Calapooia River – Sodom Dam Project

Hydraulic Modeling

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Presentation Outline

- Project Review
- Hydrology for Calapooia
- Flow Division at Bifurcation
- Hydraulic Modeling
- Summary & Potential Solution

Project Stages

Planning

- Perform studies and develop alternatives
- Obtain agency / landowner input

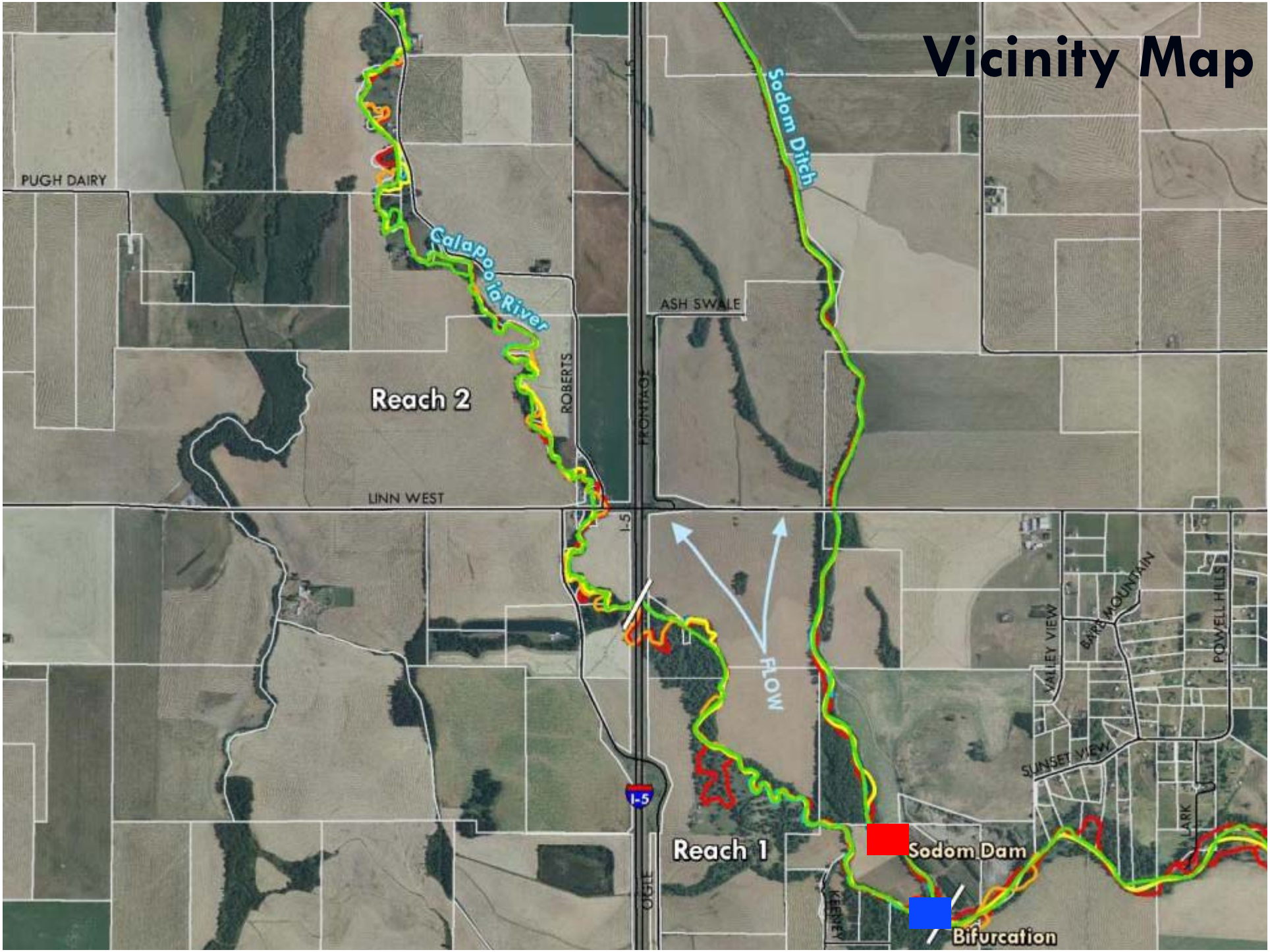
Final Design

- Final plans for construction
- Permitting

Project Implementation

- Funding
- Construction

Vicinity Map

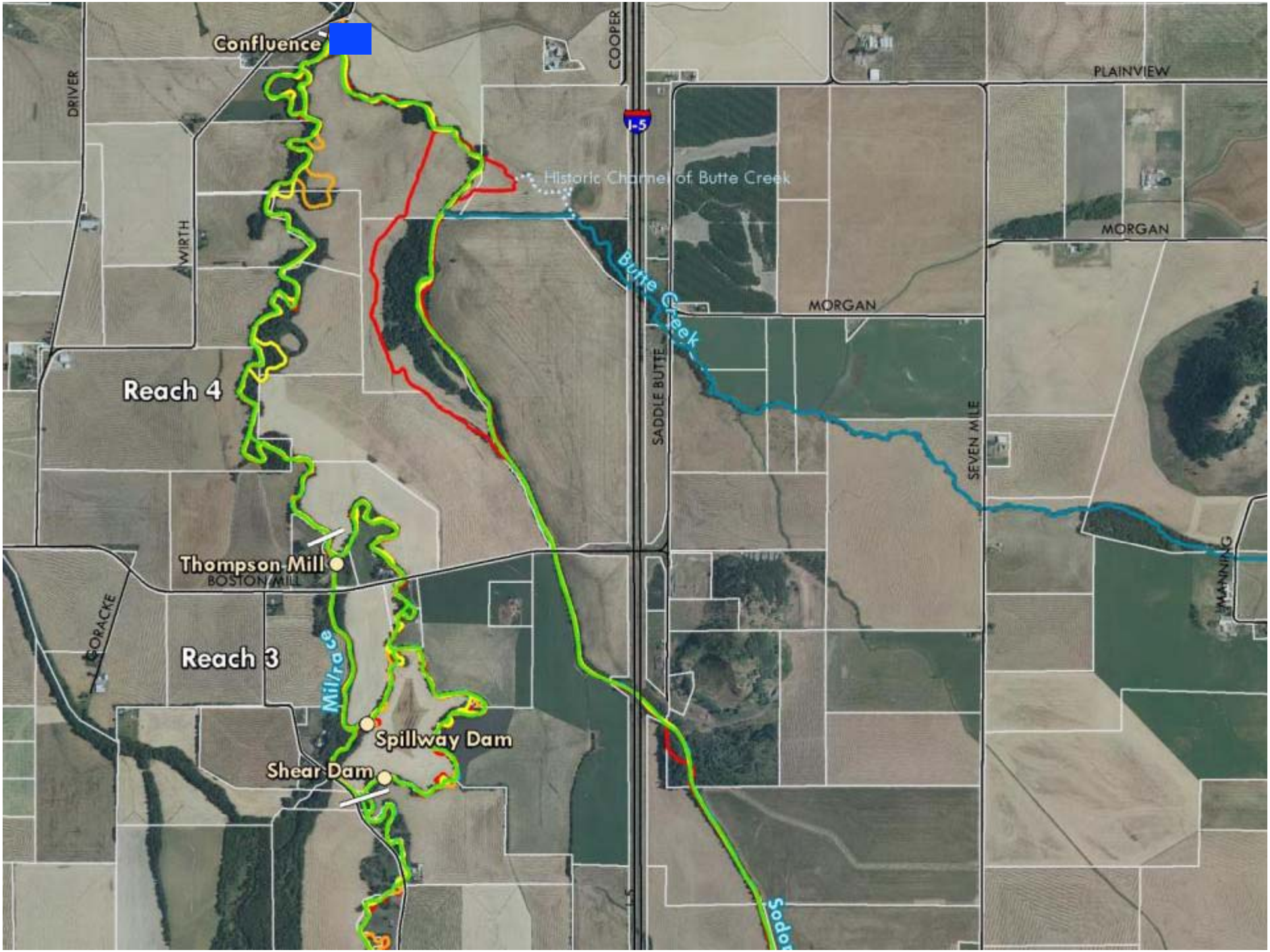


2008 – Sodom Dam


Bifurcation – 2009


Sodom Ditch (2009)

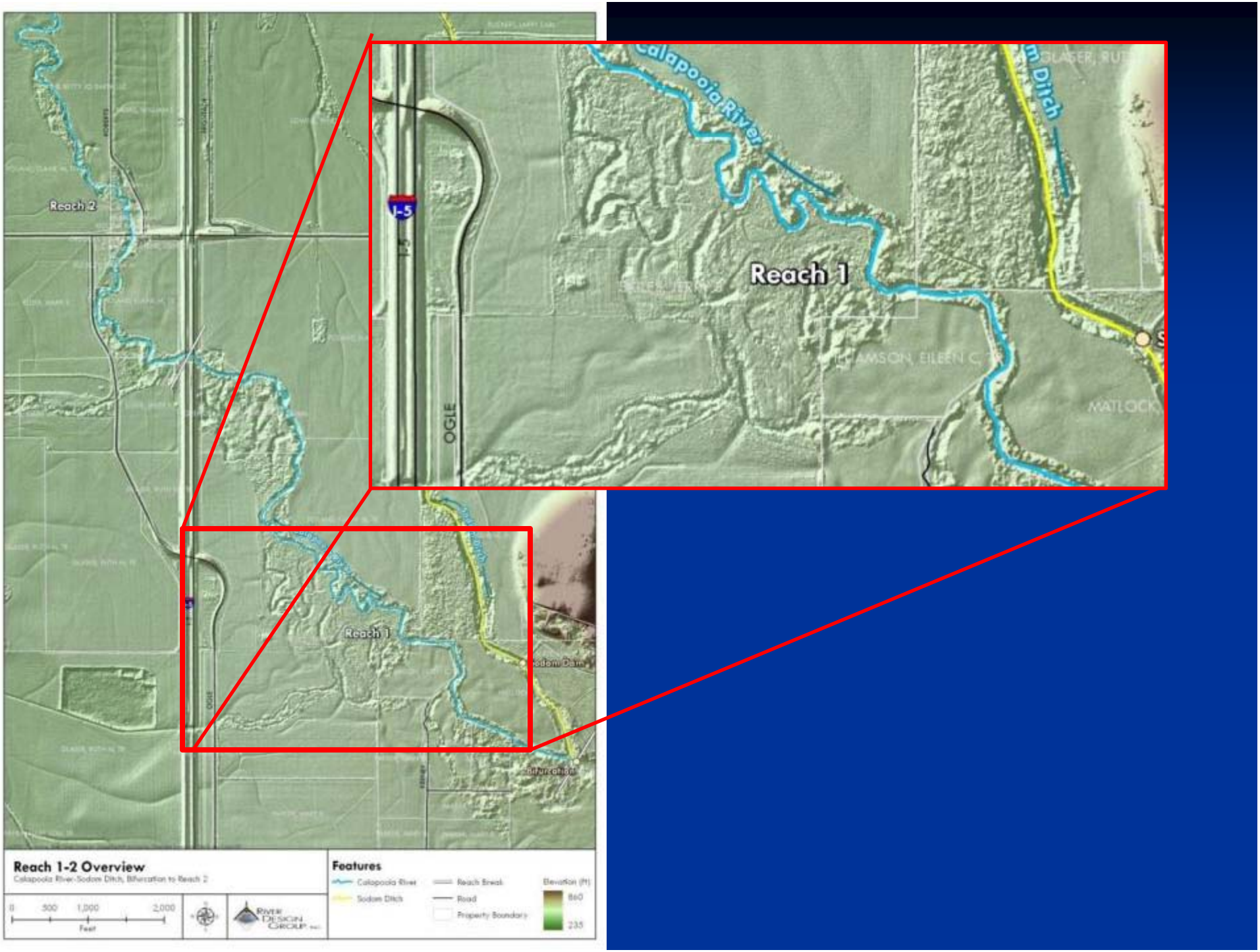

Calapooia River – Reach 1 (2009)


Confluence
DRIVER
WIRTH
COOPER
I-5
PLAINVIEW
Historic Channel of Butte Creek
MORGAN
MORGAN
Butte Creek
Reach 4
SADDLE BUTTE
SEVEN MILE
Thompson Mill
BOSTON MILL
CORACKE
Reach 3
Mill race
Spillway Dam
Shear Dam
MANNING


2008 – Shear Dam

LiDAR Data Review

- LiDAR coverage from near Brownsville to Albany
- LiDAR acquired during September 2008 low water
- Data do not accurately characterize channel bed – correct with field survey data
- Topographic surface used for hydraulic modeling and to evaluate flood inundation


Reach 2
I-5
OGLE
Calapooia River
Reach 1
Sodom Ditch
Reach 1
Reach 1-2 Overview
Calapooia River-Sodom Ditch, Bifurcation to Reach 2
0 500 1,000 2,000
Feet
River Design Group
Features
Calapooia River
Sodom Ditch
Reach Break
Road
Property Boundary
Elevation (ft)
860
235


Calapooia River
Ditch
Reach 1
I-5
I-5
OGLE
GLASER, RUT
SKILES, JERRY B
WILLIAMSON, EILEEN C,
MATLOCK

Reach 2-3 Overview

Calapooia River-Sodom Ditch, Reach 2 to Reach 3

0 500 1,000 2,000 Feet

River Design Group

Features

Calapooia River · Sodom Ditch · Other waterways · Reach Break · Road · Property Boundary

Elevation (ft): 860 – 235

Reach 3-4 Overview

Calapooia River-Sodom Ditch, Reach 3 to Confluence

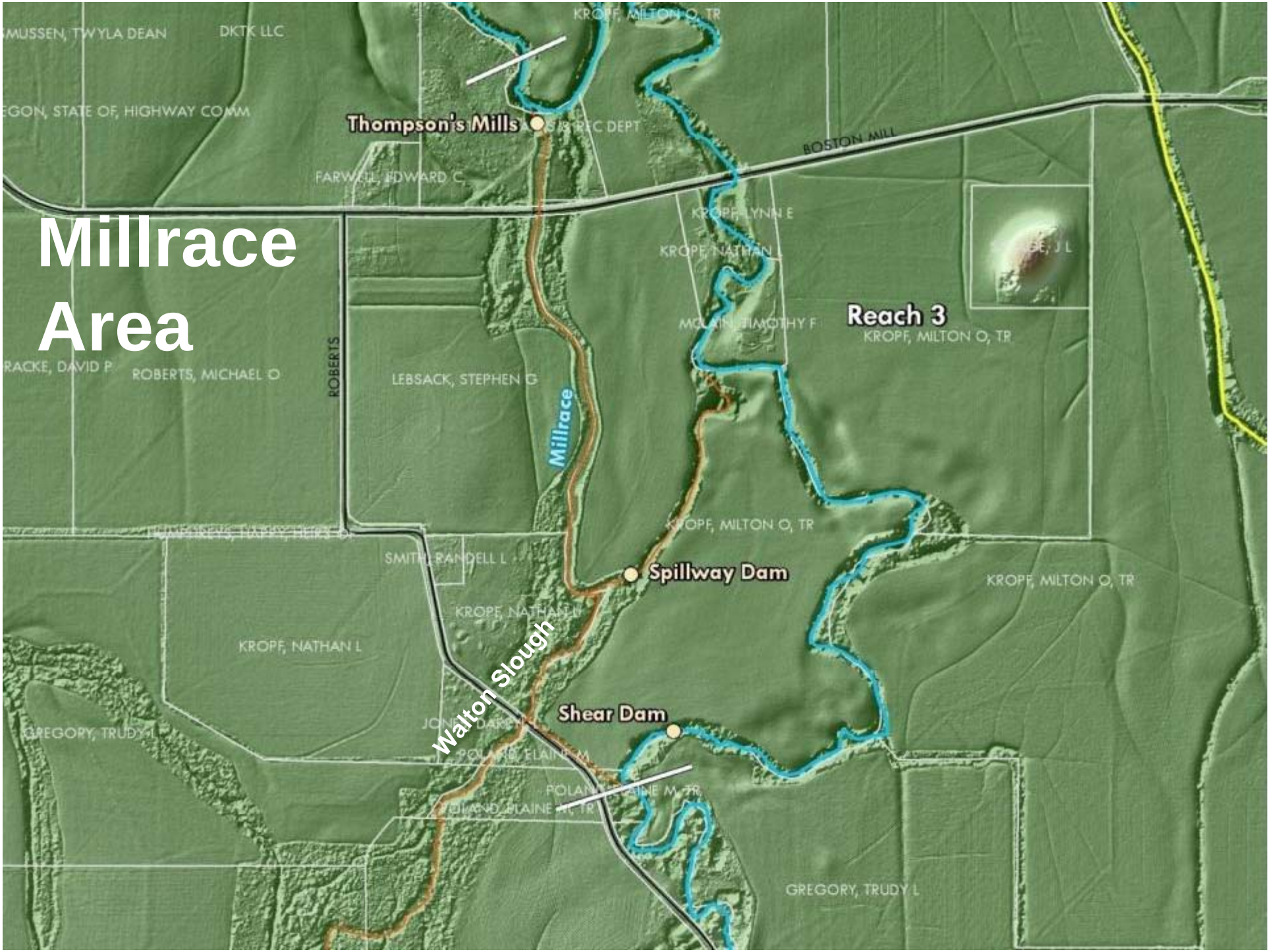
0 500 1,000 2,000 Feet

River Design Group

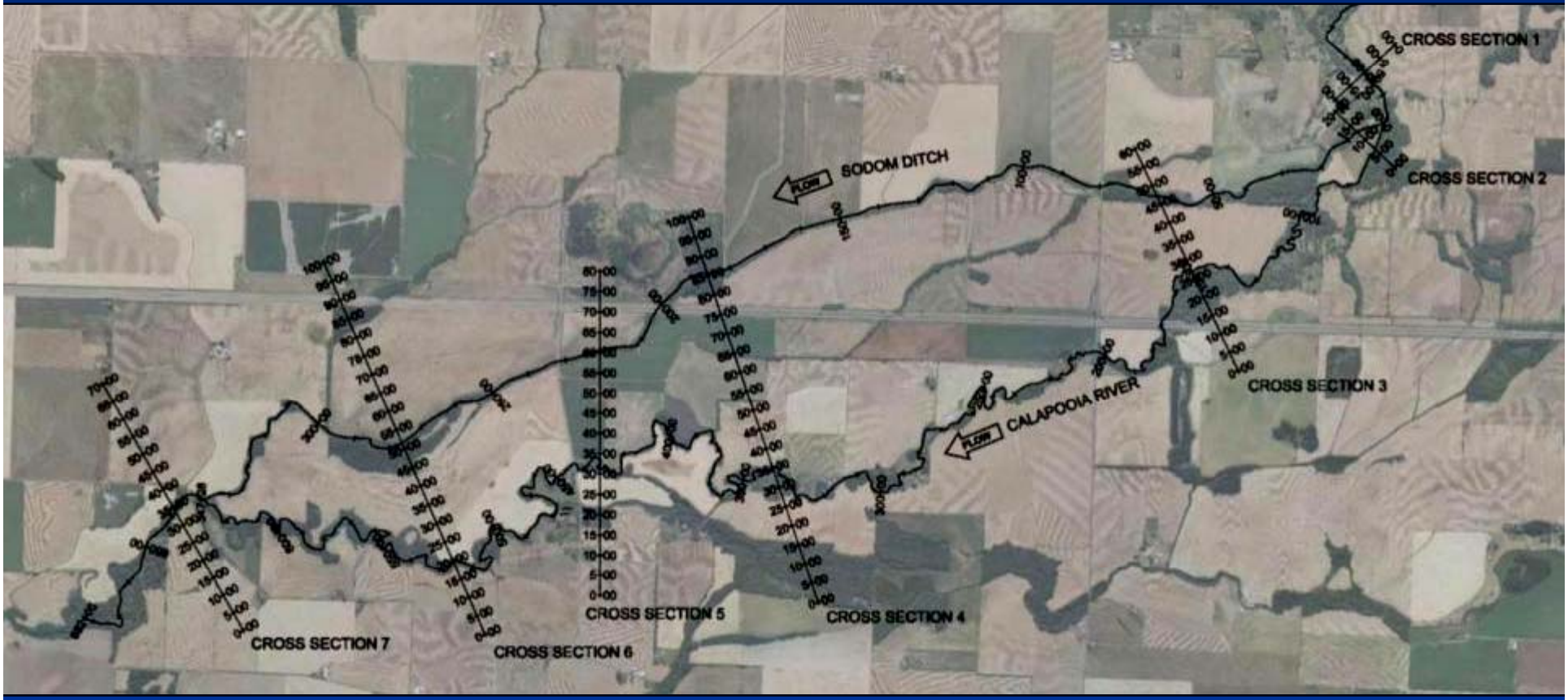
Features

Calapooia River · Sodom Ditch · Other waterways · Reach Break · Road · Property Boundary

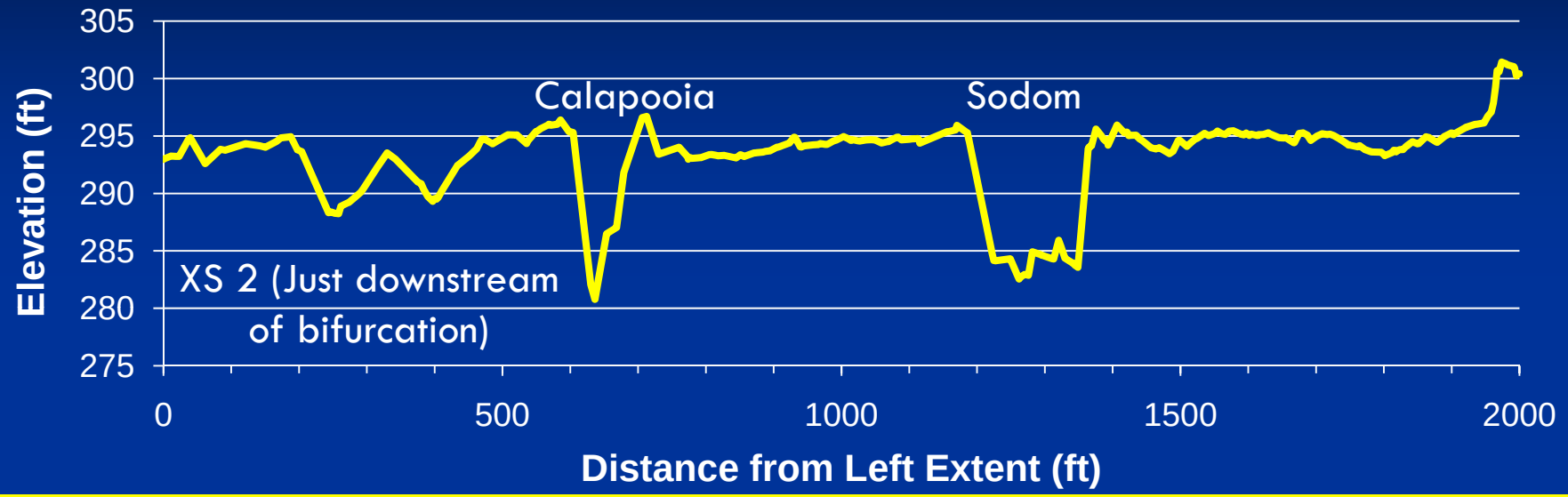
Elevation (ft): 860 – 235


Millrace Area
Thompson's Mills
Spillway Dam
Shear Dam
Reach 3
Millrace
Walton Slough
BOSTON MILL
ROBERTS
KROPF, MILTON O, TR
KROPF, NATHAN L
LEBSACK, STEPHEN G
GREGORY, TRUDY L
DKTK LLC
ROBERTS, MICHAEL O

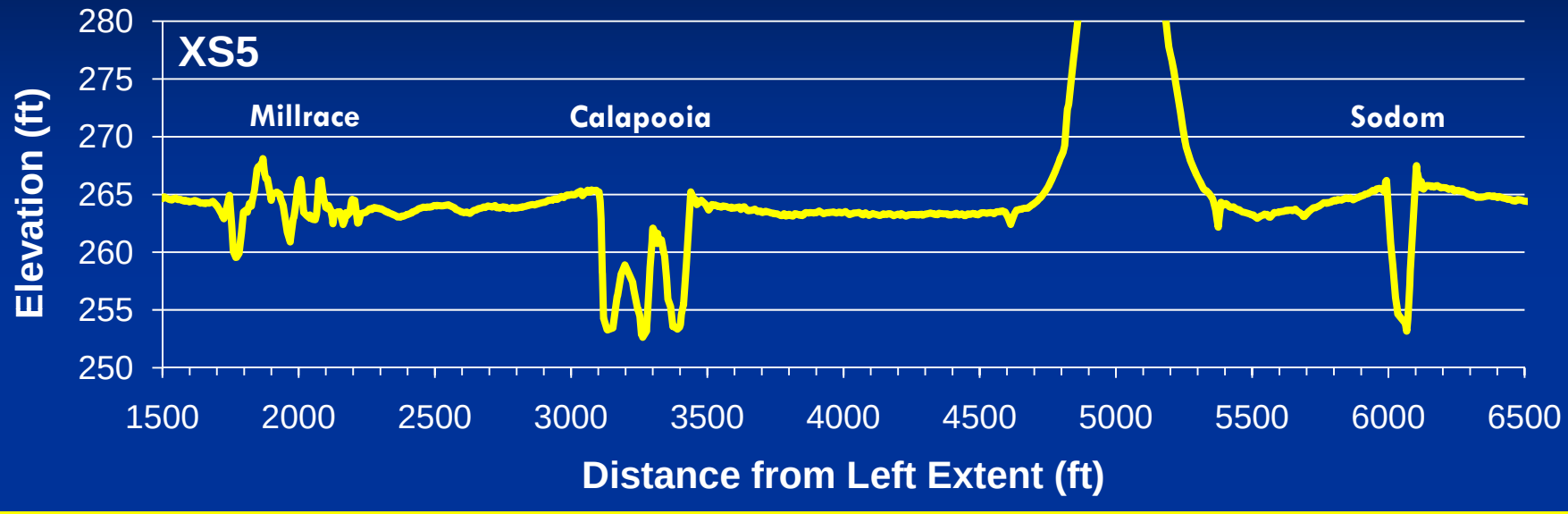
LiDAR Data Use

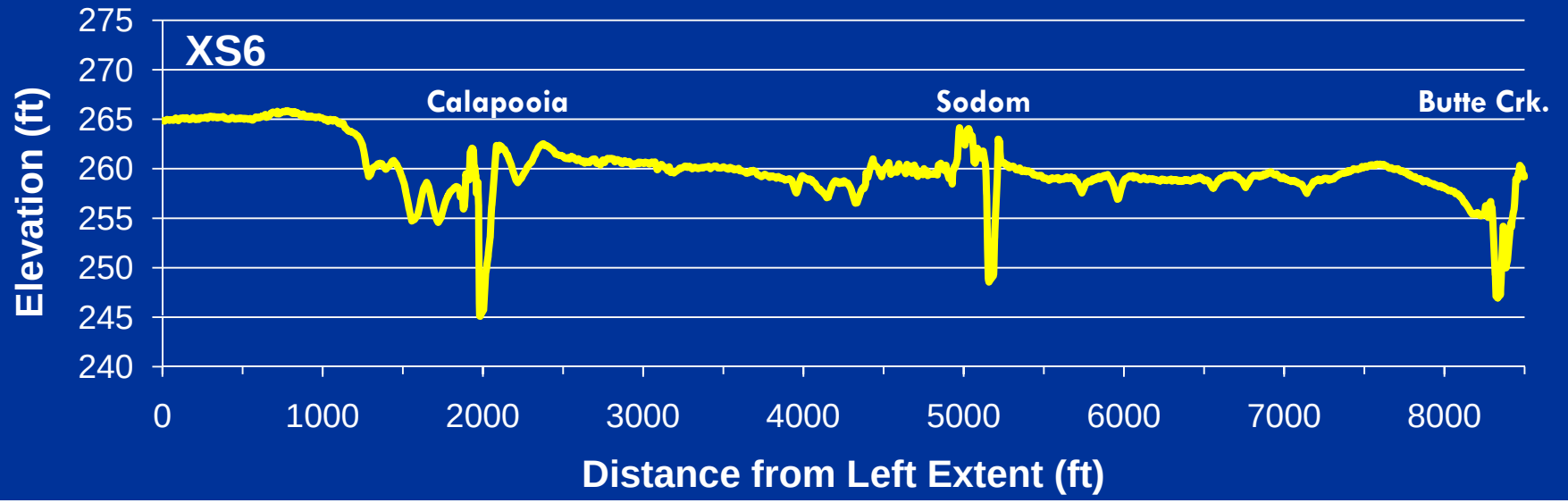


Valley Cross-sections



Valley Cross-sections





Scoping Cost Summary

(1) Interim Action

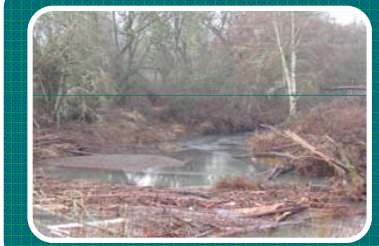
- High - $5.0 million
- Low – $1.9 million

(3) Restore Calapooia as Mainstem

- High - $27.0 million
- Low - $12.6 million

(4) Sodom Ditch as Mainstem

- High - $9.9 million
- Low – $5.6 million



(5) Variable Flow Management

- High - $22.9 million
- Low – $11.6 million

Hydrology for Modeling

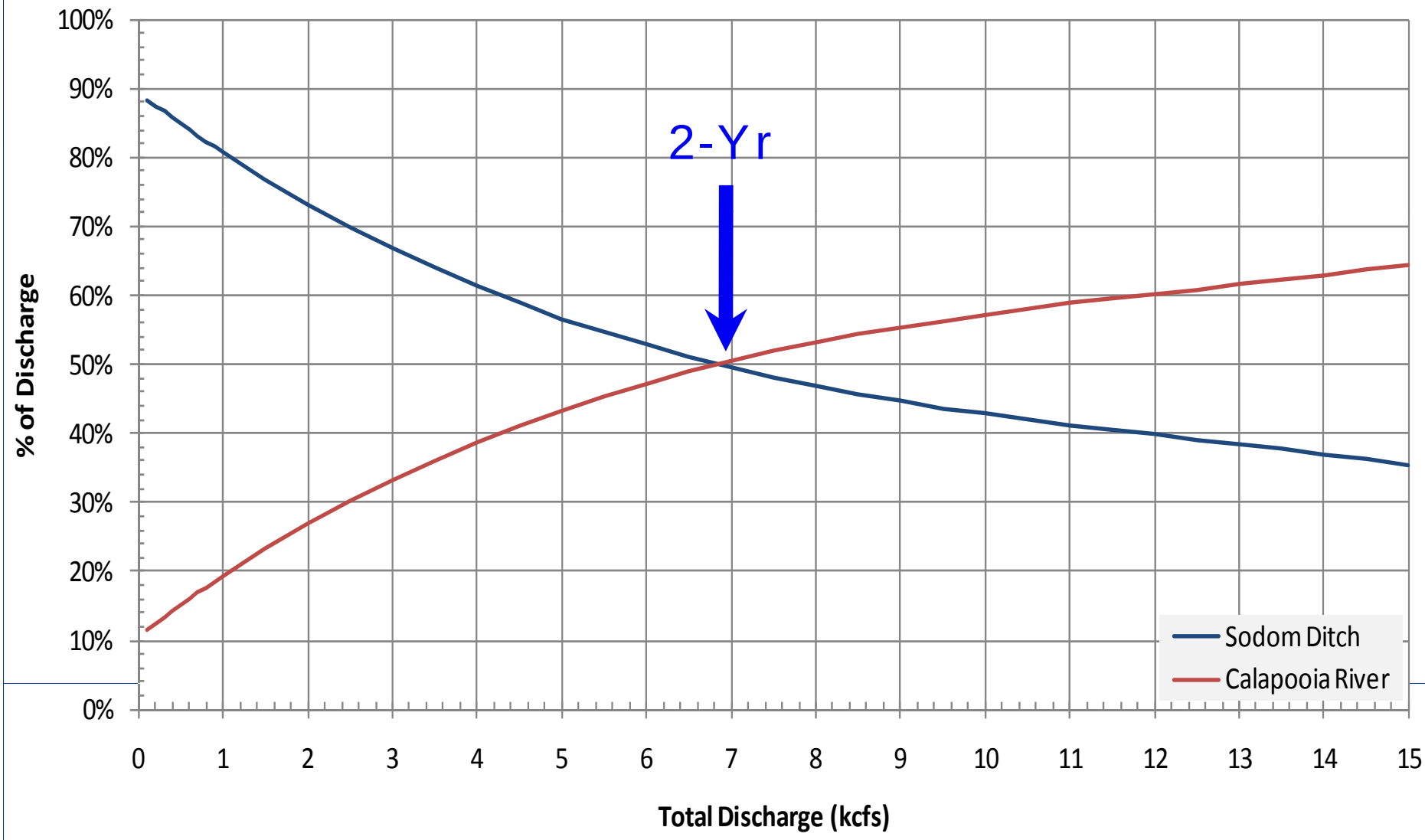
Available stream flow gaging data for Calapooia River. Linn County, Oregon.				
USGS#	**Name**	**Data Type**	**Date Range**	**Count**
14172000 (upstream)	Calapooia River at Holley, OR.	Daily Data	10/1/1935 to 9/3/1990	20,089
		Peak Stream flow	1/4/1936 to 1/8/1990	55
14173500 (downstream)	Calapooia River at Albany, OR.	Daily Data	10/1/1940 to 12/10/1981	15027
		Peak Stream flow	12/22/1940 to 12/4/1980	41

* OSU has also recorded some stream flow data for the Calapooia River @ Brownsville

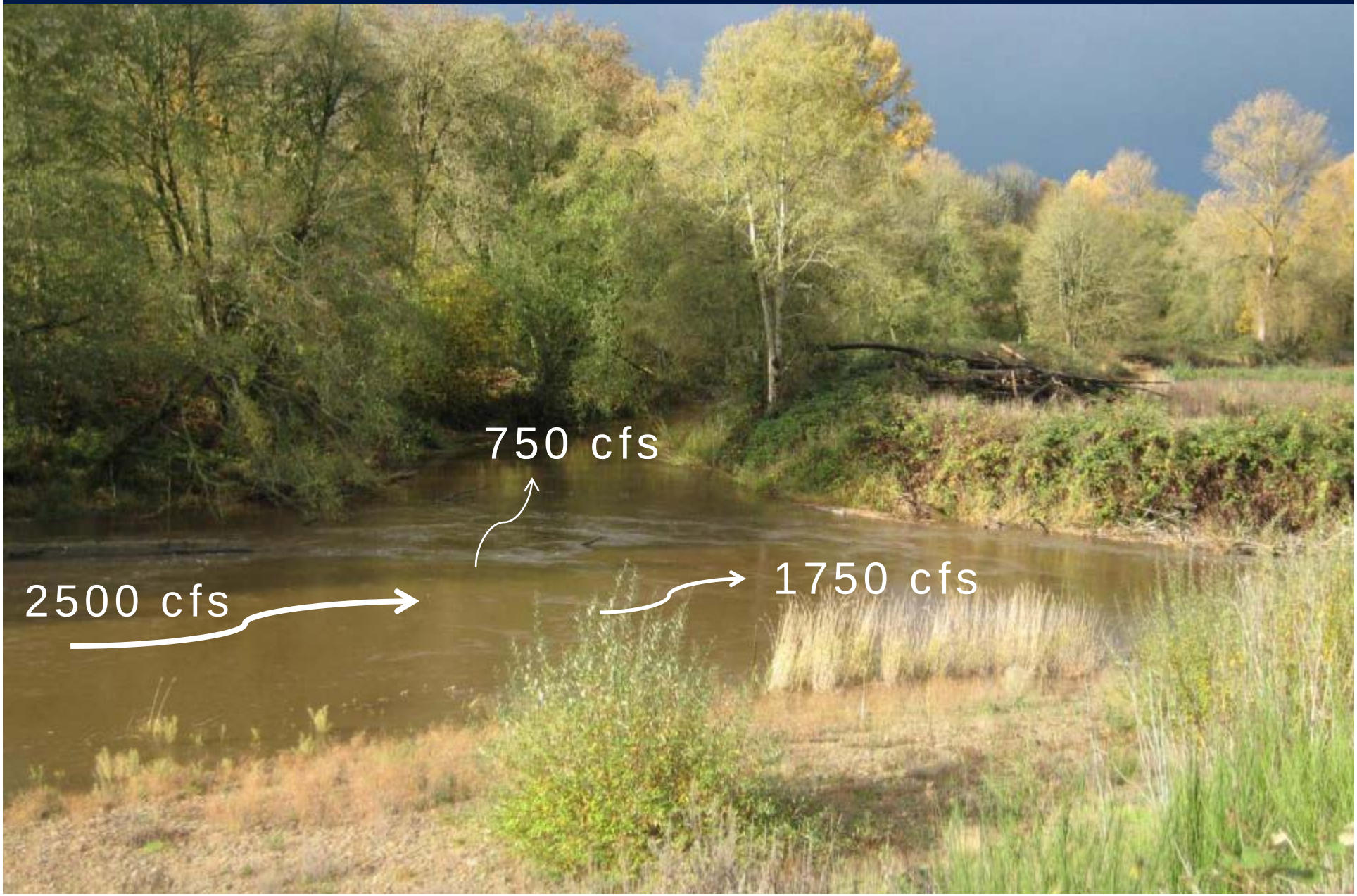
Hydrology for Modeling

Flood frequency data for Calapooia River. Linn County, Oregon.		
Recurrence Interval		**Peak Discharge at Bifurcation**
1.01 yr	99%	2,140 cfs
2 yr	**50%**	**7,021 cfs**
5 yr	20%	10,652 cfs
10 yr	**10%**	**13,207 cfs**
25 yr	4%	16,582 cfs
50 yr	2%	19,181 cfs
100 yr	1%	21,837 cfs
**Source: TetraTech 2008.*		

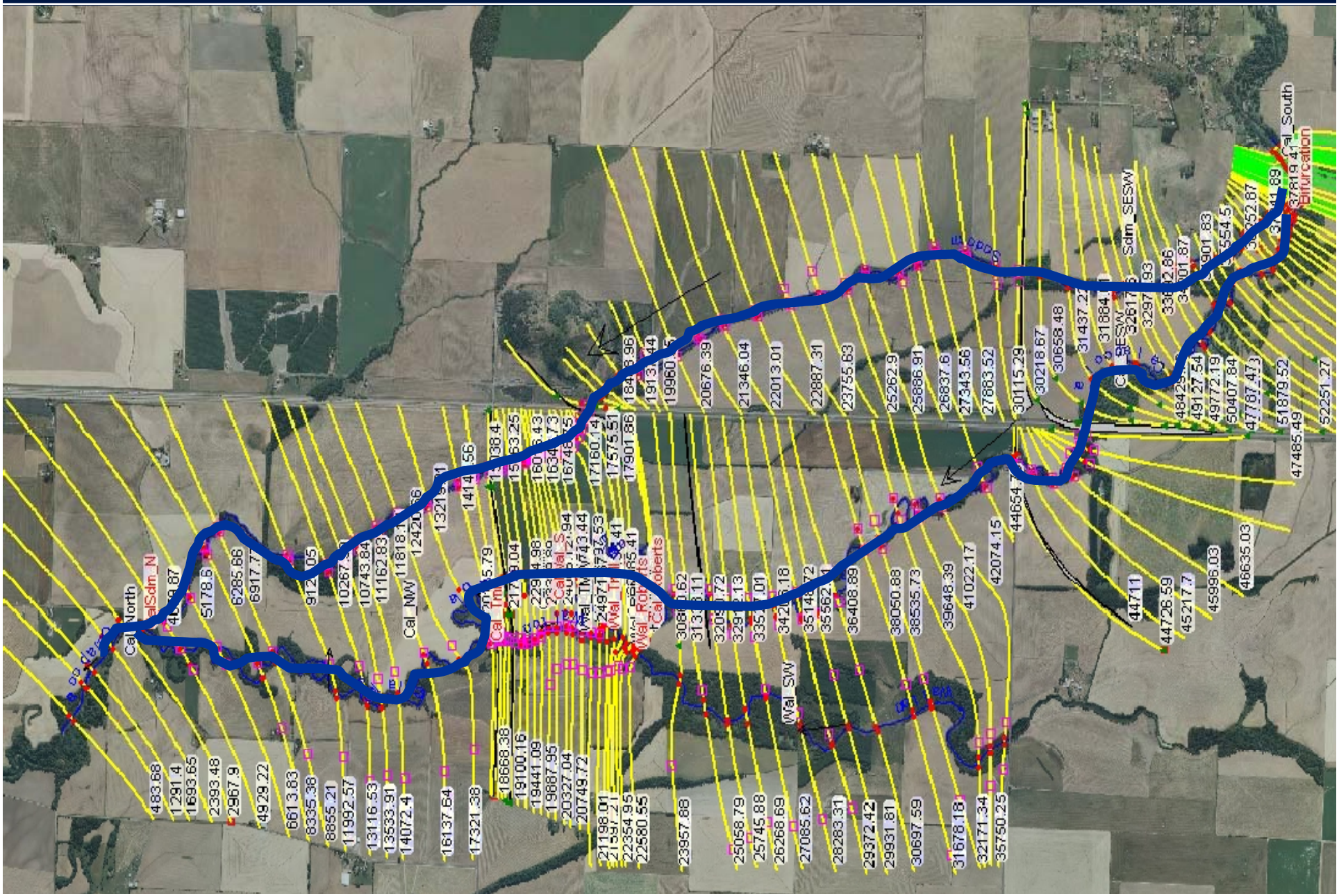
Flow Division for Modeling



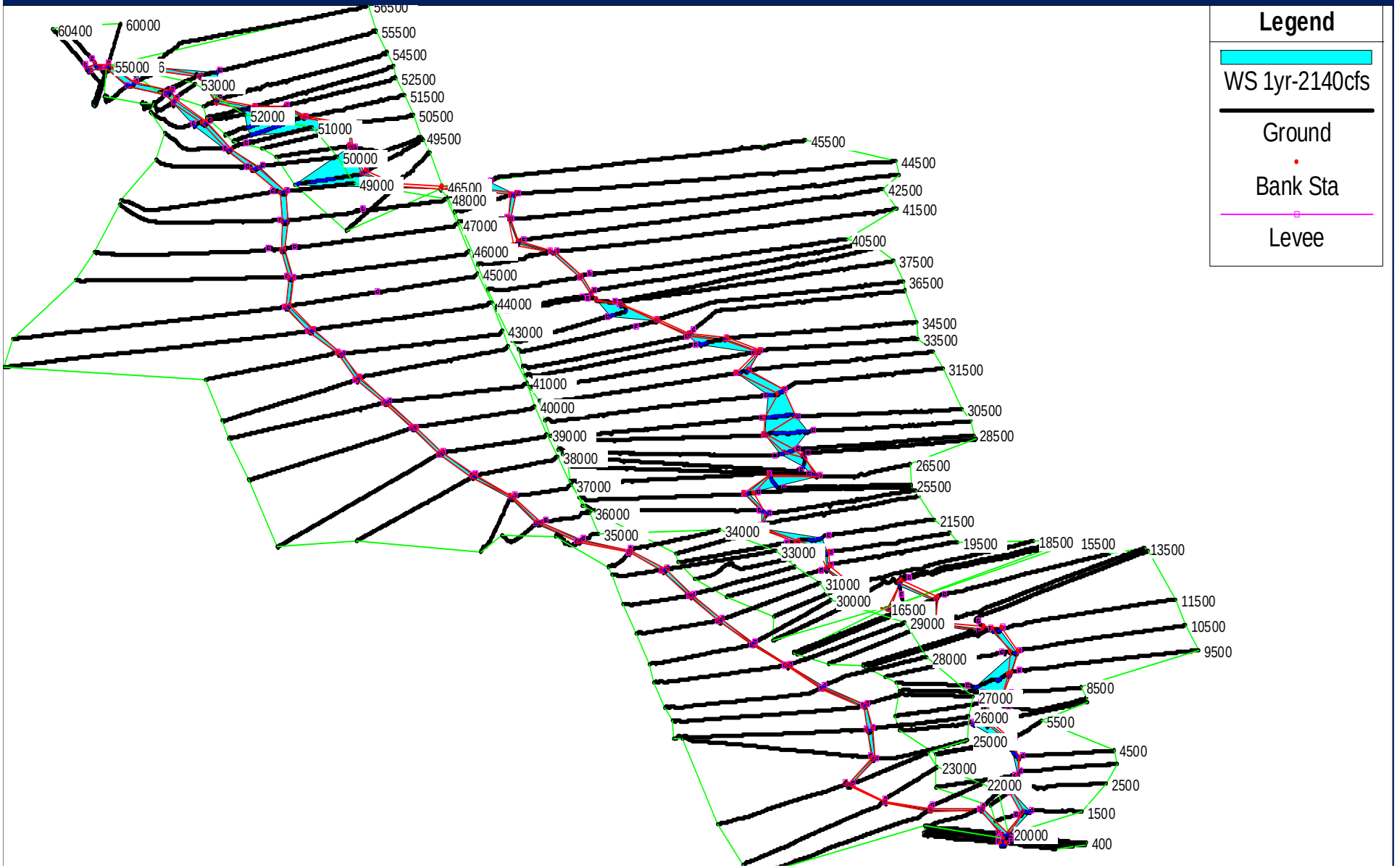
Flow Division for Modeling



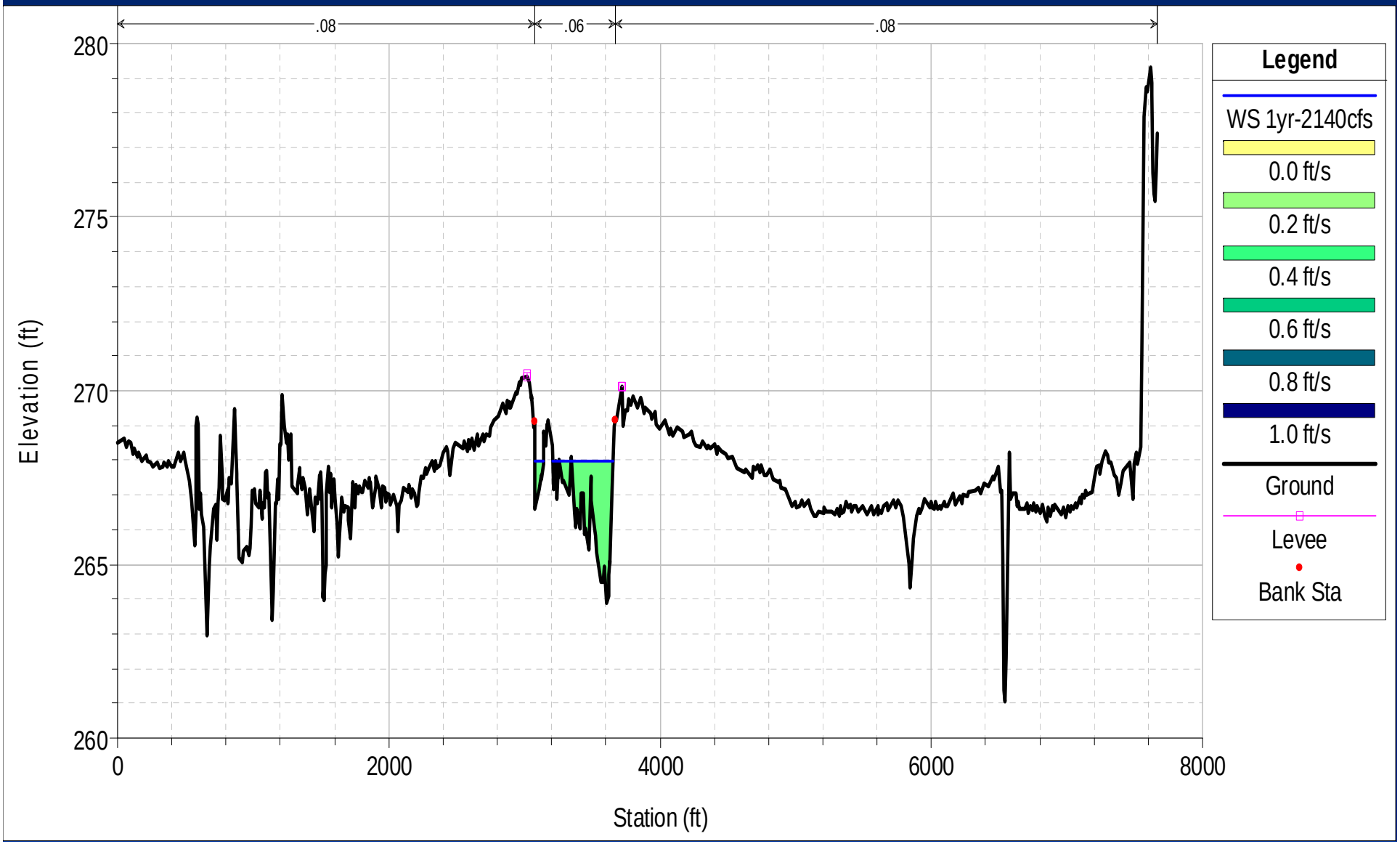
Hydraulic Model Sections



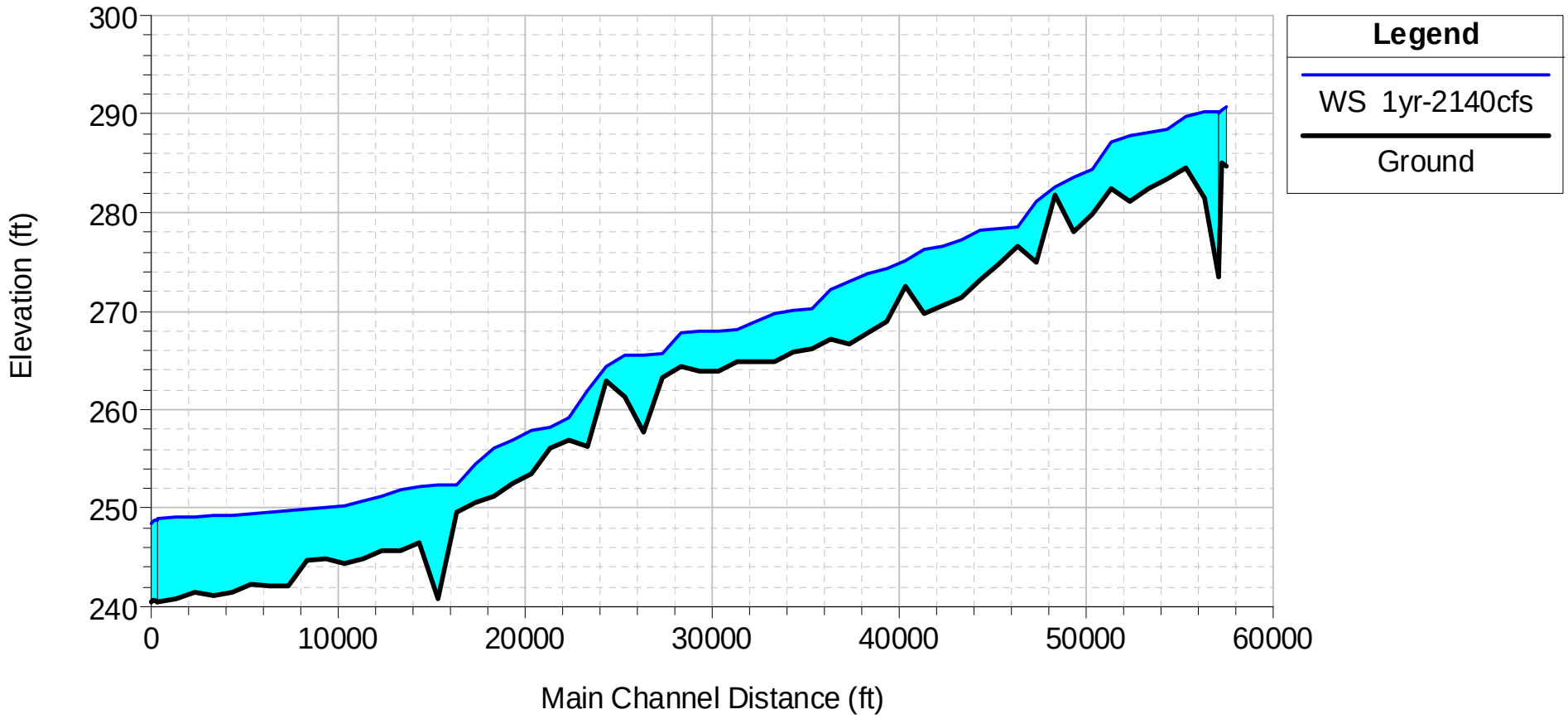
Hydraulic Model (HEC-RAS)



Hydraulic Model (HEC-RAS)

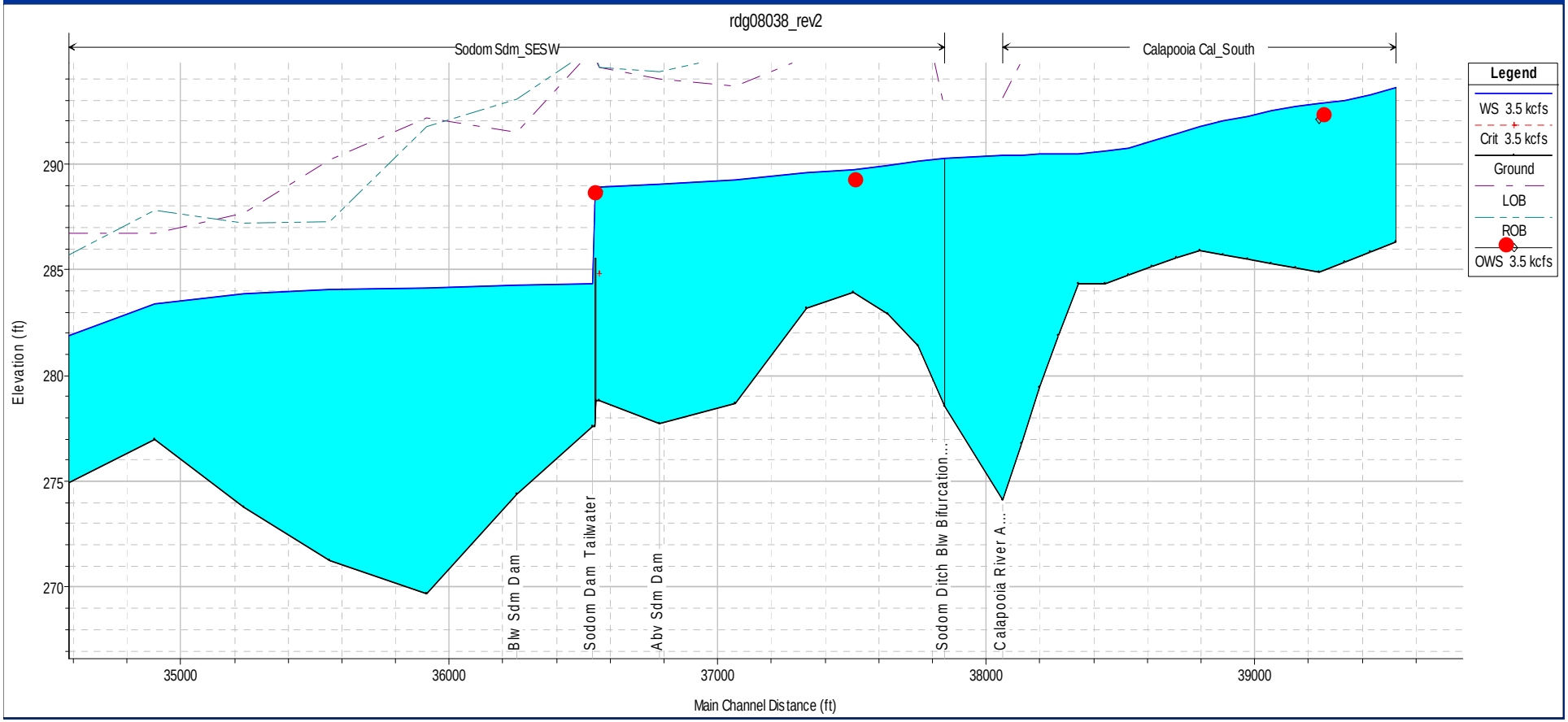


Hydraulic Model (HEC-RAS)



Hydraulic Model - Calibration

Models must be calibrated to ensure they are an accurate depiction of real world conditions!



Hydraulic Modeling

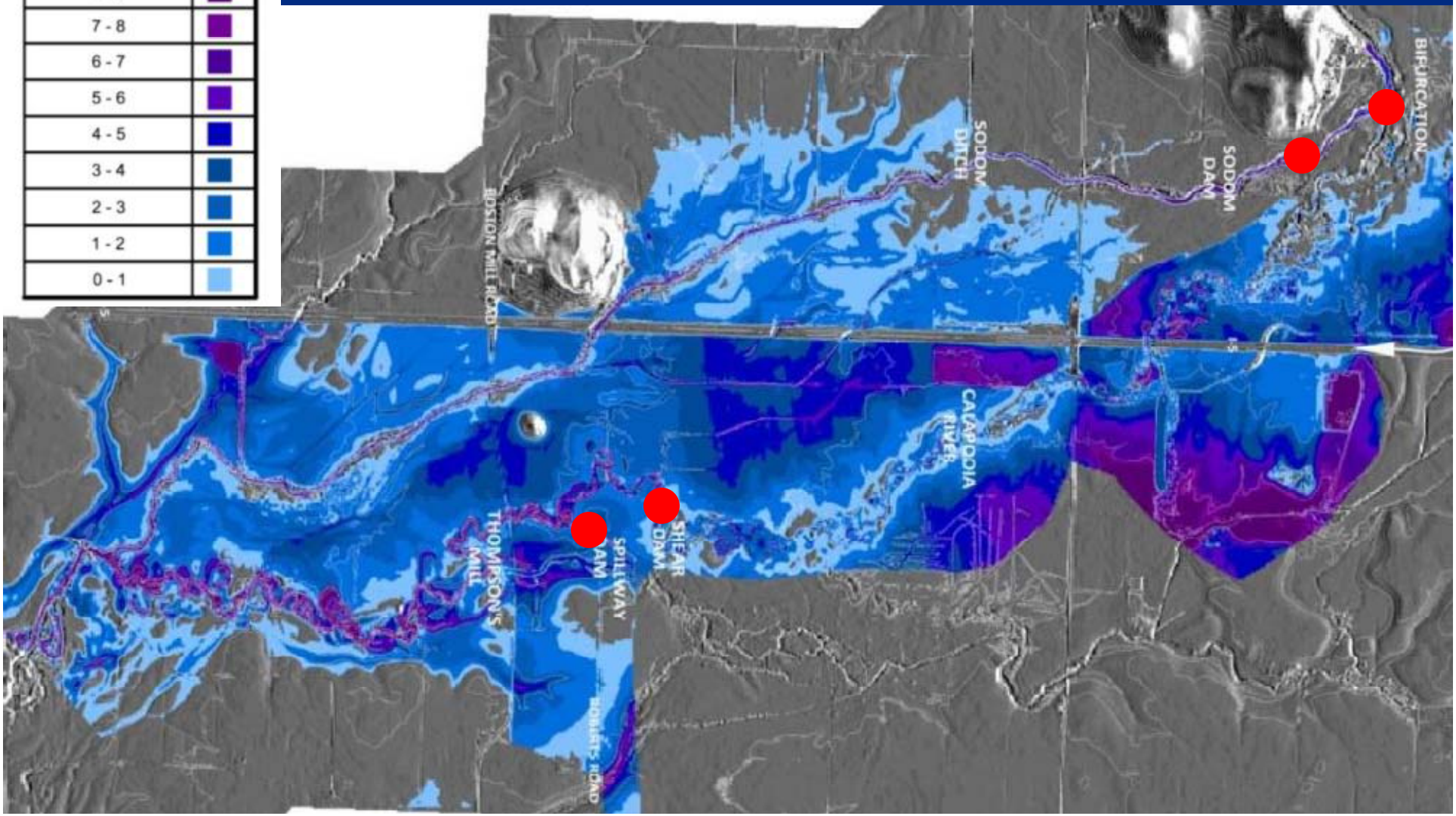
Two Primary Scenarios

1) **Existing Conditions – useful for calibrating roughness characteristics**

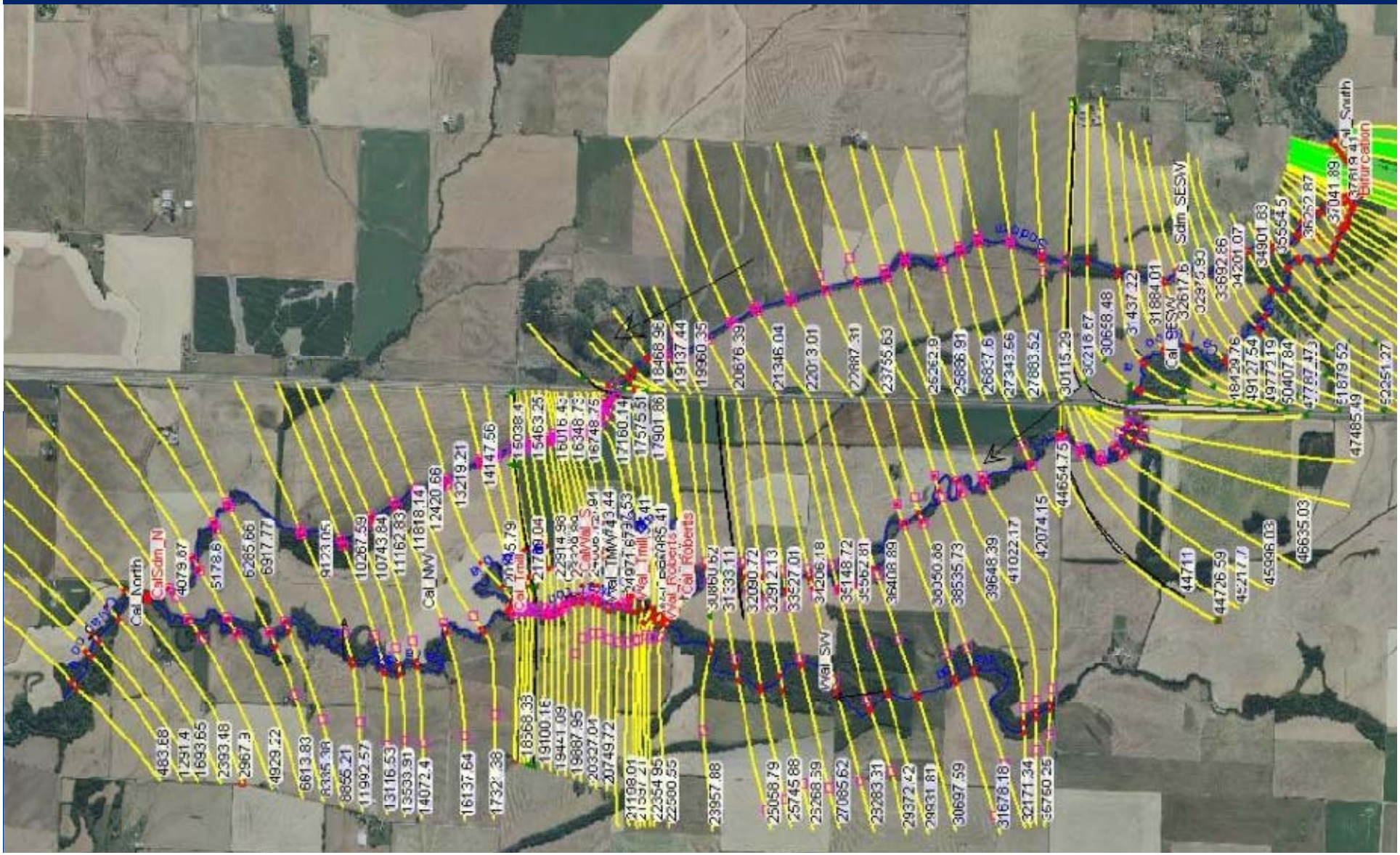
2) **Remove Dams (Sodom, Shear, and Spillway) and replace Sodom Dam with grade control**

Hydraulic Modeling
2-yr Flow (7,000 cfs)

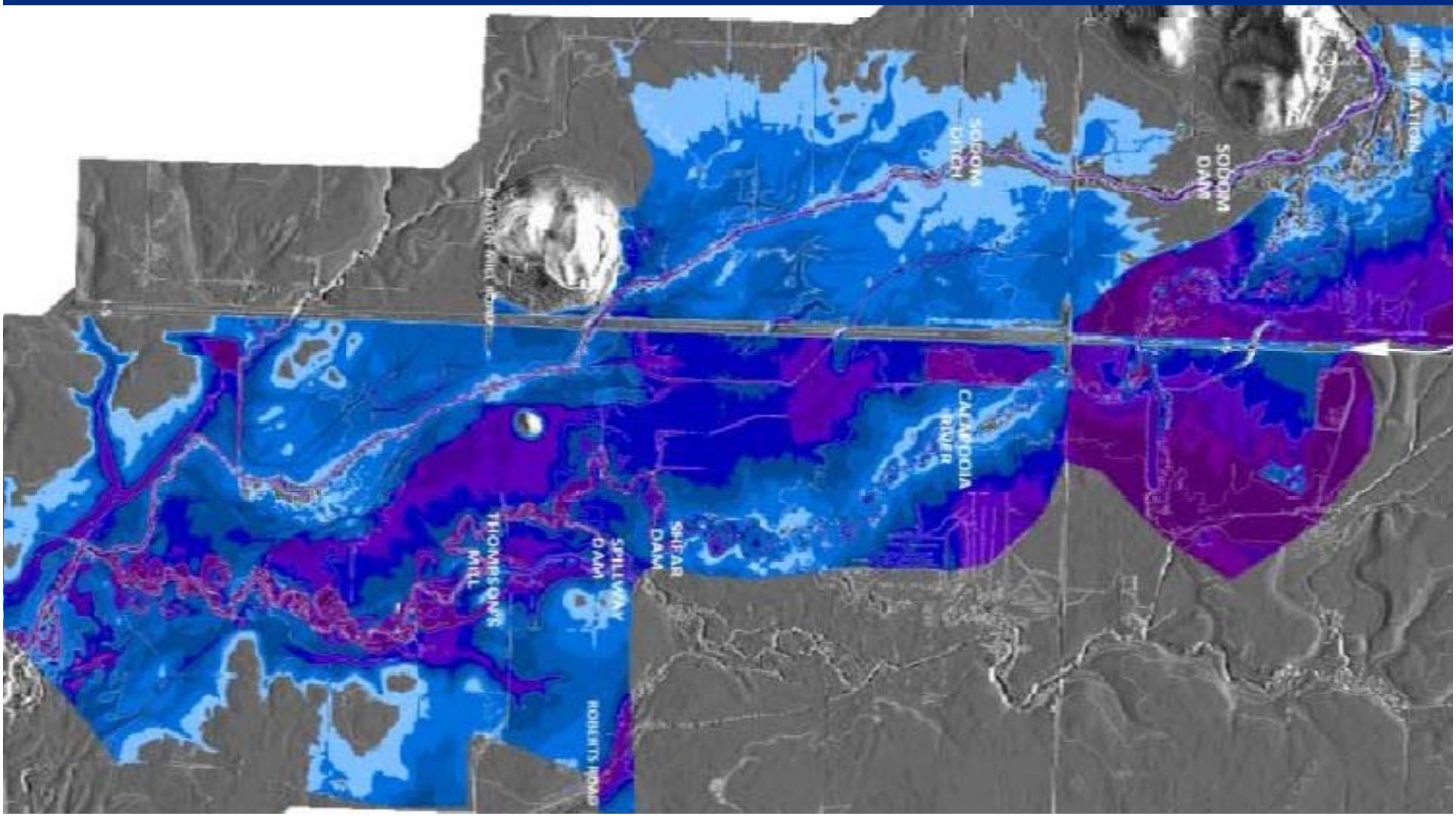
Inundation Depths	
Depth Range	Color
>8	
7 - 8	
6 - 7	
5 - 6	
4 - 5	
3 - 4	
2 - 3	
1 - 2	
0 - 1	



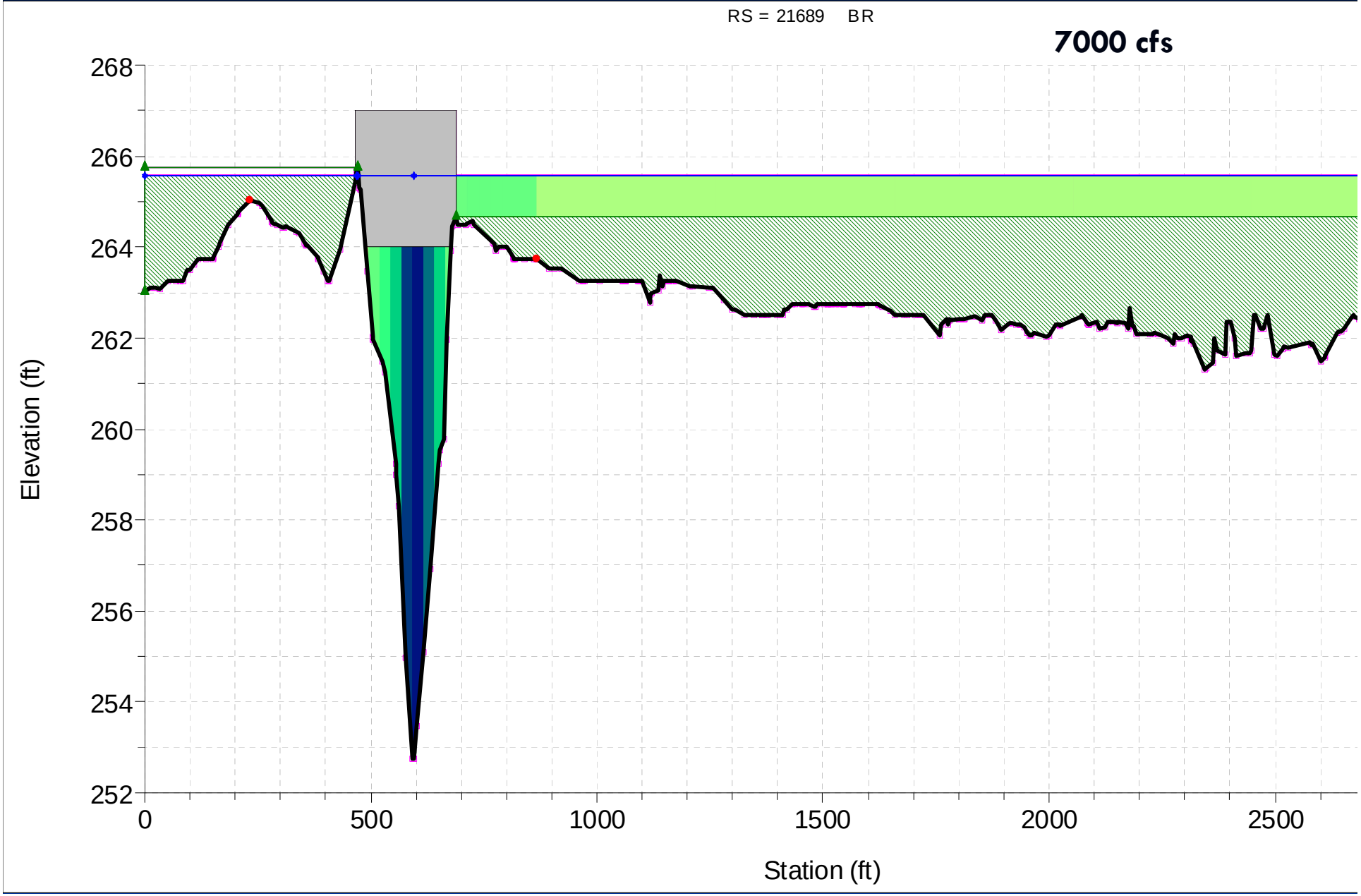
Hydraulic Modeling Results
2-yr Flow (7,000 cfs)



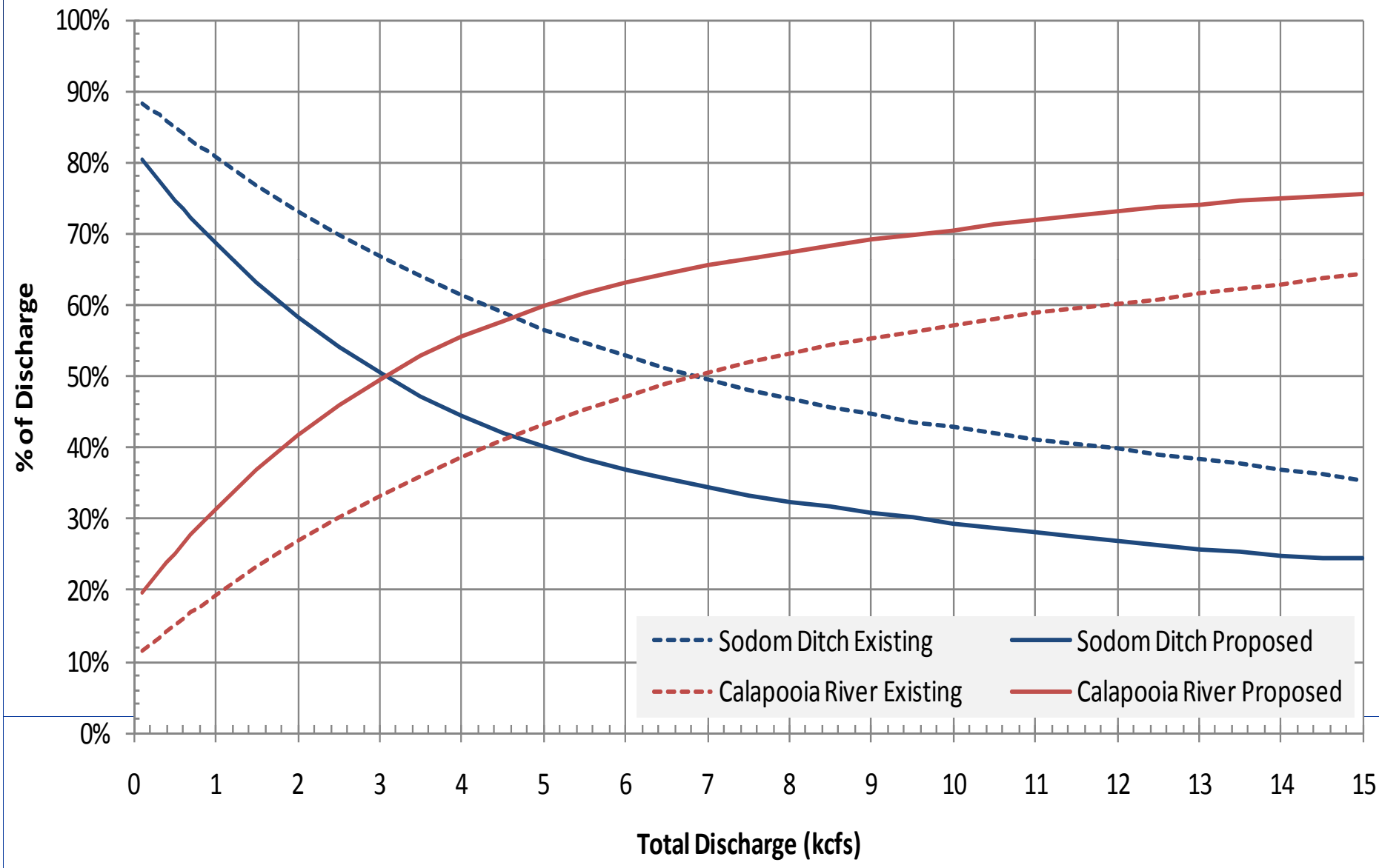
Hydraulic Modeling Results
10-yr Flow (13,000 cfs)



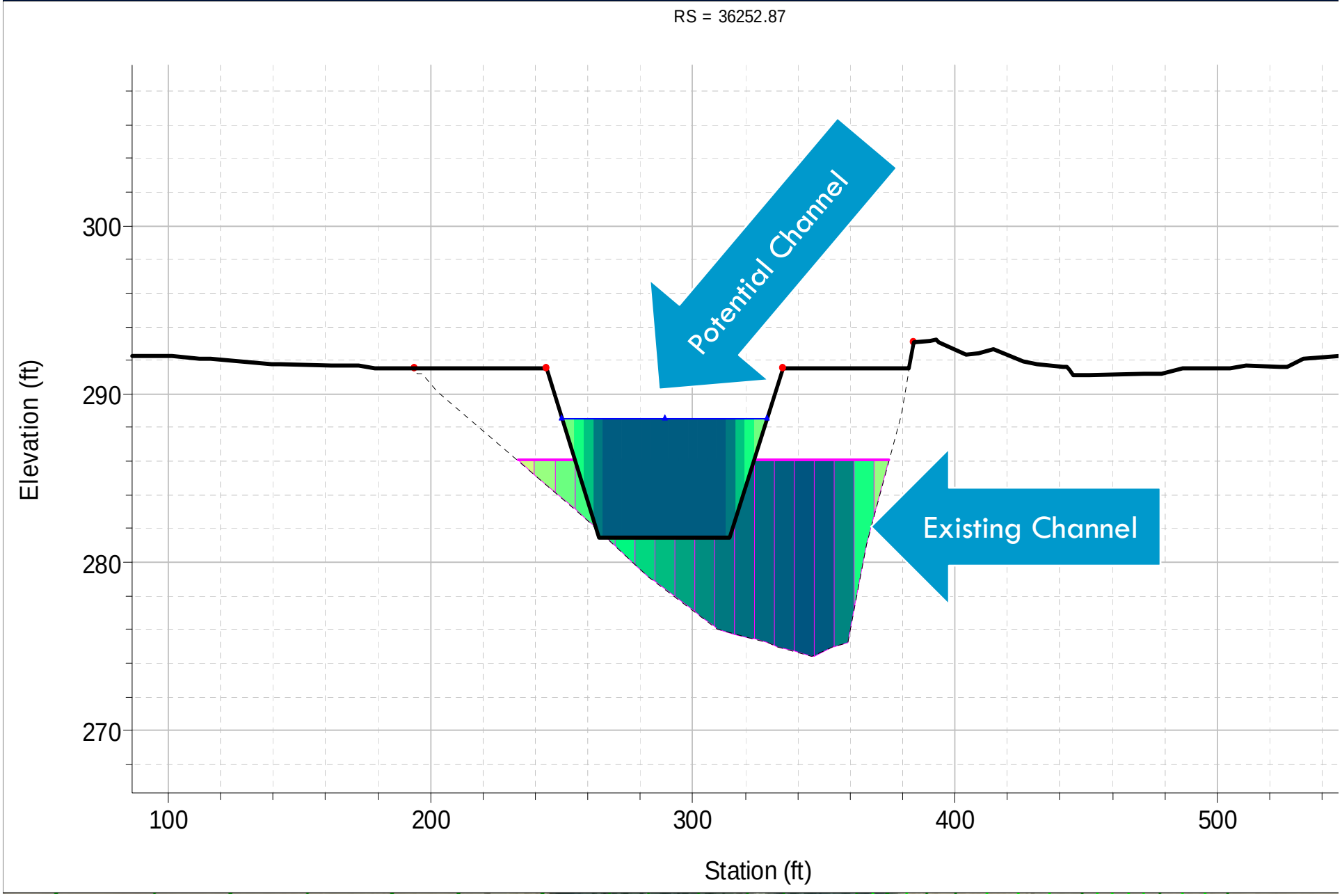
Typical Bridge Modeling (Boston Mill Road)



Future Flow Conditions



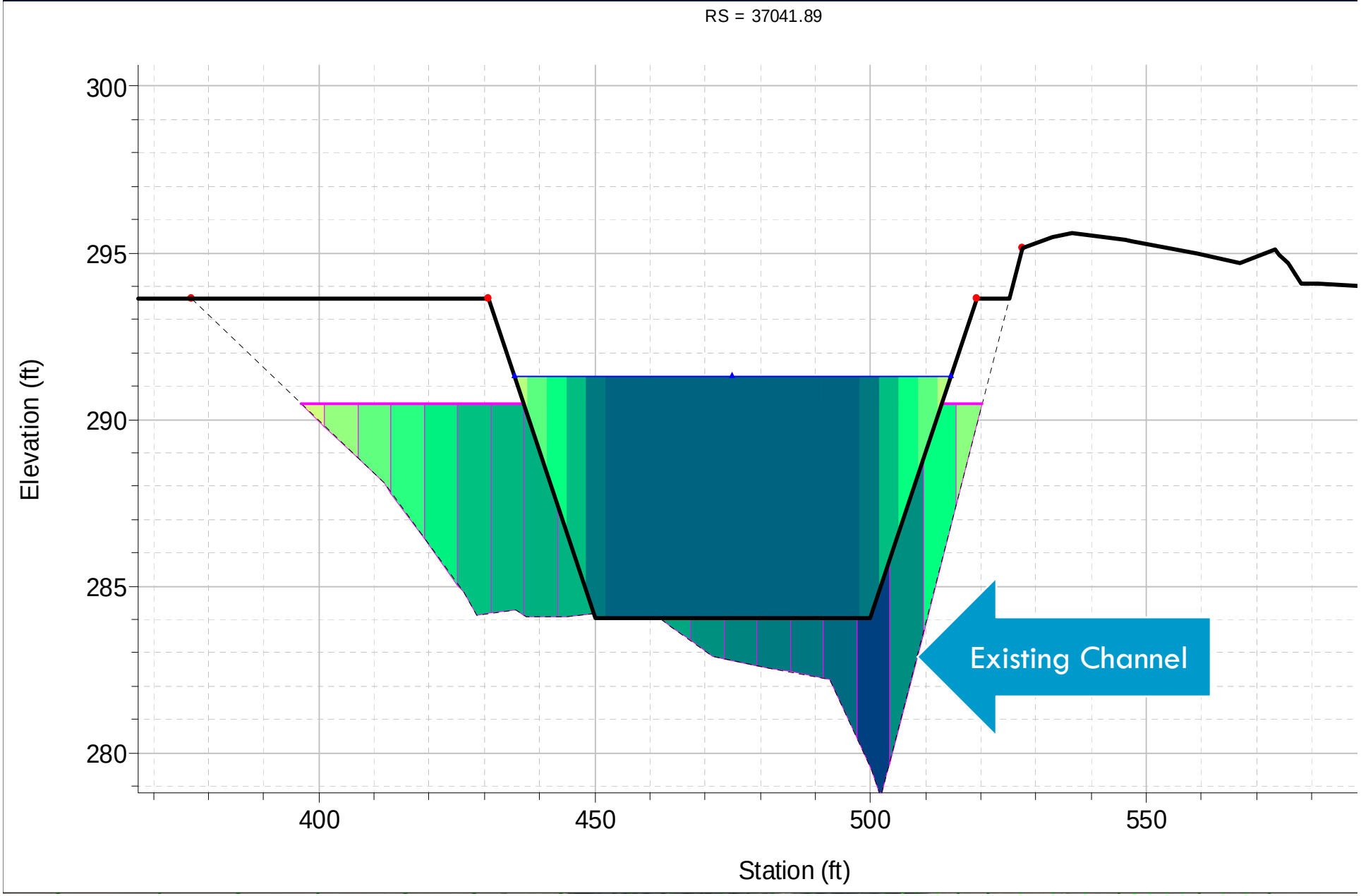
2yr Flow – Sodom Dam Removed



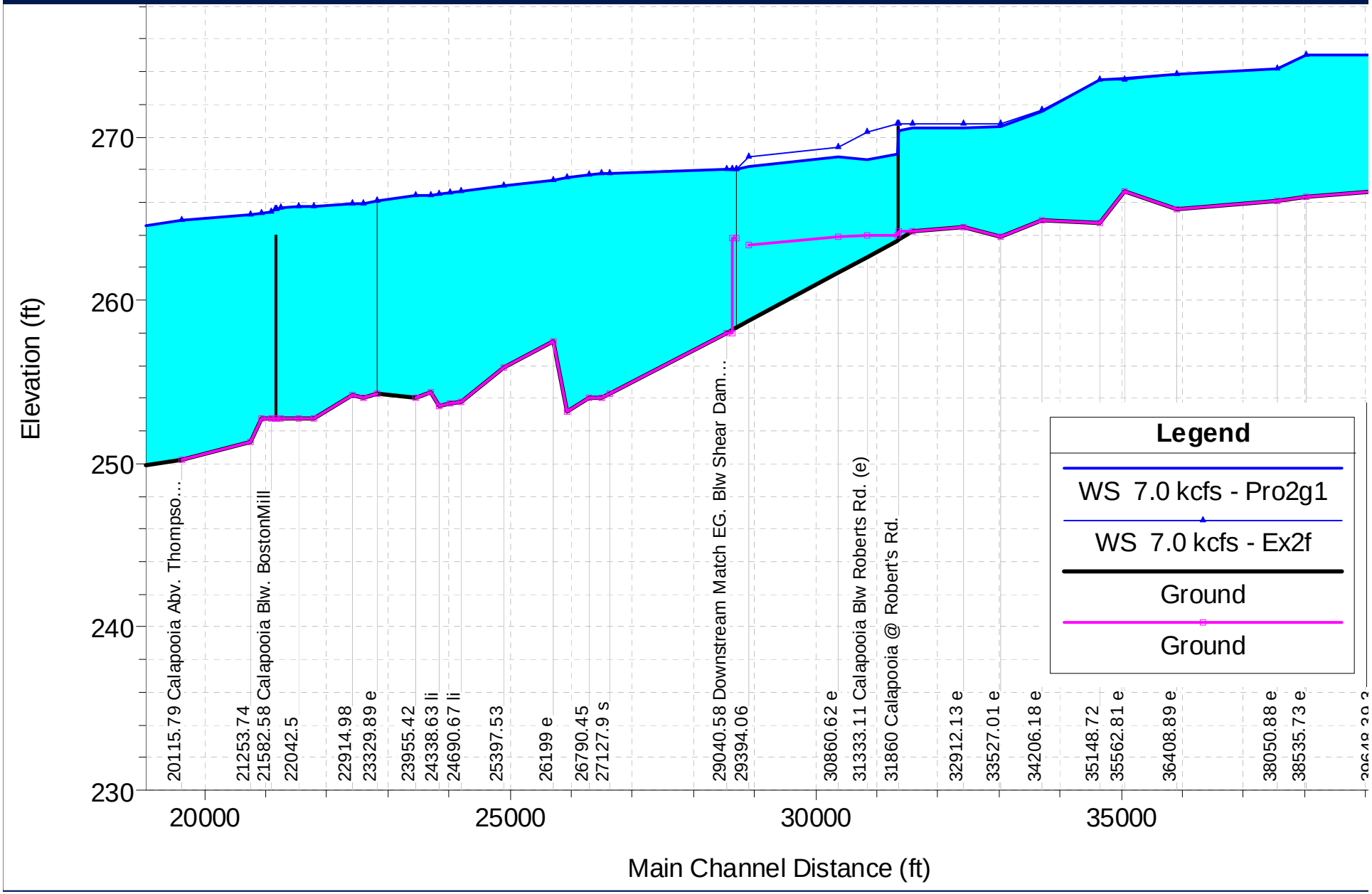
Grade Control Structures

Extended Riffles with Vegetation

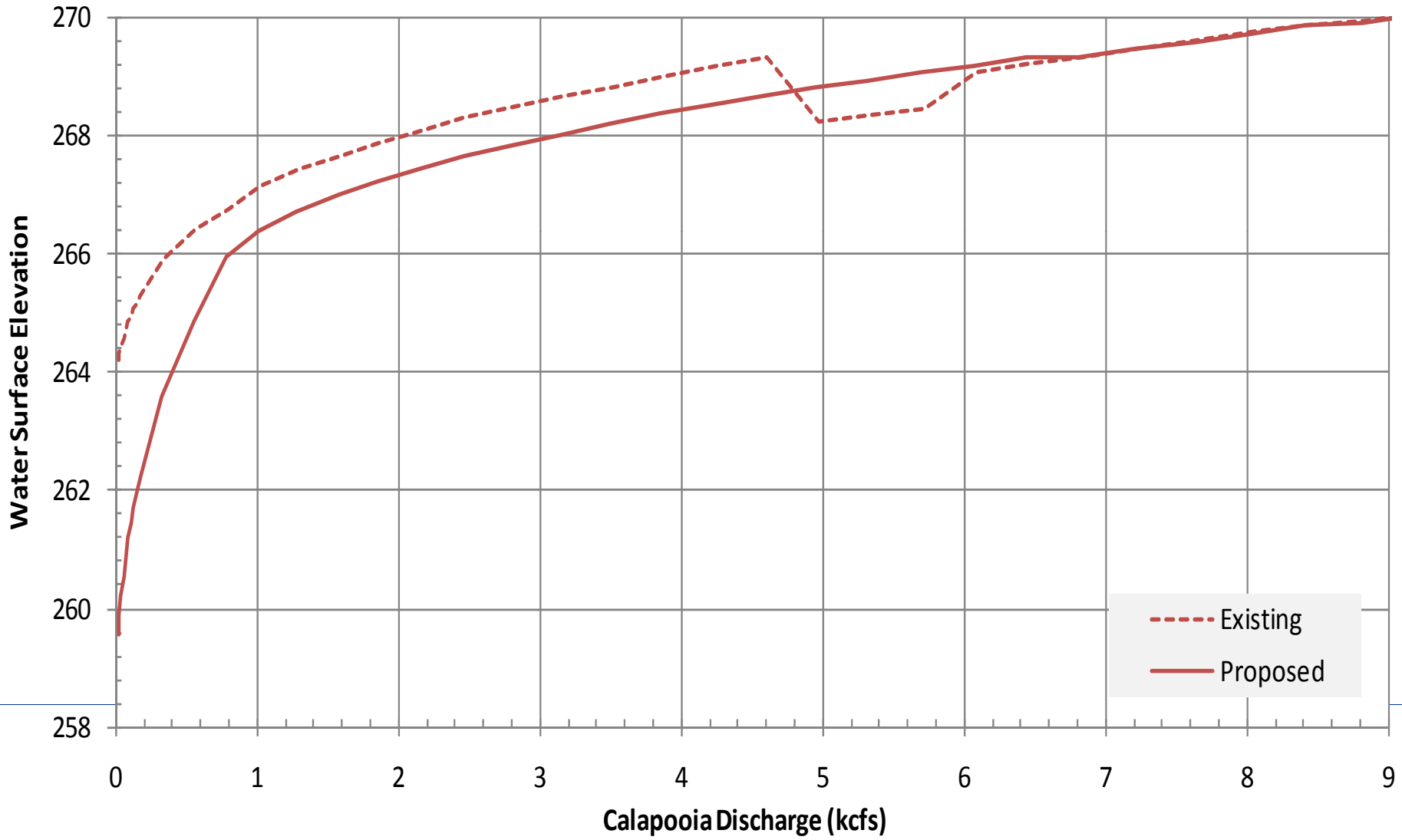
2yr Flow – Sodom Dam Removed



2yr Flow – Shear Dam Removed

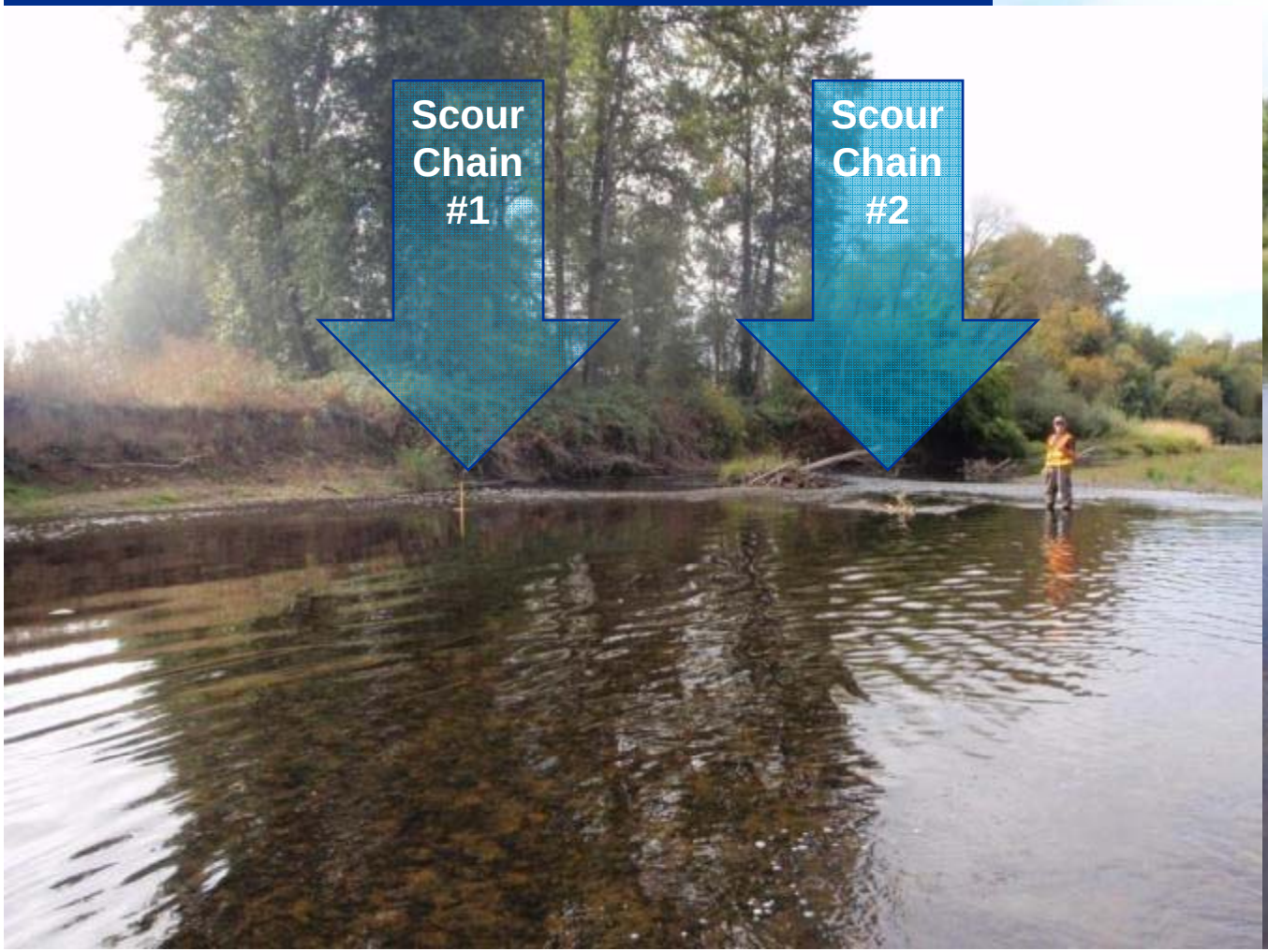


Comparison of existing and proposed water surface elevations at station 29+394 upstream of Shear Dam



Scour Chains
800’ upstream of Bifurcation

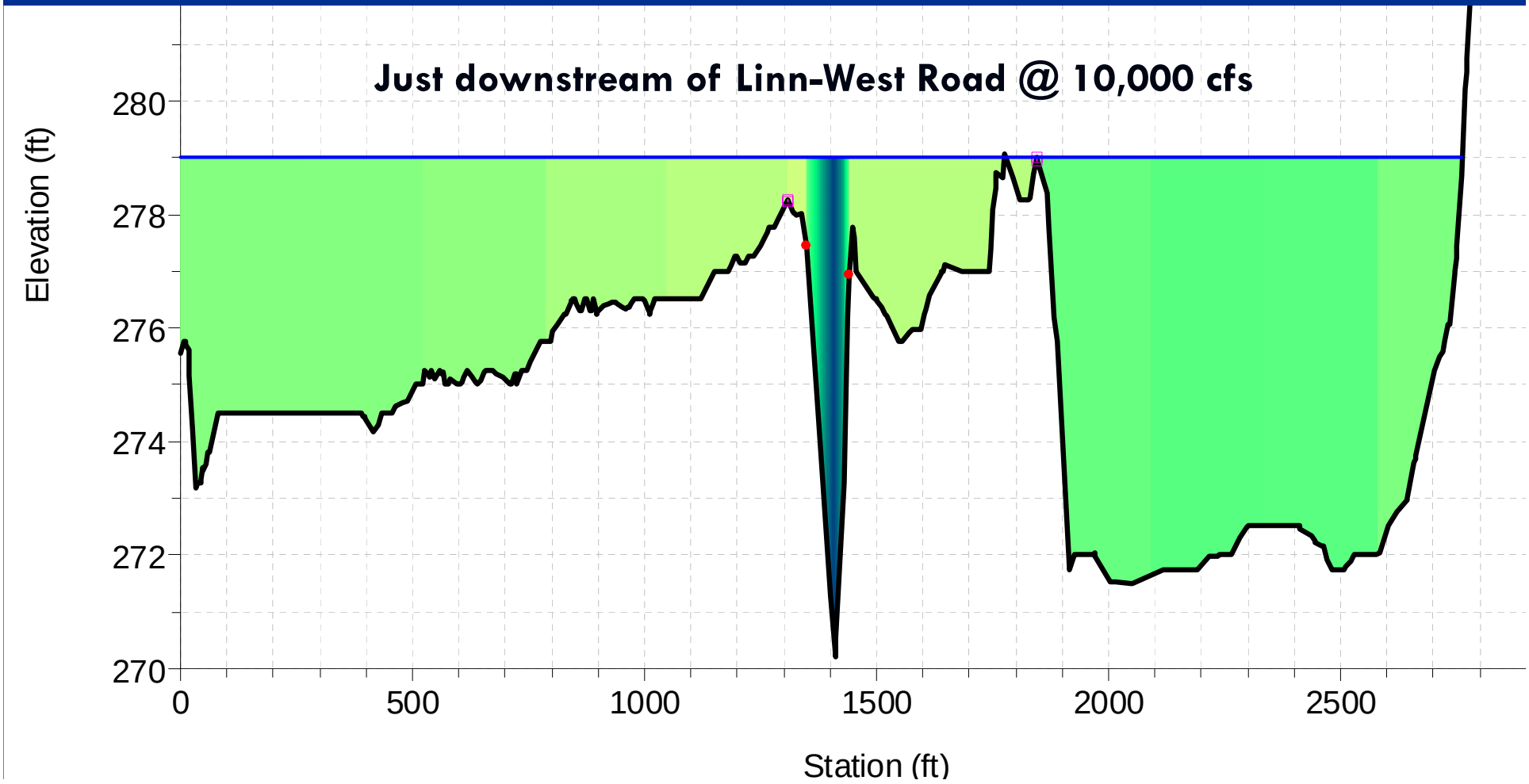
10/7/08 Installation



Next upstream riffle, 6” scour depth, 1” bed increase

Summary

- Hydraulic modeling has not removed any of the alternatives or identified critical constrictions

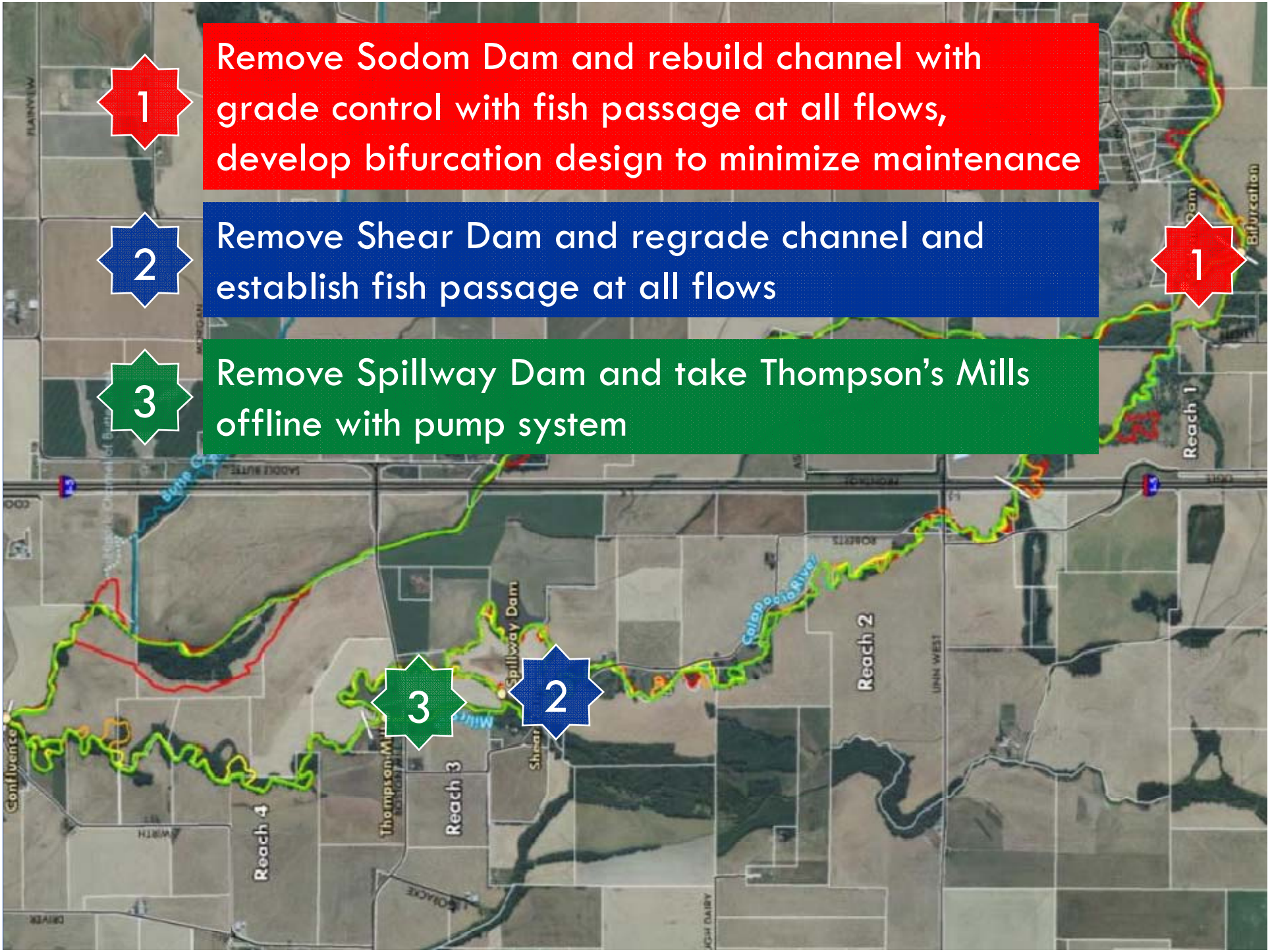


Summary

- Hydraulic modeling has not removed any of the alternatives or identified critical constrictions
- For larger peak flow events like the 10-yr or 25-yr, the dams are minor obstructions in the landscape, barely detectable

Combined Solution

- Based on landowner / agency / stakeholder feedback and economics
- Derived from various components supported from alternatives
- Achievable
- A solution that multiple objectives:
  - Fish Passage
  - Maintains water delivery for landowners
  - Minimizes flood risk


1
Remove Sodom Dam and rebuild channel with grade control with fish passage at all flows, develop bifurcation design to minimize maintenance
2
Remove Shear Dam and regrade channel and establish fish passage at all flows
3
Remove Spillway Dam and take Thompson's Mills offline with pump system
Bifurcation
Reach 1
Reach 2
Reach 3
Reach 4
Spillway Dam
Shear
Thompson Mill
Confluence
Calapooia River
Butte Creek
1
2
3