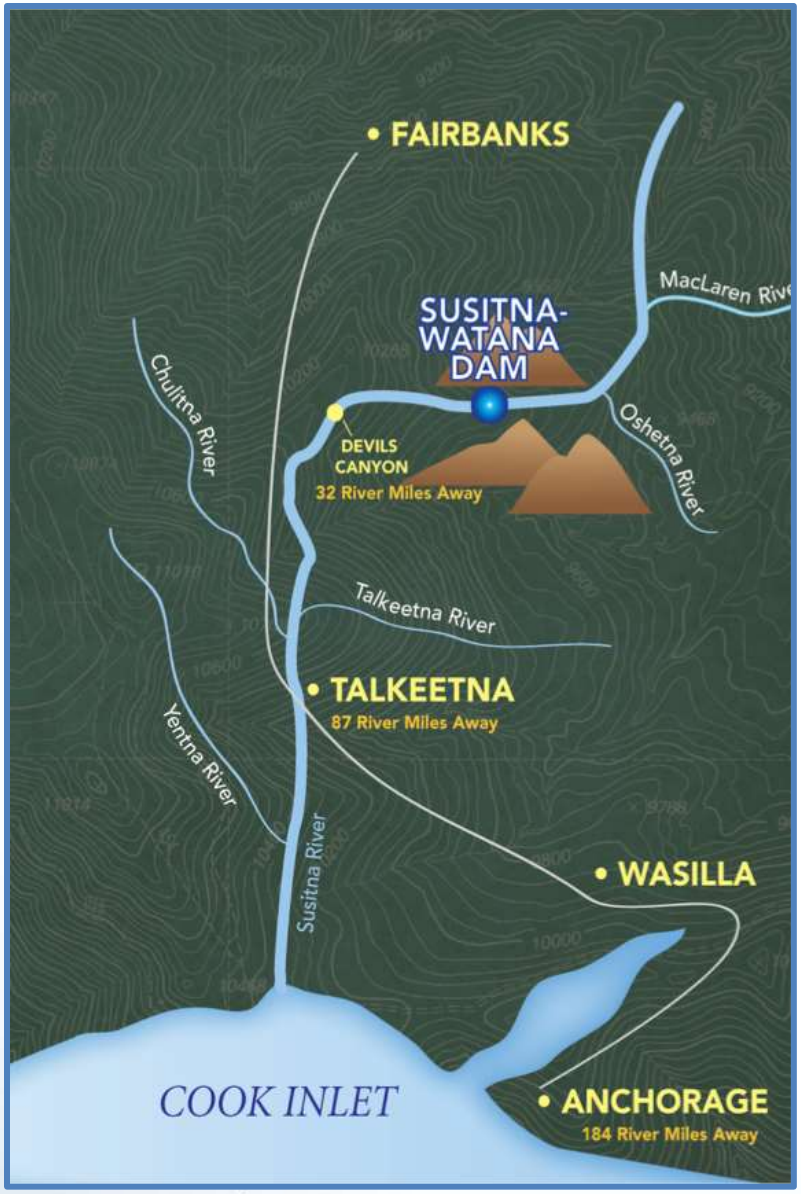

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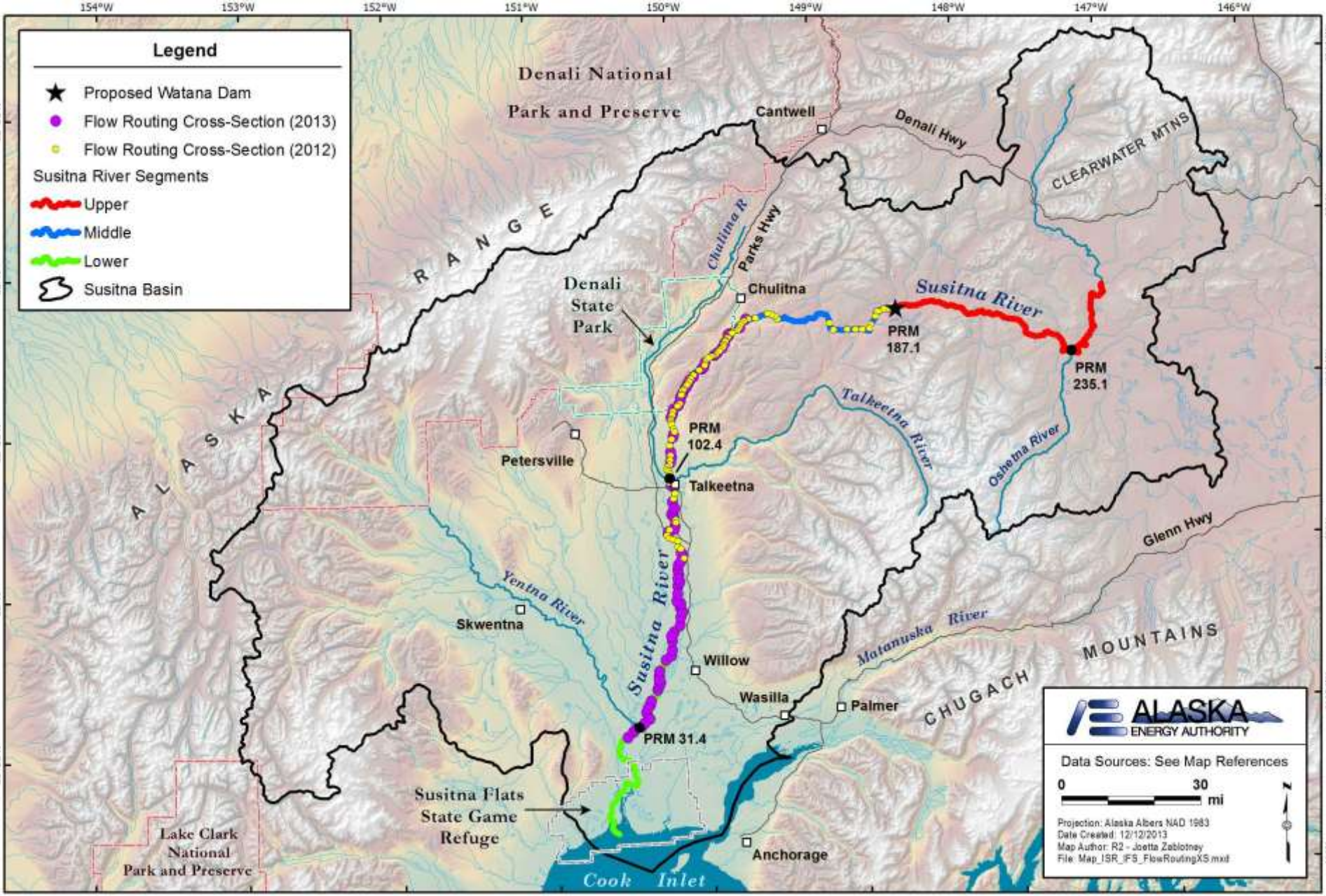
Technical Team Meeting

Riverine Modeling Proof of Concept

Version 2 – HEC-RAS Open-water Flow Routing Model

April 15-17, 2014

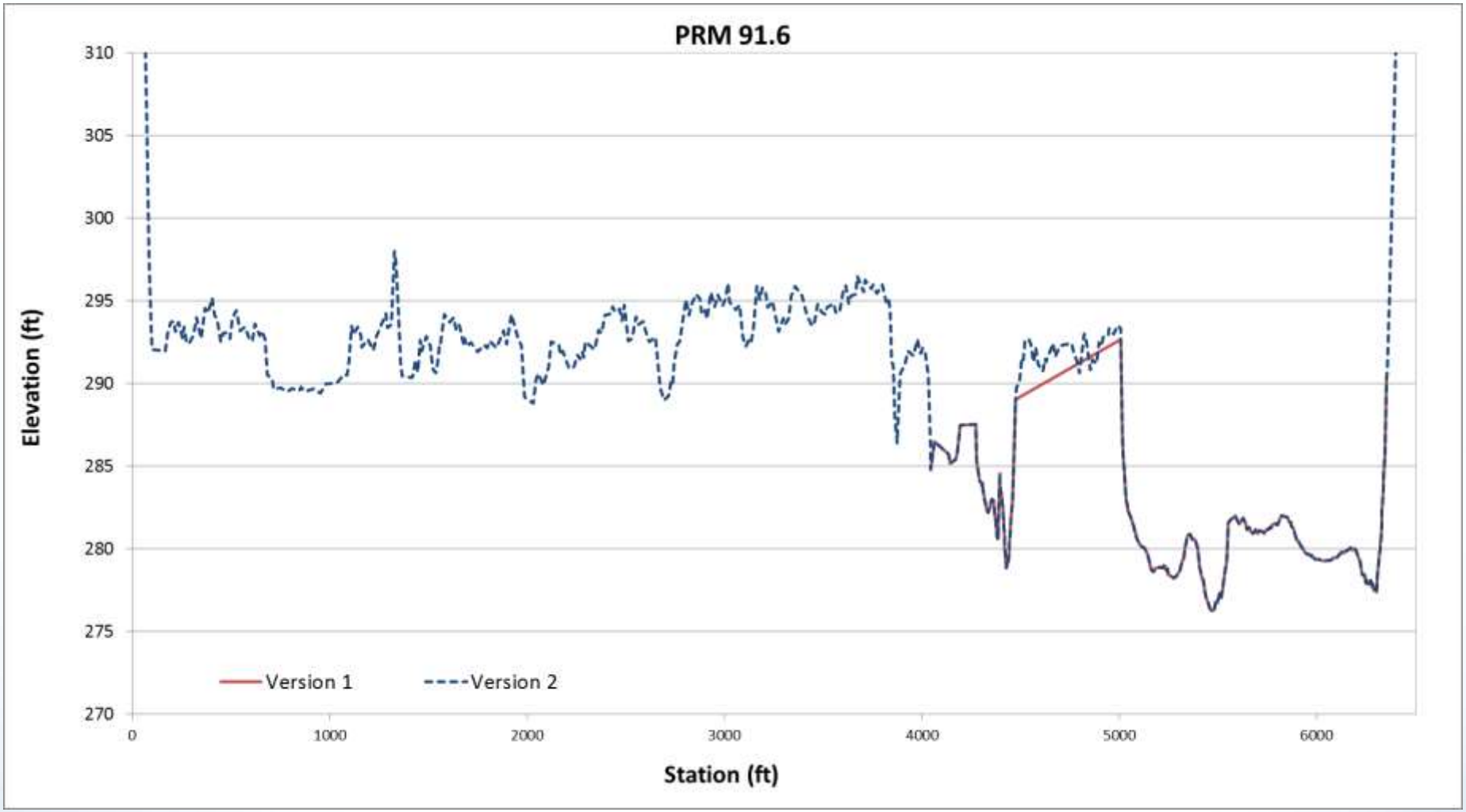
Prepared by R2 Resource Consultants, Brailey Hydrologic, Geovera, Tetra Tech, and HDR


Legend
Proposed Watana Dam
Flow Routing Cross-Section (2013)
Flow Routing Cross-Section (2012)
Susitna River Segments
Upper
Middle
Lower
Susitna Basin
Denali National Park and Preserve
Cantwell
Denali Hwy
CLEARWATER MTNS
ALASKA RANGE
Chulitna R
Parks Hwy
Chulitna
Denali State Park
Susitna River
PRM 187.1
PRM 235.1
Talkeetna River
Oshetna River
PRM 102.4
Petersville
Talkeetna
Glenn Hwy
Yentna River
Skwentna
Susitna River
Willow
Matanuska River
Wasilla
Palmer
CHUGACH MOUNTAINS
PRM 31.4
Susitna Flats State Game Refuge
Lake Clark National Park and Preserve
Anchorage
Cook Inlet
ALASKA ENERGY AUTHORITY
Data Sources: See Map References
0
30
mi
Projection: Alaska Albers NAD 1983
Date Created: 12/12/2013
Map Author: R2 - Joetta Zablotney
File: Map_ISR_IFS_FlowRoutingXS.mxd

HEC-RAS Open-water Flow Routing Model – V2

- Improvements
  - Coverage
    - New Cross-sections – Middle and Lower River
    - Extended Domain - Dam Site (PRM 187.2) to Susitna Station (PRM 29.9)
    - Floodplain coverage – XS extended with LiDAR
      - Devils Canyon
        - » LiDAR + Estimated Channel

HEC-RAS Open-water Flow Routing Model – V2



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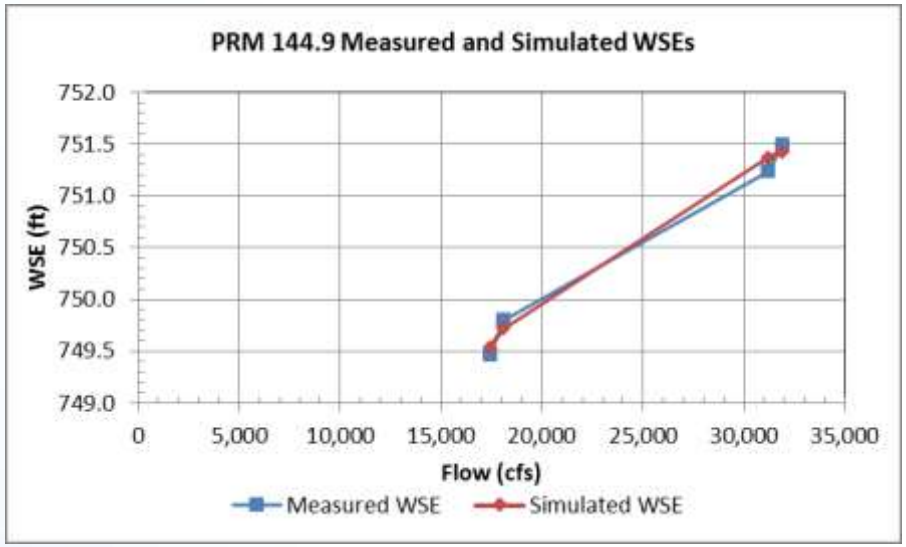
HEC-RAS Open-water Flow Routing Model – V2

- Improvements
  - Coverage
    - New Cross-sections – Middle and Lower River
    - Extended Domain - Dam Site (PRM187.2) to Susitna Station (PRM 29.9)
    - Floodplain coverage – XS extended with LiDAR
      - Devils Canyon
  - Refined Calibration
    - New XS rating curves and additional points for 2012 XS

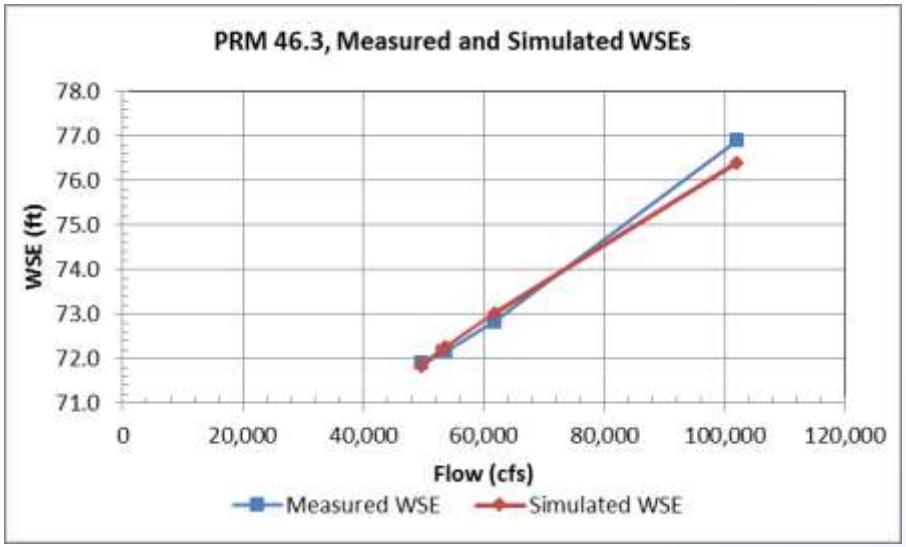
HEC-RAS Open-water Flow Routing Model – V2

Refined Calibration

Middle River



Lower River



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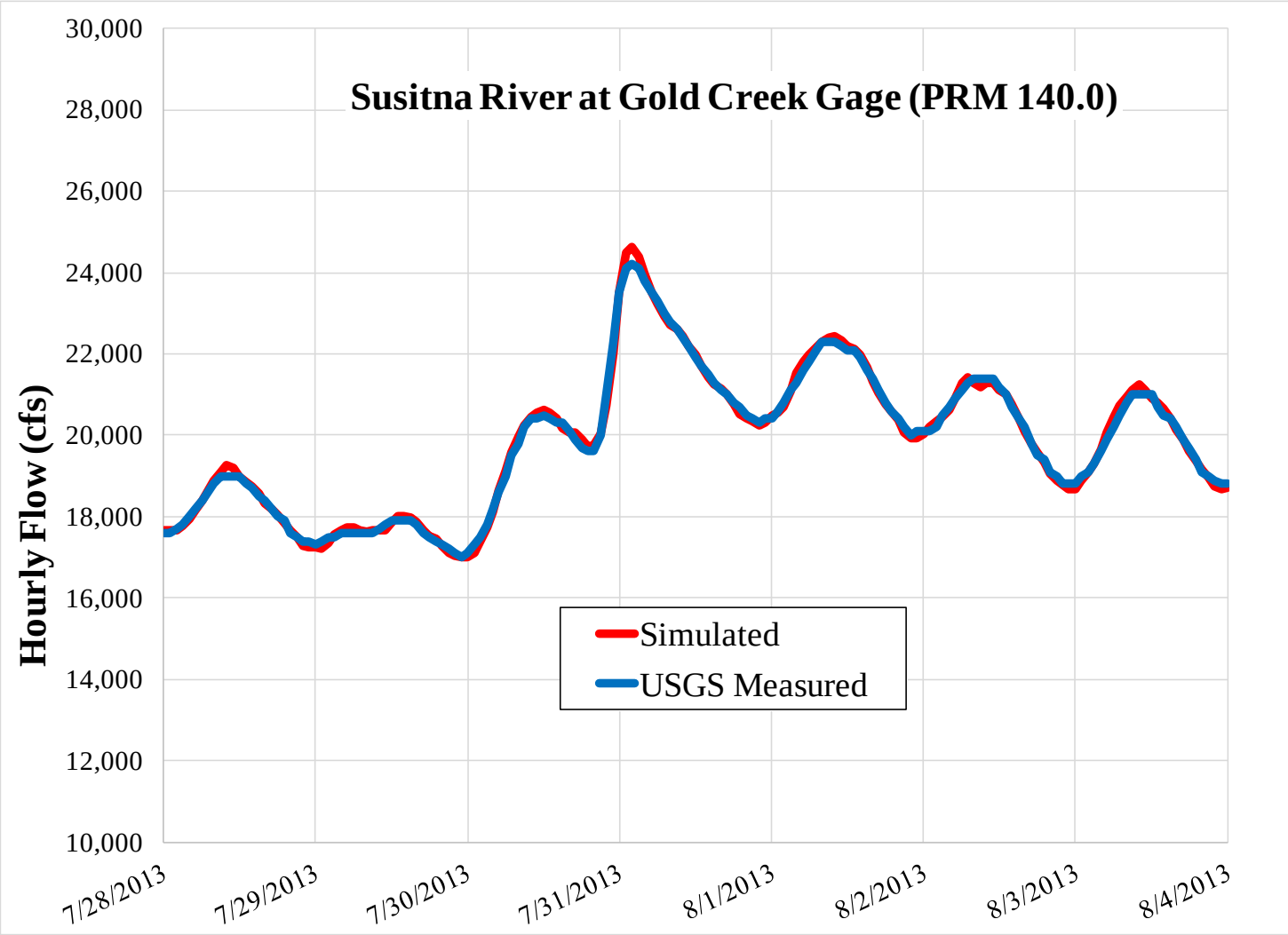
HEC-RAS Open-water Flow Routing Model – V2

- Improvements
  - Coverage
    - New Cross-sections – Middle and Lower River
    - Extended Domain - Dam Site (PRM187.2) to Susitna Station (PRM 29.9)
    - Floodplain coverage – XS extended with LiDAR
      - Devils Canyon
  - Refined Calibration
  - Synthesized Tributary Flows
    - Hourly Accretion
    - 61 year record

HEC-RAS Open-water Flow Routing Model – V2



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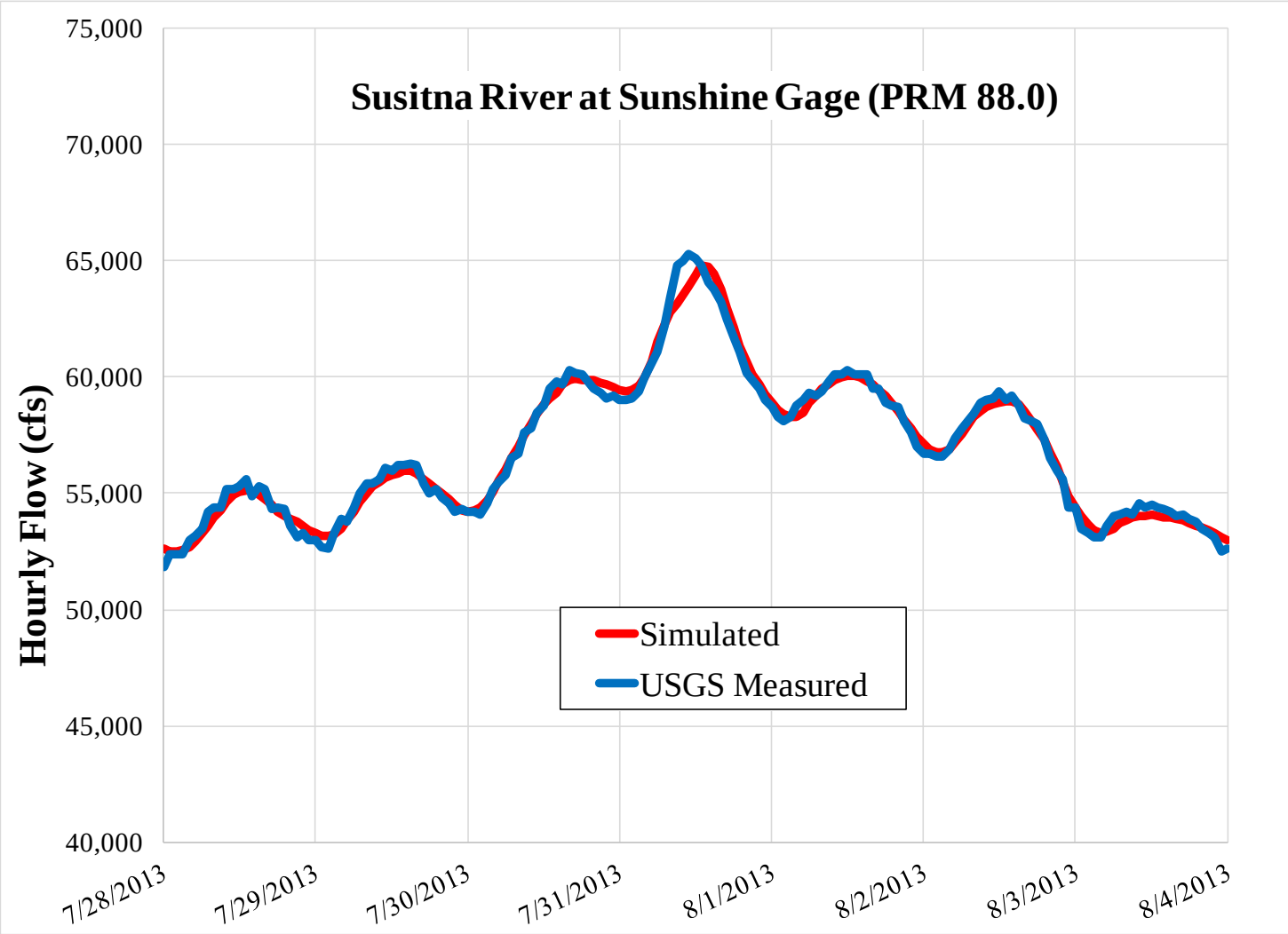
HEC-RAS Open-water Flow Routing Model – V2



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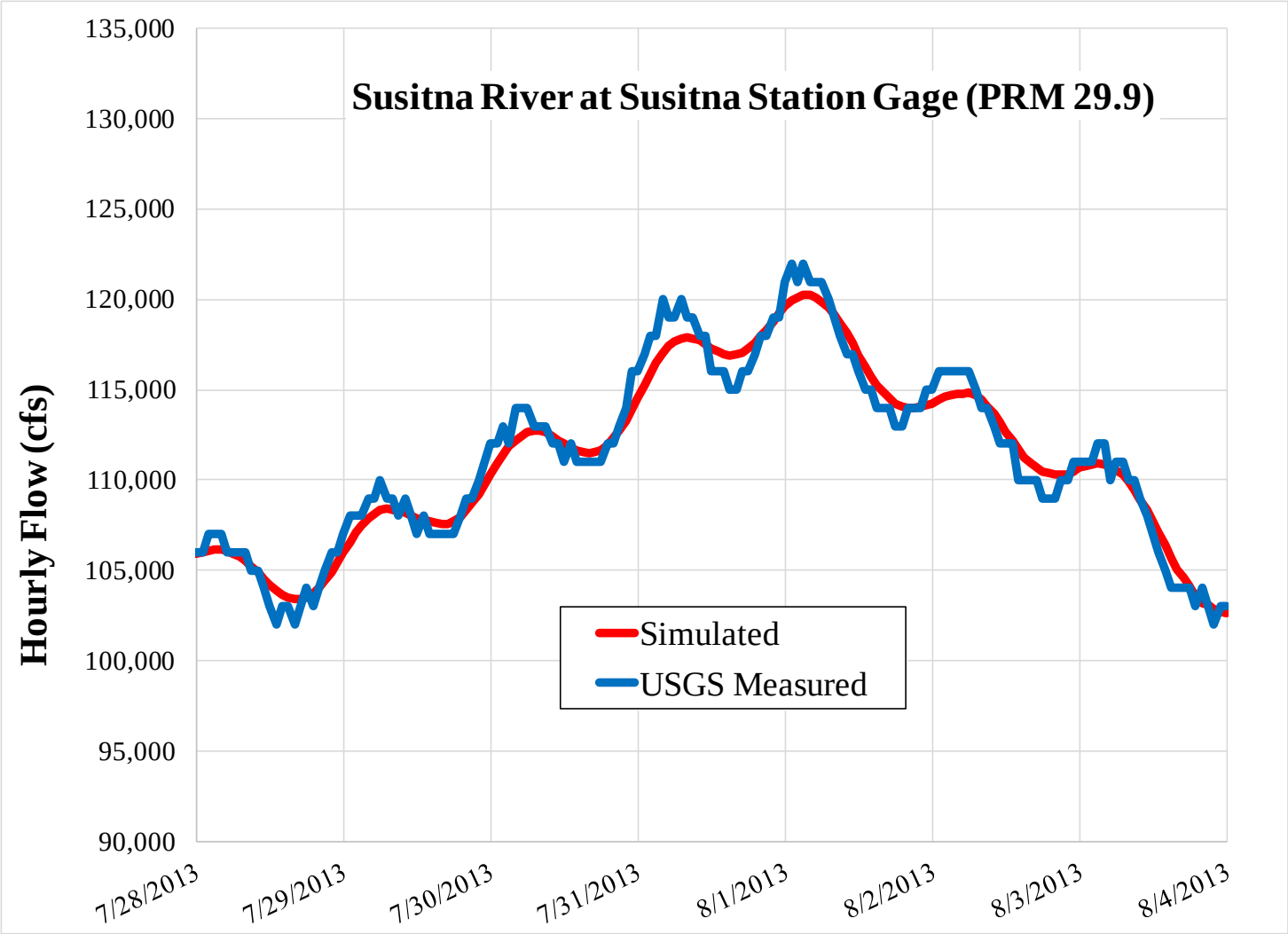
HEC-RAS Open-water Flow Routing Model – V2



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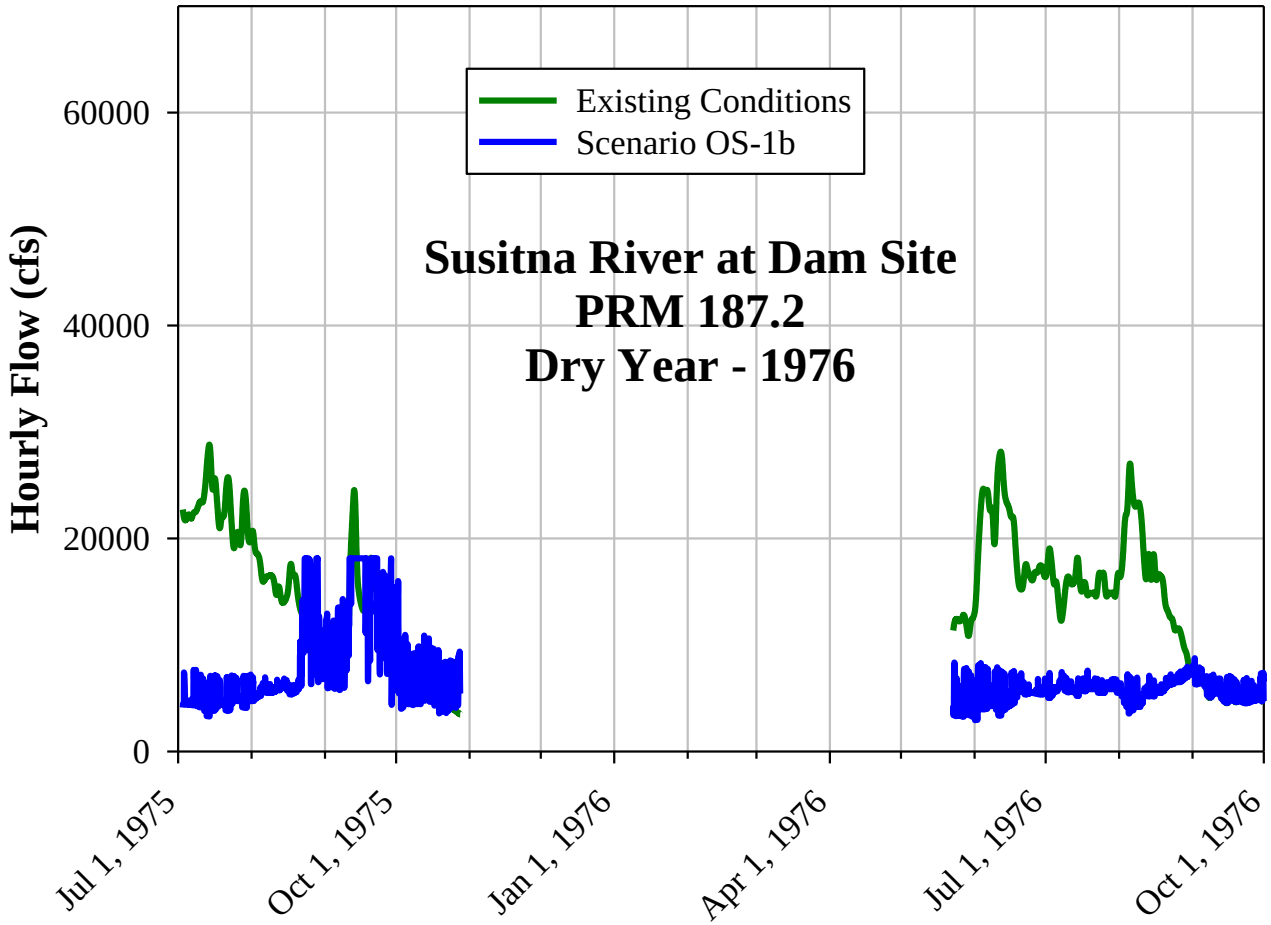
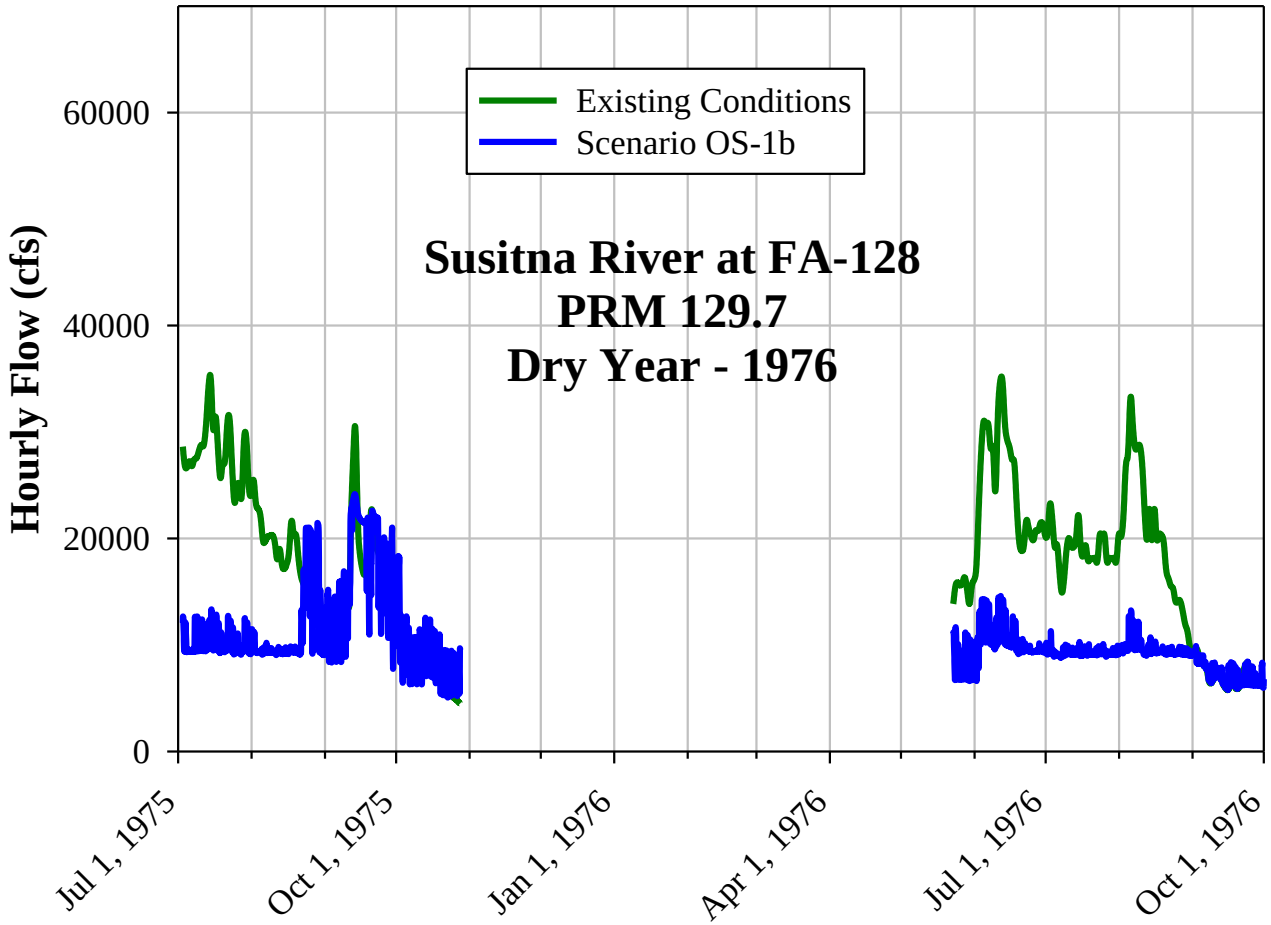
HEC-RAS Open-water Flow Routing Model – V2

- Outputs
  - Hourly flow hydrographs of the Susitna River at any location (including Focus Areas) between the proposed dam site (PRM 187.2) and just downstream from the Yentna River confluence (PRM 29.9).
  - Hourly stage hydrographs of the Susitna River at surveyed river cross-sections (total = 212).

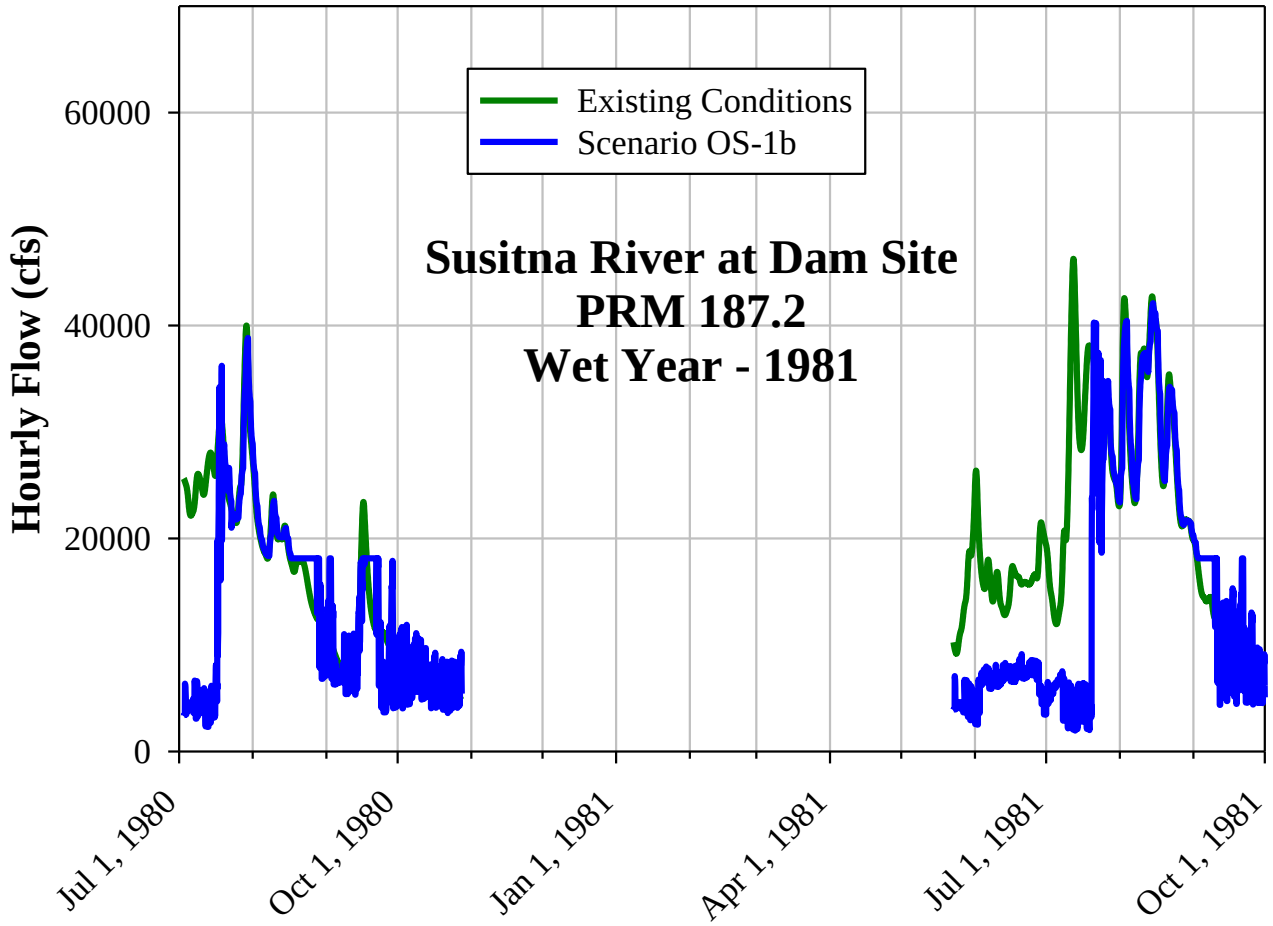
HEC-RAS Open-water Flow Routing Model – V2



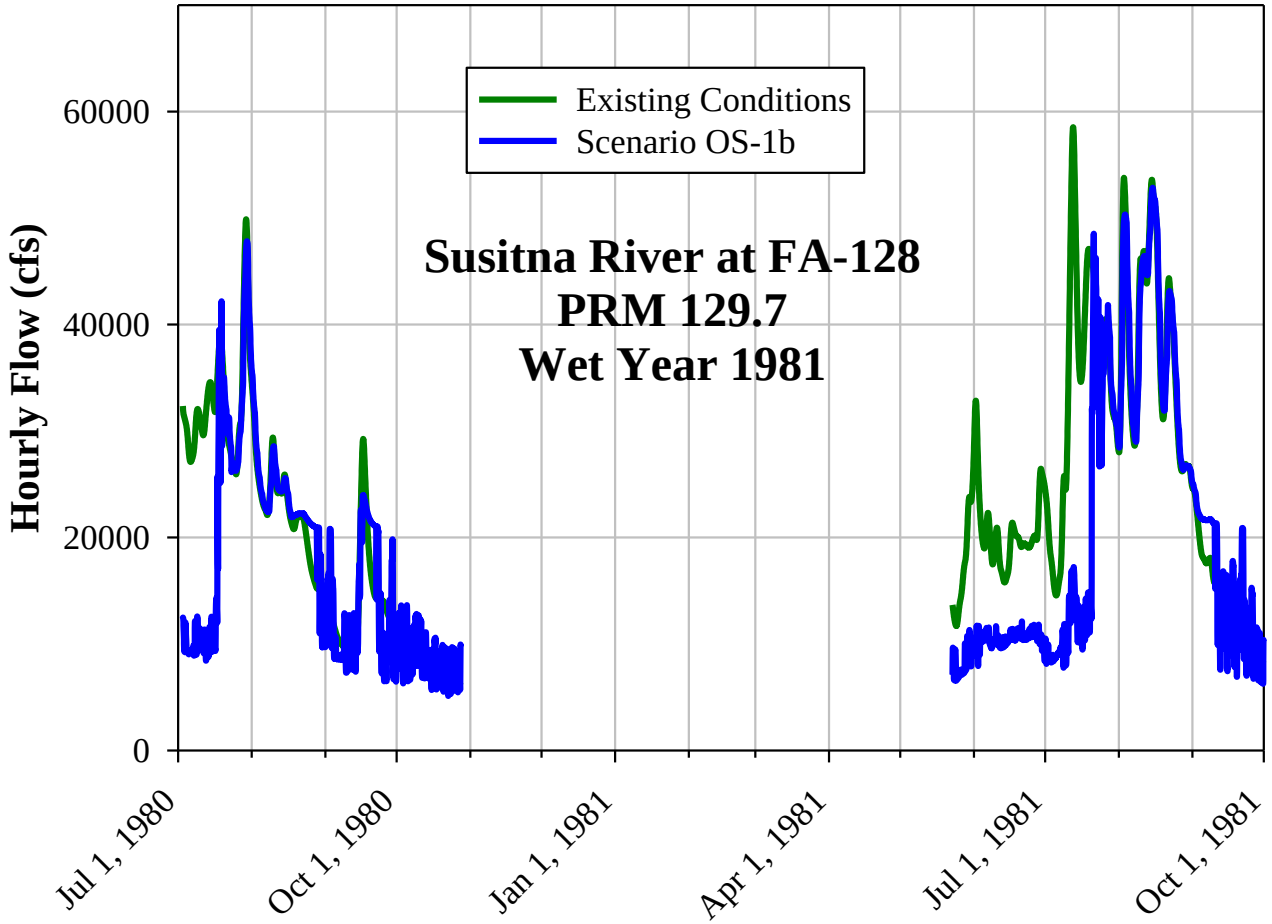
HEC-RAS Open-water Flow Routing Model – V2



HEC-RAS Open-water Flow Routing Model – V2



HEC-RAS Open-water Flow Routing Model – V2



HEC-RAS Open-water Flow Routing Model – V2

- Limitations
  - Not applicable during ice covered conditions (October 28 through May 22)
  - One-dimensional
  - Devils Canyon bathymetry estimated
  - No water surface elevations at locations in between surveyed cross-sections.
    - The 2D hydraulic model in the Focus Areas will rely on input from the HEC-RAS Open-water Flow Routing Model to determine water surface elevations in Focus Areas.
    - Output from the HEC-RAS Open-water Flow Routing Model, combined with LiDAR data, may be used to estimate areas of inundation in riparian floodplain zones.