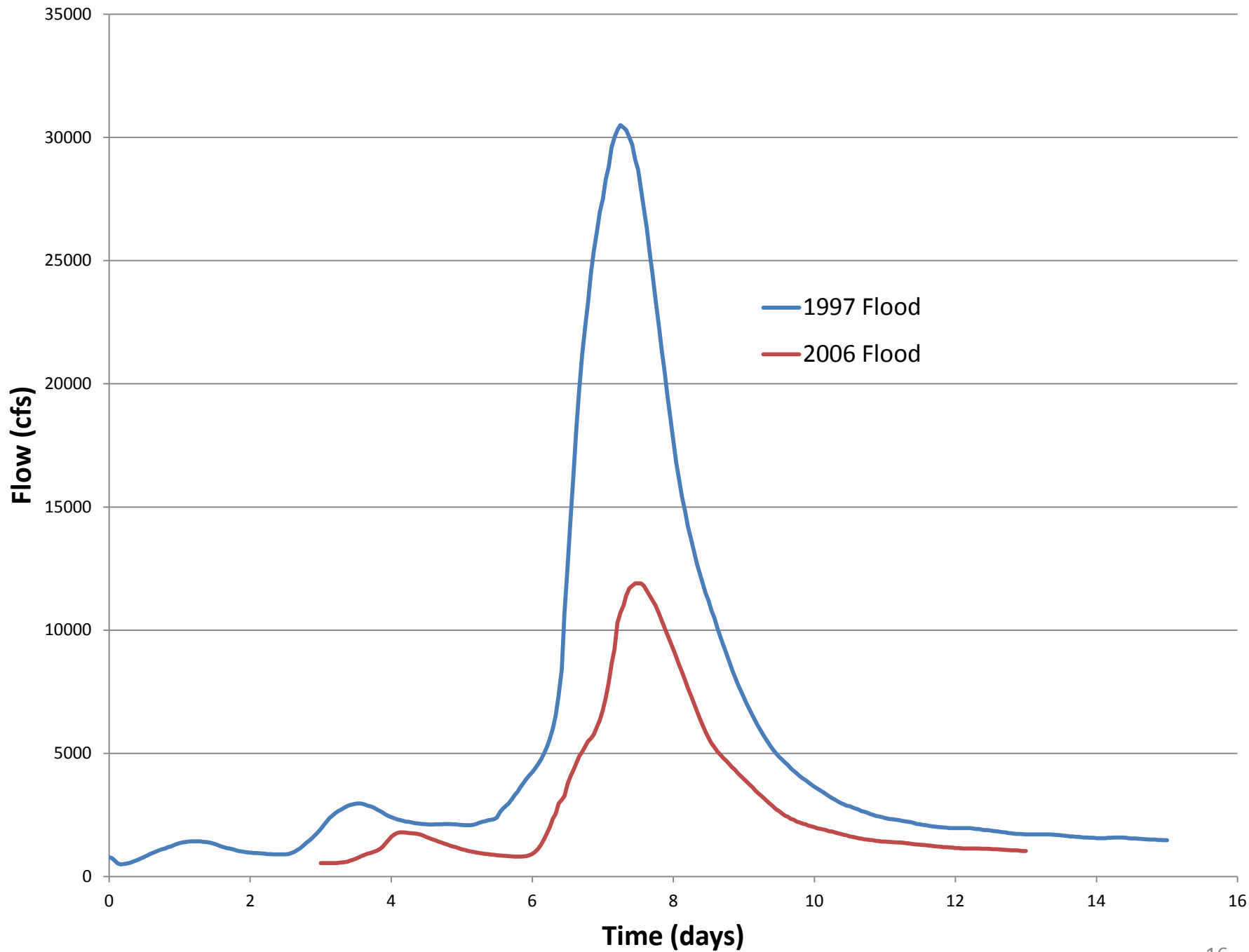
New data, New tools

New Data

- Effective FEMA Flood Insurance Study
 - Hydrology based on 1980's estimates
 - Revised peak flow estimates
 - Include 1997 and 2006 events

New Tools

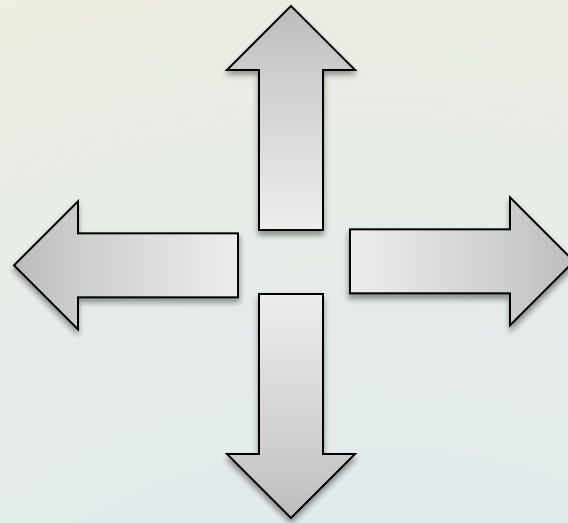
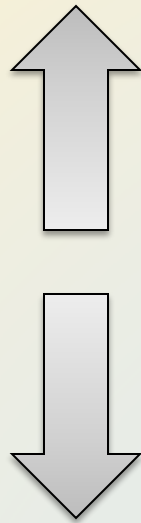
- Traditional flood studies use steady-state
 - Flow in an instant in time
- New model is unsteady State
 - Hydrograph input (time vs. flow)
- Non standard
- Assess **timing** and **volume** impacts to the floodplain
 - Floodplains attenuate flow and store water



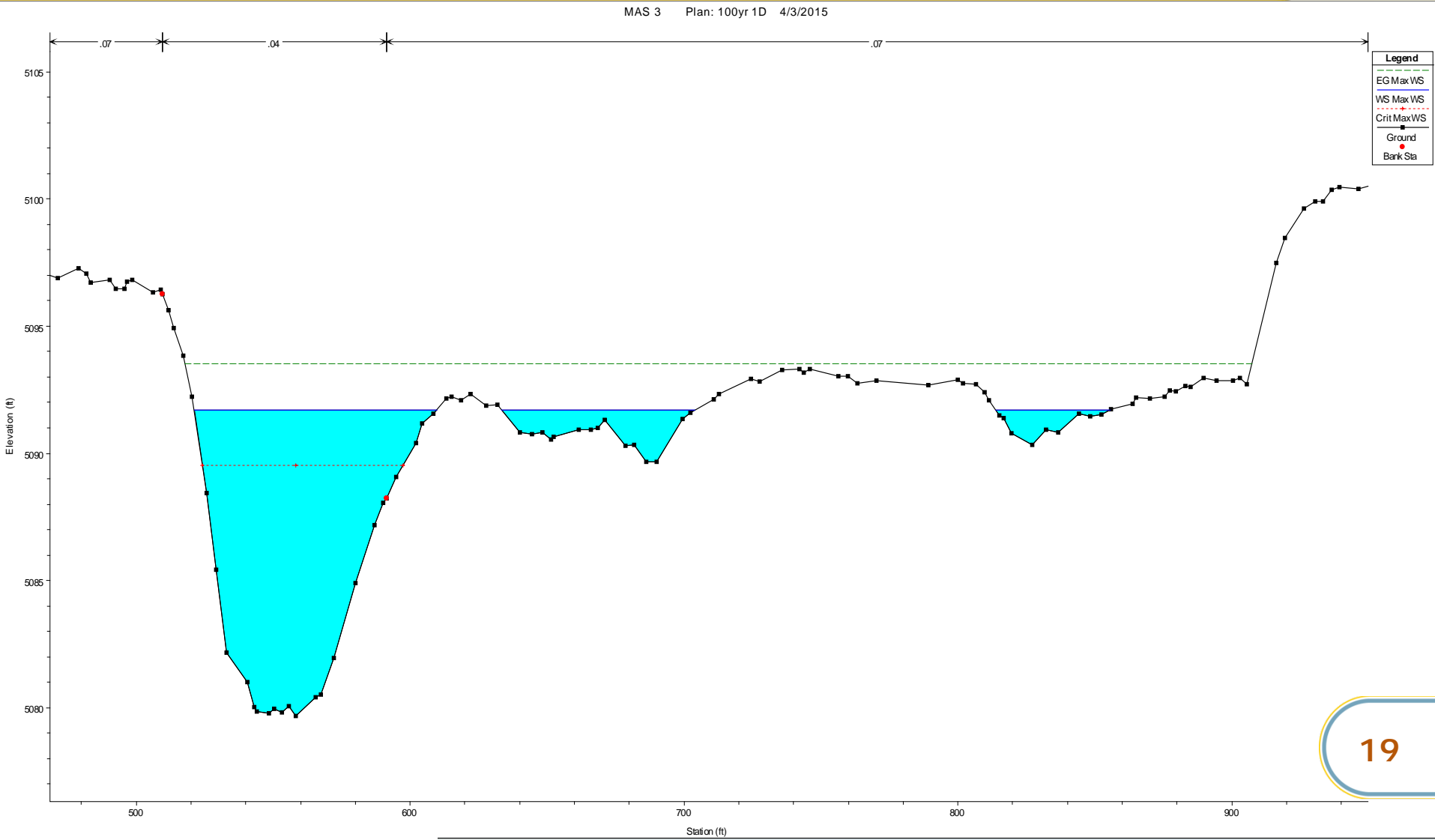
New Tools

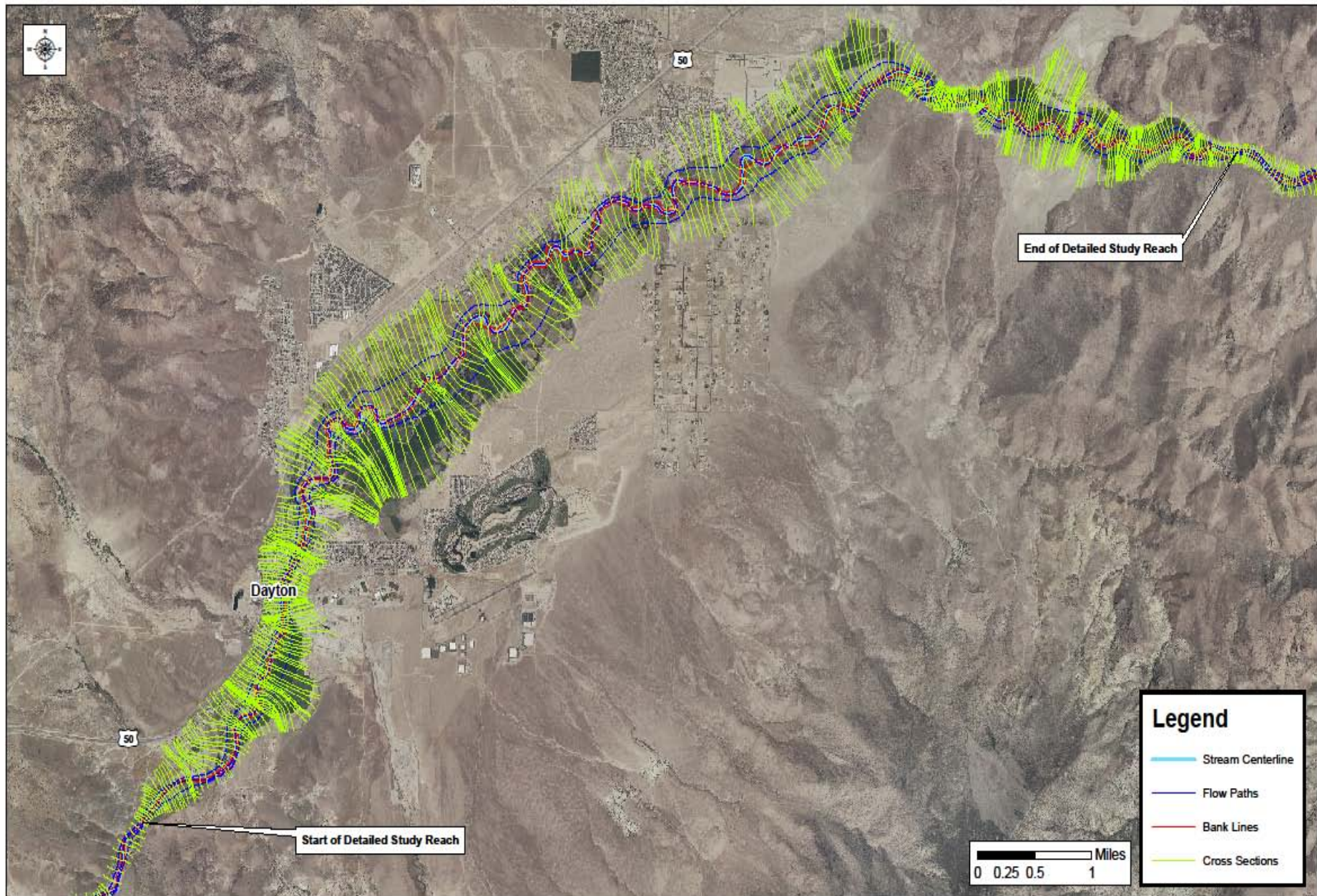
- US Army Corps of Engineers' HEC-RAS 5.0
 - HDR is Beta Testing 2D for Corps
- One & **Now** Two Dimensional Model
- Model Elements
 - Stream Centerline
 - Flow Paths
 - Cross Sections
 - Bank Lines
 - 2D Computational Mesh

1D vs. 2D

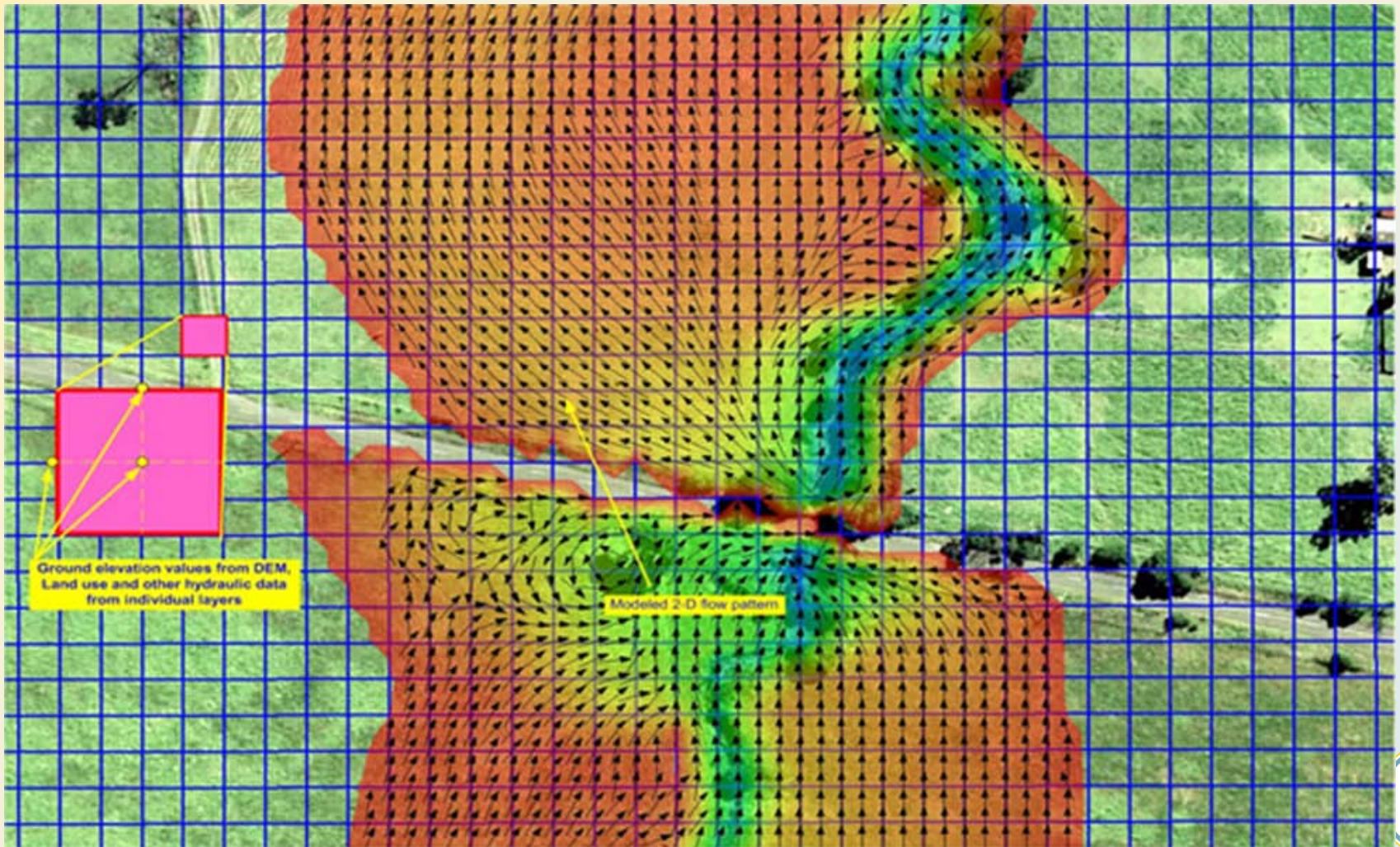


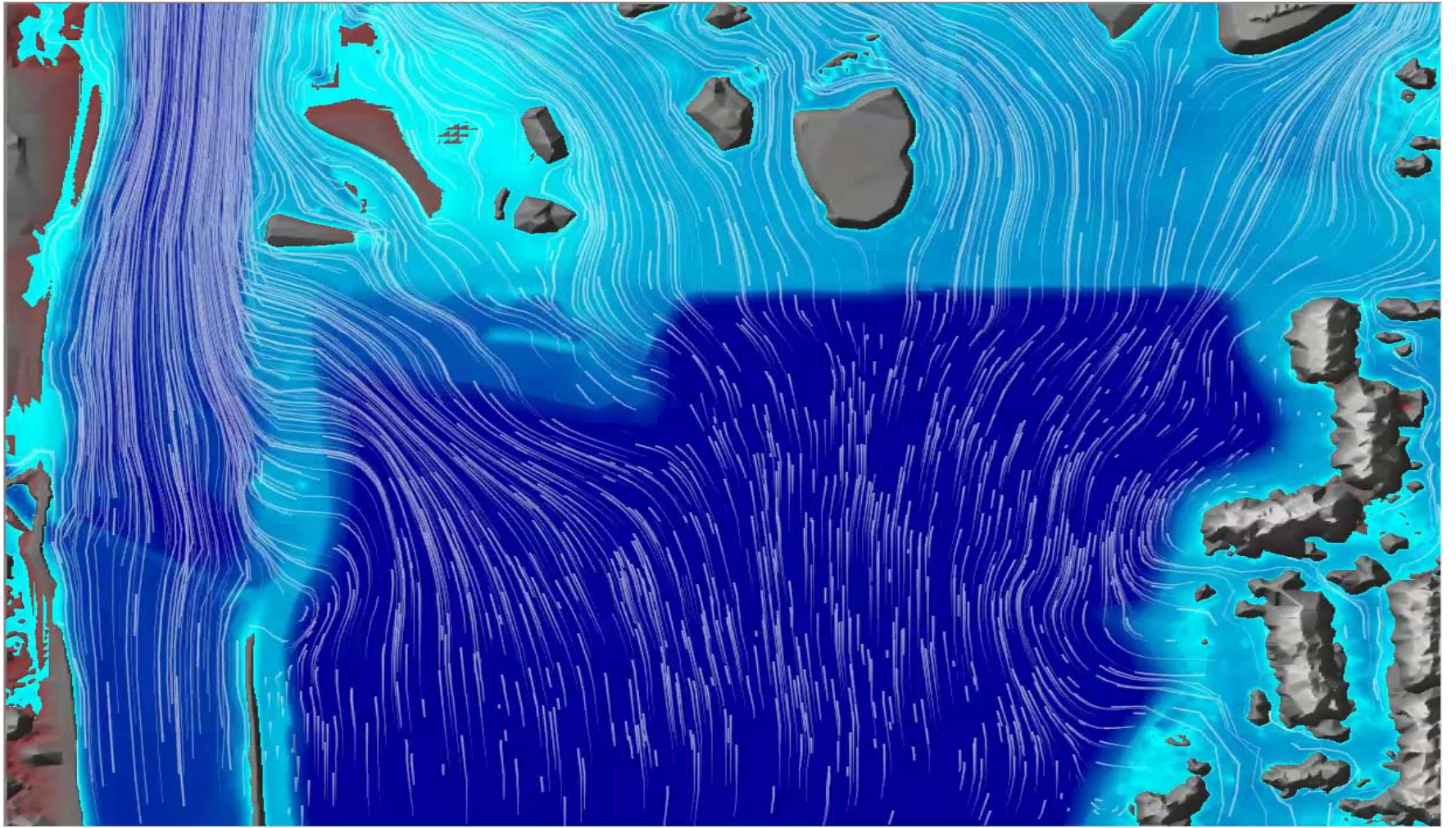
1D Model





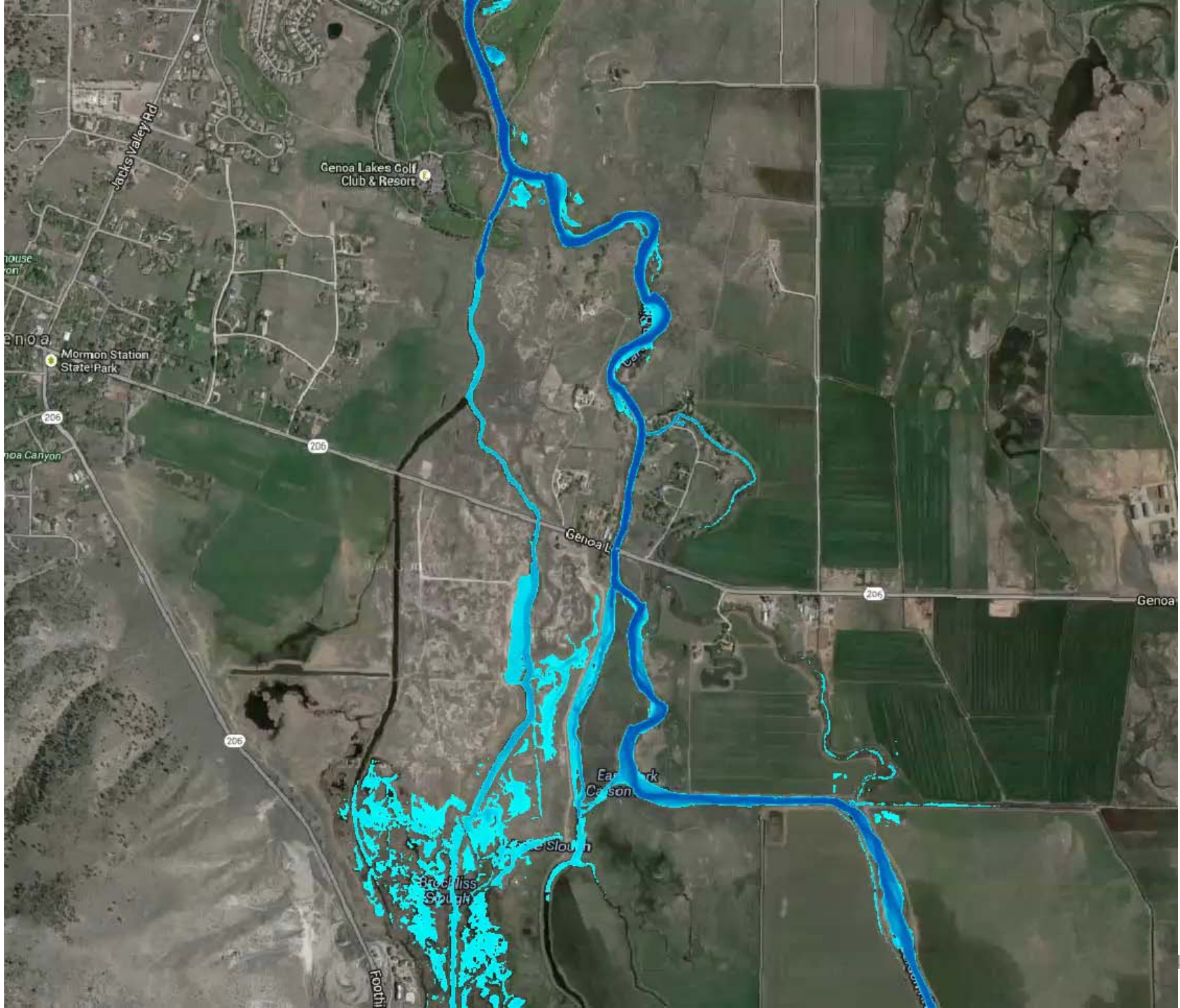
2D Model





Integrated 1D/2D Modeling



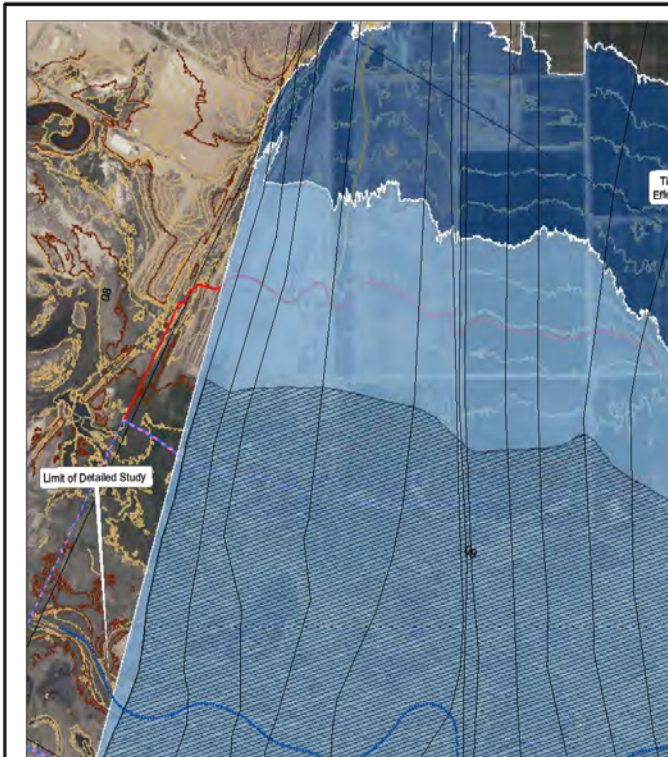


Results

Hydrology, Flood Hazard Maps,
Watershed Scale Tool

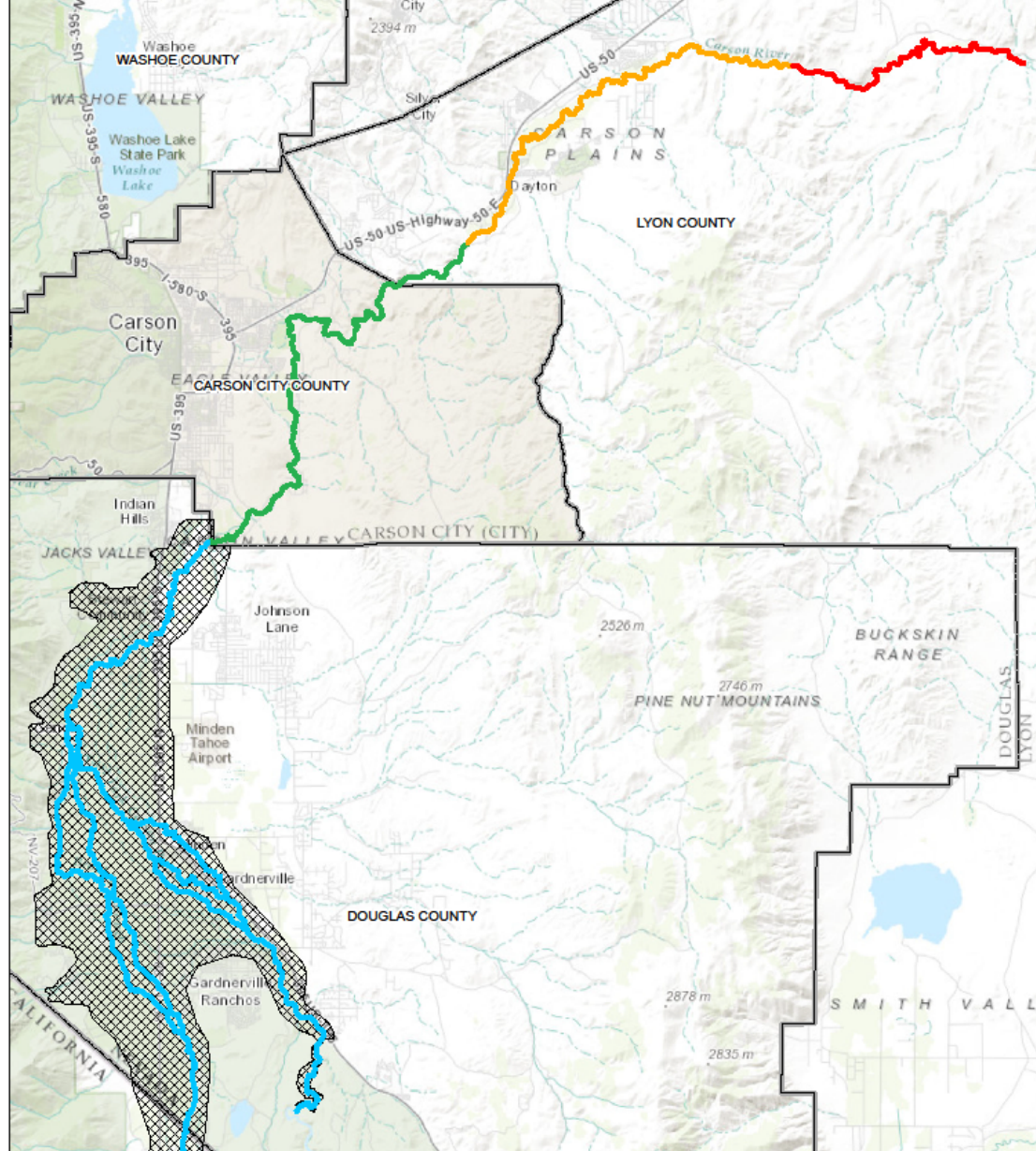
Hydrology

Streamgaging Station	Description	Effective (cfs)	Proposed (cfs)
10308200	EFCR Markleeville	23,556	22,974
10309000	EFCR Gardnerville	21,694	21,305
10310000	WFCR Woodfords	8,465	6,985
10311700	Carson City	36,000	33,500
10311000	Dayton	36,000	30,700



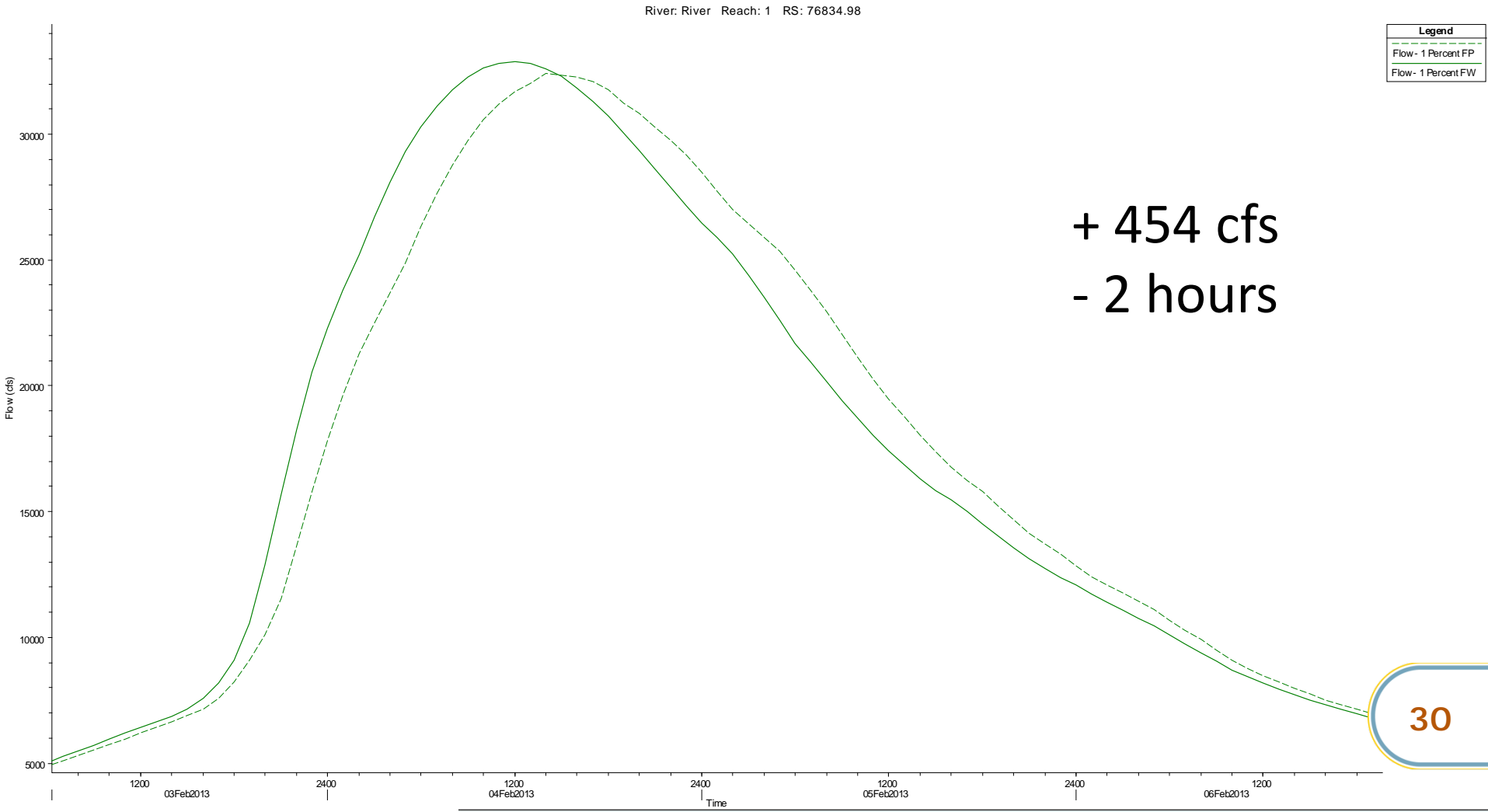
Watershed Scale Tool

- Look at Cumulative Impacts
 - Unsteady-state
 - Changes in peak flow
 - Changes in Volume
 - Changes in Base Flood Elevations
 - 2D modeling
 - Complex floodplain hydrodynamics
 - Proposed Condition Scenarios
 - Encroachments
 - Restorations
 - Land use changes



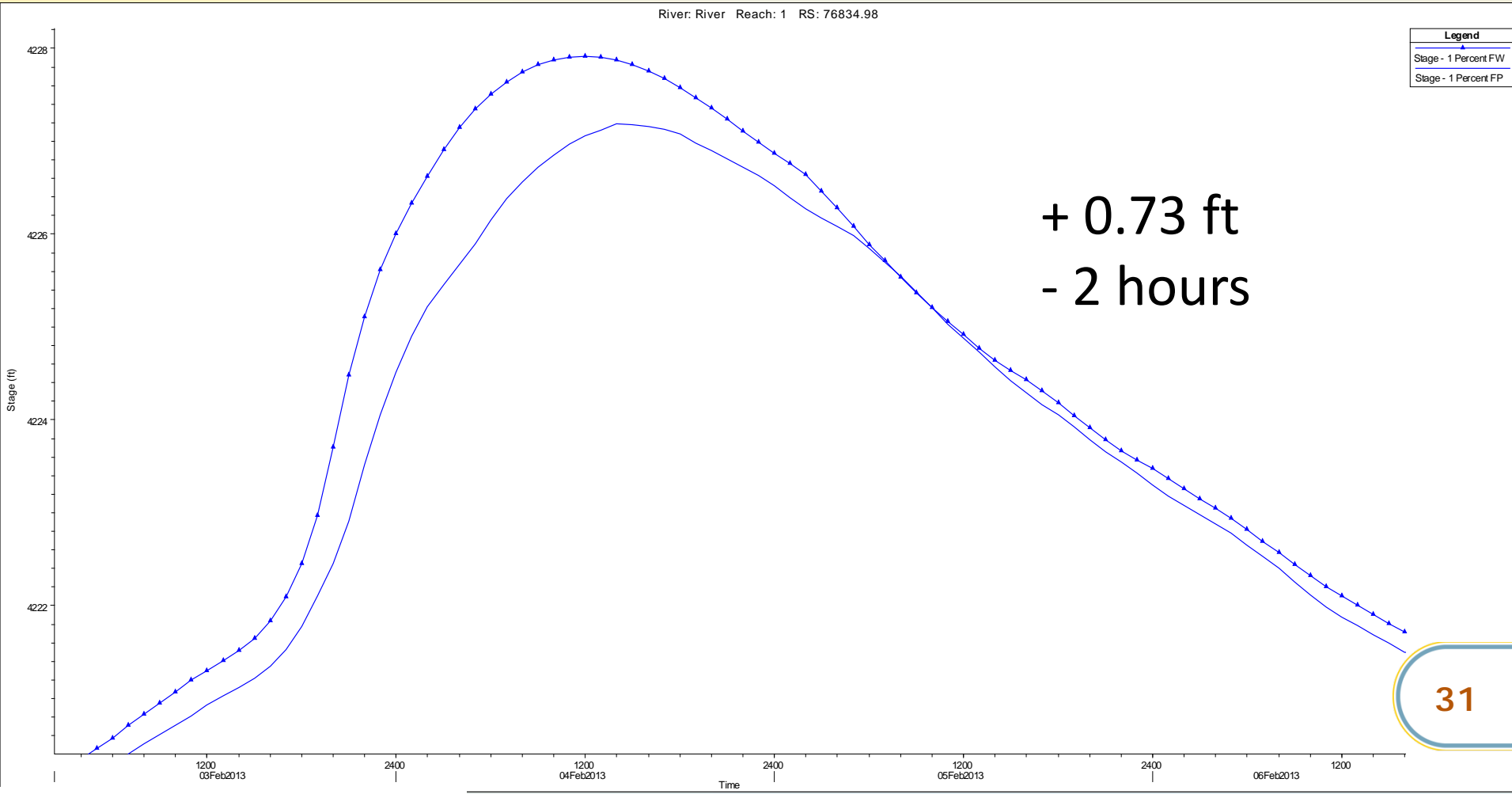
Carson City Impacts

Flow



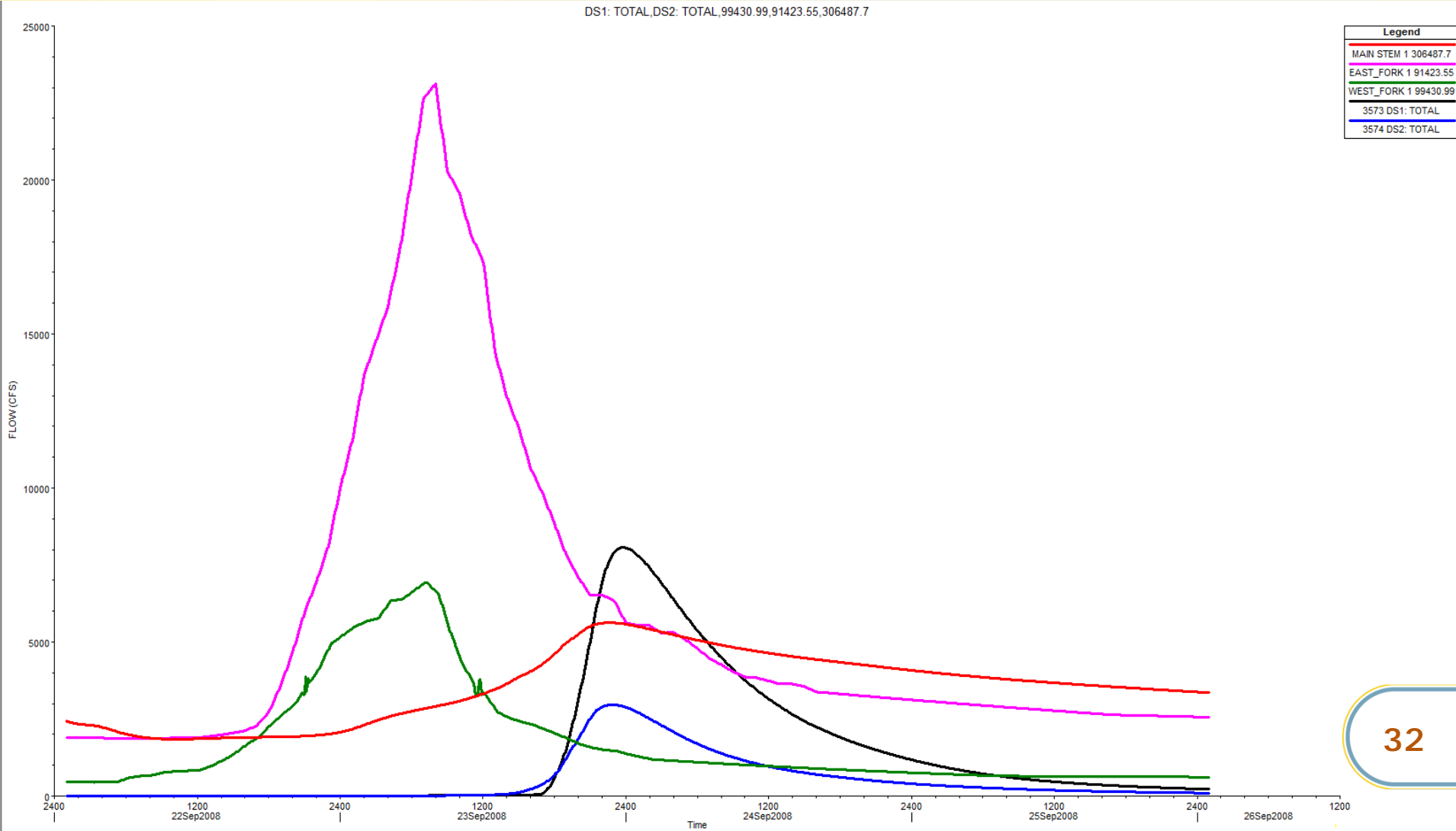
Carson City Impacts

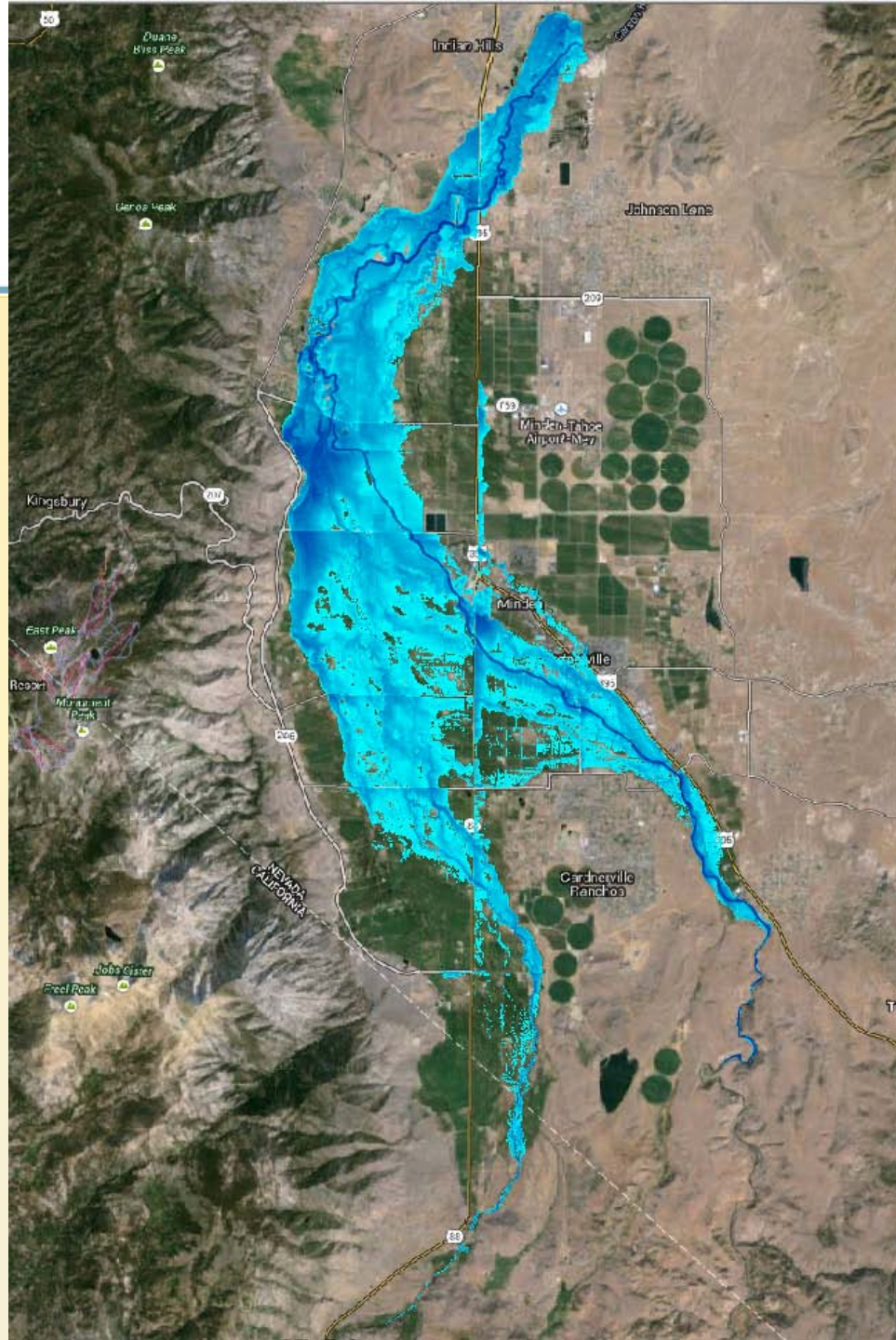
Stage



Douglas County Impacts

Flow





- Douglas County preliminary 100-yr
- Model refinements needed
- Validation needed
- Tributary flow needed

Project Status

- MAS 1 (Lyon Co.)
 - Submitted to FEMA
- MAS 2 (Carson City)
 - Submitted to FEMA
- MAS 3 (Douglas & Alpine)
 - Finalizing 2D model elements
 - September 2015