Papillion Creek Watershed: Making the Most of Available Data

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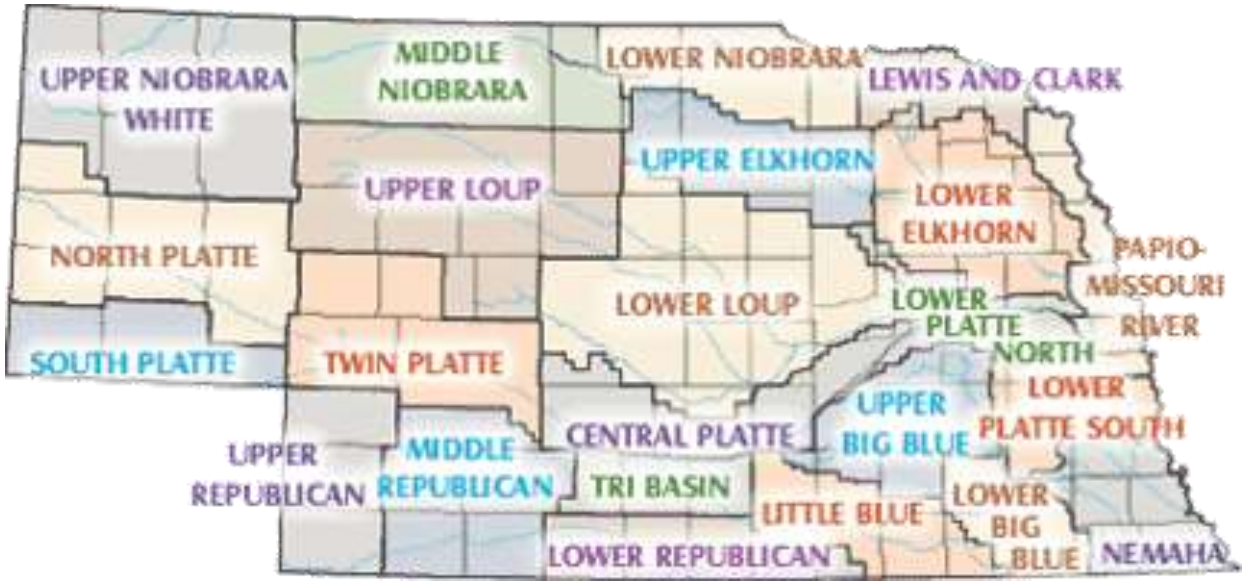
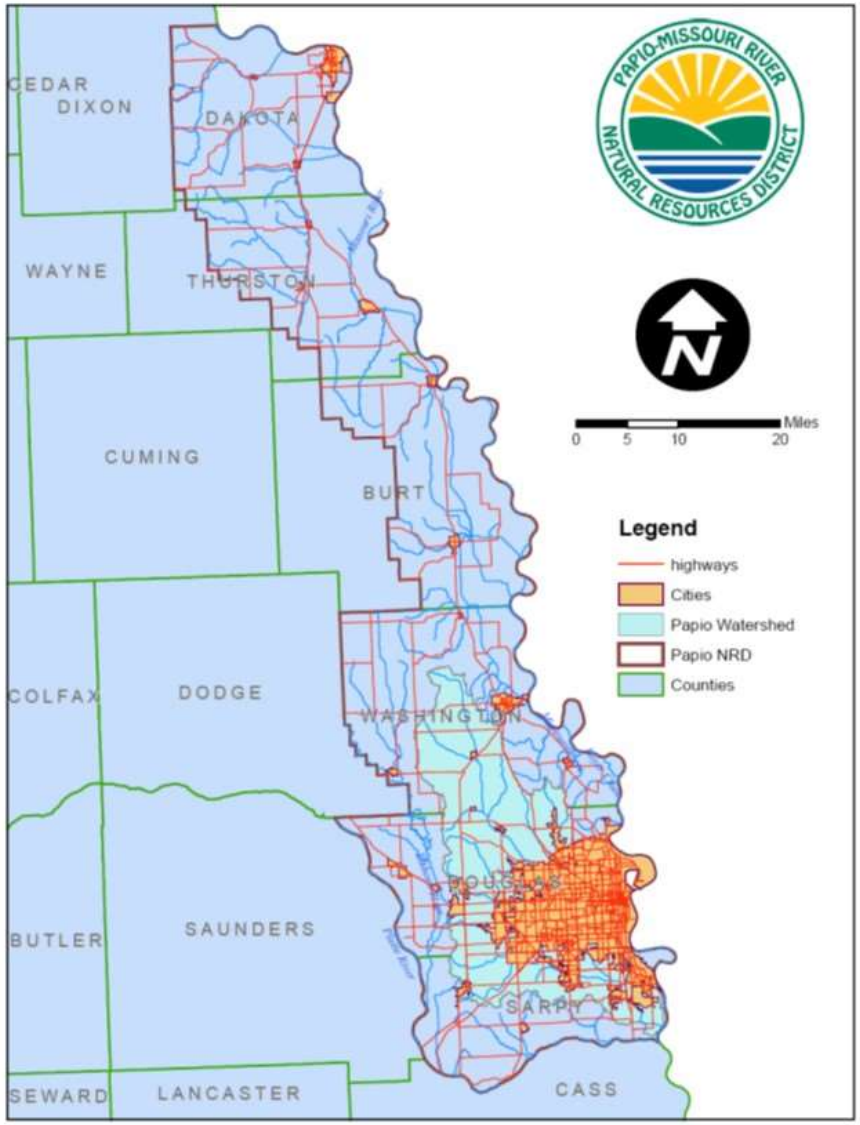
Unique Natural Resources Districts



THE MISSION

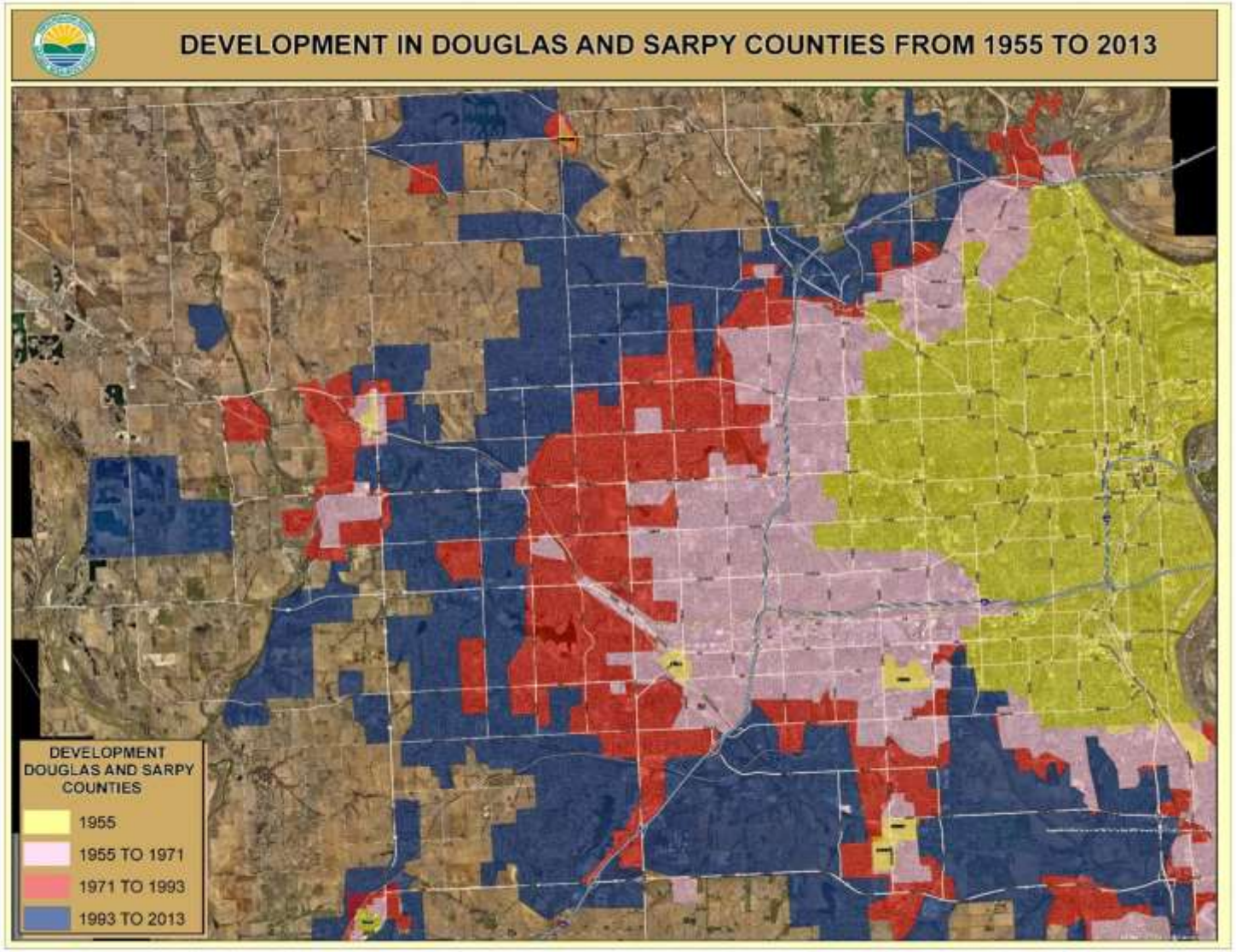
of the Papio-Missouri River NRD is to wisely Conserve, Manage and Enhance our soil, water, wildlife, and forest resources for the good of all people residing within the District's boundaries.



Omaha Metropolitan Area

- One-Third of Nebraska's Population
- 3 Counties
- 13 Cities/Villages
- Rivers on 3 sides

Watershed Development



Big and Little Papillion Basins

- $2.4 Million
- USACE Floodplain Management Program
- MapMOD

Original Project Timeline

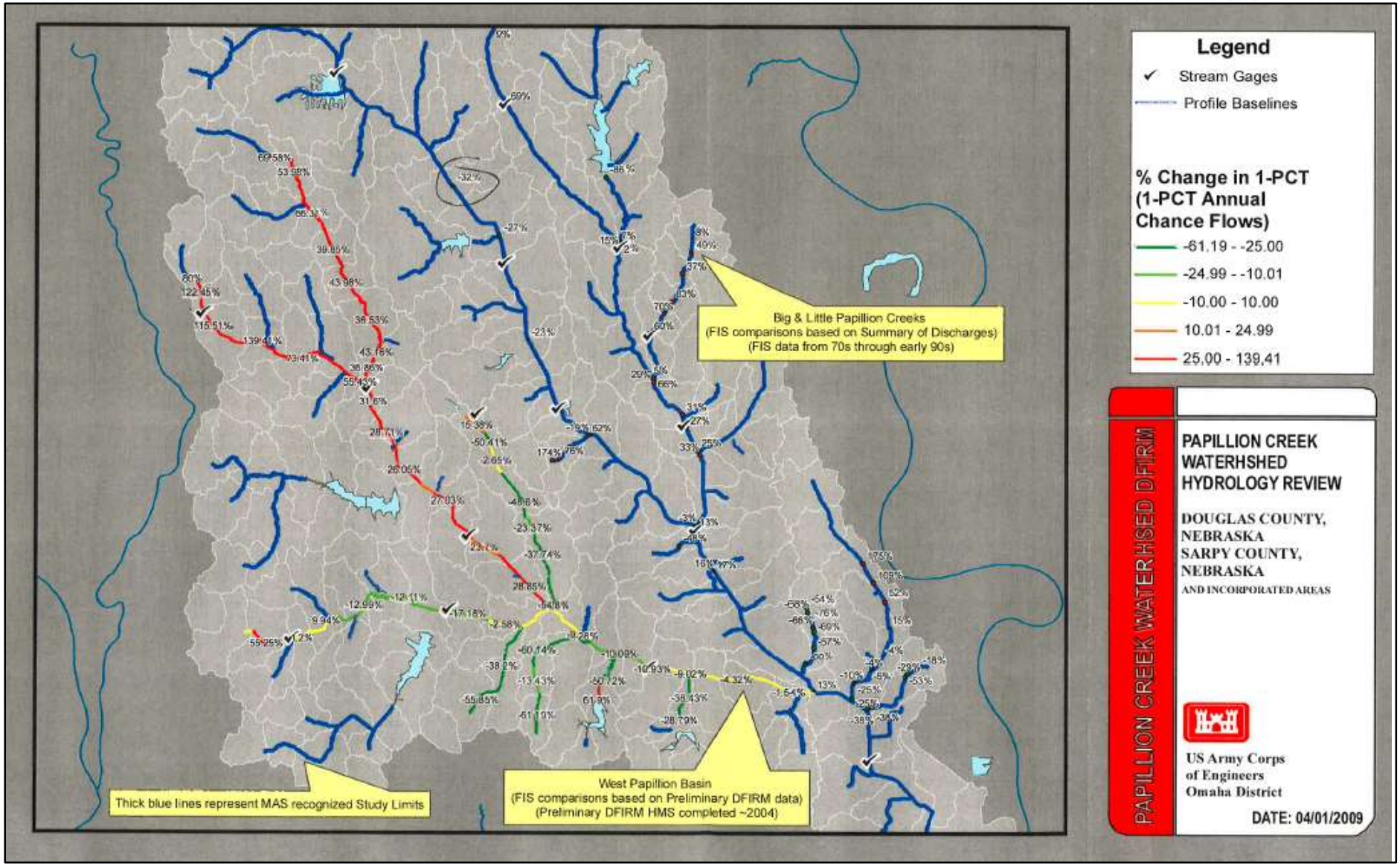
June 2008
Notice to Proceed

November 2009
Hydrology and Hydraulics Complete

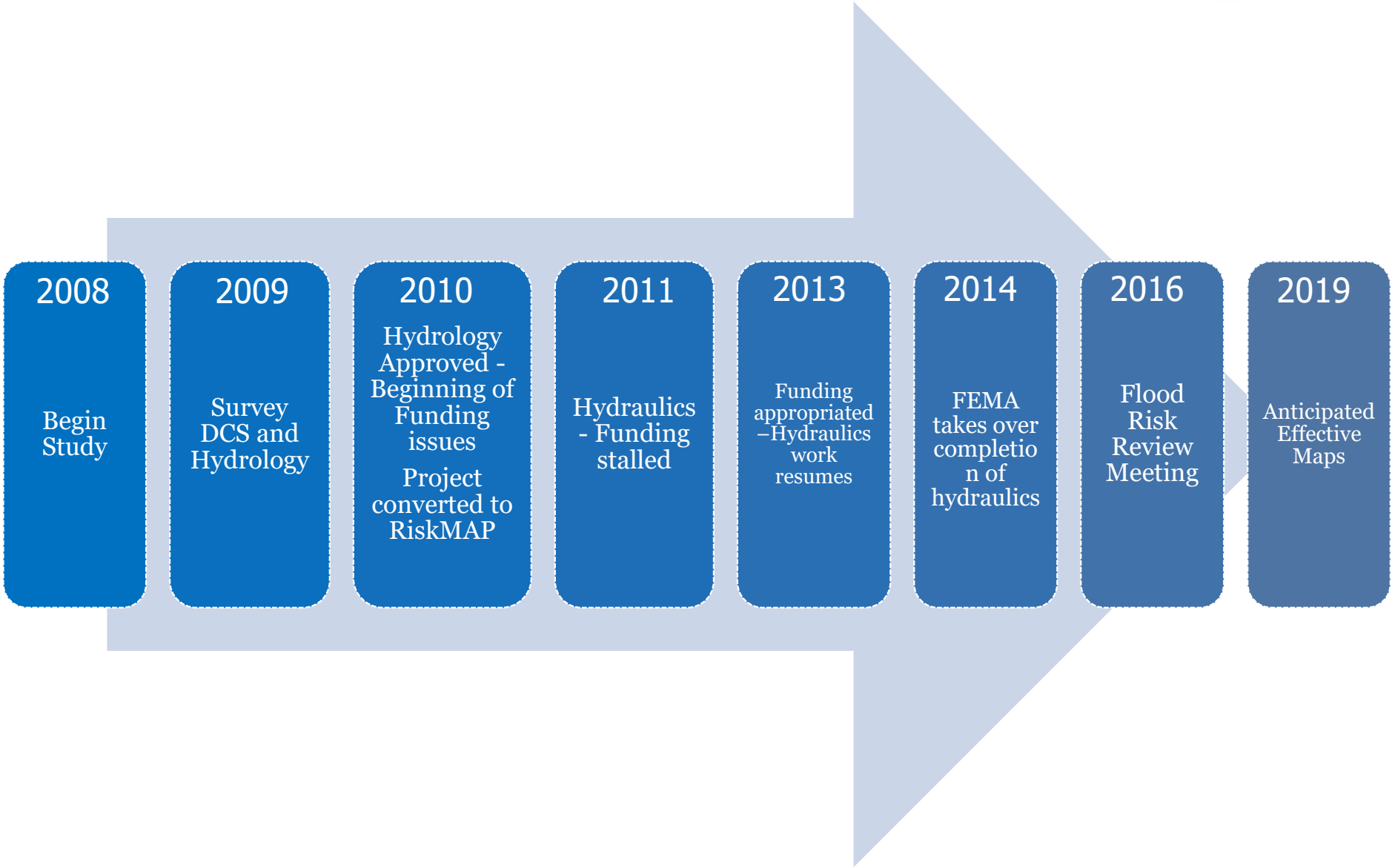
May 2012
Preliminary Maps

2013
Effective Maps

Watershed Hydrology Review



Actual Project Timeline



Updating the Analysis

Several new regional detention basins

Updated rainfall depths and temporal distributions

New methods and/or calibrations?

Tasks:

- Process updated temporal distribution with Atlas 14 rainfall depths
- Incorporate new regional detention basins
- Verify existing calibration to new storms
- Recalibrate model if verification suggests the need
- Package and submit for mapping process

Design Storm – NOAA Atlas 14

Volume 8 (V2) published in April 2013

Revised rainfall depths and temporal distributions

- Increased depths (100-year: 6.75-inches to 7.5 inches)
- Softened temporals, limited guidance on application

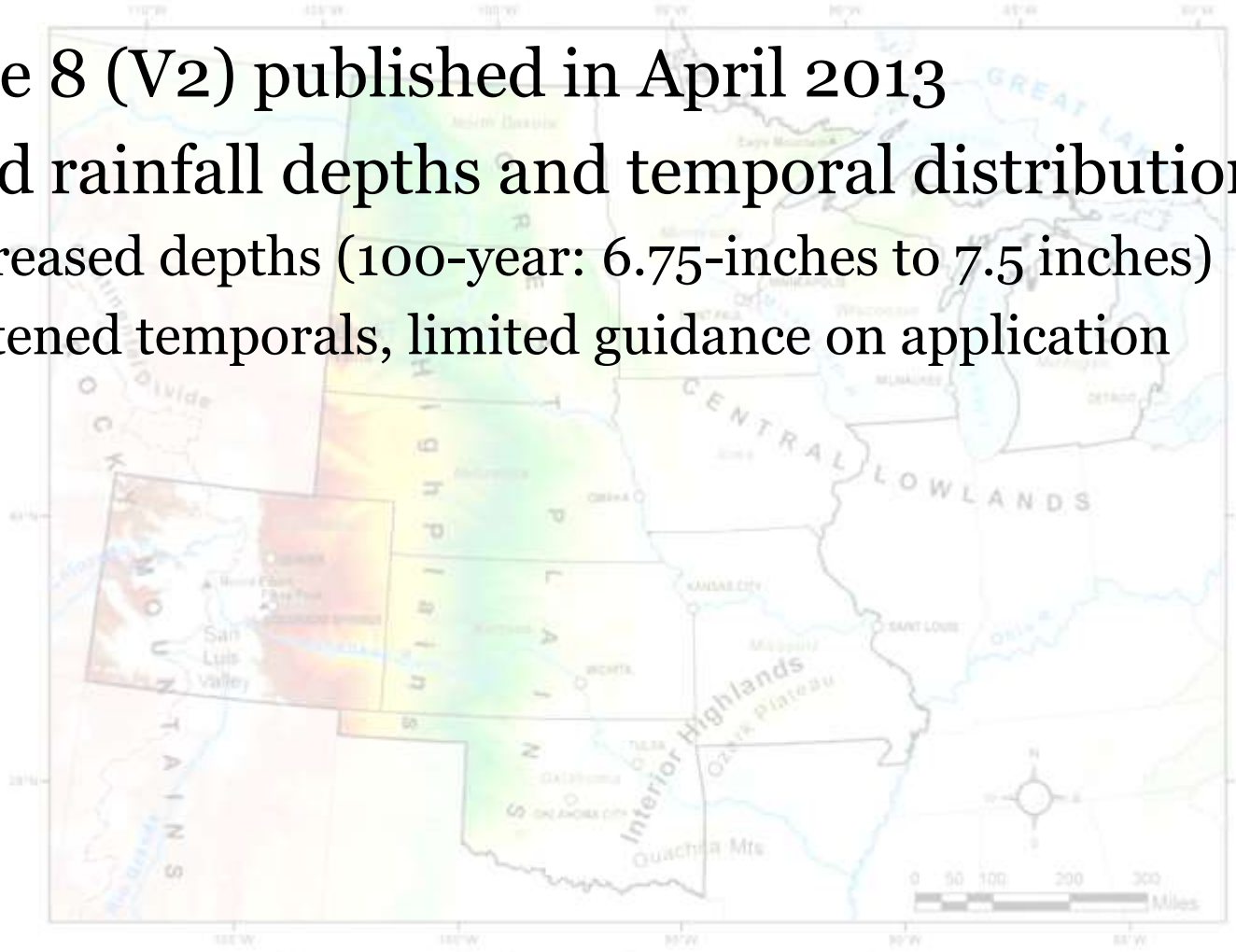
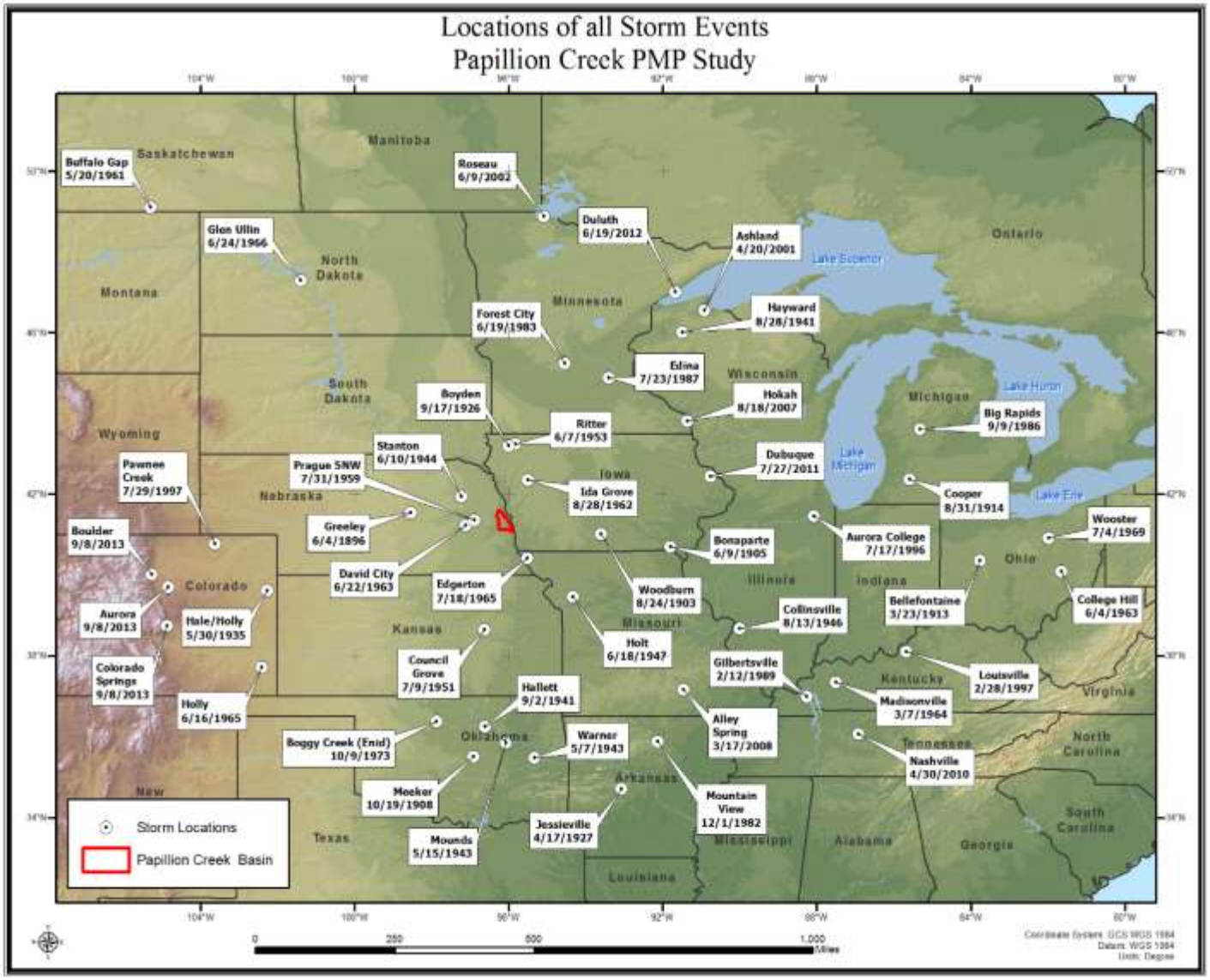


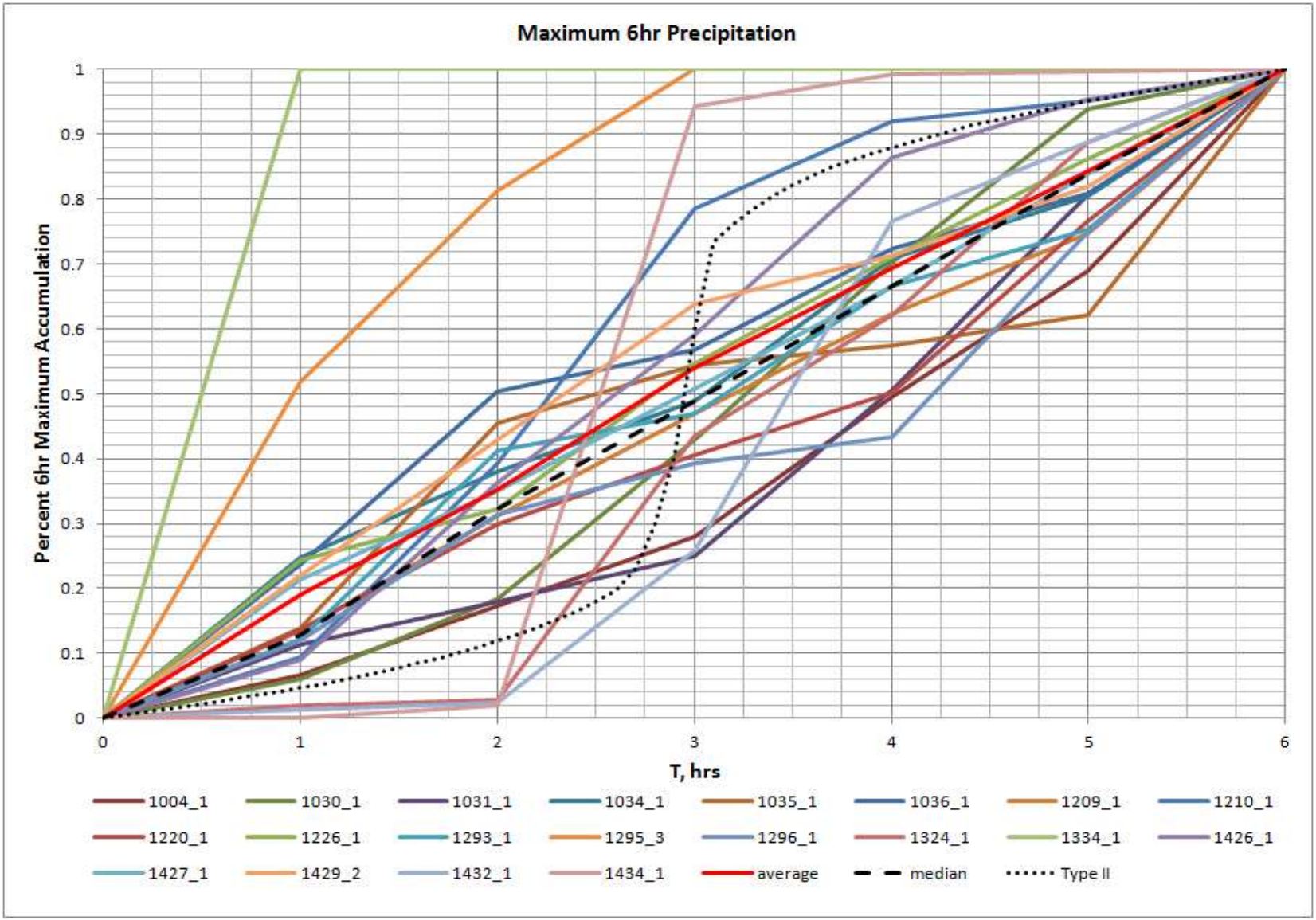
Figure 4.1.1. Project area for NOAA Atlas 14 Volume 8.
(The shaded relief was obtained from USGS EROS Data Center.)

Design Storm – Site Specific Meteorology



Applied Weather Associates

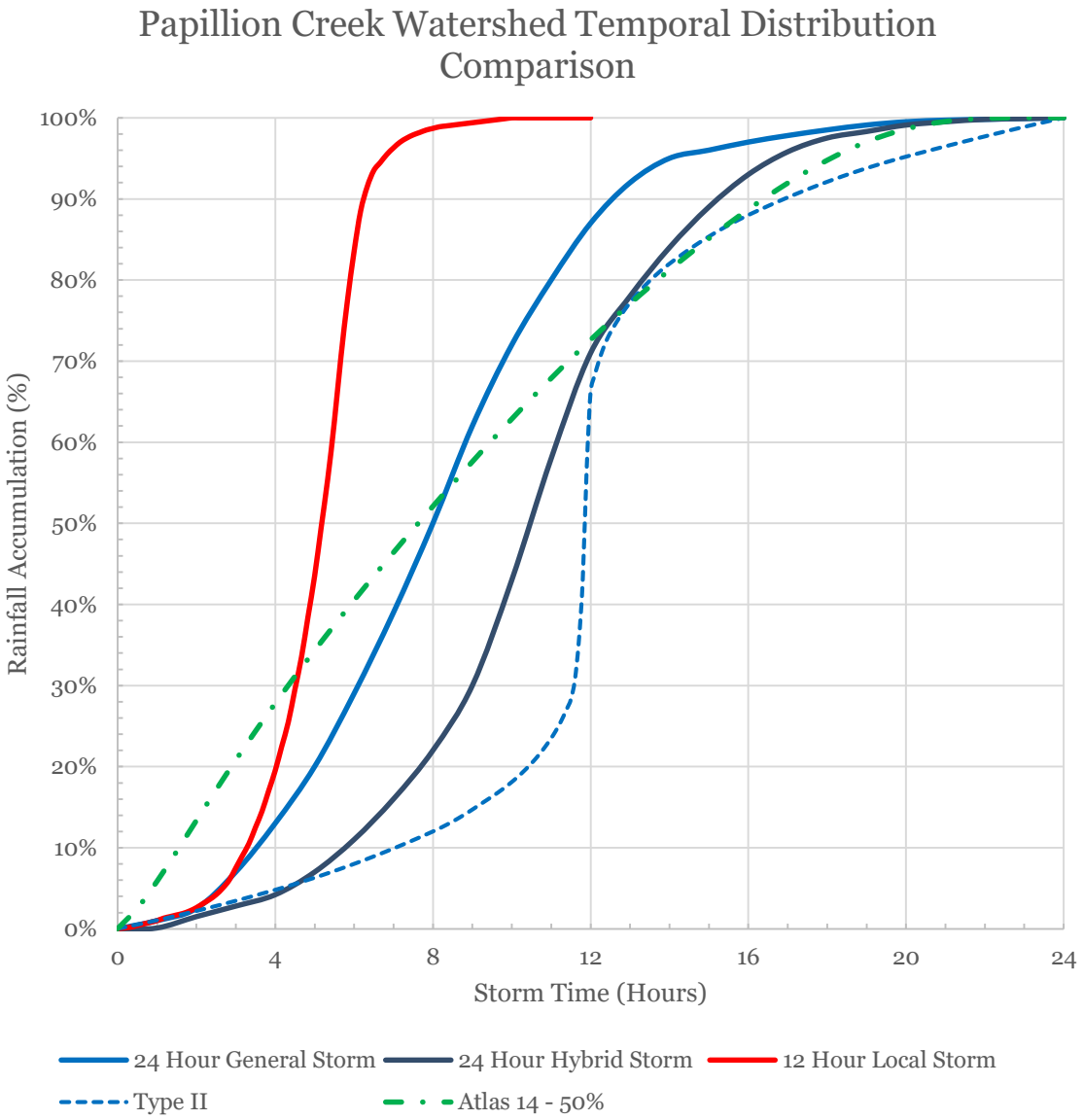
Design Storm – Site Specific Meteorology



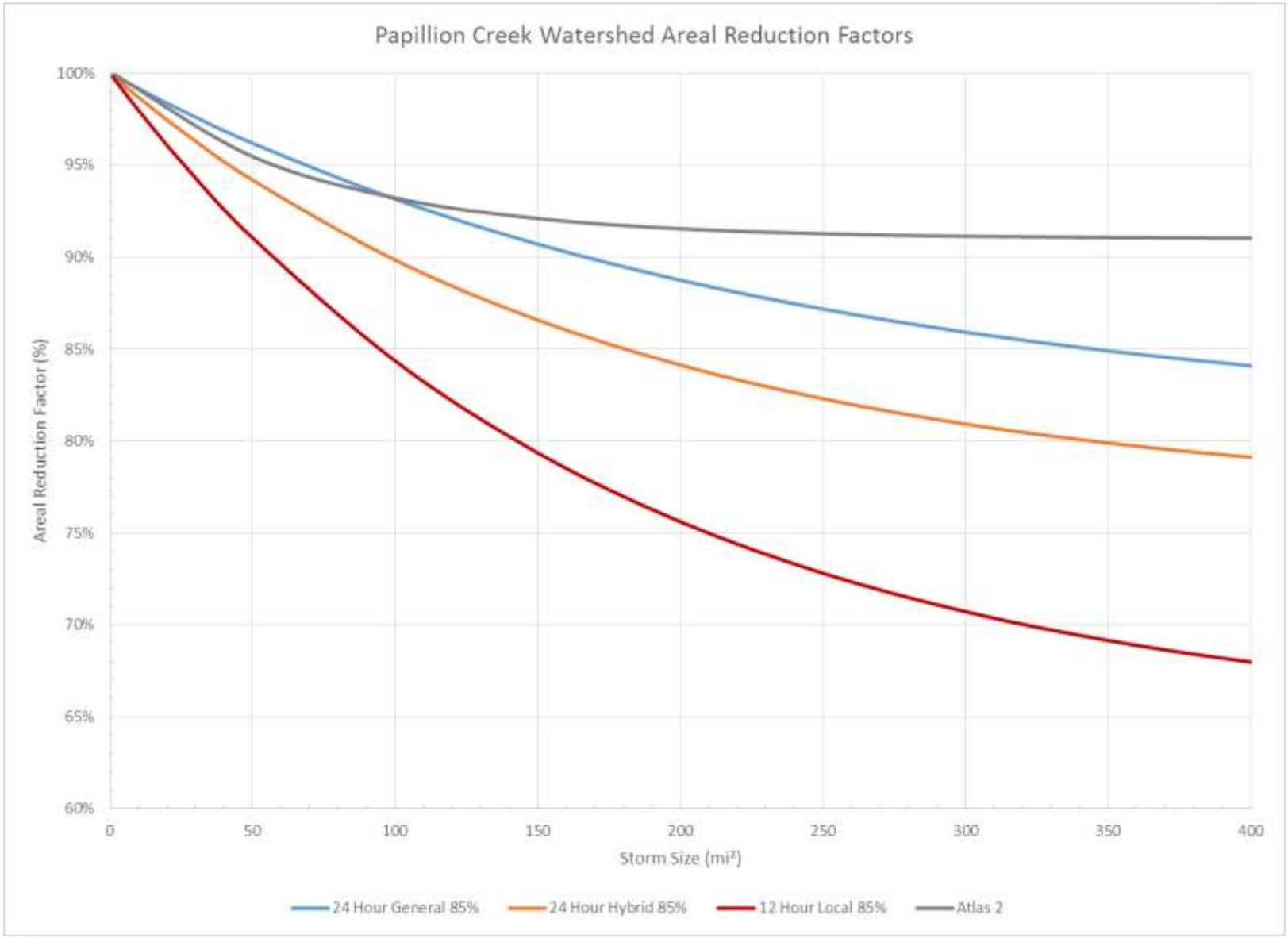
Design Storm – Site Specific Meteorology

Analysis yielded three storm types:

- General
- Hybrid
- Local



Design Storm – Areal Reduction Factor



Design Storm – Baseline Results

- Using existing calibration, results were mapped
- General and Hybrid storm types were far too dramatic (30-60% reductions)
- Local storm yielded the most conservative results for all basin sizes

- To keep modeling as simple as possible, the Local Storm was utilized for all storm sizes without storm path development
  - 10-, 20-, 40-, 50-, 70-, 90-, 120-, 150-, 300-, and 400-mi^2

Verification of the Calibration

Calibrated stream gages

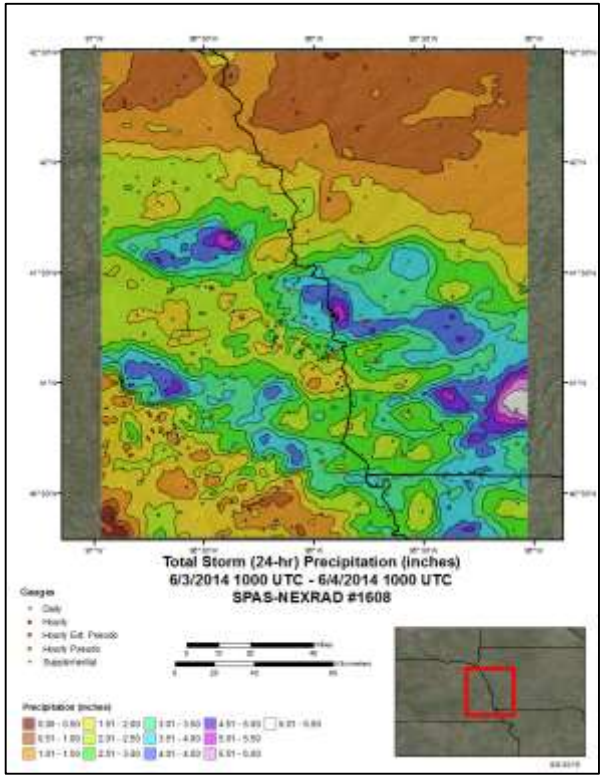
- ALERT Gages were calibrated starting in 2012 by USGS

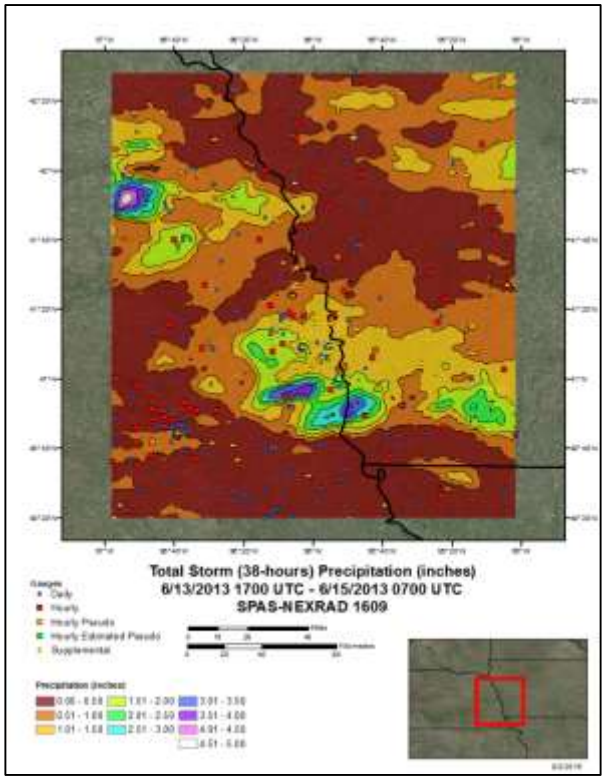
NEXRAD

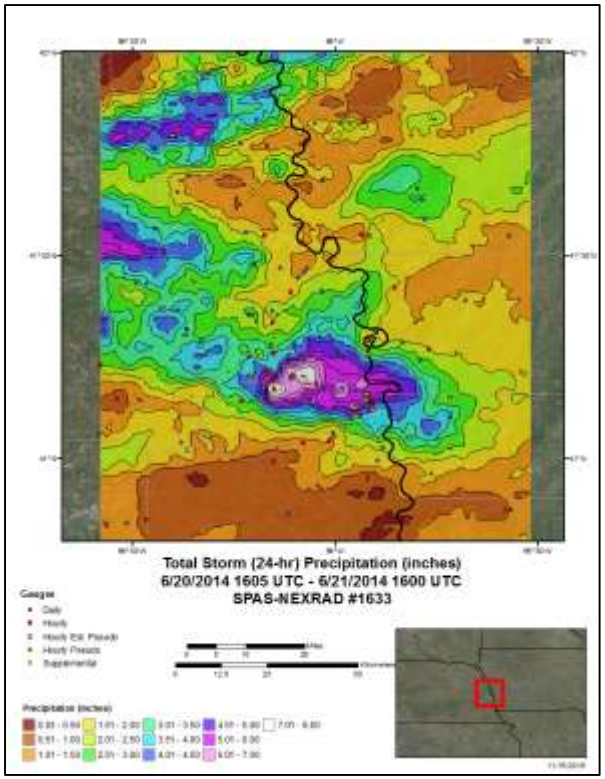
- High resolution rainfall data

Verification

- Three new significant storm events occurred in 2013 and 2014
- High resolution rainfall- mean depths by basin centroid
- USGS calibrated stream gages starting in 2012
- How does the existing calibration hold up to these events?

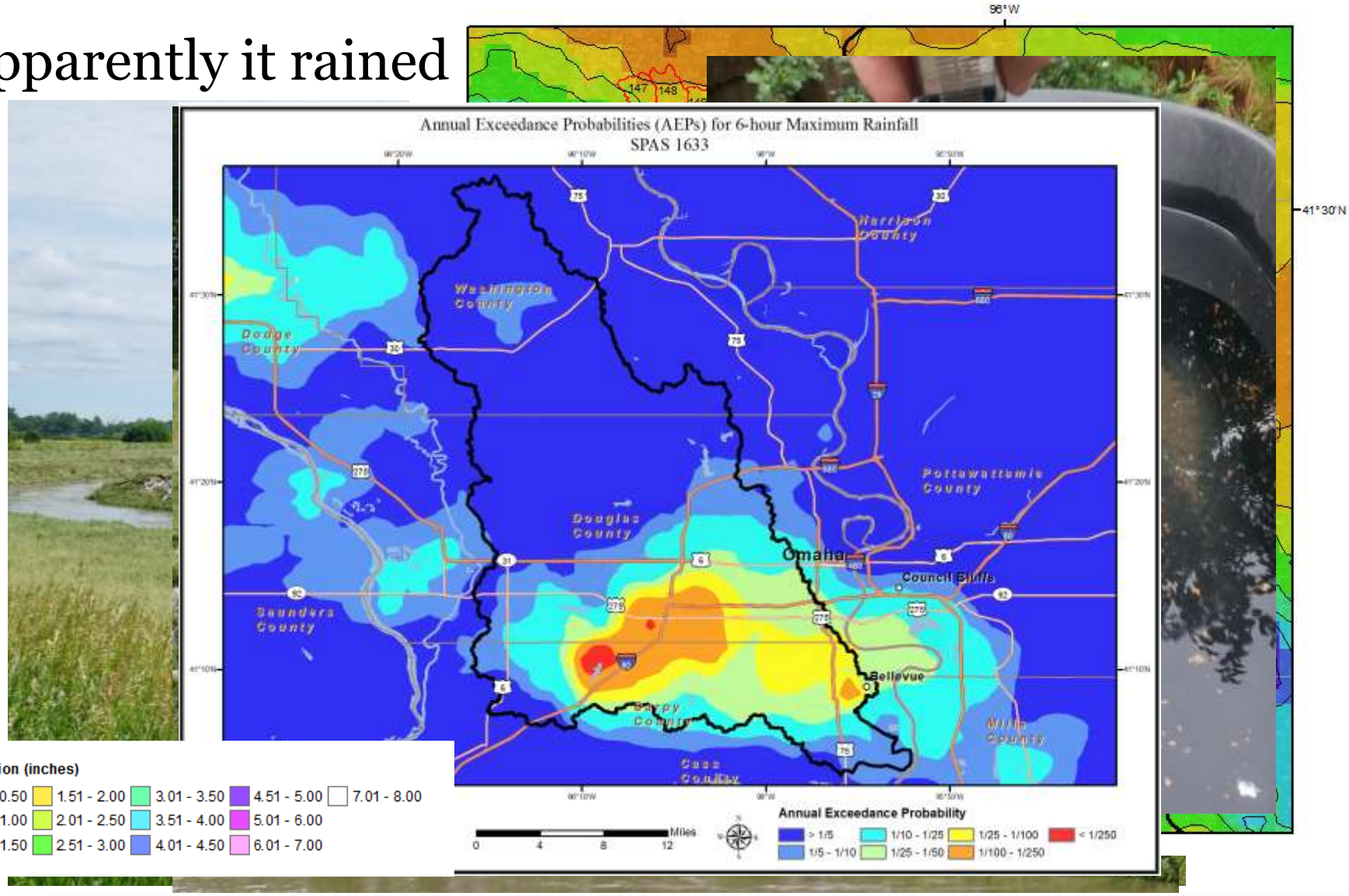




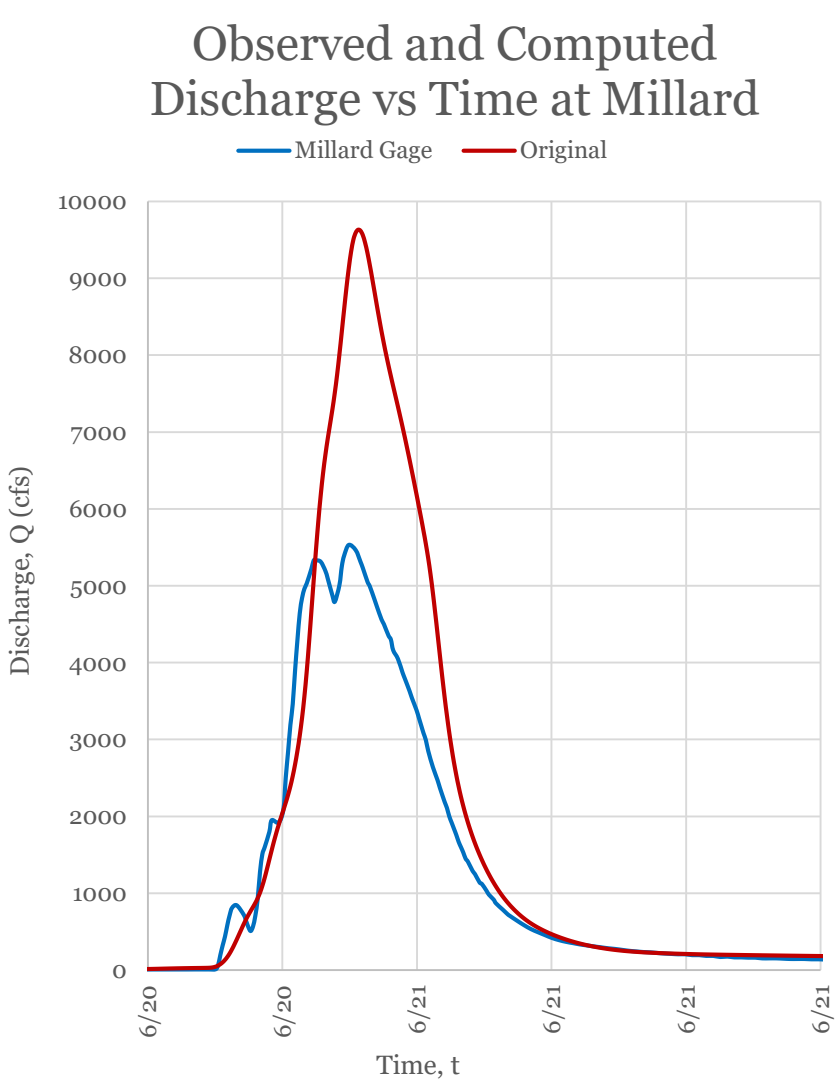


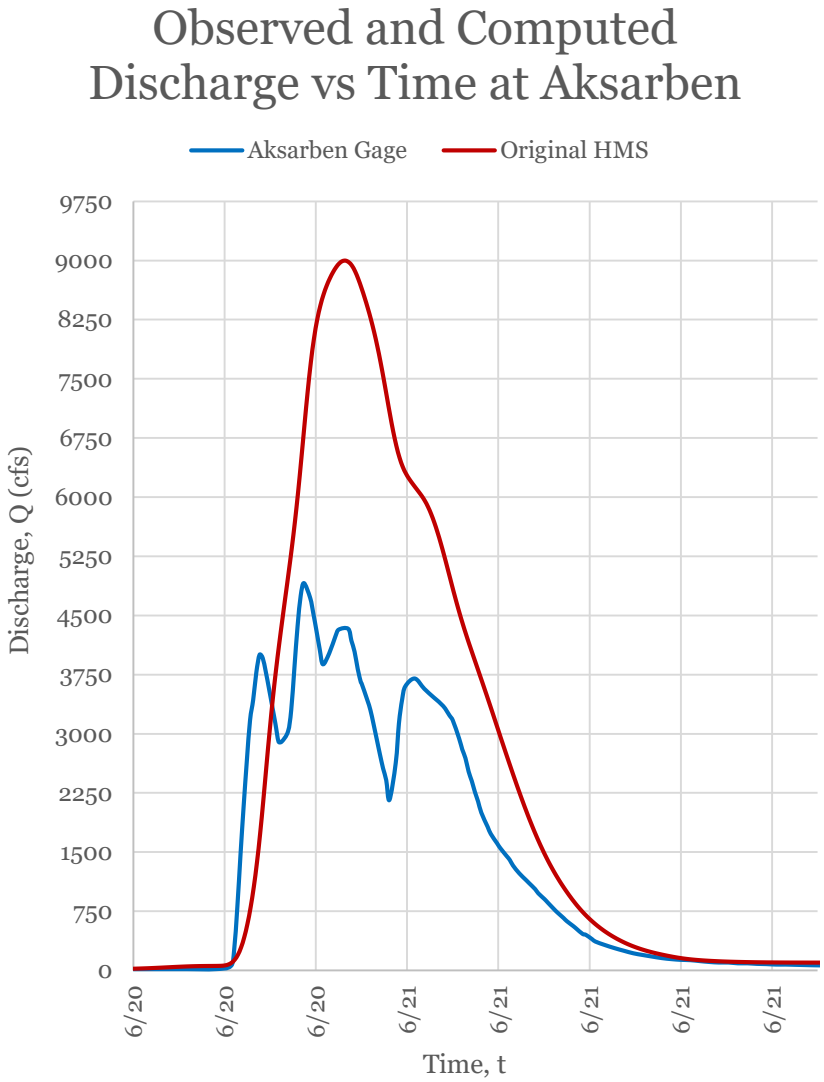
21 June 2014

Apparently it rained



21 June 2014 – Verification Results

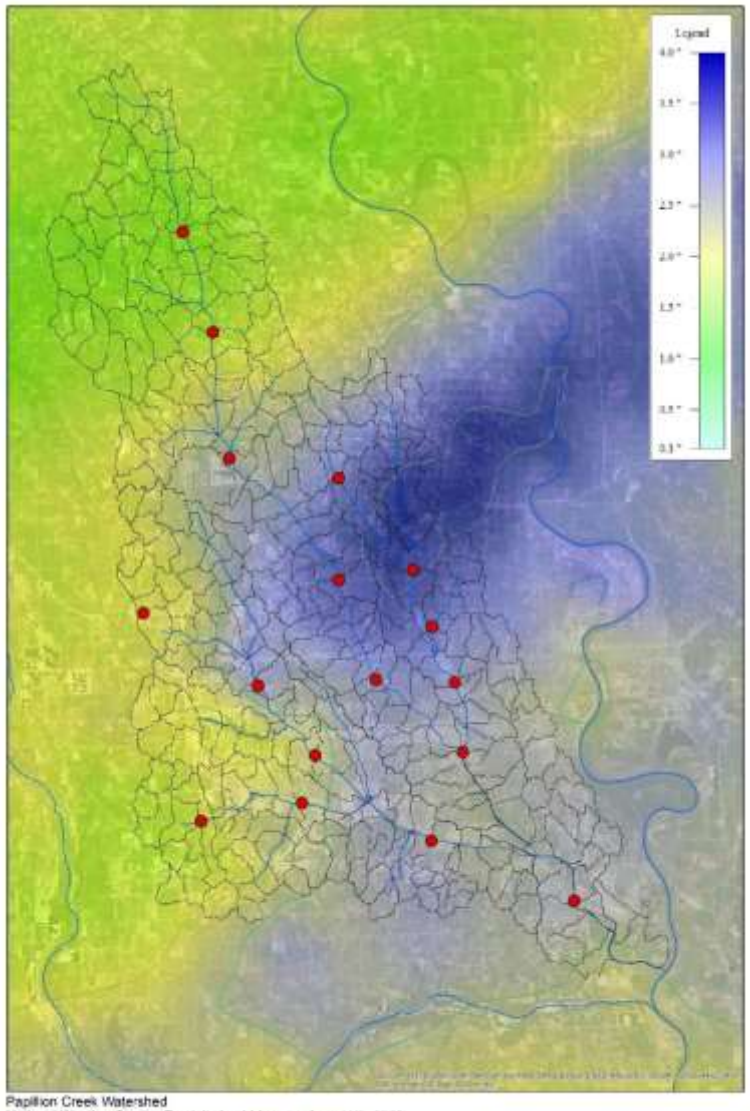




Rainfall Gages

- Verify gage depths
- Check RADAR loops when possible
- Go outside of your basin
- NEXRAD post-processing

- Most of the previous calibration was based on a few storm events, 2008 included



Papillion Creek Watershed
National Weather Service Precipitation Values on June 11th, 2008
October 24, 2018

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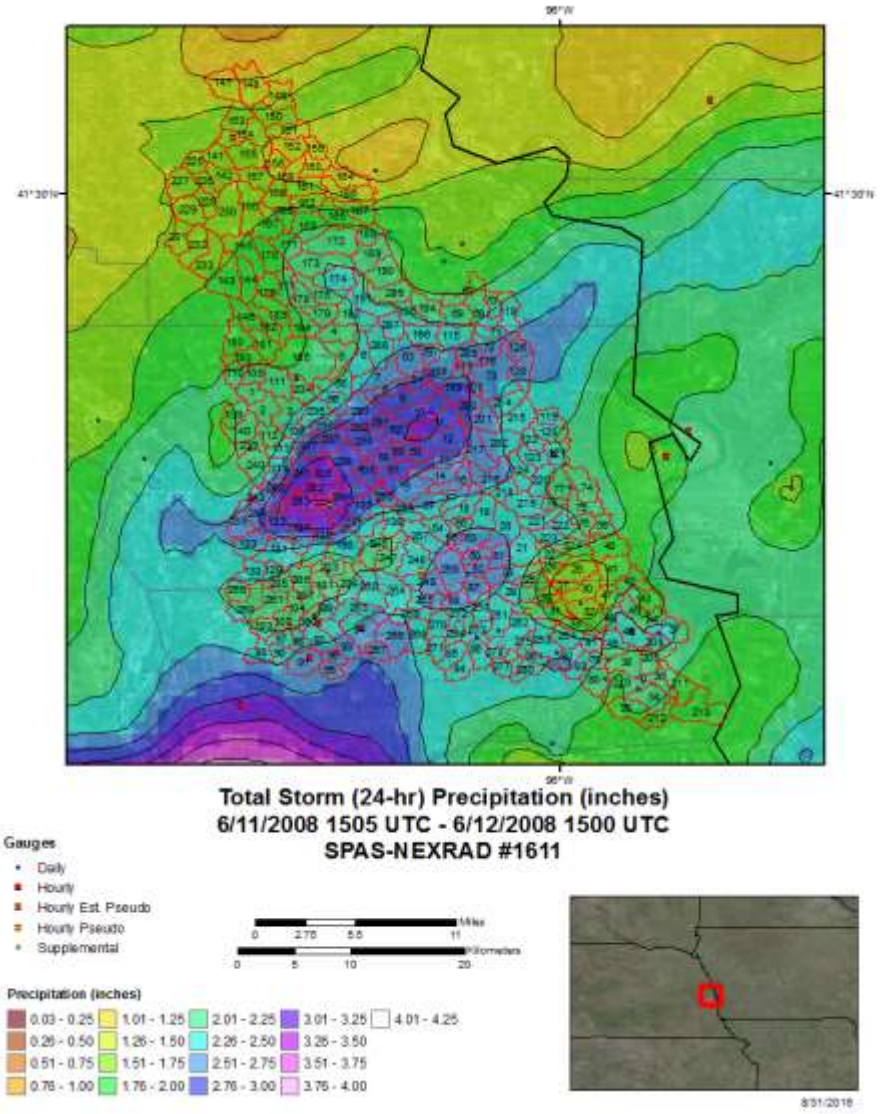
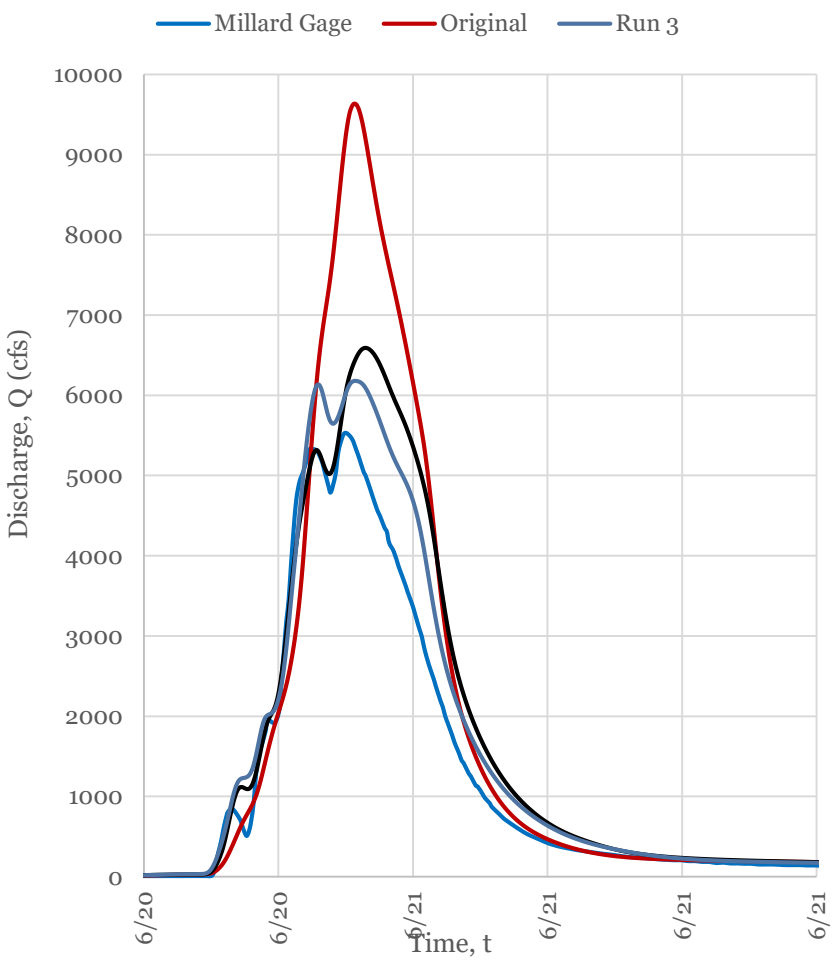
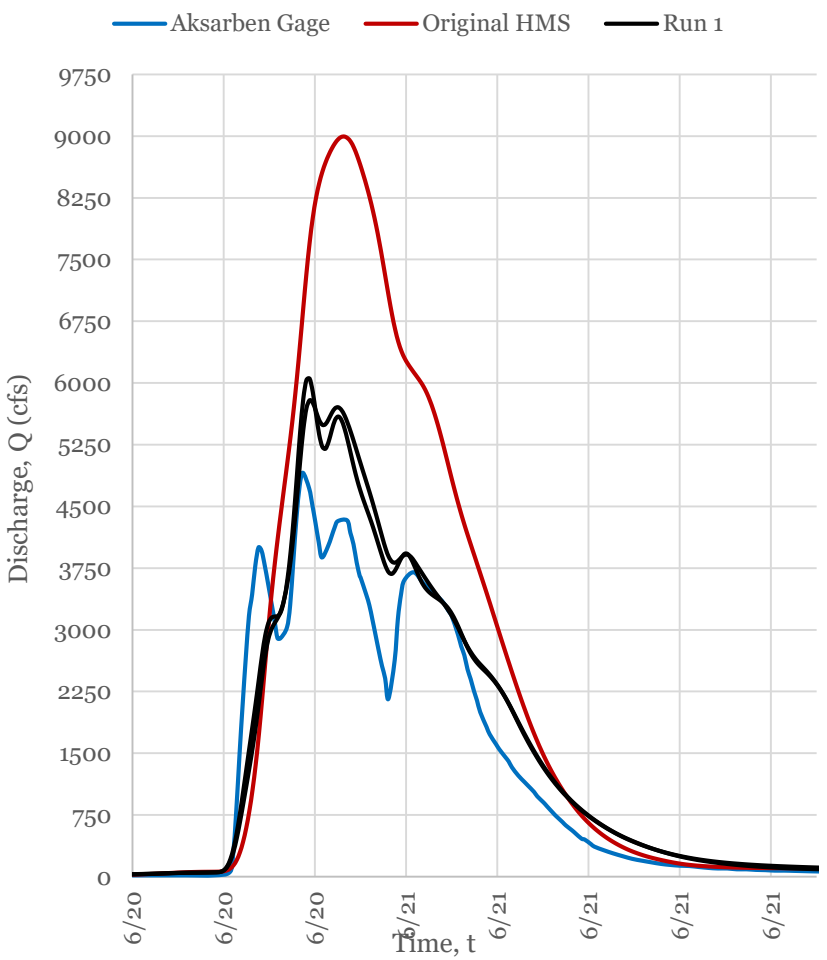


21 June 2014 – Re-Calibration Results

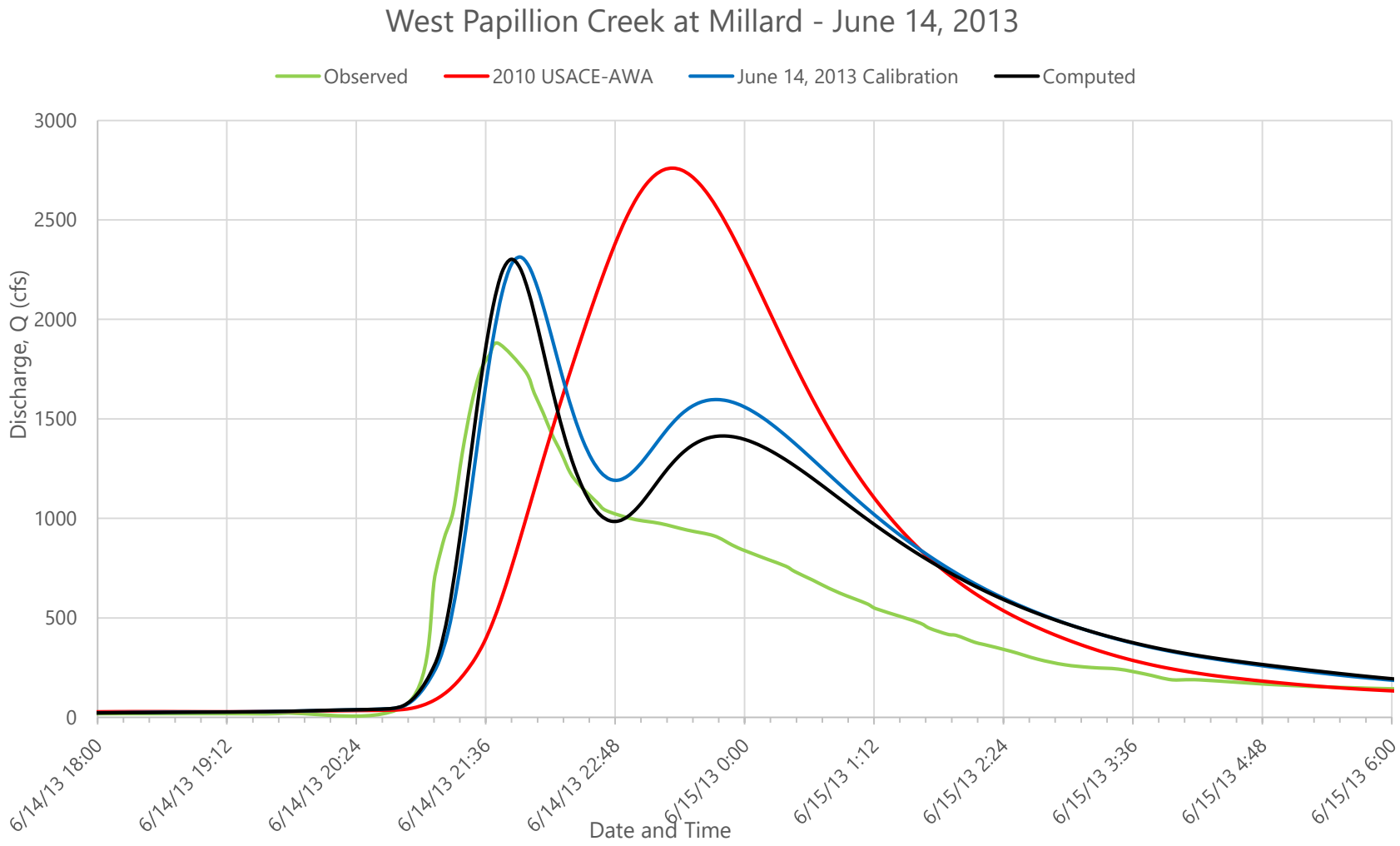
Observed and Computed Discharge vs Time at Millard



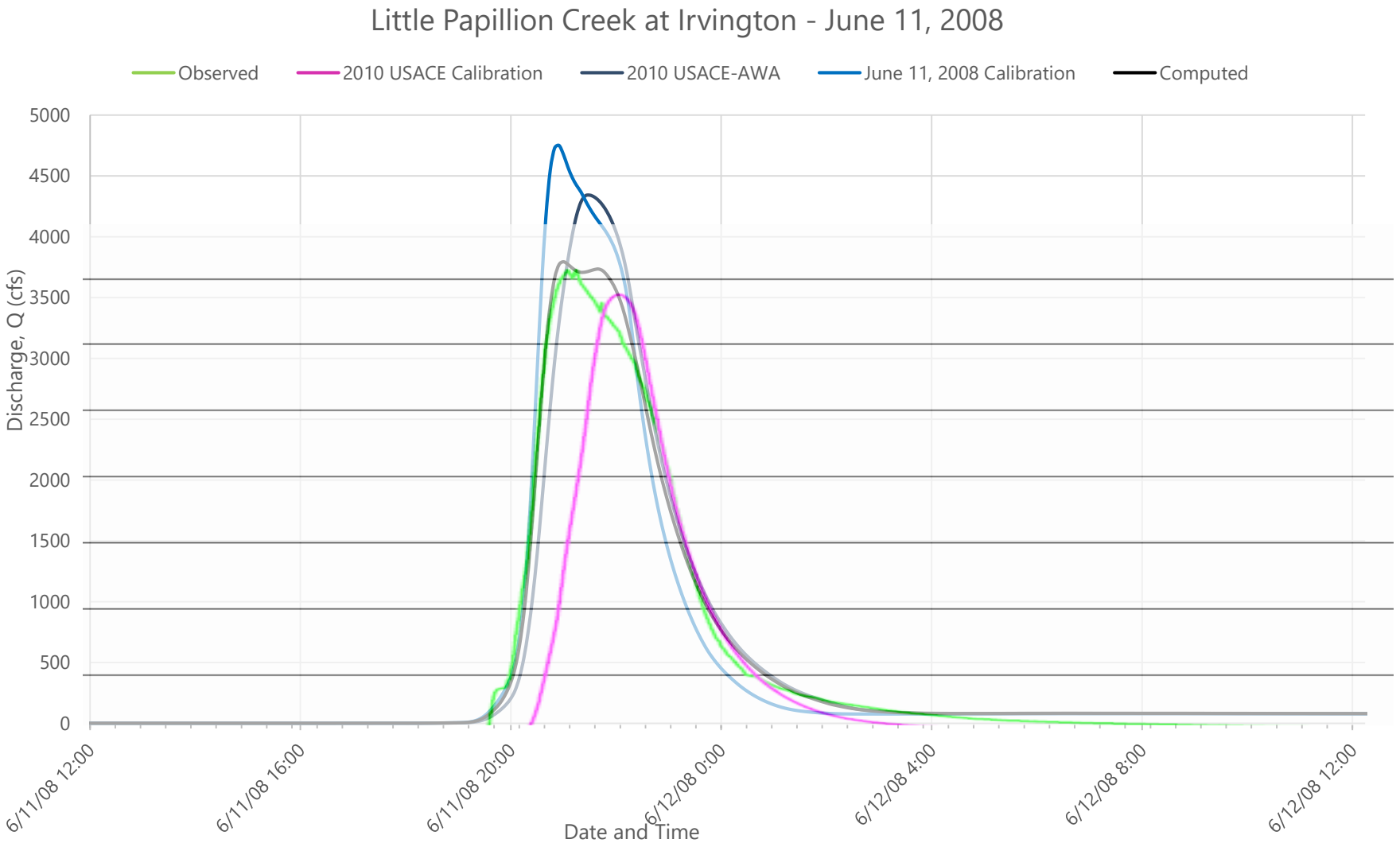
Observed and Computed Discharge vs Time at Aksarben



14 June 2013 – Re-Calibration Results



11 June 2008– Re-Calibration Results



Change from Previous Analysis

- Calibration improved based on three new storm events and back-checked against previous calibration event.
- Incorporates newest NOAA rainfall data and site-specific meteorological data
- Accounts for new regional detention basins
- 1% Existing Conditions discharges reduced by an average of 25%

Questions?

OWH – 2014, http://www.omaha.com/news/metro/close-to-inches-of-rain-reported-in-parts-of-omaha/article_6ea8bf78-f8d7-11e3-b7ba-0017a43b2370.html