Lower Satsop River Floodplain Project

October 2014

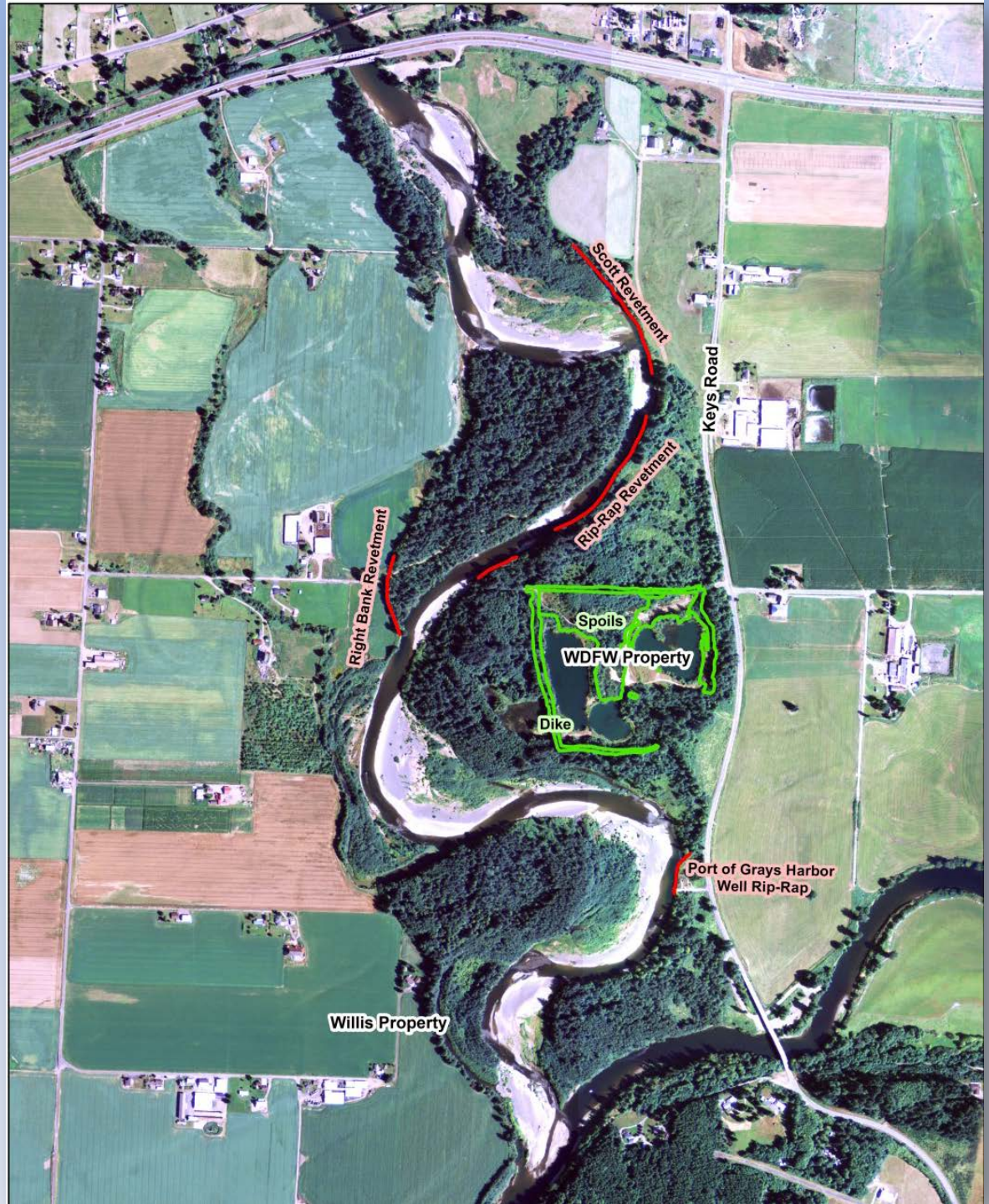
WATERSHED SCIENCE & ENGINEERING

- *Review of project history*
- *Project alternatives*
  - *No Action*
  - *Dikes and spoils removal*
  - *Flood corridor protection*
  - *Channel maintenance*
  - *Bank Protection*
- *Analysis of flood and bank erosion impacts*
- *Next steps to select preferred alternative*
  - *Evaluation criteria*
  - *Stakeholder input & discussion*

Lower Satsop River

Review of project history

- Local concerns
  - Loss of farm land & soils
  - Flooding
- Current project builds off of previous studies
- WDFW property



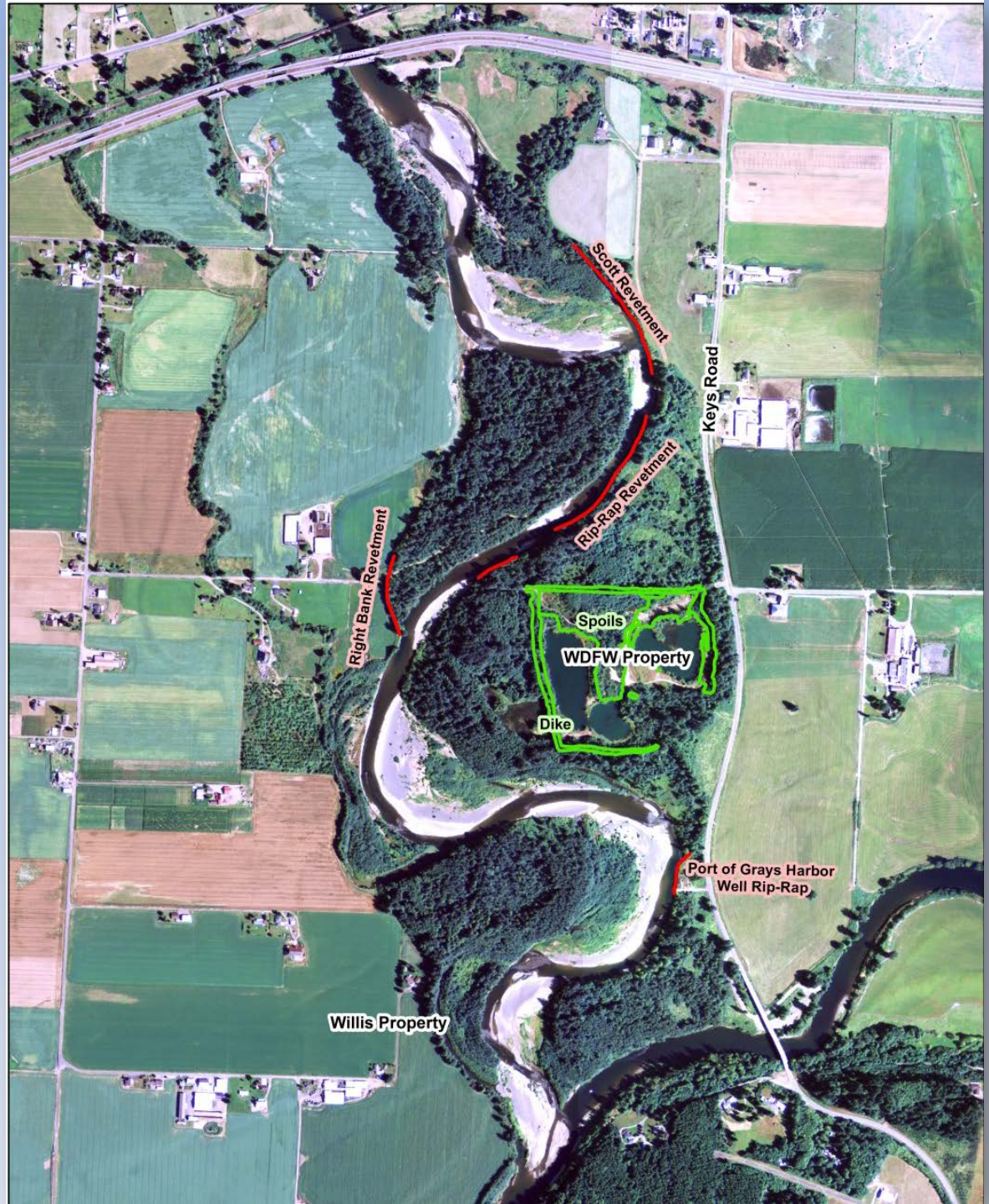
USACE, 2002-2004

Purpose:

Floodplain Restoration

Proposed Restoration

- Removing all dikes/levees & spoils at pits
- Fill ponds with spoils
- Interconnect ponds
- Enhance or create new egress channel

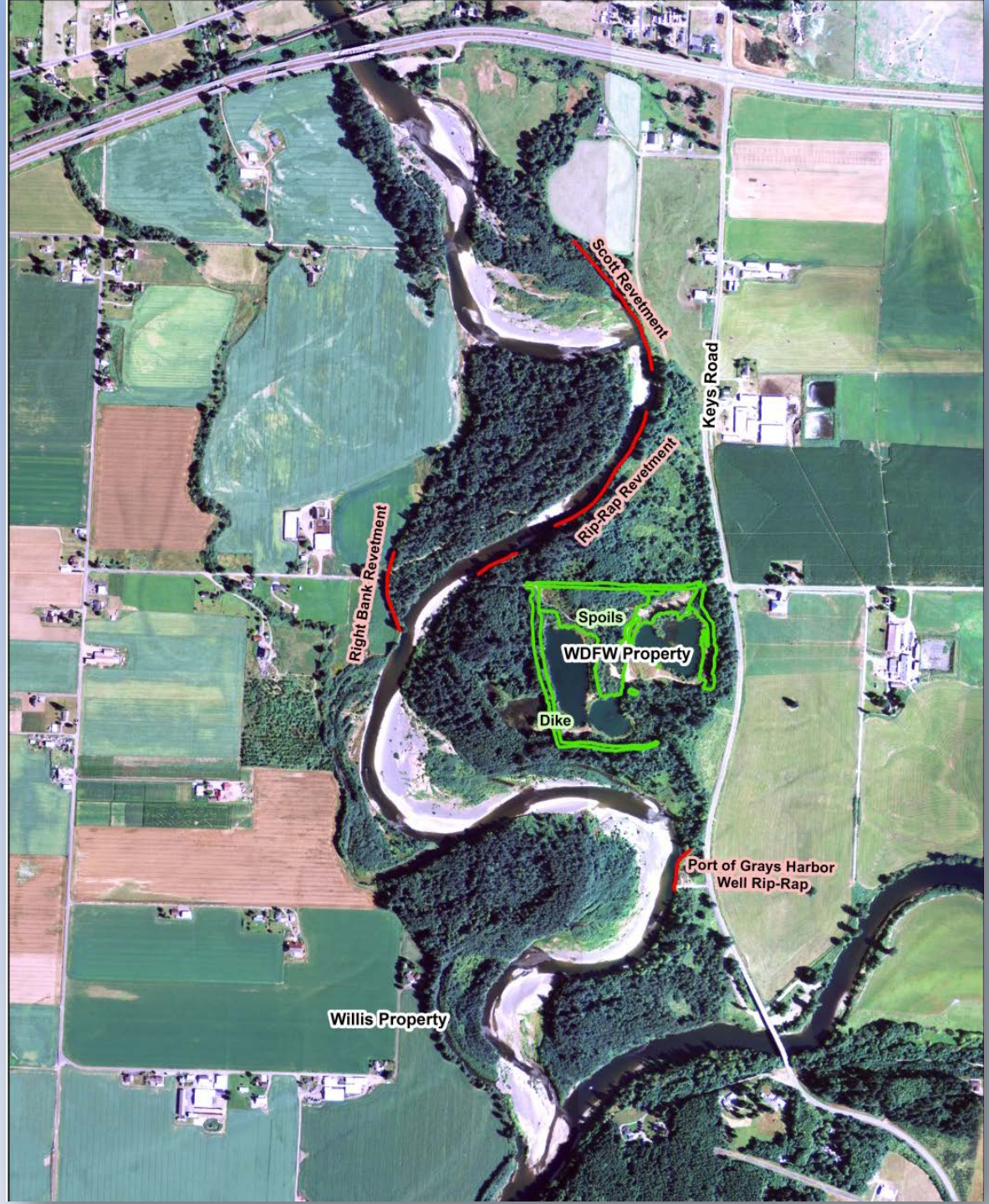


Rip Rap Removal Project, WSE 2013

Purpose:

Remove left bank hardening to reduce right bank erosion

- Analysis indicated a more comprehensive solution required
  - Rip-Rap removal alone would not offer significant protection for downstream properties
  - Removing rip-rap would increase risk to Keys Rd
  - Firehose analogy – allowing larger degree of freedom makes channel less predictable



Project Scope:

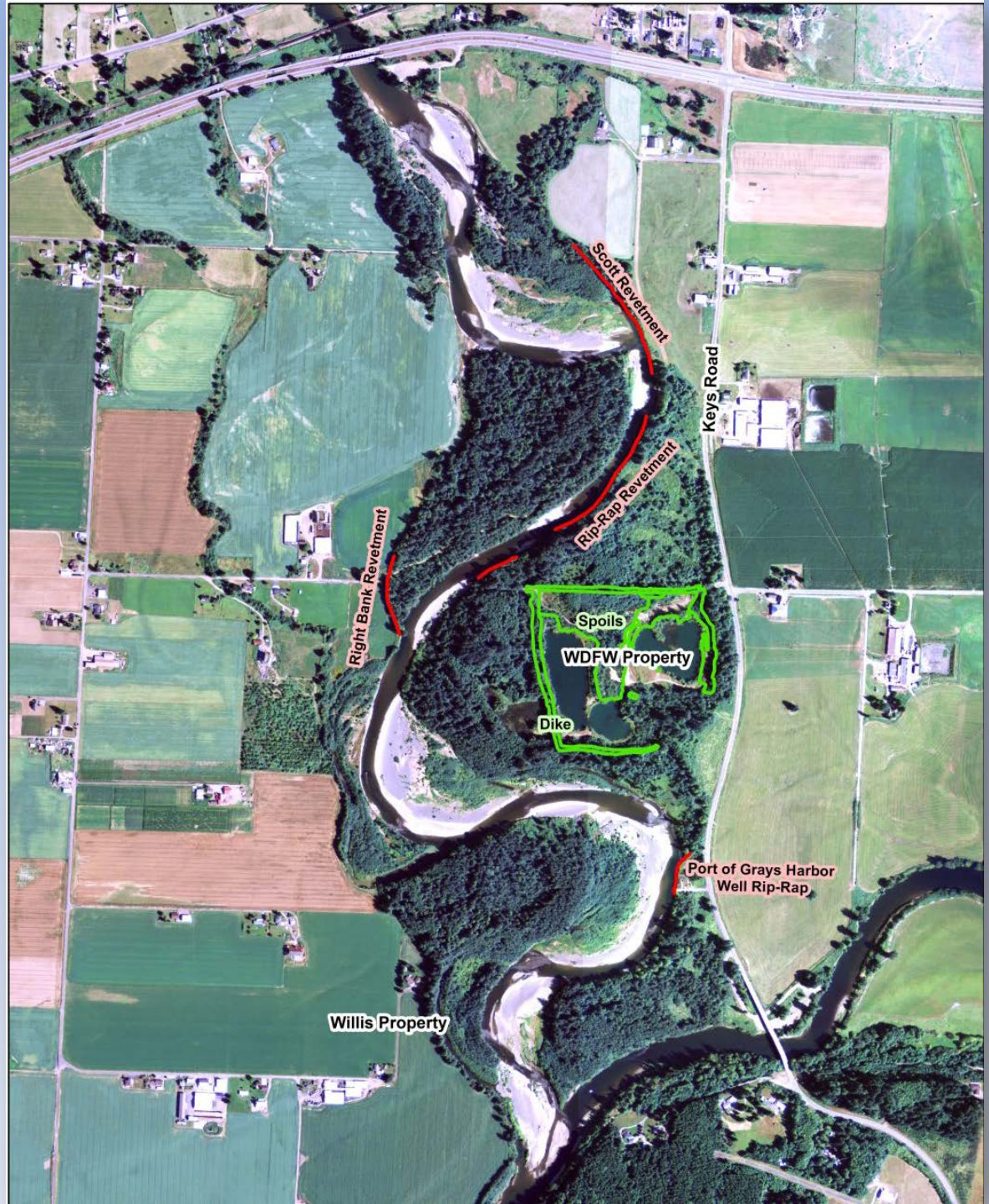
- *Lower Satsop River*

Funding:

- *Chehalis River Basin Flood Authority*
- *Development of project alternatives & analysis*
- *Preliminary design (60%)*
- *June 2015*

Goals:

- **Protect infrastructure and agricultural**
- **Create better fish and wildlife habitat**
- **Flood reduction**



Stakeholder Meeting #1
March 2014

What did we talk about:

- History of project
- Channel migration zones & river history
- Goals & objectives
- Next steps

What did we hear:

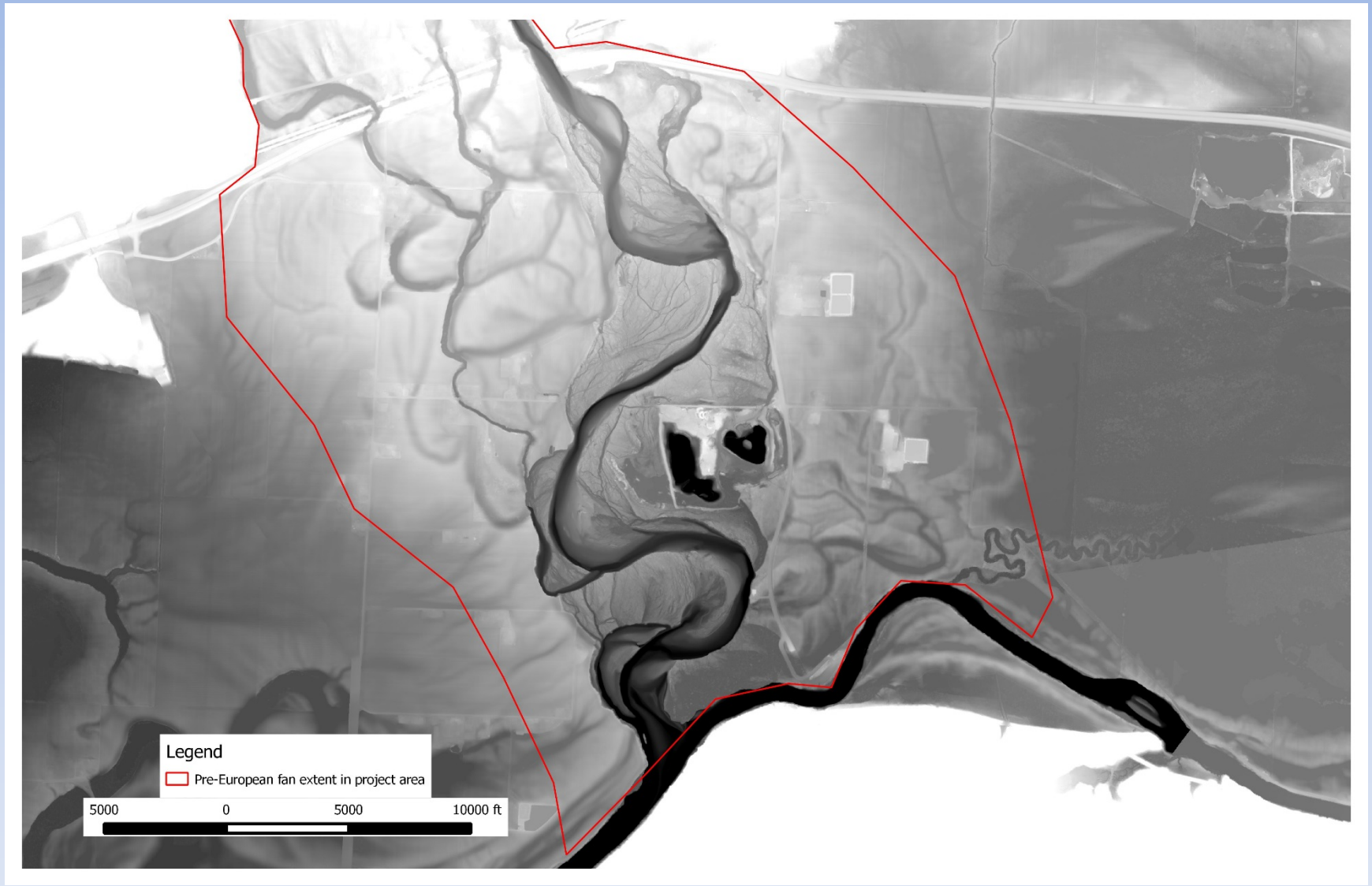
- Strong local community
- Shared experience about flooding and bank erosion
- Gravel removal support; frustration about permitting
- Bank erosion concerns more than flooding concerns

Stakeholder Meeting #2
October 2014

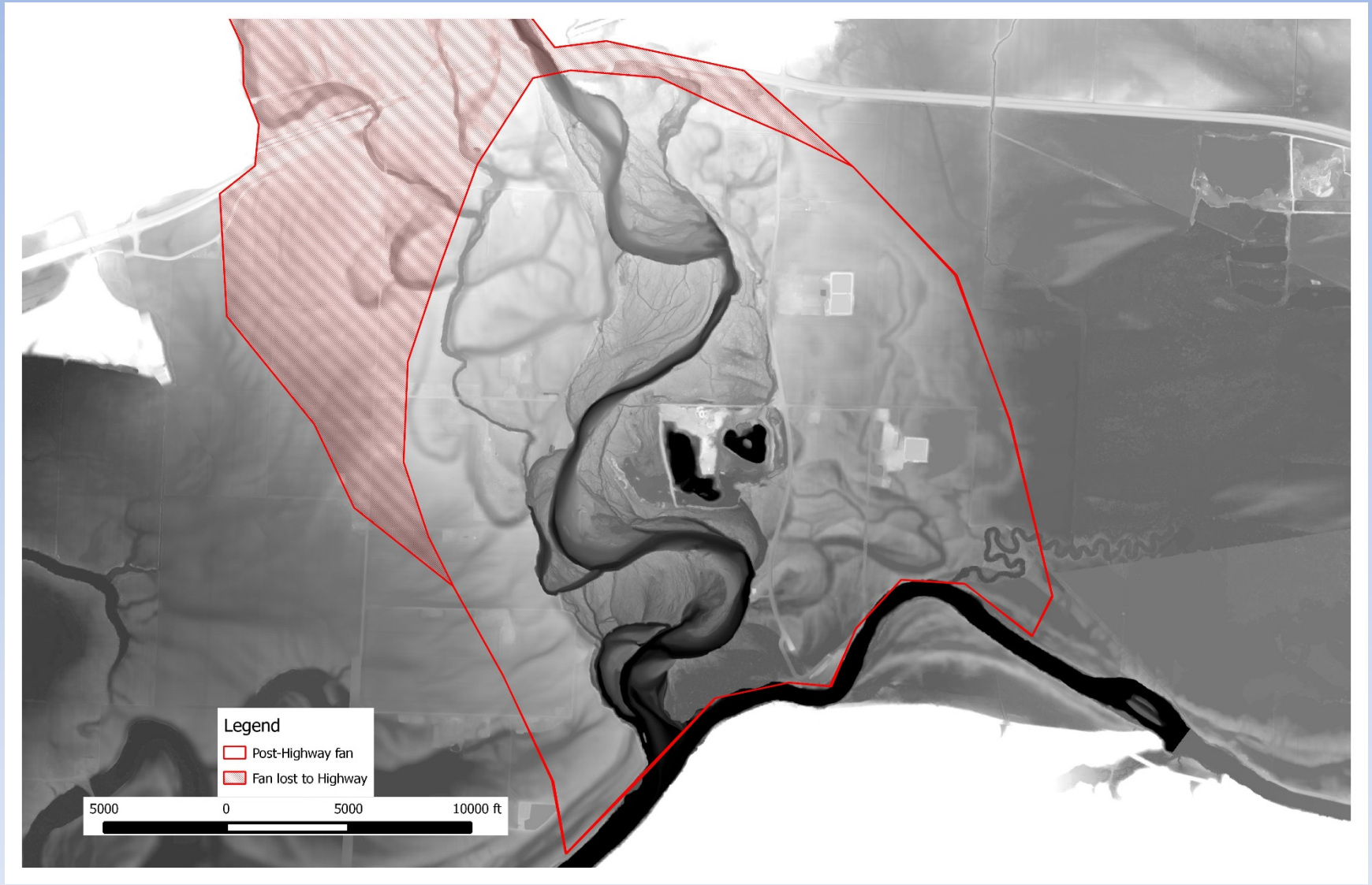
Outcome:

- *Review project alternatives*
- *Review analysis of project alternatives*
- *Stakeholder input*
- *Prepare for evaluation of project alternatives*

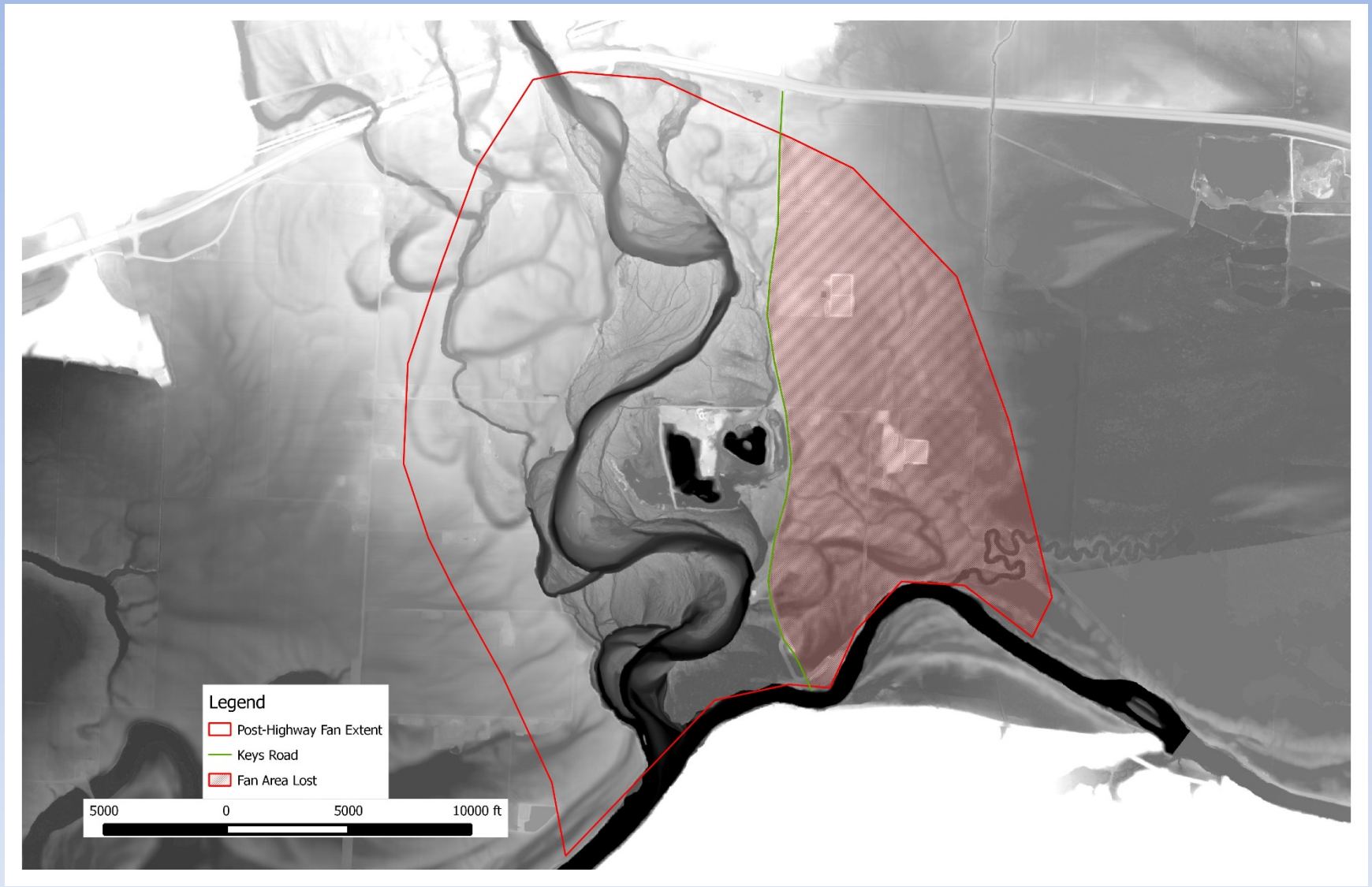
Pre-European fan extent



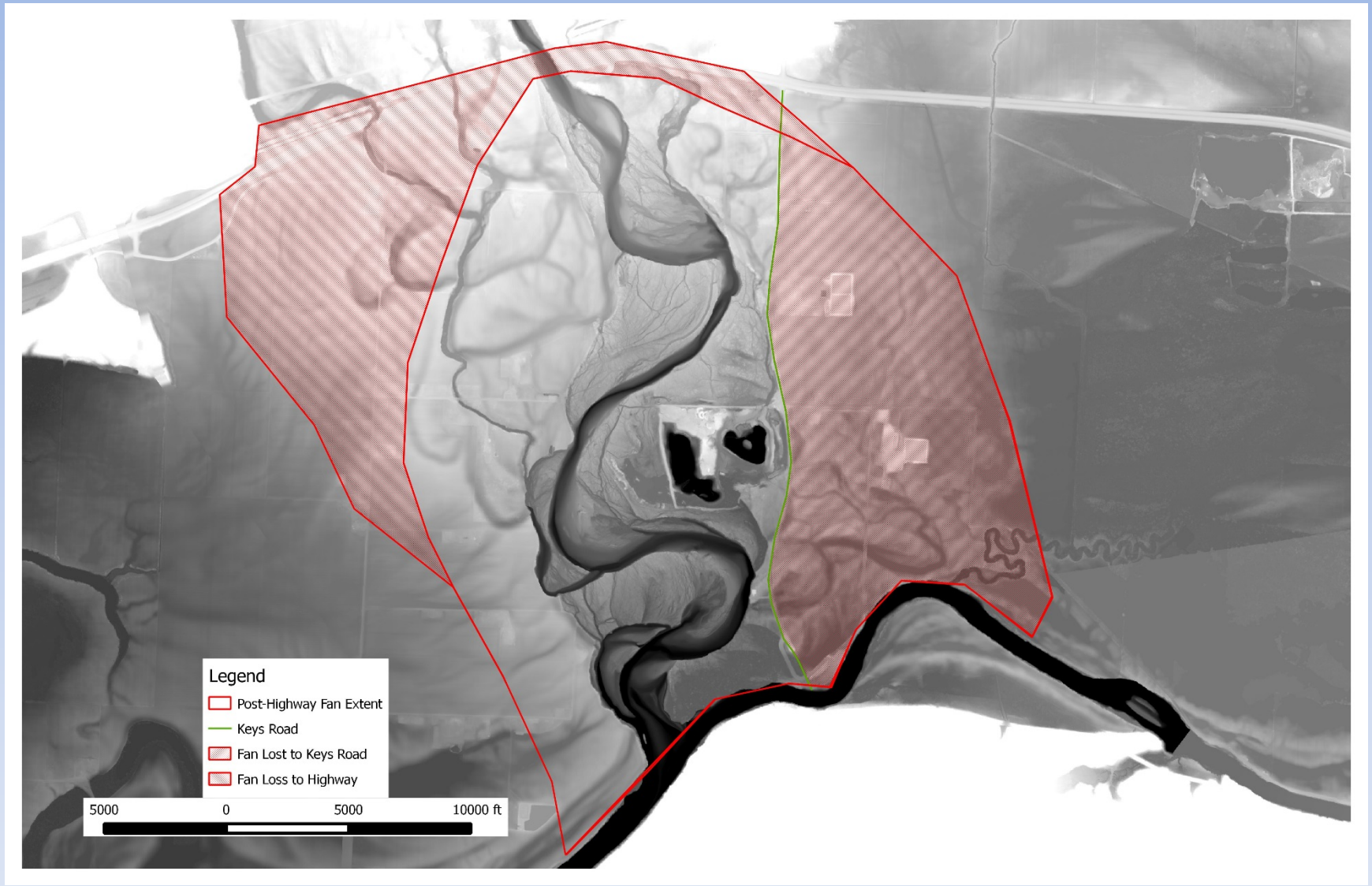
Railroad & Highway fan impact



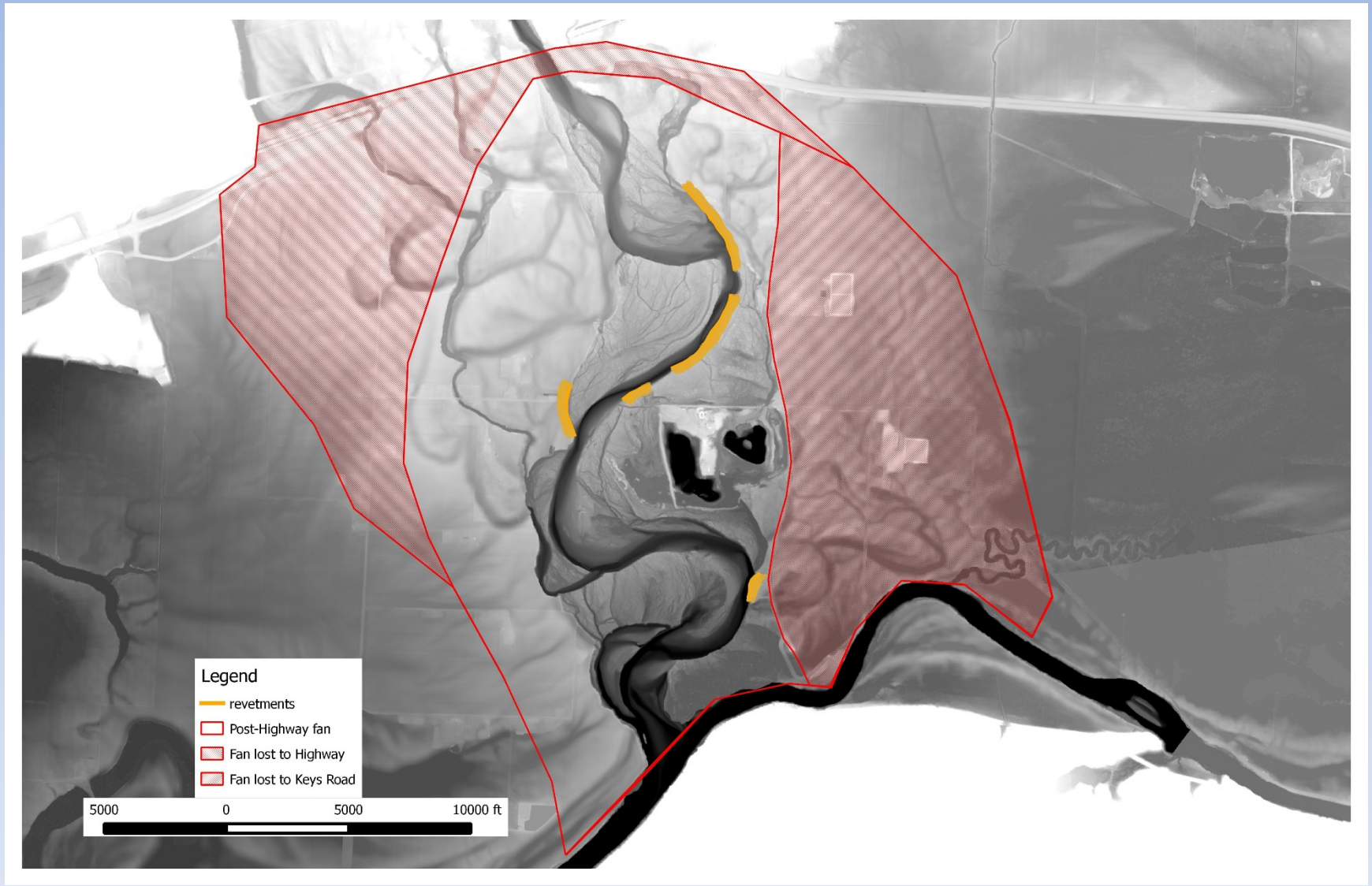
Keys Road fan impact



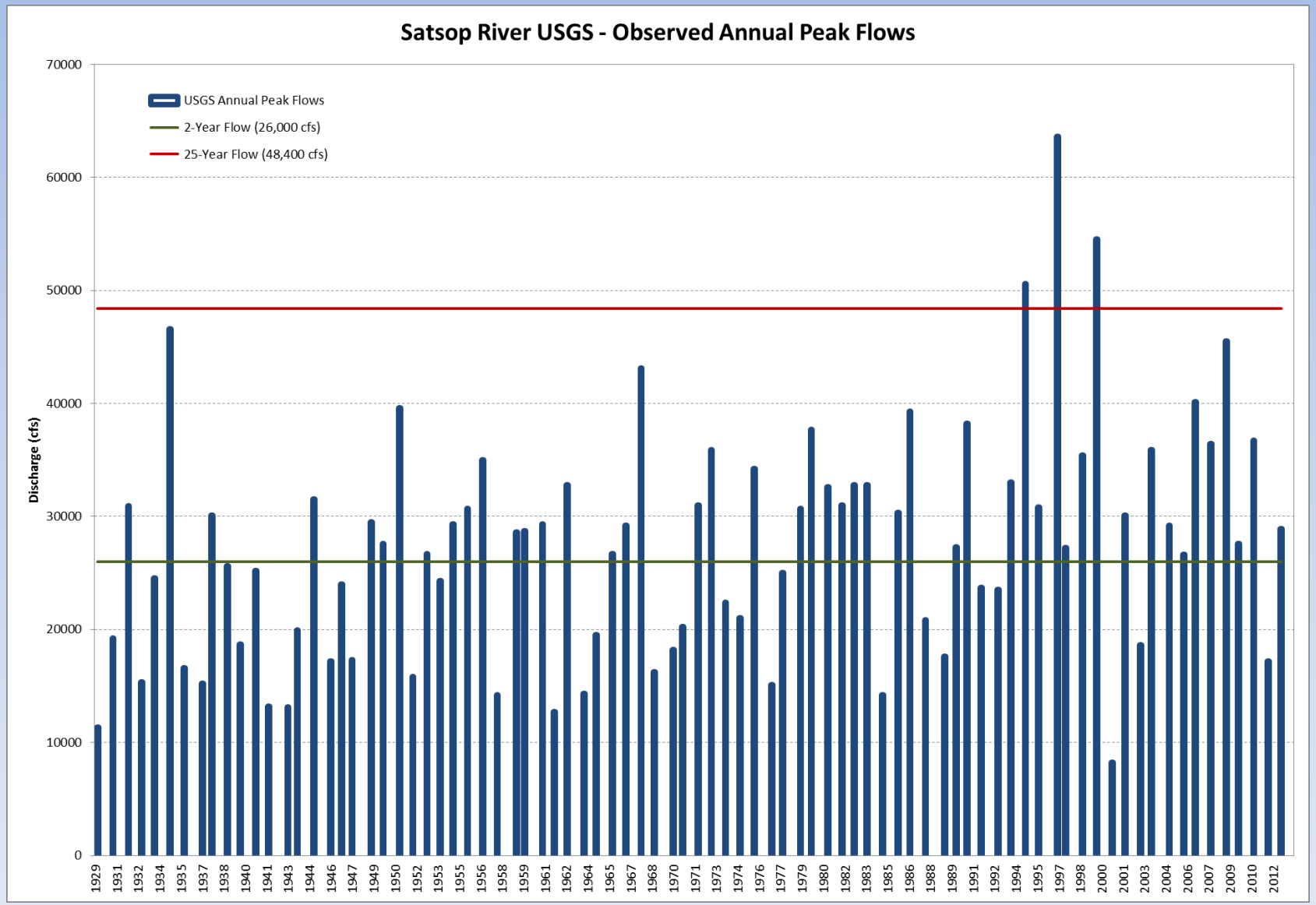
Cumulative loss to fan surface



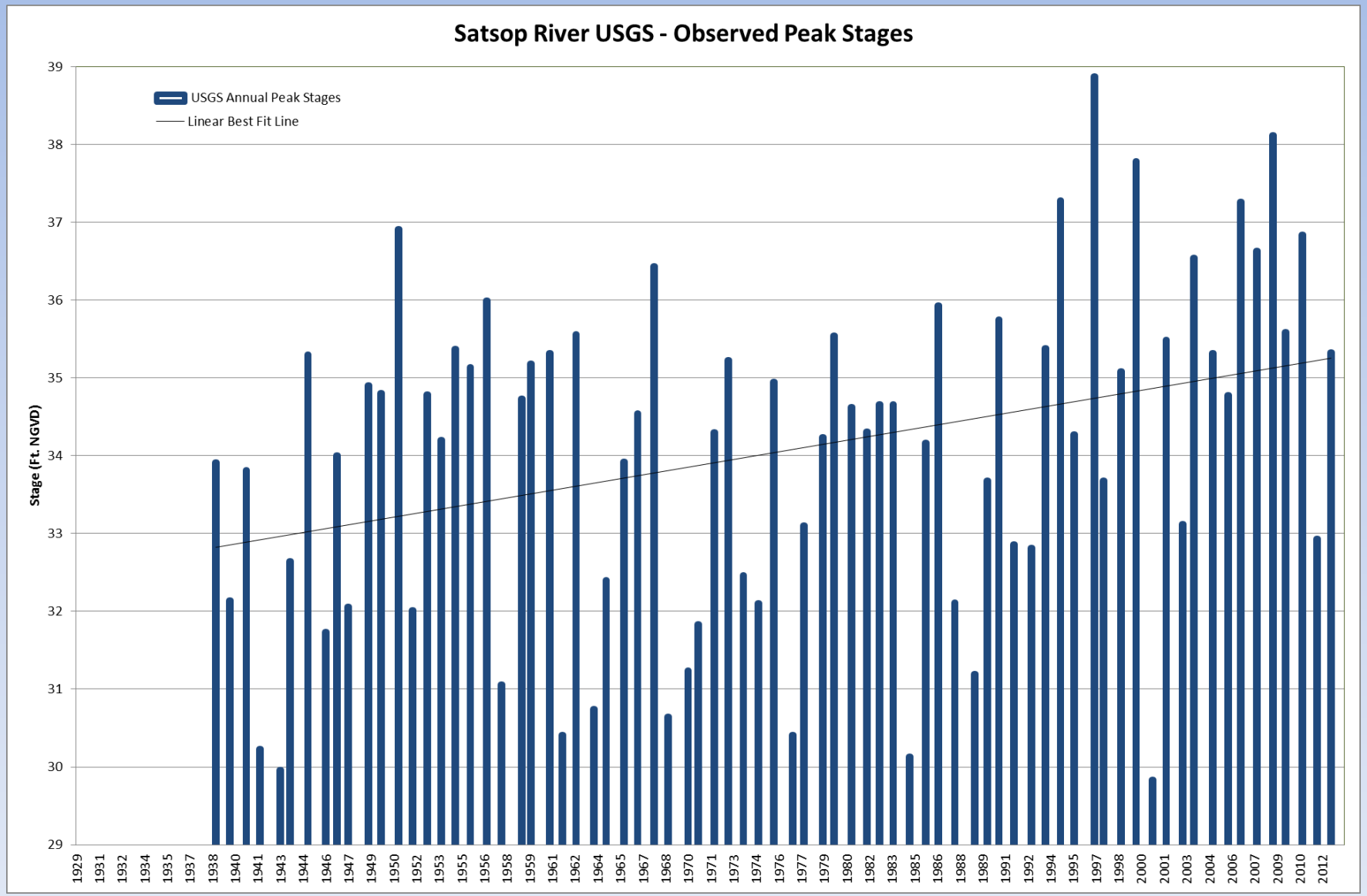
Revetments


Legend
revetments
Post-Highway fan
Fan lost to Highway
Fan lost to Keys Road
5000
0
5000
10000 ft

Hydrologic changes - Flow



Hydrologic changes - Stage



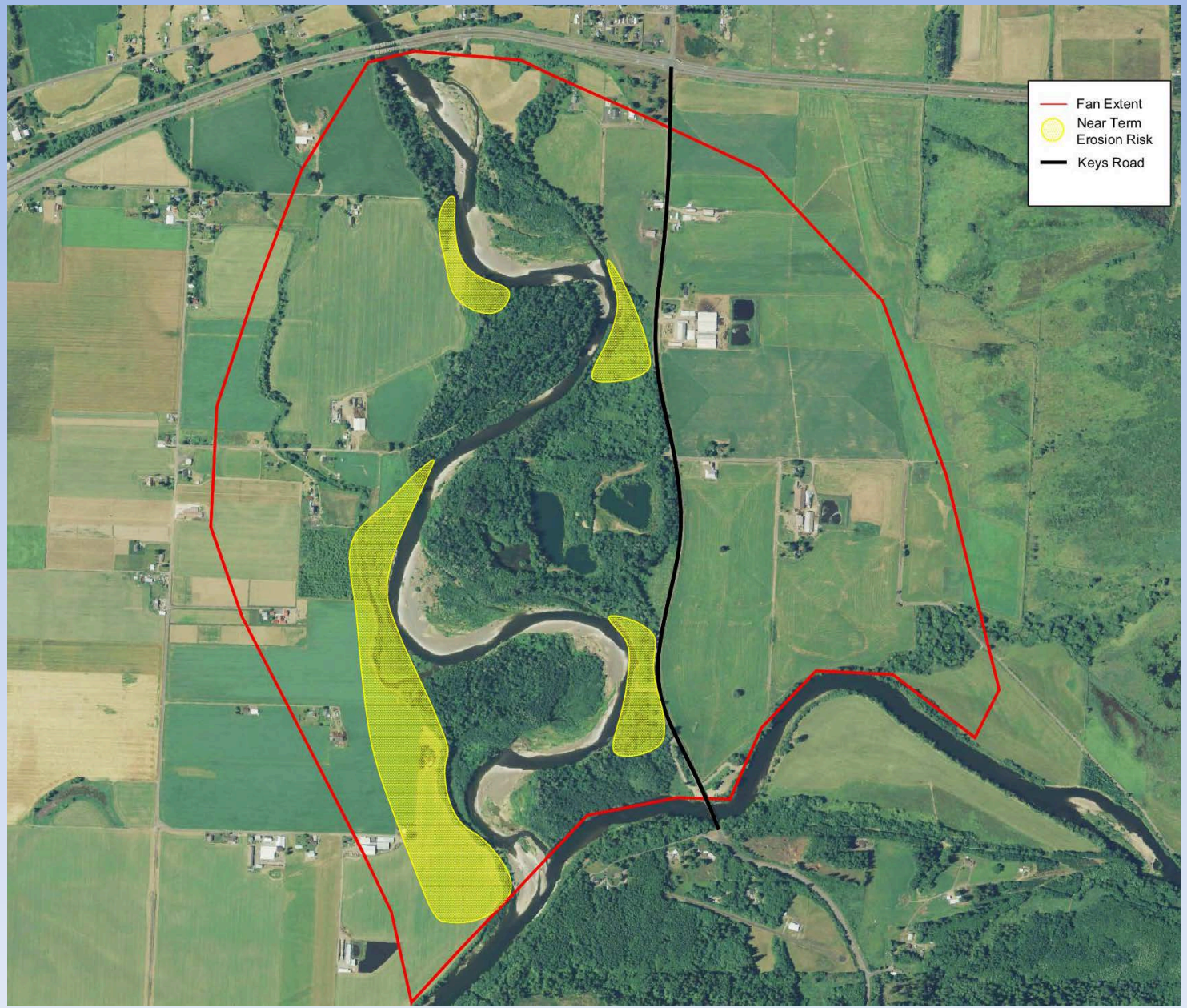
Project Goals

1. Reduce bank erosion
2. Improve habitat
3. Reduce flooding

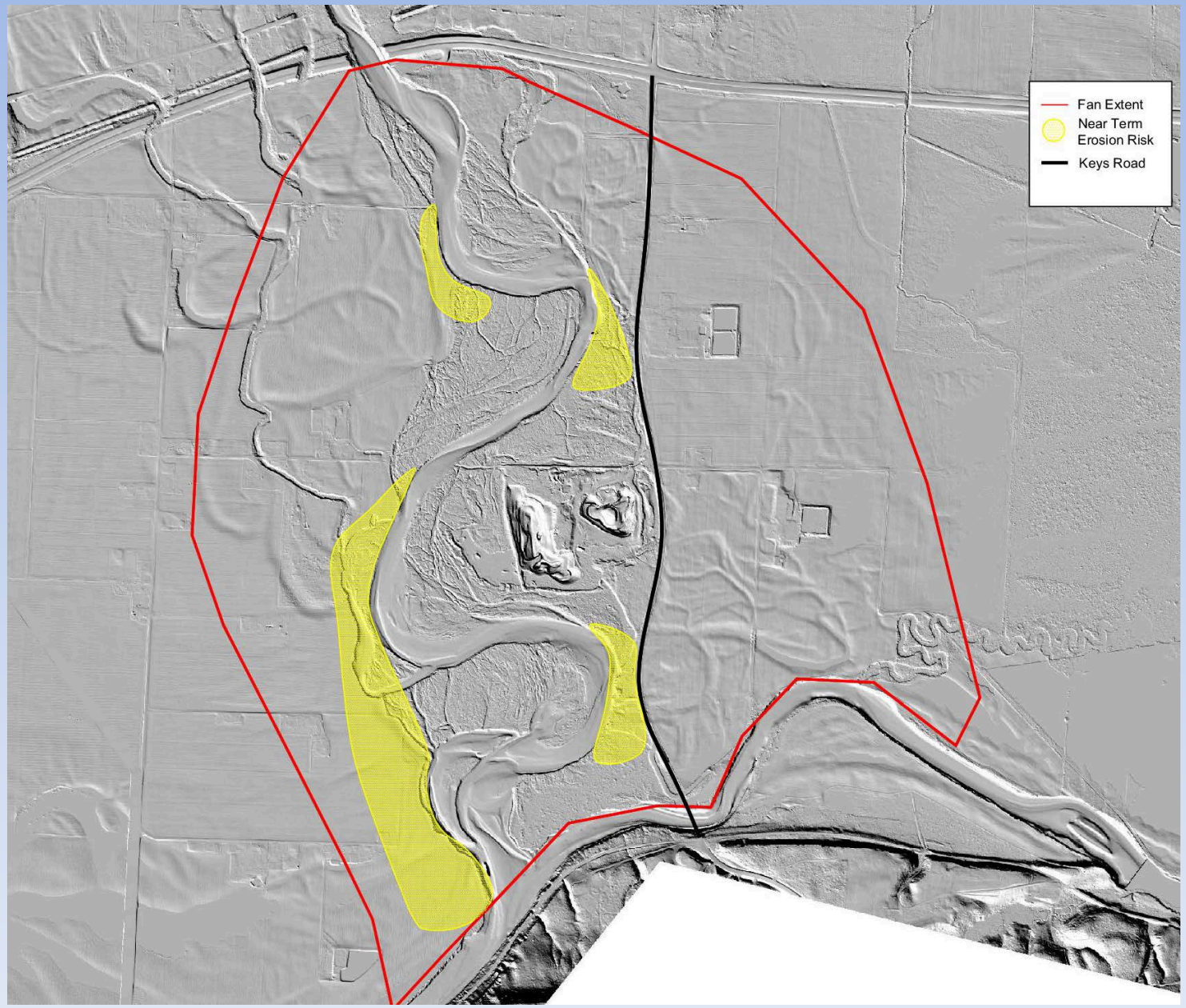
Alternatives

- A1 - No Action
- A2 – Spoils & Dike Removal
- A3 – Migration Corridor
- A4 – Channel Maintenance
- A5 – Bank Protection

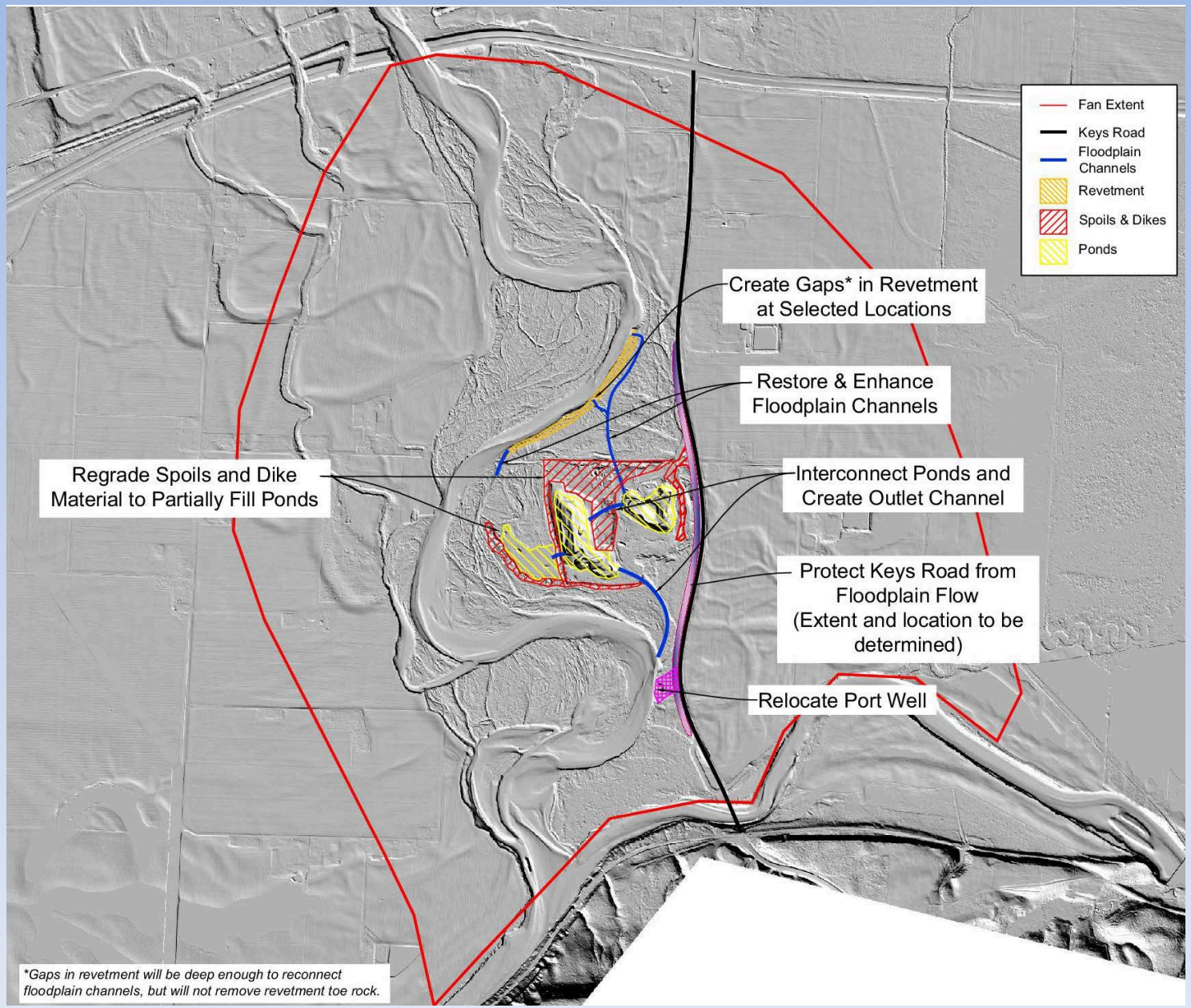
Alternative A1 – No Action



Alternative A1 – No Action



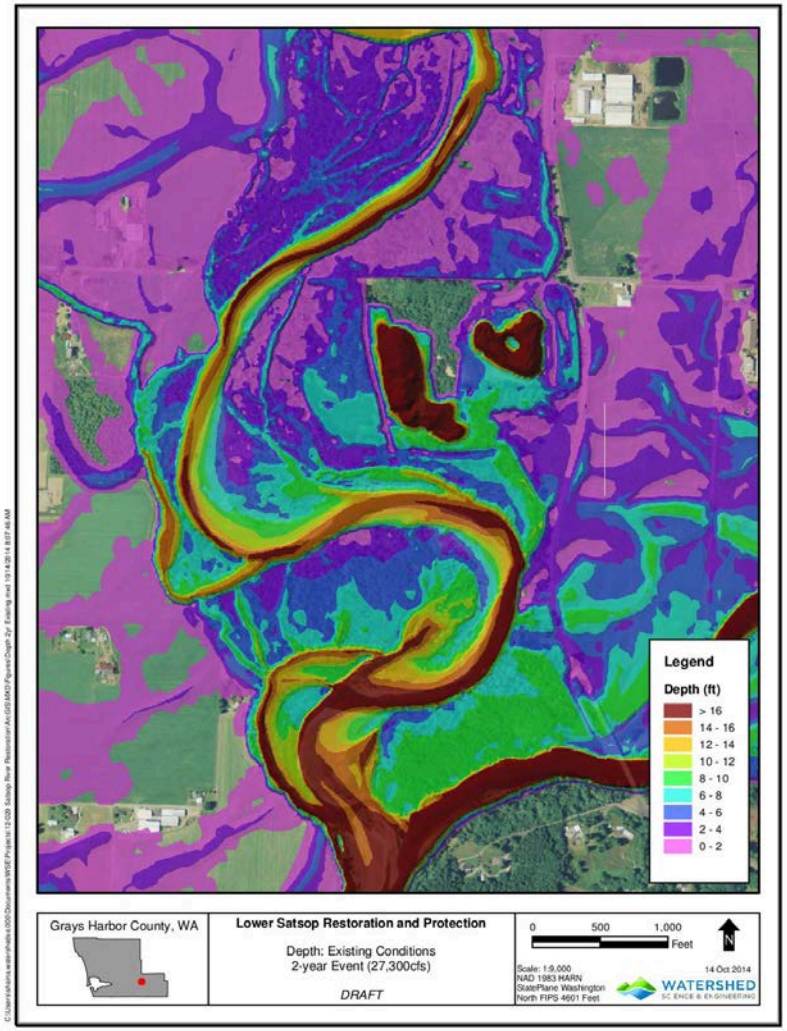
Alternative A2-A – Spoils & Dikes Regrading



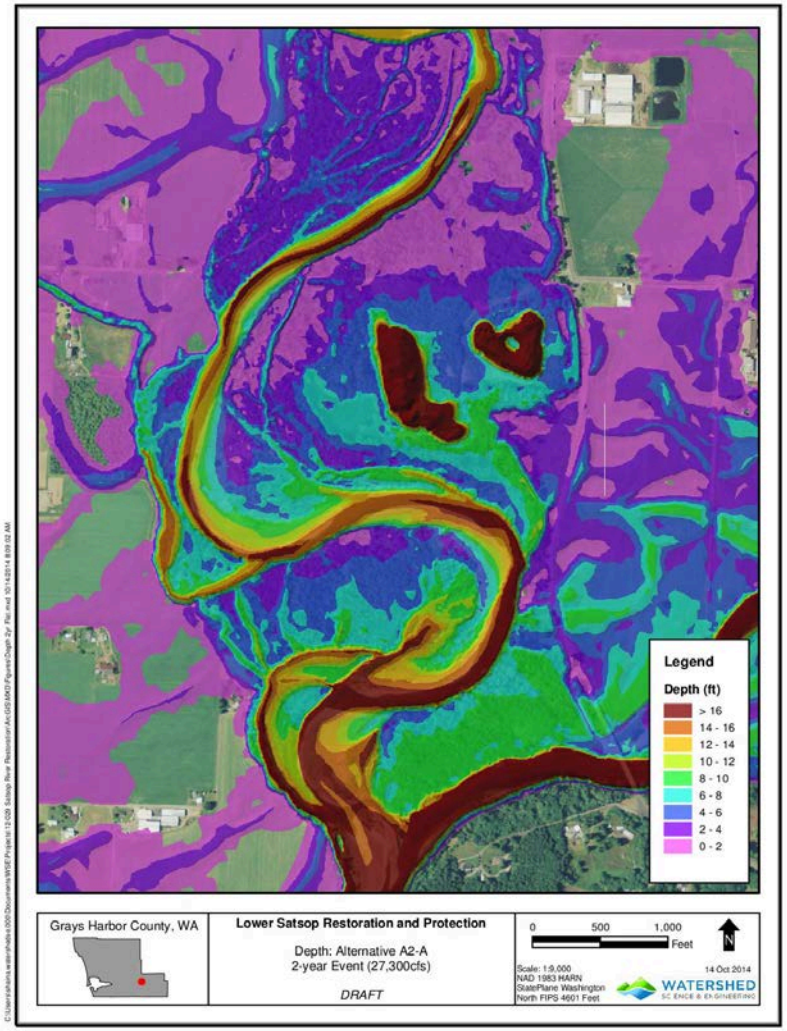
Approximate Cost: $3,100,000

2-Year Water Depth

Existing

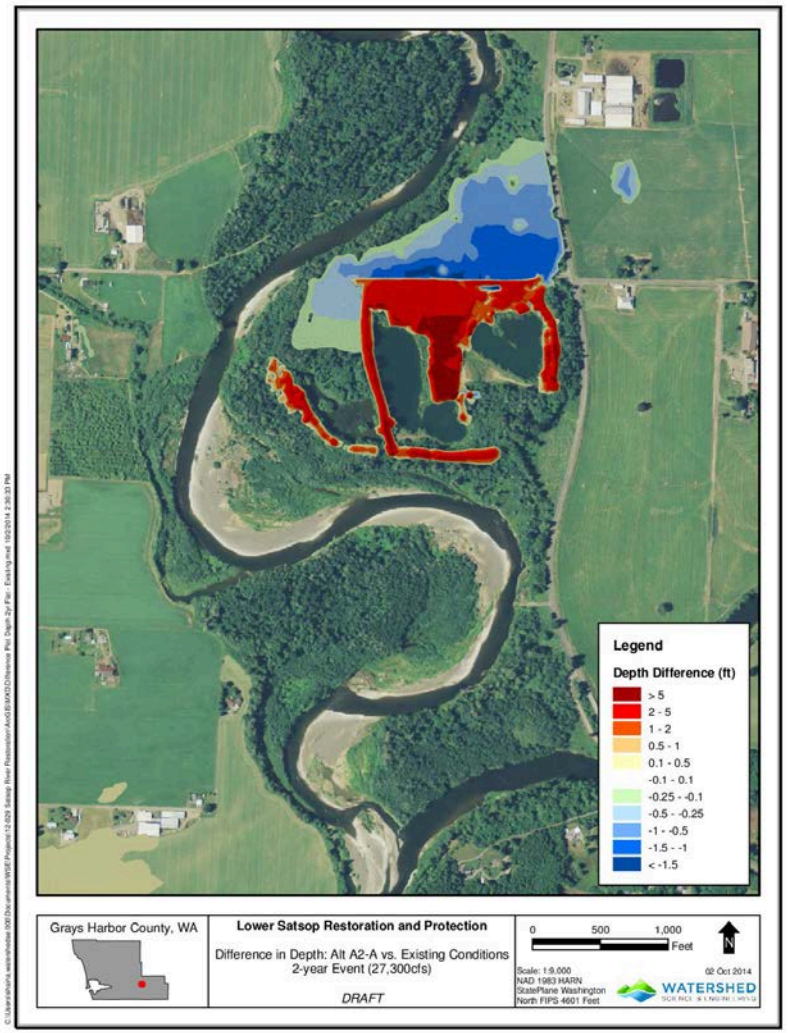


A2

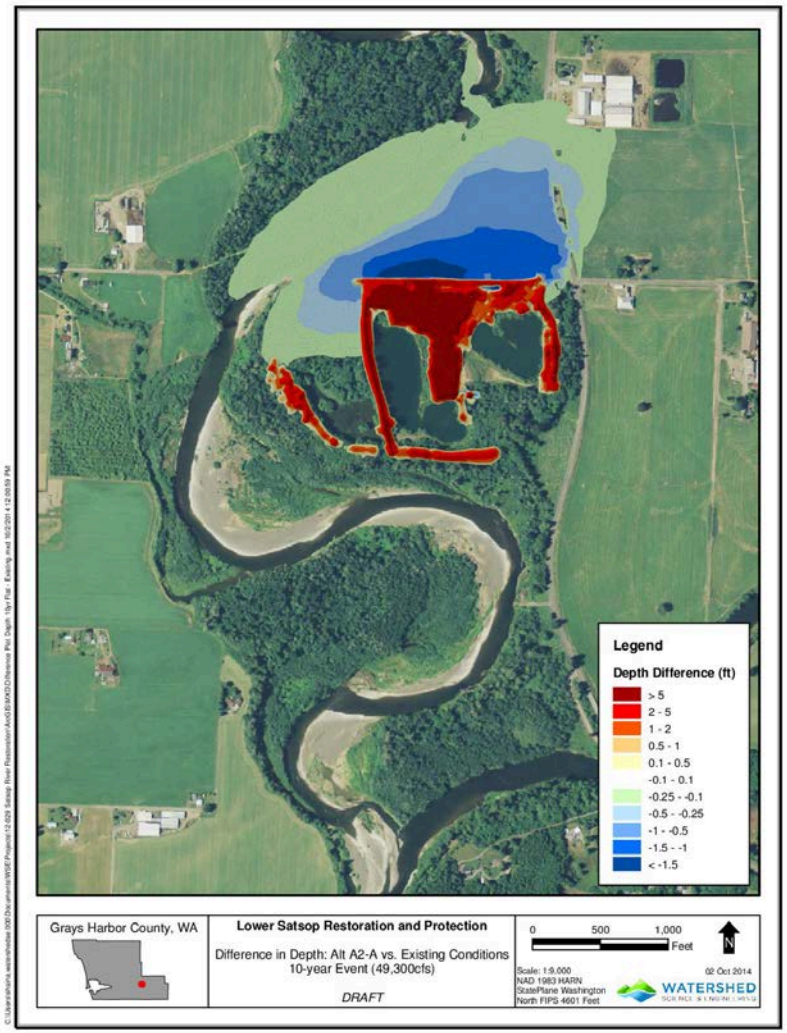


Depth Difference – Existing VS A2

2-Year



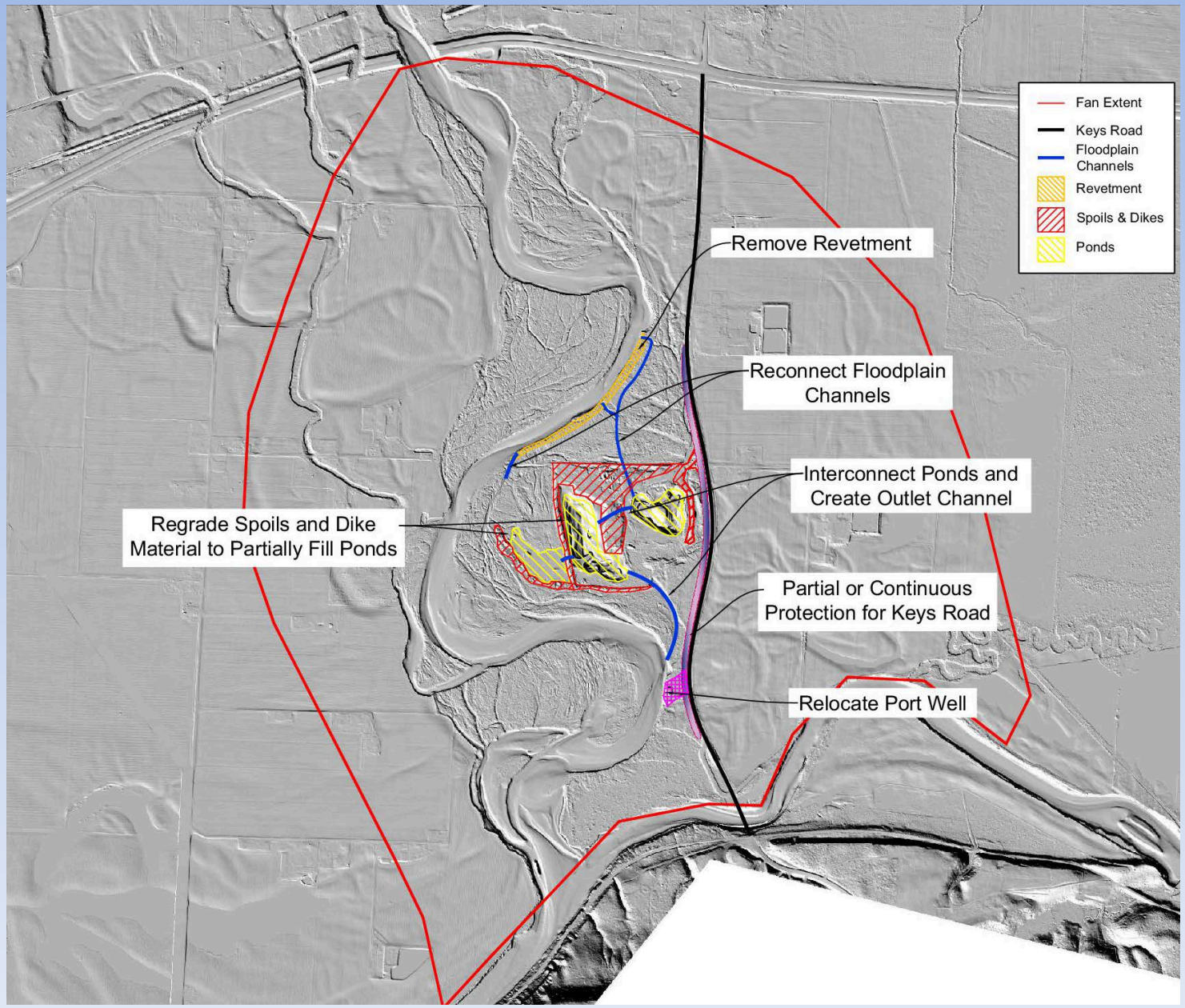
10-Year



A2-A – Spoils & Dike Regrading

- Goals
  - No immediate erosion benefit
  - Significant habitat benefit
  - Some flood reduction benefit
- Expense
  - Moderate expense
  - Potential for cost sharing?
- Concerns
  - None

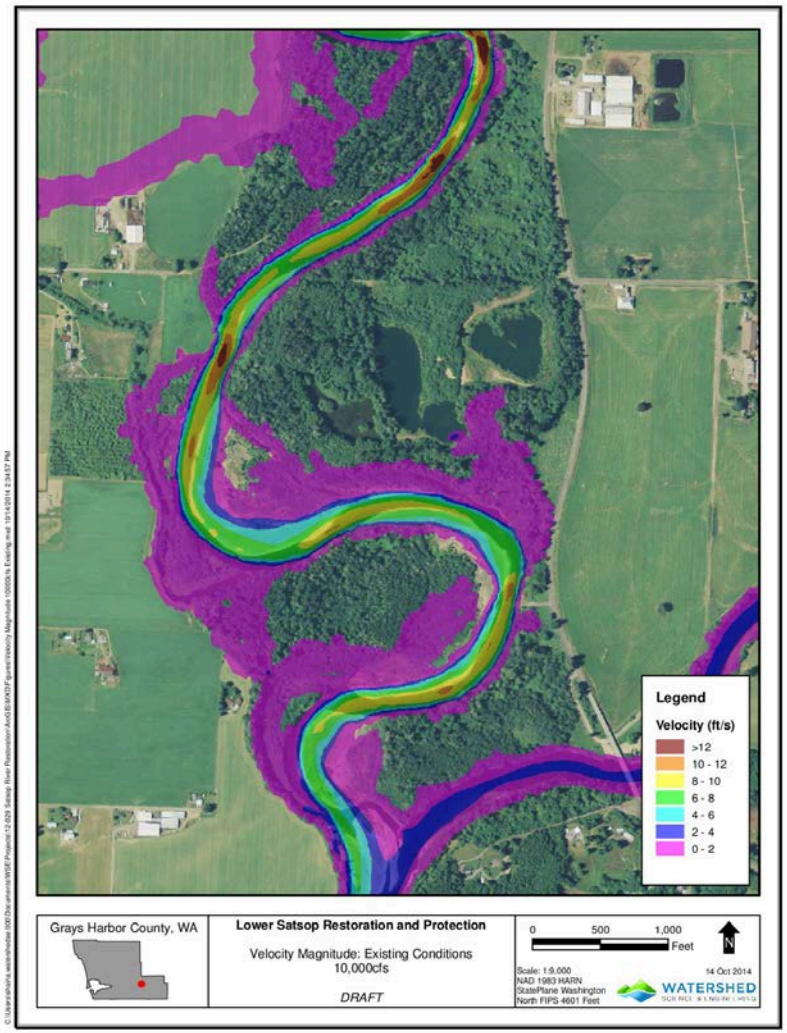
Alternative A2-B – Regrading & revetment removal



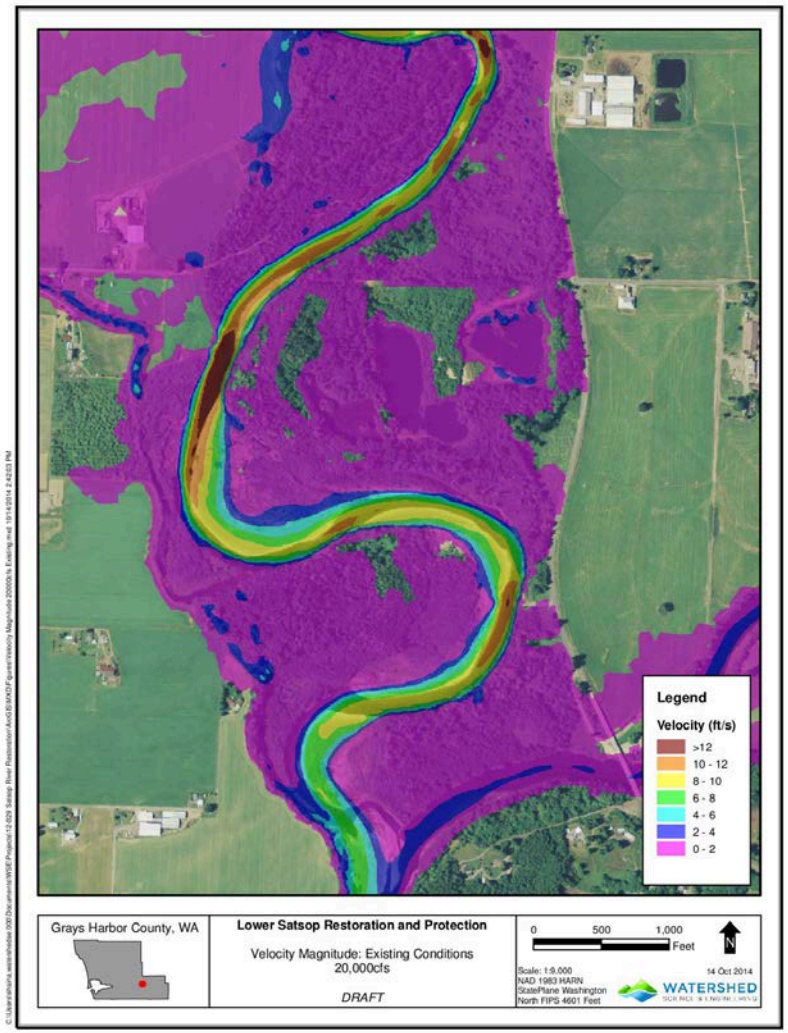
Approximate Cost:
$5,600,000
To
$9,600,000

Existing Velocity

10,000 CFS



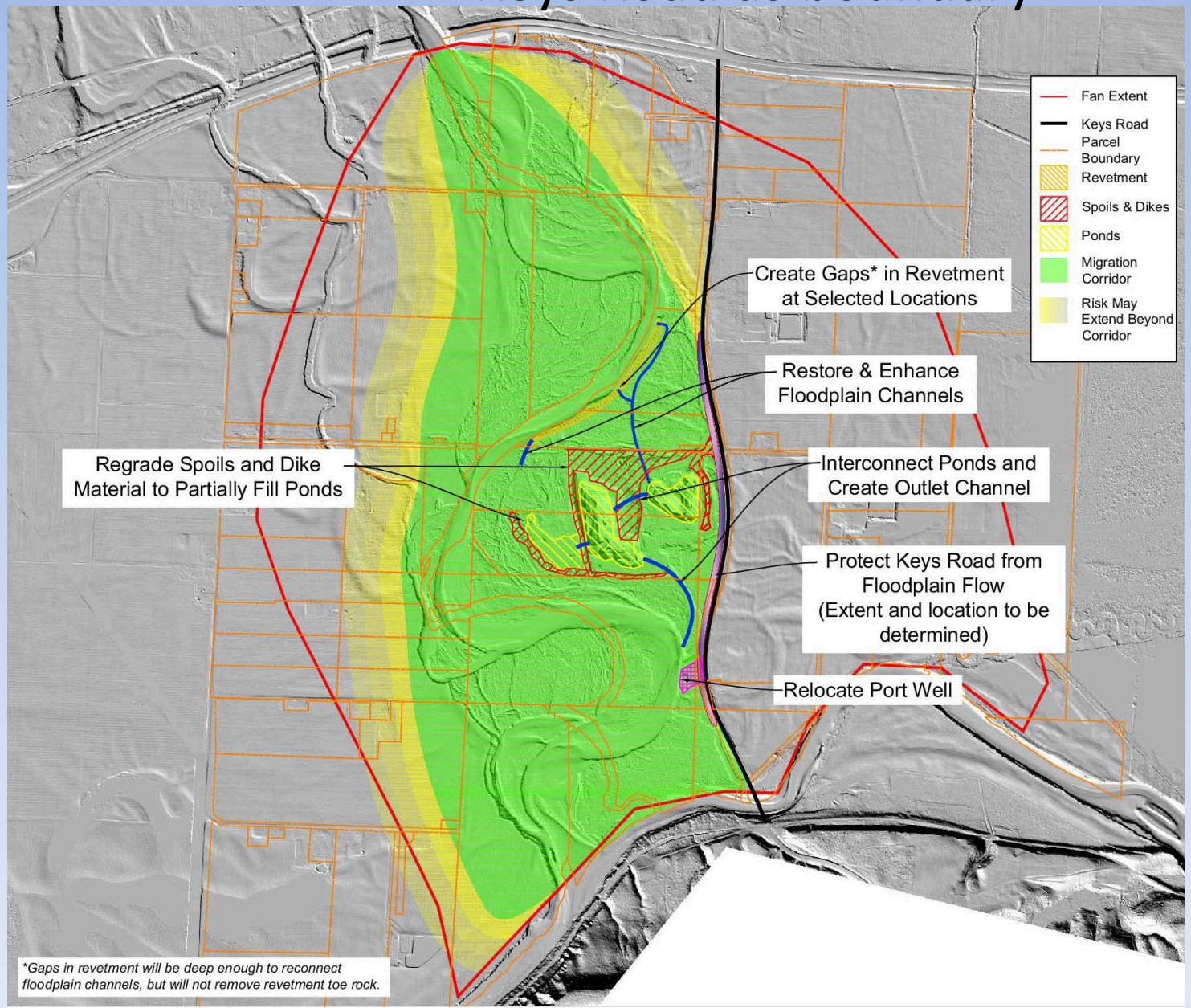
20,000 CFS



A2-B – Spoils, Dike Regrading & Revetment Removal

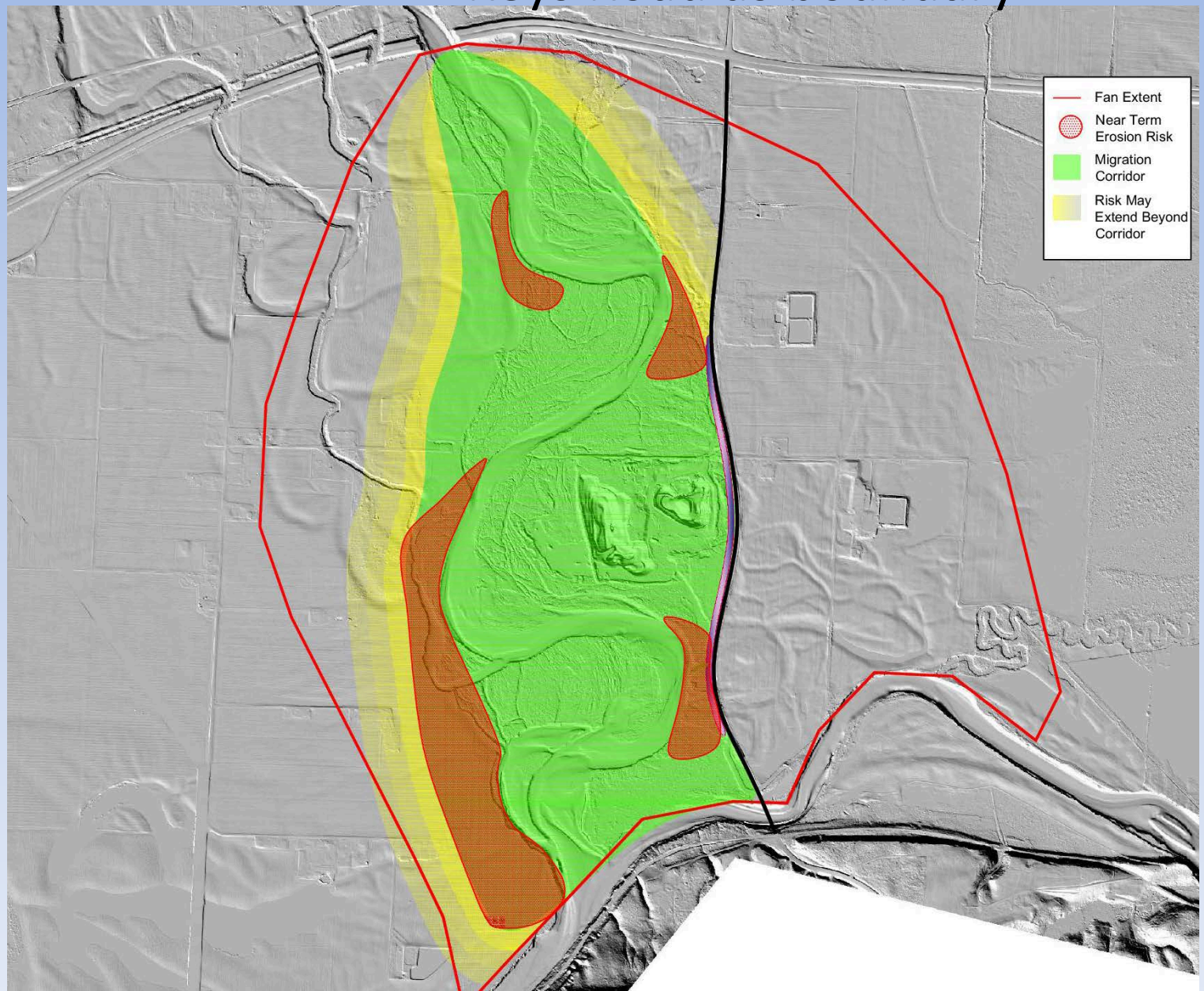
- Goals
  - No immediate erosion benefit
  - Significant habitat benefit
  - Some flood reduction benefit
- Expense
  - Higher expense
- Concerns
  - Erosion risk at Keys Road
  - Less certainty for downstream landowners

Alternative A3-A – Channel Migration Corridor Keys Road as boundary

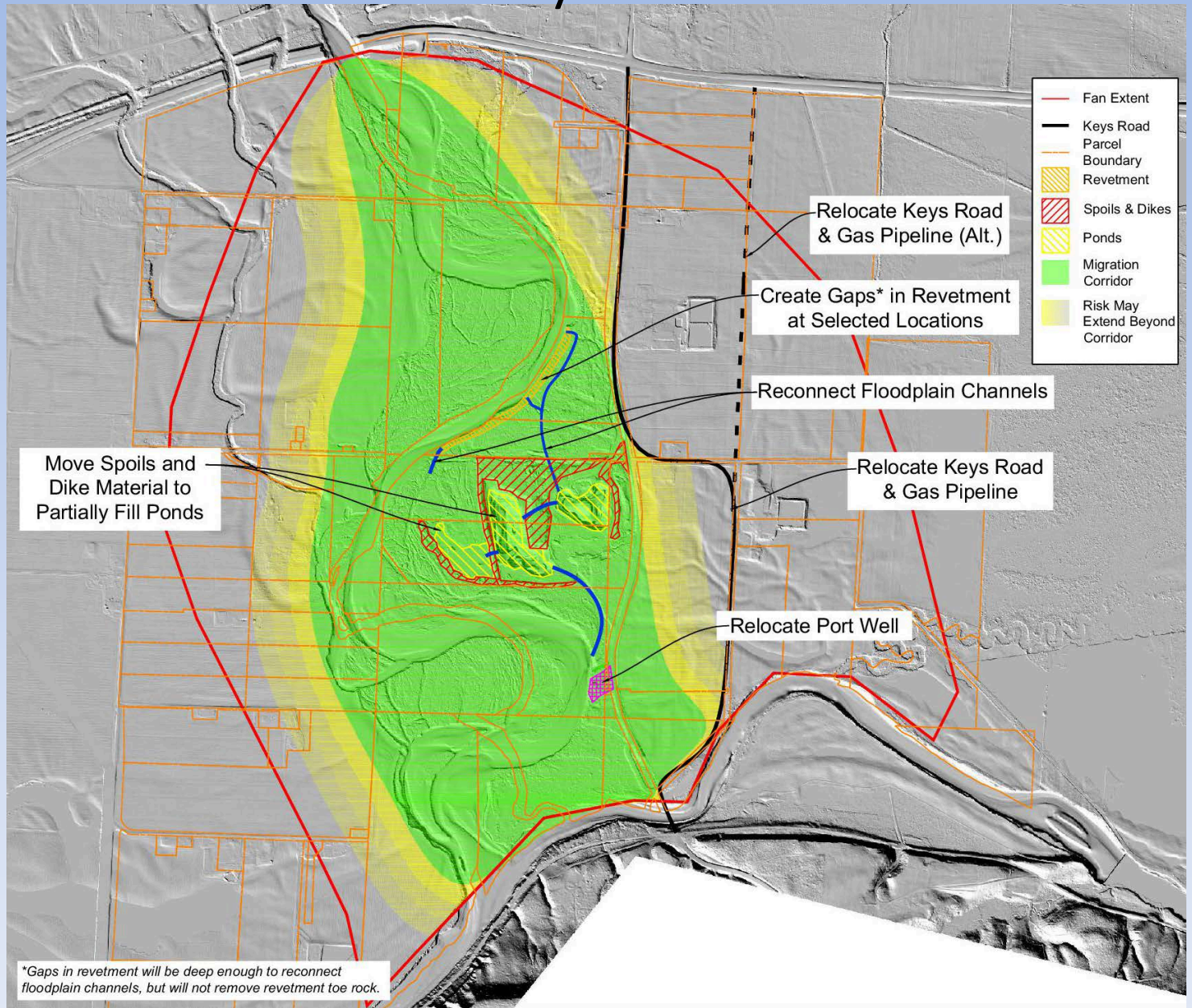


Approximate Cost: $3,700,000

Alternative A3-A – Channel Migration Corridor
Keys Road as boundary



Alternative A3-B – Channel Migration Corridor
Keys Road relocation

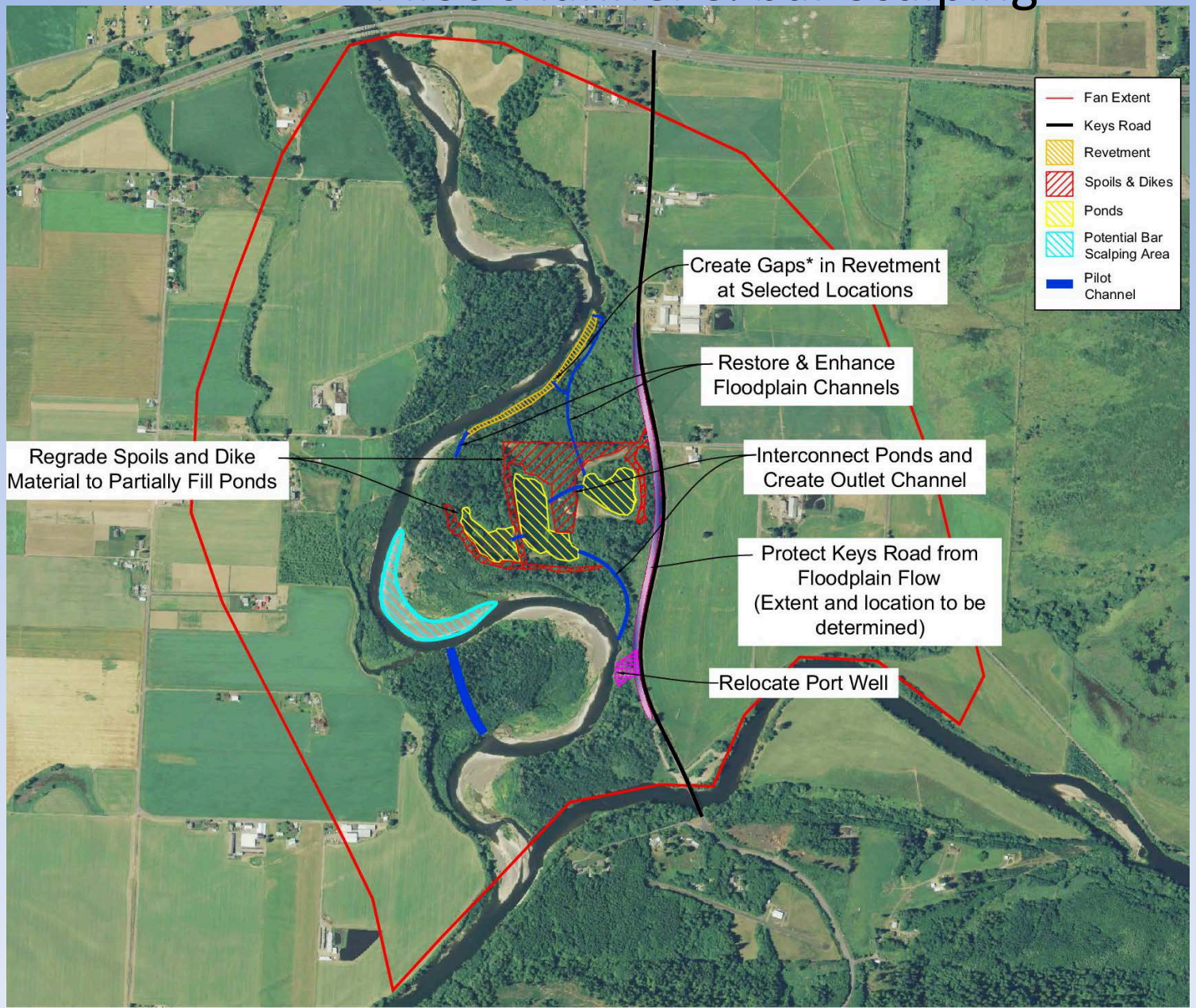


Approximate Cost:
$13,400,000
to
$16,700,000

A3 – Corridor Options

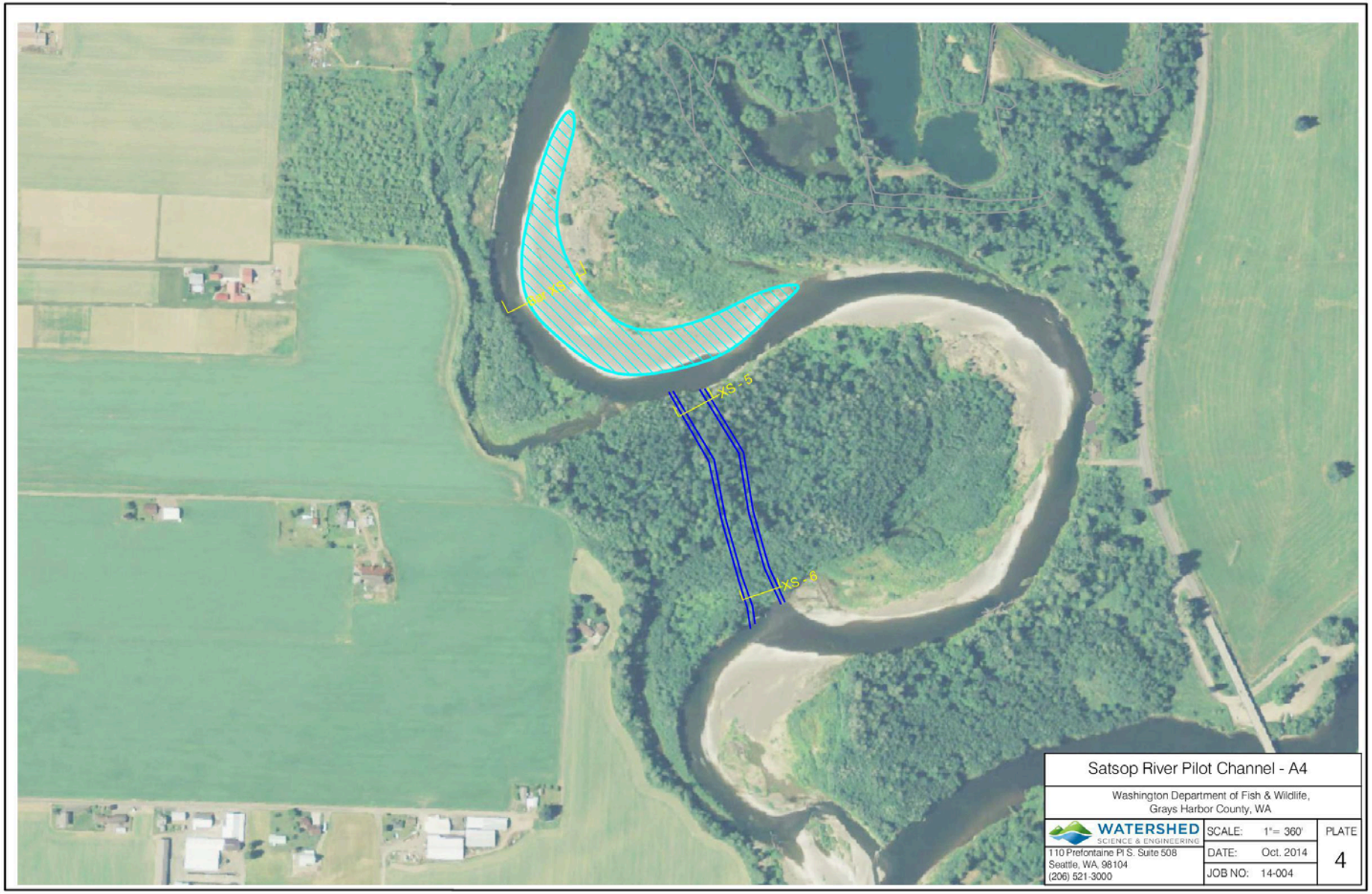
- Goals
  - No immediate erosion benefit
  - Long term habitat benefit
  - No flood benefit beyond A2
- Expense
  - Moderate to extremely high expense
- Concerns
  - Only partially addresses financial risk of landowners
  - Ag land still at risk

Alternative A4 – Channel Maintenance
Pilot channel & bar scalping



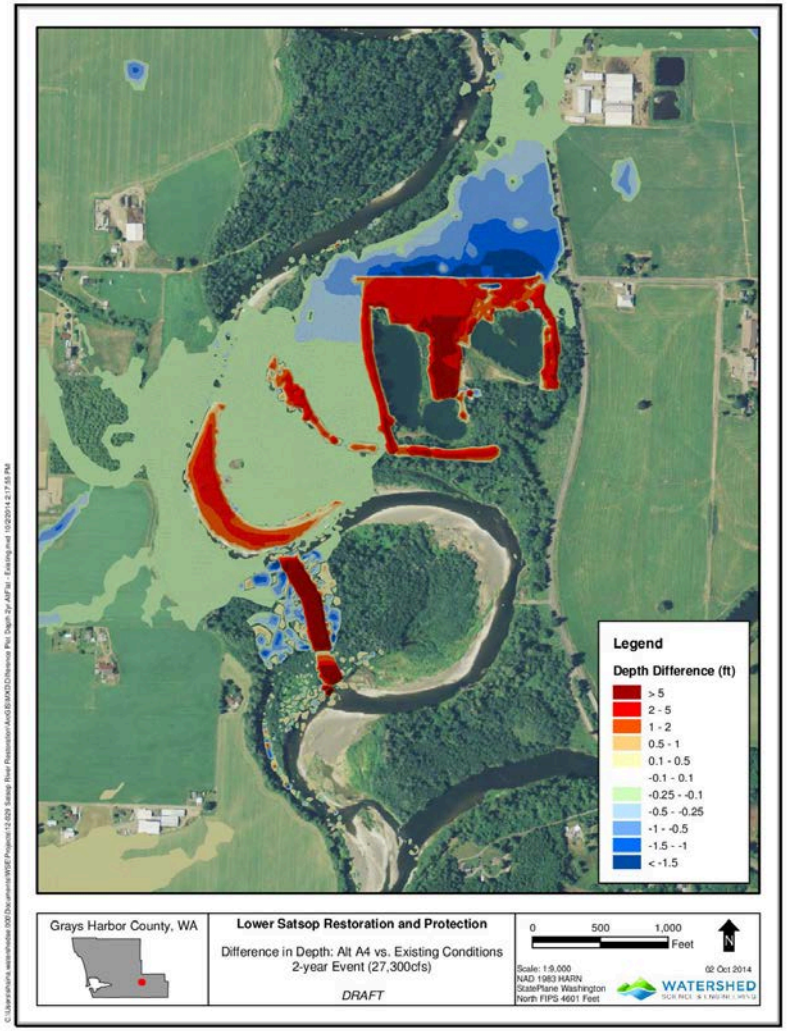
Approximate Cost:
$3,600,000 now
Plus
$160,000 annually

Concept for Alternative A4 – Pilot Channel & Bar Scalping

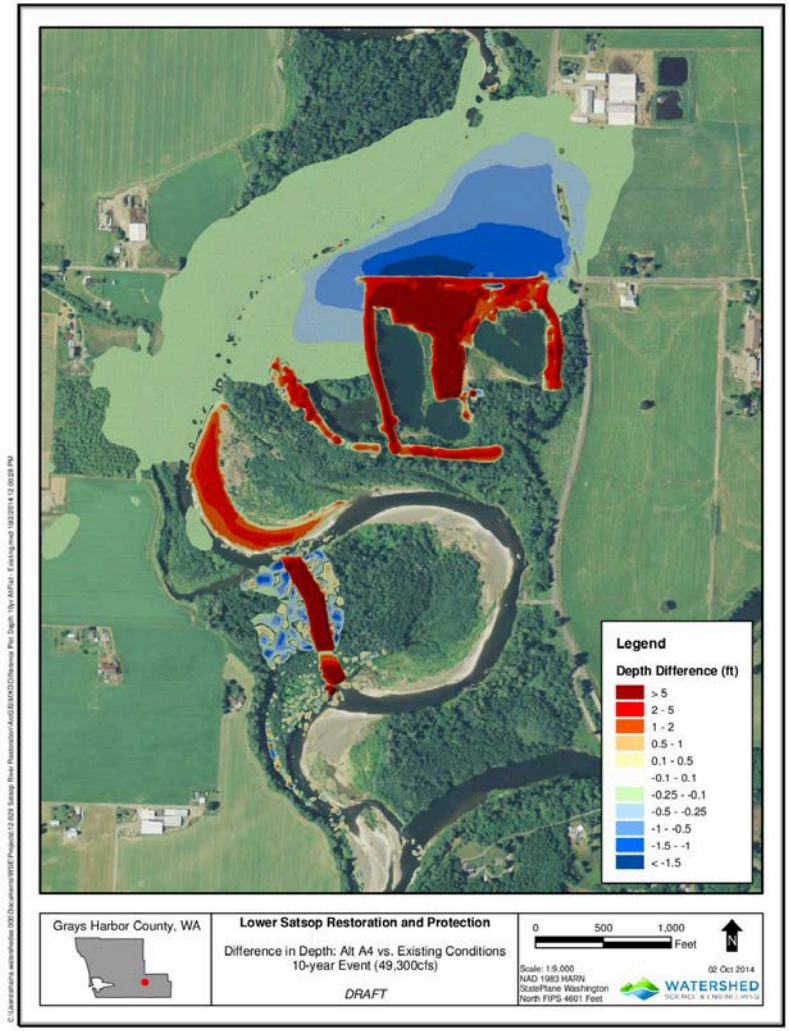


Depth Difference - Existing VS A4

2-Year

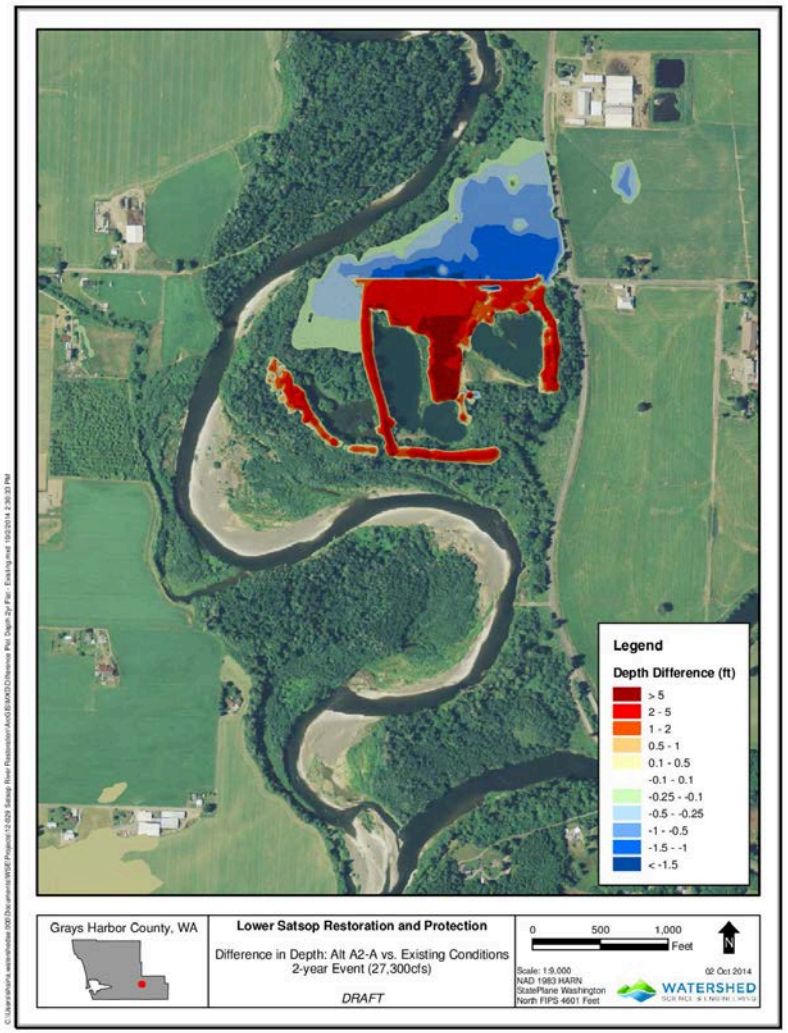


10-Year

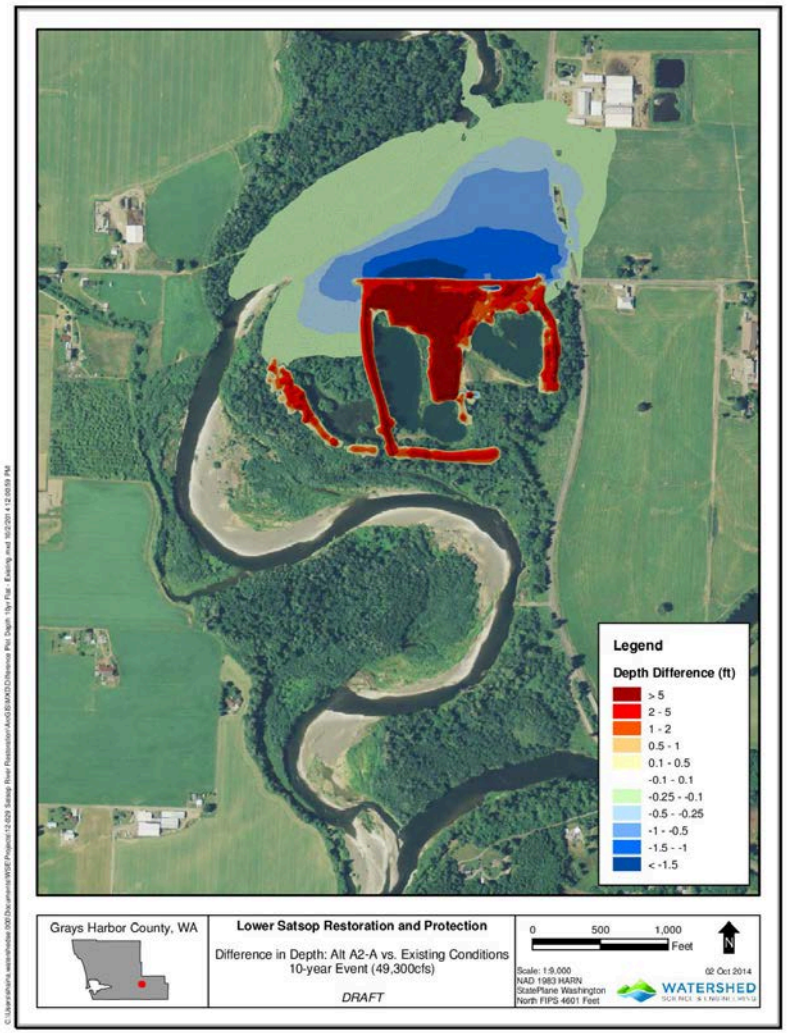


Depth Difference – Existing VS A2

2-Year

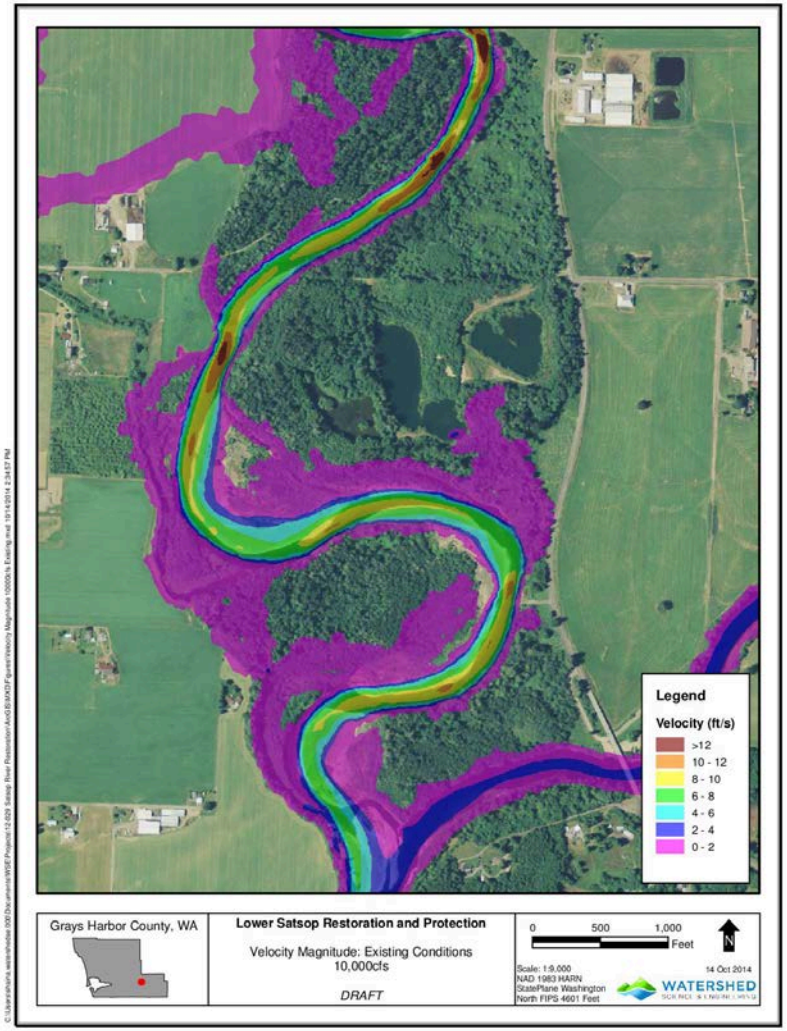


10-Year

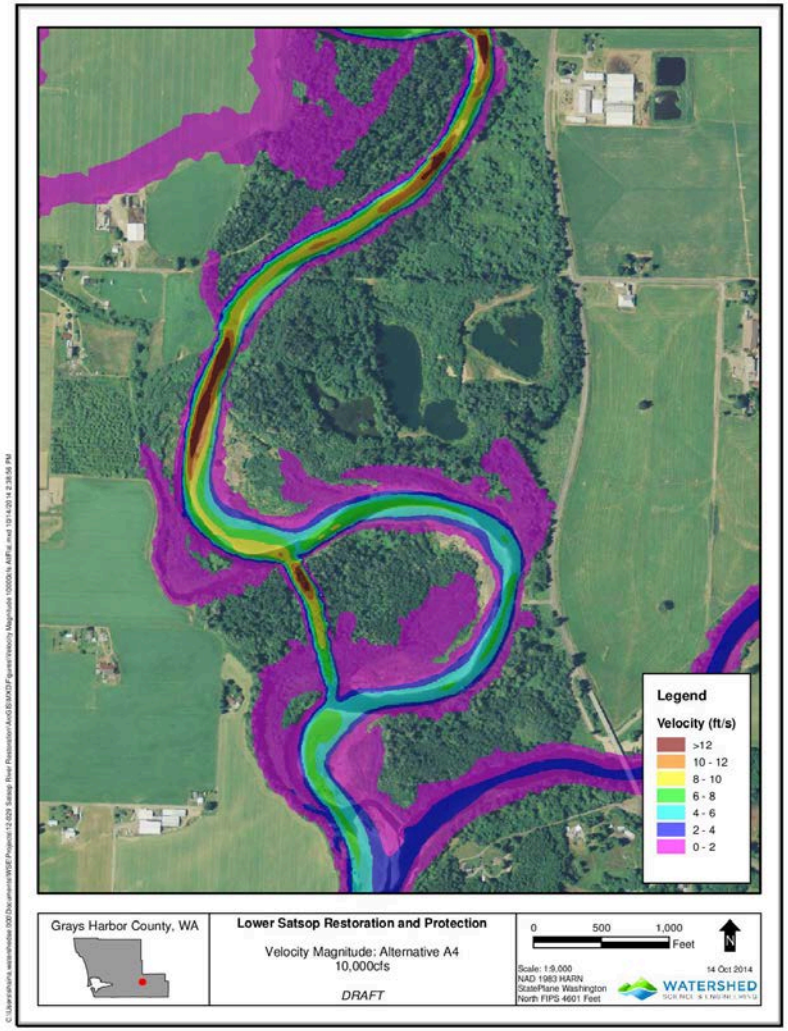


10,000 CFS Velocity

Existing

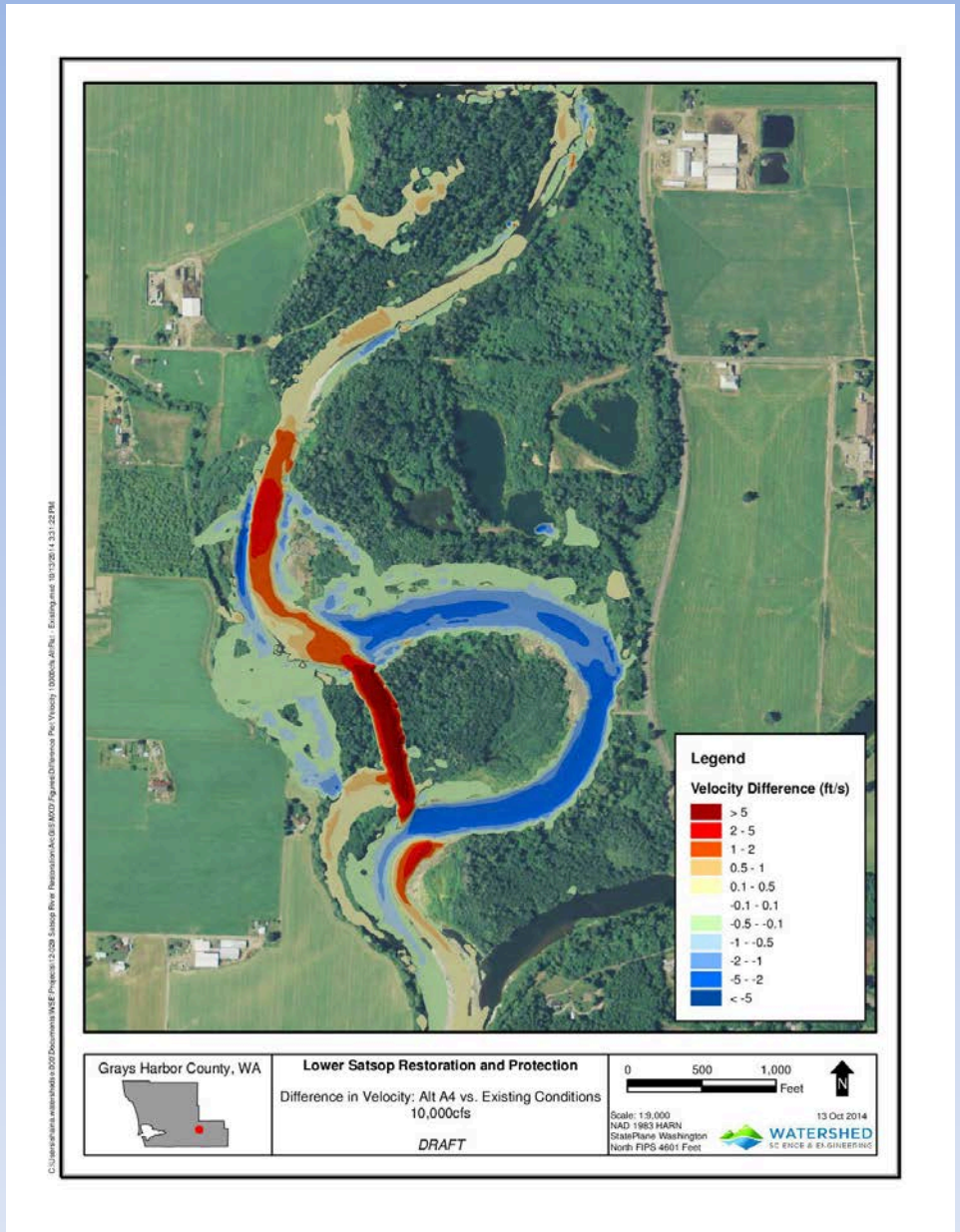


A4



Existing VS A4 10,000 CFS Velocity Difference Plot

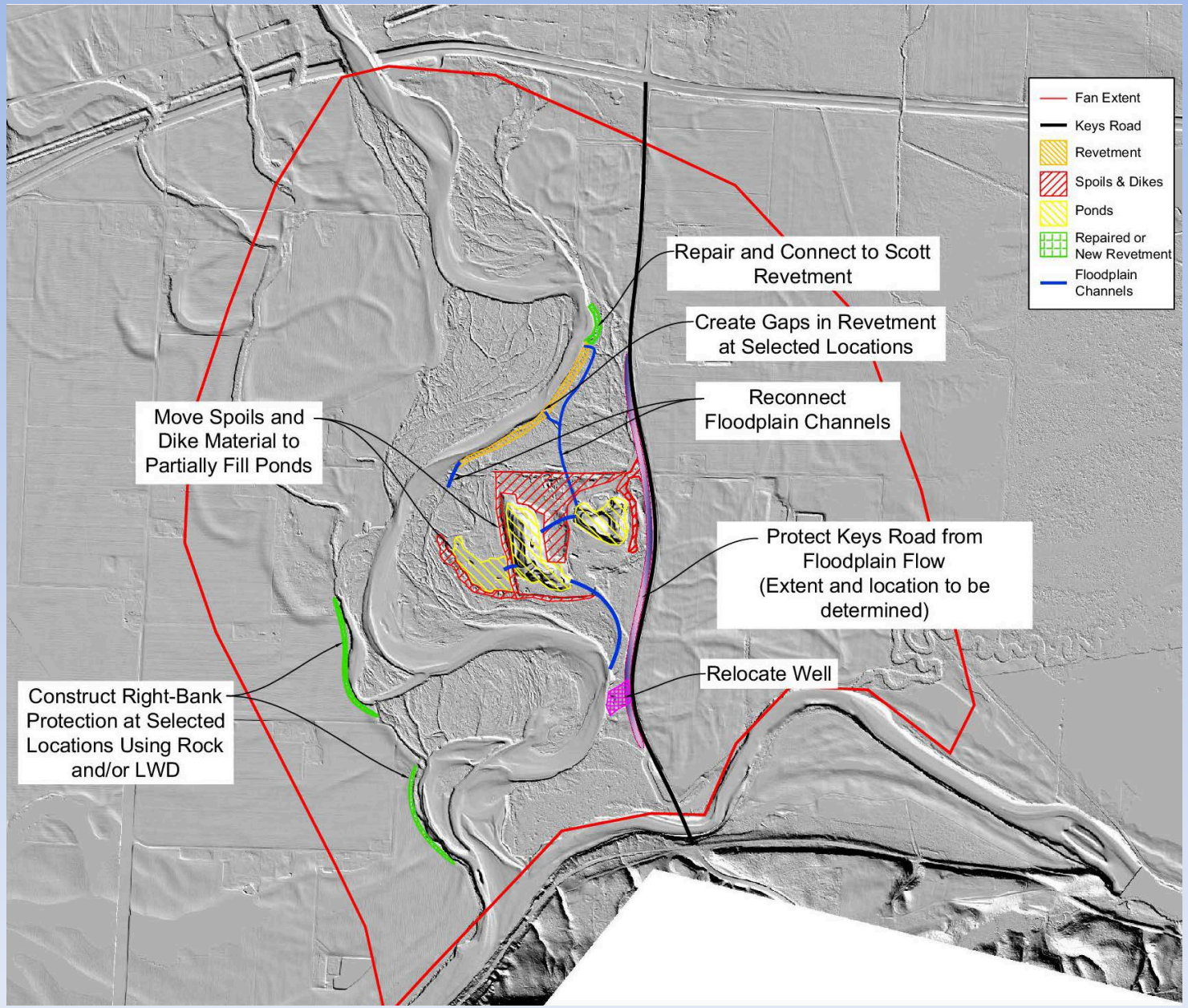
- Velocity slows at bend near Port well
- Velocity increases in channel upstream of pilot channel, where velocity is already high
- Velocity at bar downstream of pilot channel increases
- Velocity in channel downstream of pilot channel decreases



A4 – Channel Maintenance

- Goals
  - Both erosion reduction and erosion increase
  - Both habitat benefit and habitat loss
  - Small flood benefit beyond A2
- Expense
  - Moderate, with ongoing annual expense
- Concerns
  - Increases erosion in some areas
  - Permitting
  - Long term commitment

Alternative A5 – Bank Protection

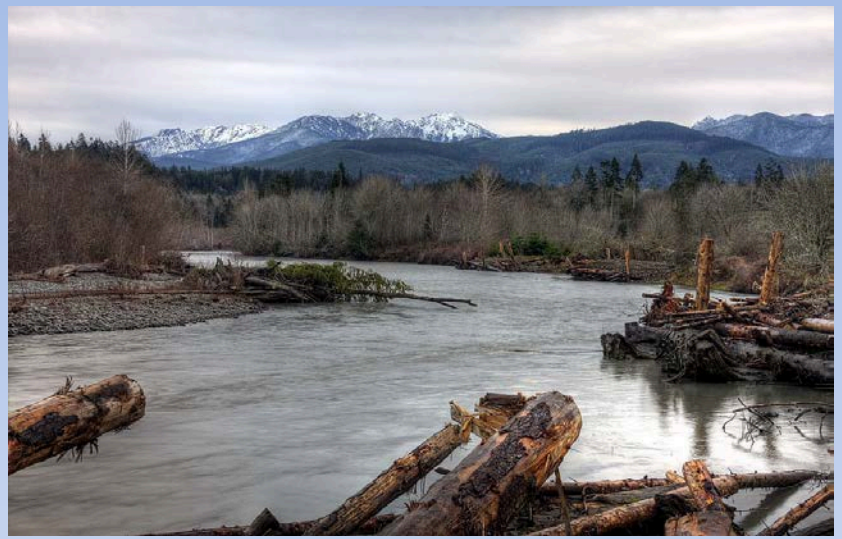


Approximate Cost: $7,800,000

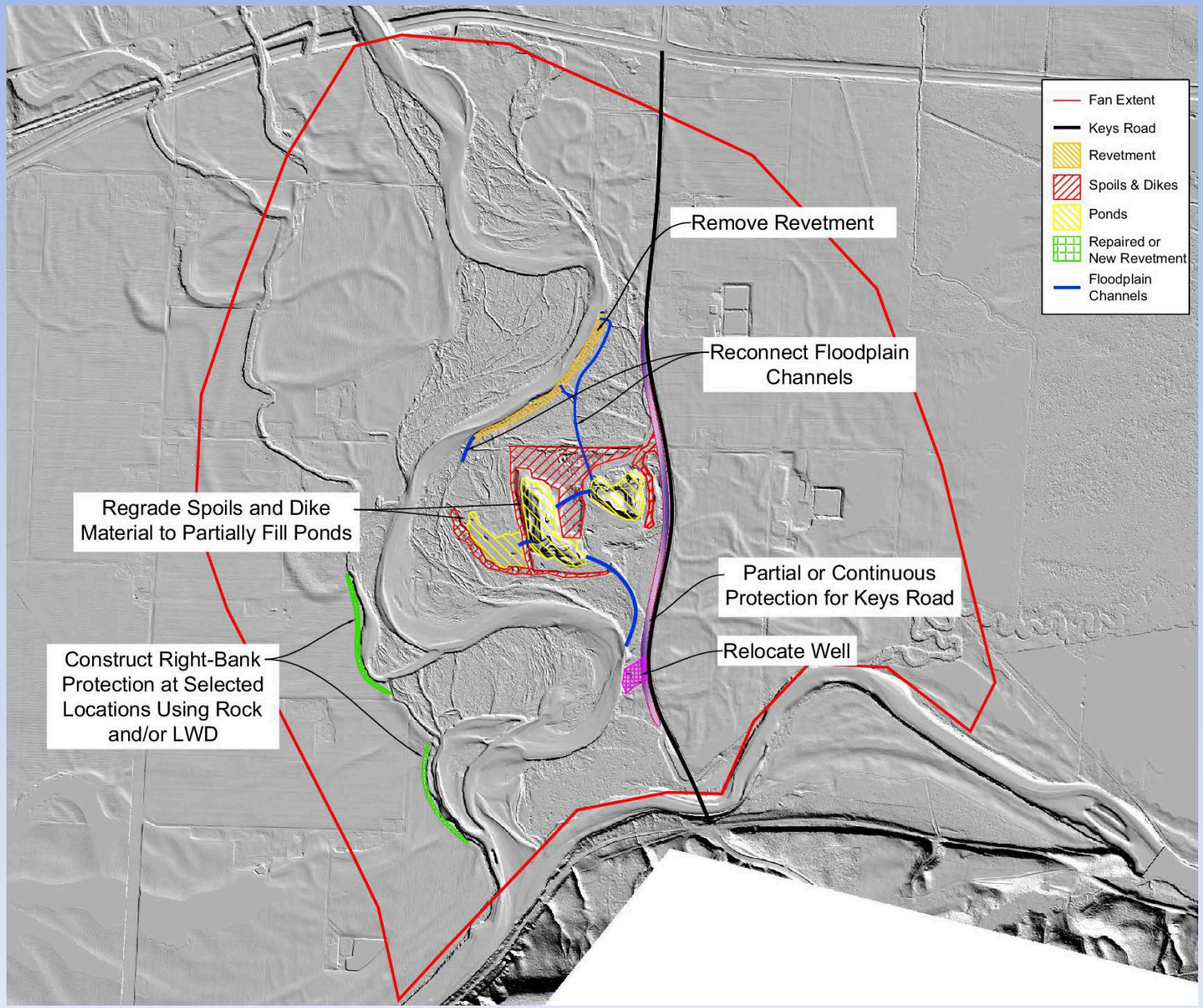
Concept for Alternative A5 – Bank Protection - LWD

Concept for Alternative A5 – Bank Protection - Rock

Example of Bank Protection



Alternative A5 – Bank Protection with Revetment Removal



Approximate Cost:
$10,100,000
To
$13,100,000

A5 – Bank Protection Options

- Goals
  - Significant erosion benefit
  - Both habitat benefit and habitat loss
  - No flood benefit beyond A2
- Cost
  - High to extremely high
- Concerns
  - Limits migration to a smaller than natural corridor
  - Difficult to permit

Summary

A1 – No action

- No benefit, no additional cost

A2 - Spoils/Dikes Regrading

- Lowers peak floods marginally
- Improves habitat

A3 - Corridor

- No additional flood or erosion benefit
- Habitat improvement
- Financial benefit to landowners over A1
- Relatively inexpensive, unless Keys Road moved

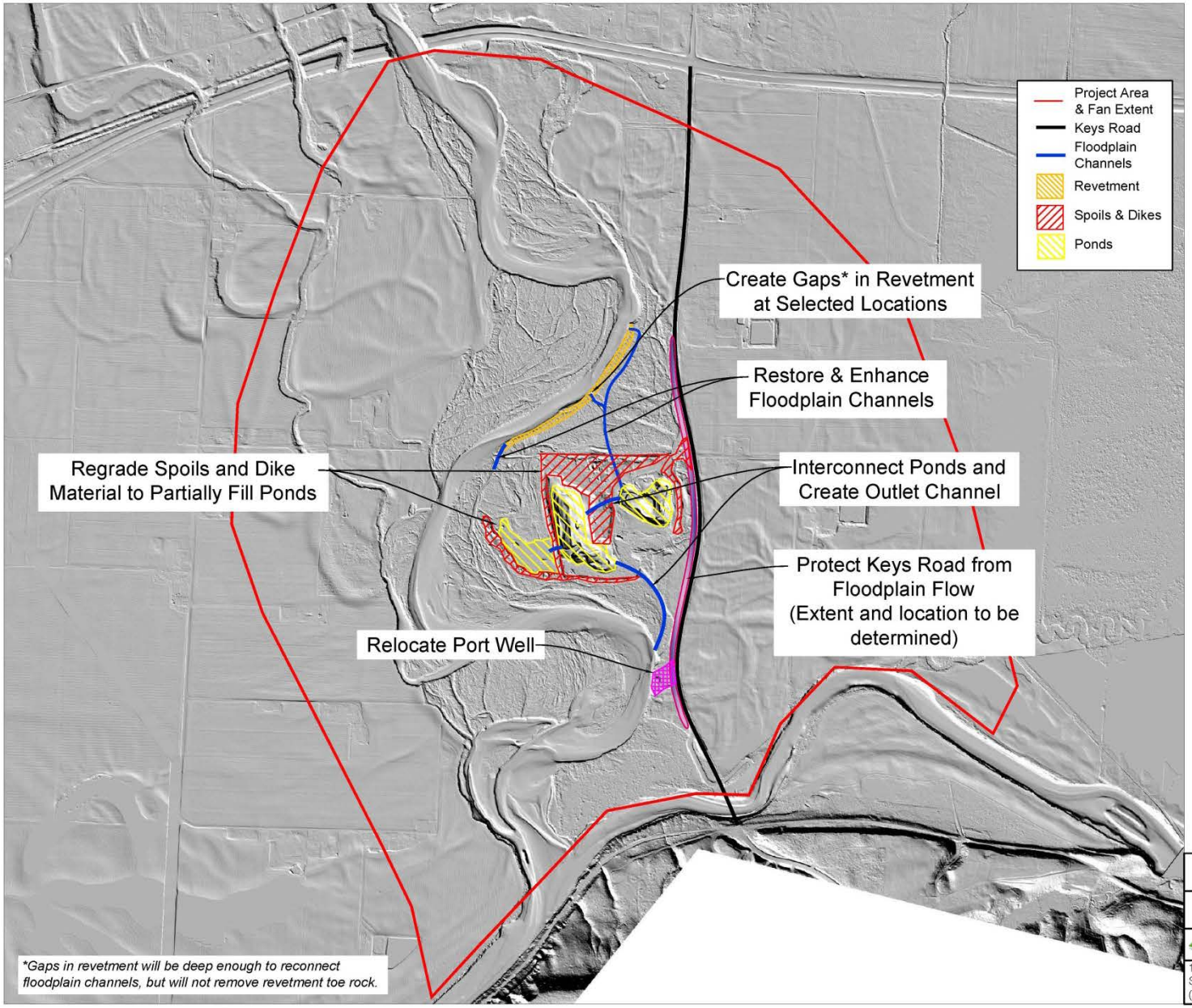
A4 – Channel Maintenance

- Some additional flood benefit
- Relatively inexpensive
- Trades erosion risk from one spot to another
- Loss of habitat
- Difficult to permit

A5 – Bank Protection

- No additional flood benefit
- Erosion benefit
- Loss of habitat (floodplain function)
- Constricted migration zone
- High cost

Phase 3 Project Proposal



Lower Satsop Restoration Phase III Elements

Elements include:

- Move spoils piles & dikes to partially fill ponds (approx. 1/3 full) & create safer sideslopes
- Excavate gaps in revetment to reconnect floodplain channels
- Restore & enhance floodplain channels
- Interconnect ponds and restore outlet channel
- Protect Keys Road from overbank/floodplain channel flow
- Revegetate disturbed areas
- Assist with relocation of Port well

Order of Magnitude Cost Estimate:

• Regrade spoils: 160,000 CY	$2,000,000
• Floodplain channels (3,000 feet): 6,000 CY	$150,000
• Revegetation 14 Acres	$250,000
• Keys Road Protection Lump Sum	$200,000
• Port Well Relocation WDFW portion	$500,000
• Final Design & Permitting Lump Sum	$200,000
Total	**$3,300,000**

Lower Satsop Phase III Elements

Washington Department of Fish & Wildlife, Grays Harbor County, WA

WATERSHED SCIENCE & ENGINEERING
110 Prefontaine Pl S. Suite 508
Seattle, WA, 98104
(206) 521-3000

SCALE: 1" = 1,000'
DATE: Sep. 2014
JOB NO: 14-004
PLATE 1

Next Steps

Stakeholder input

- Today's discussion
- Comment form

Project alternatives evaluation

- Erosion and flood reduction
- Stakeholder support
- Ecological benefits
- Feasibility
- Sustainability
- Cost

Please fill out:

Stakeholder Survey and Comments

Alternative	Score (1 – 4)	Comments
A1-No action		
A2- Dikes and Spoils removed		
A3- Flood Corridor Protection		
A4-Channel Maintenance		
A5-Bank Protection		

1-no support, 2-low support, 3-medium support, 4-high support

Discussion

Stakeholder Meetings Preliminary Schedule

- Kick-Off
  - March 2014
- Alternative Discussion
  - October 16, 2014
- Preferred Alternative Selected
  - November 2014
- Preliminary Design & Permit Strategy
  - December 2014
- Final Project Design & Report
  - June 2015

Contact Information

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