



Restoration of Urban Ravines to Increase In-situ Storage of Sediment and Water

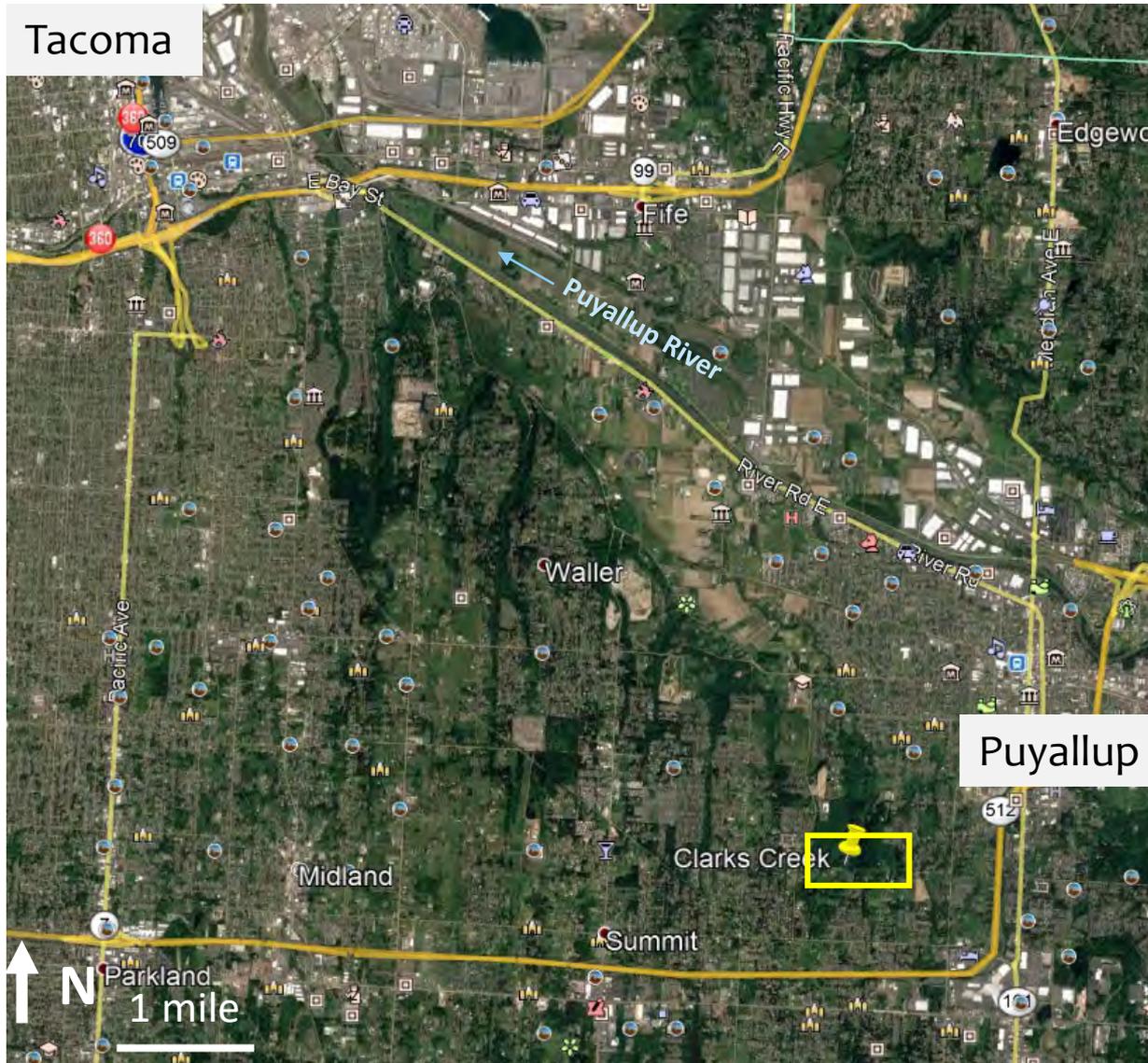
Maggie Stepp

For this session...

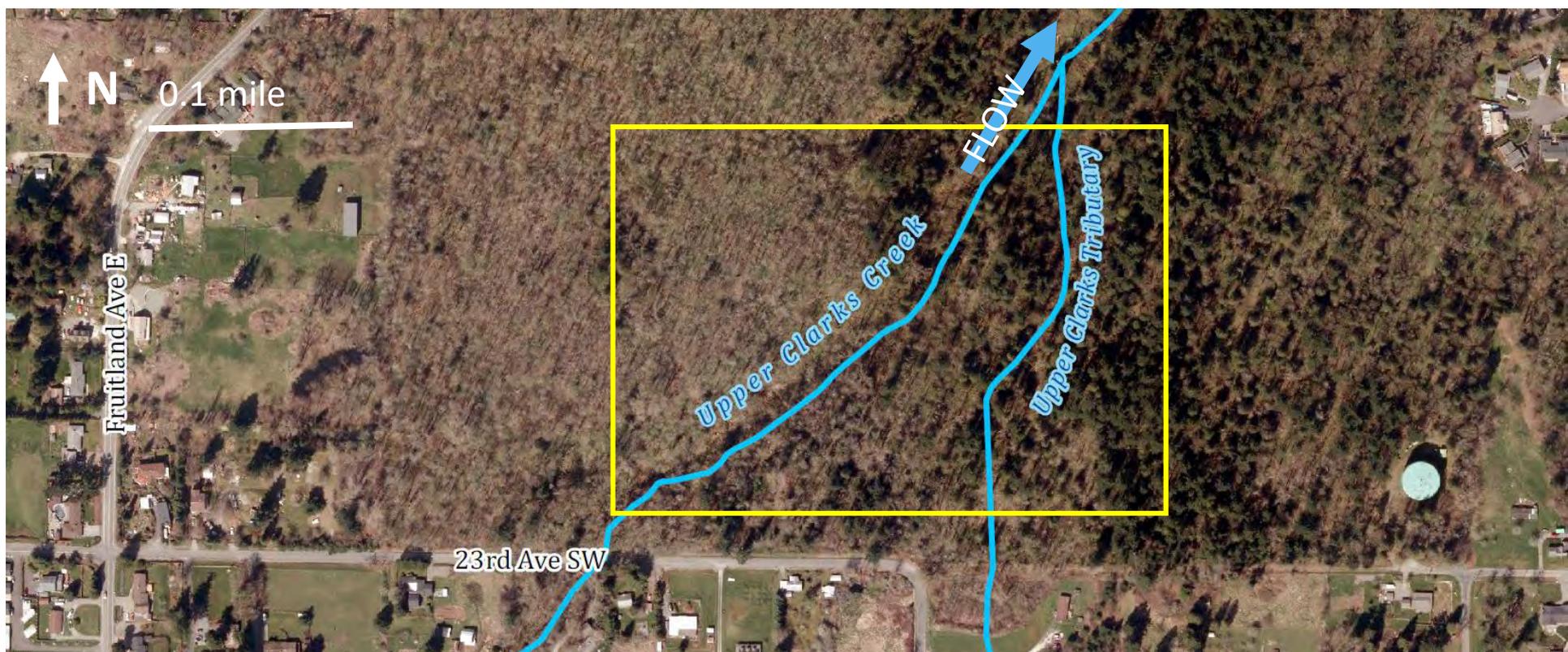
- A degraded urban ravine – Clarks Creek
 - ▶ Impaired water quality/salmon habitat
 - ▶ Treatment approach
 - ▶ Construction methods
 - ▶ Stored sediment and water



Clarks Creek Vicinity



Clarks Creek Project Site



Problem – Impaired Water Quality

Channel and bank erosion

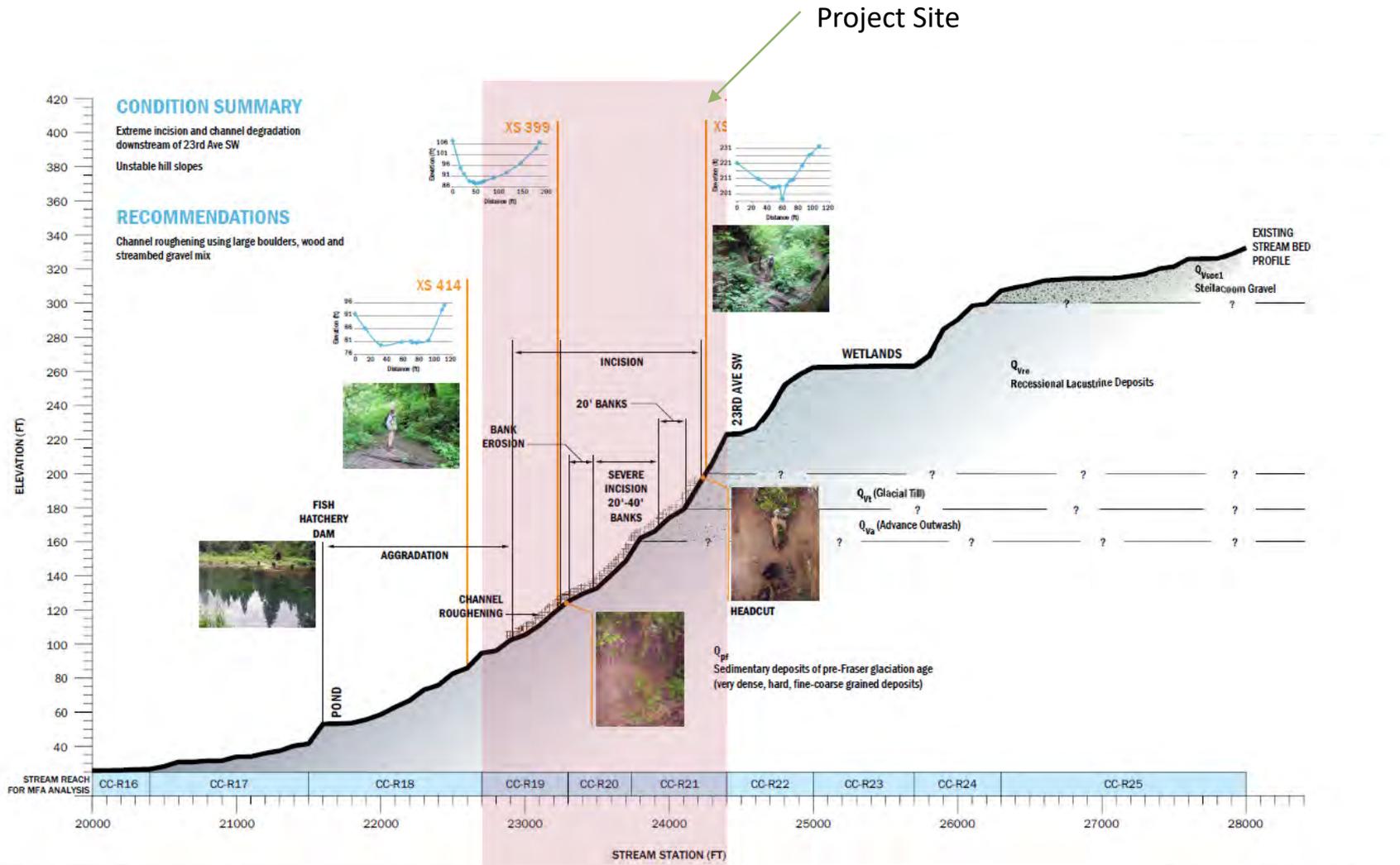


Increased sediment transported downstream



Impaired water quality and decreased salmonid habitat



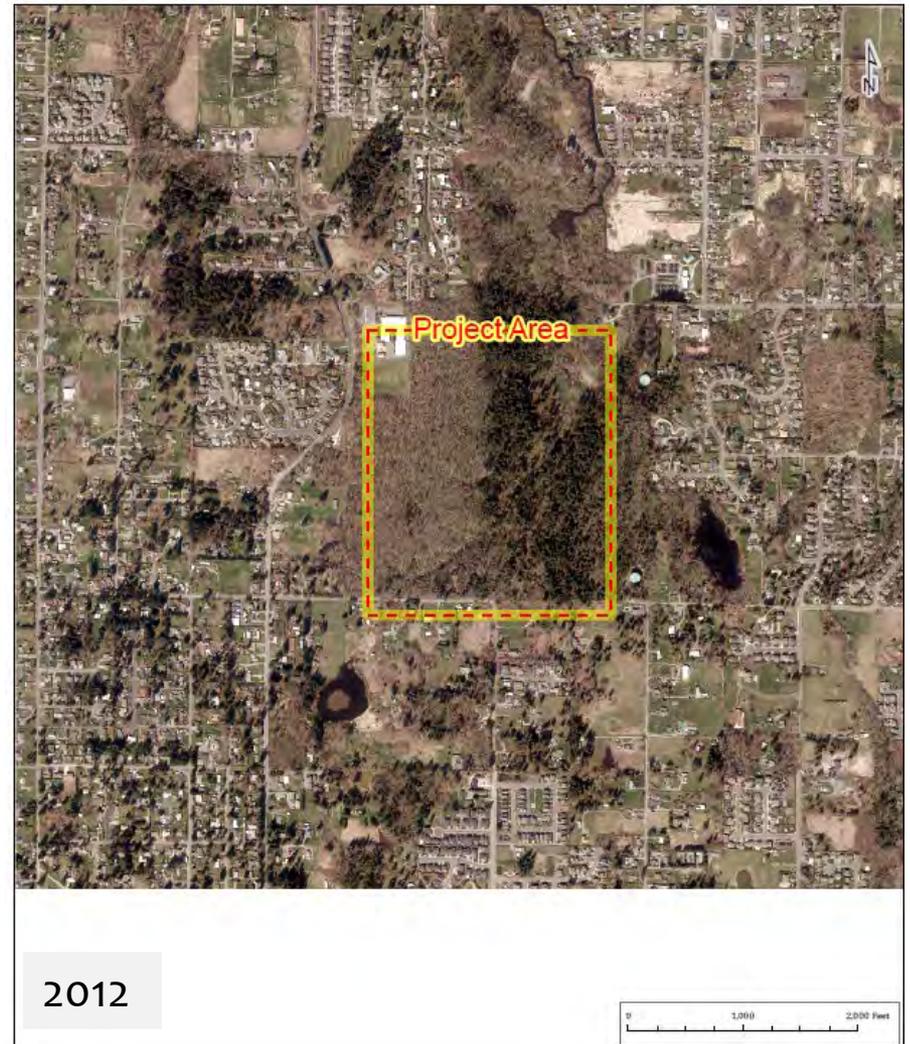


Profile Vertical Scale: 1 Inch = 50 feet, Profile Horizontal Scale: 1 Inch = 600 feet
 Surface Geology from Toot, K.G. in Review, Geologic Map of the Puyallup 7.5 Minute Quadrangle, Washington; U.S. Geological Survey Miscellaneous Field Investigation, Scale 1:24,000



UPPER CLARKS CREEK PROFILE AND GENERAL GEOMORPHIC CONDITIONS
 Clarks Creek Sediment Reduction Action Plan

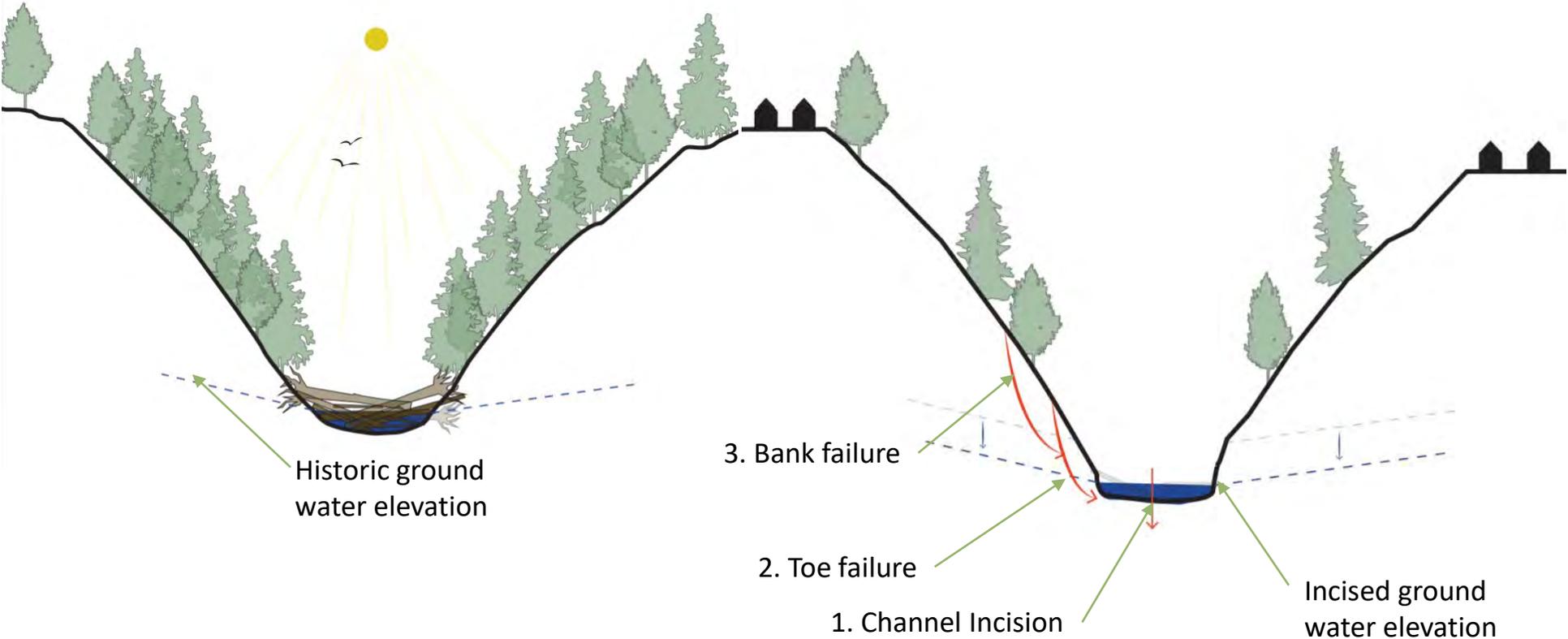
Upland Modifications



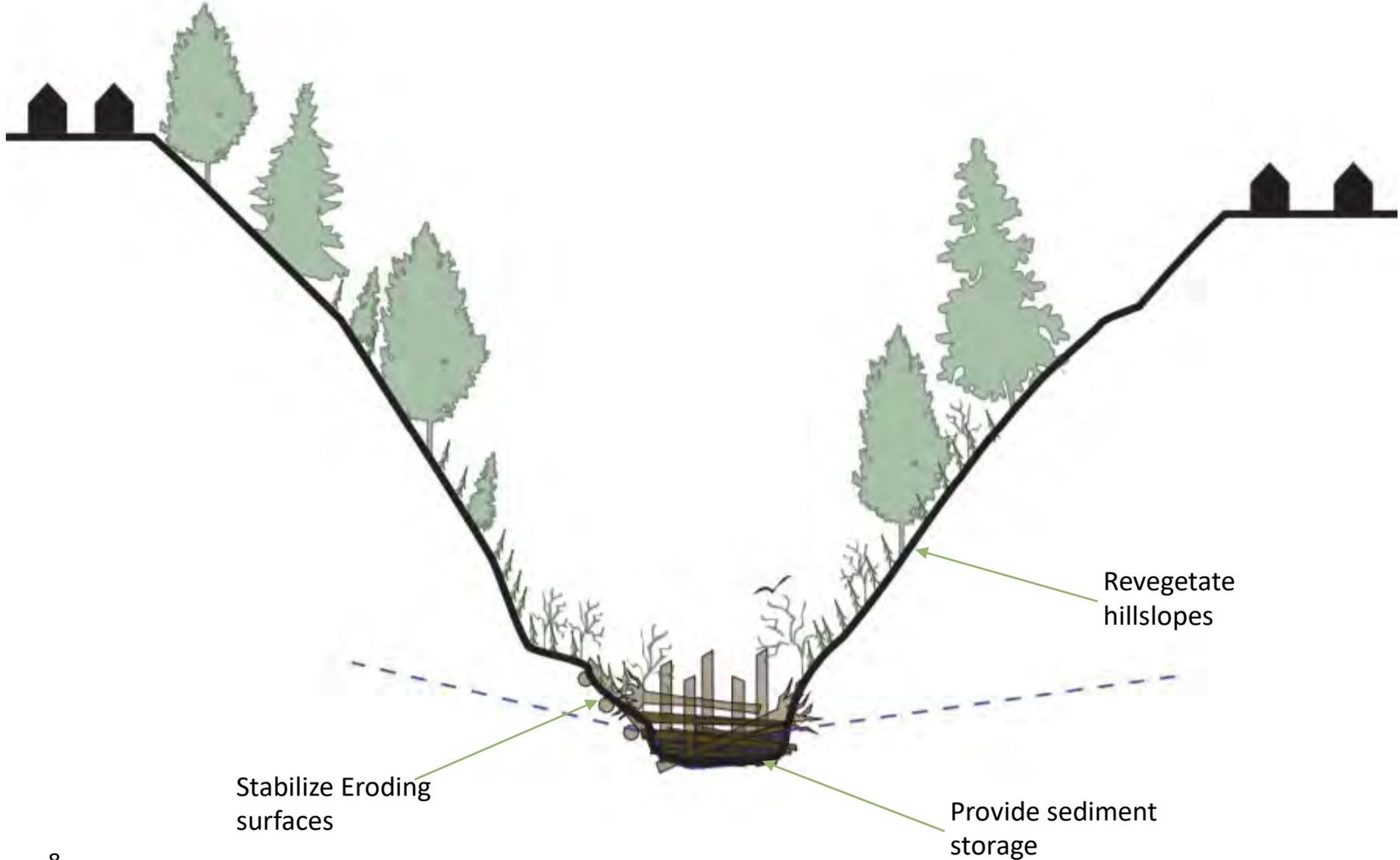
Changes to Historic Conditions

Historic Valley

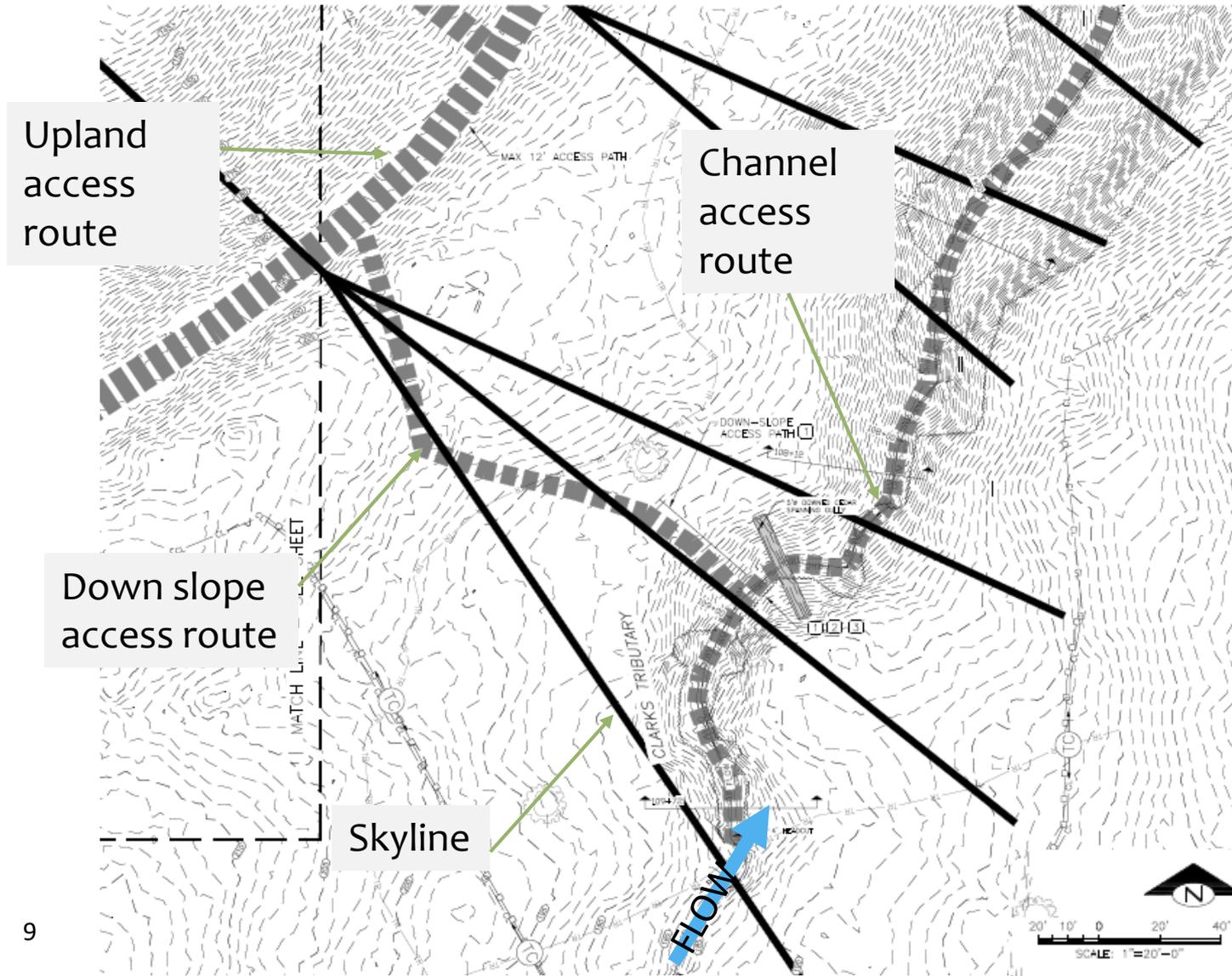
Pre-project/Eroded Valley



Conceptual Approach



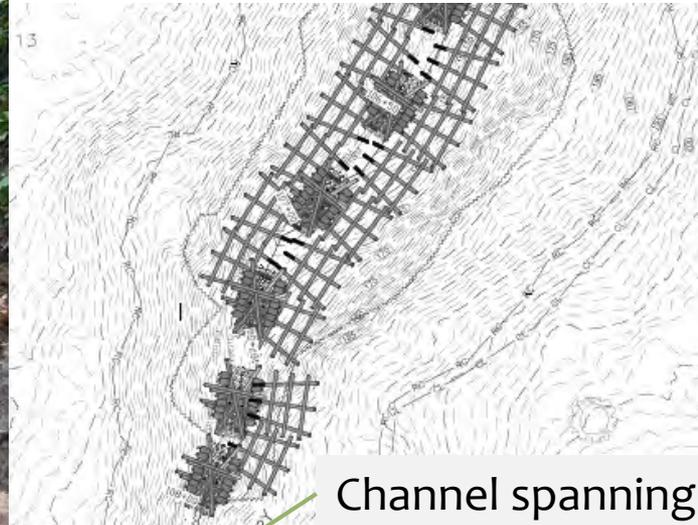
Clarks Creek Construction Access



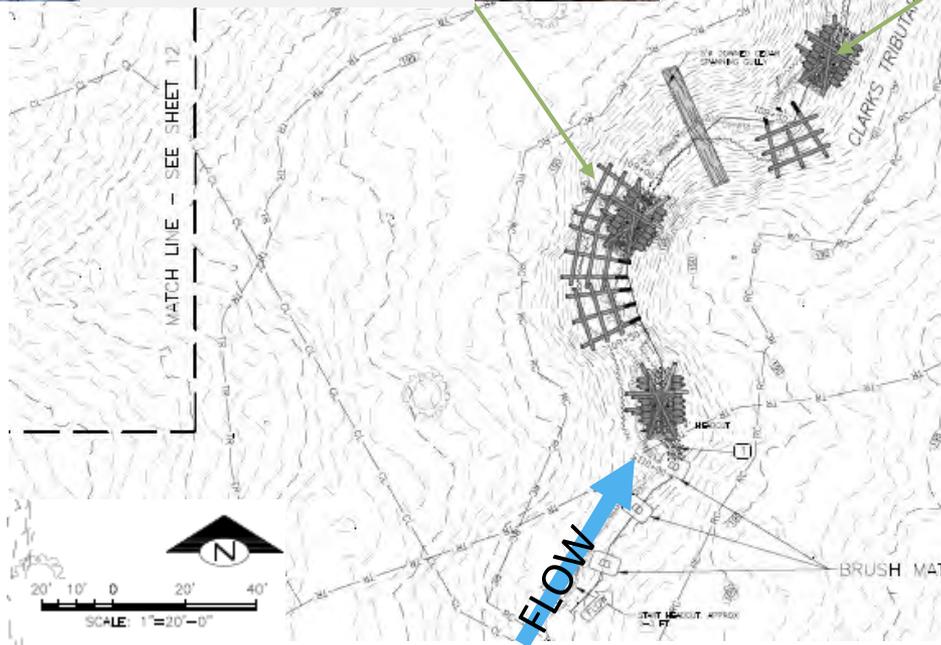
Aggressive Treatment



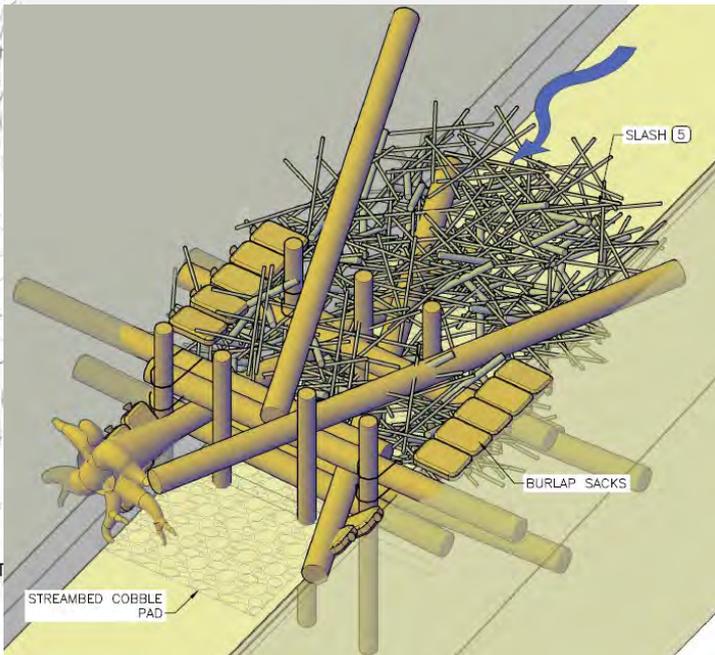
Bank structures



Channel spanning structure



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Aggressive Treatment



Channel
spanning
structure

Bank
structure

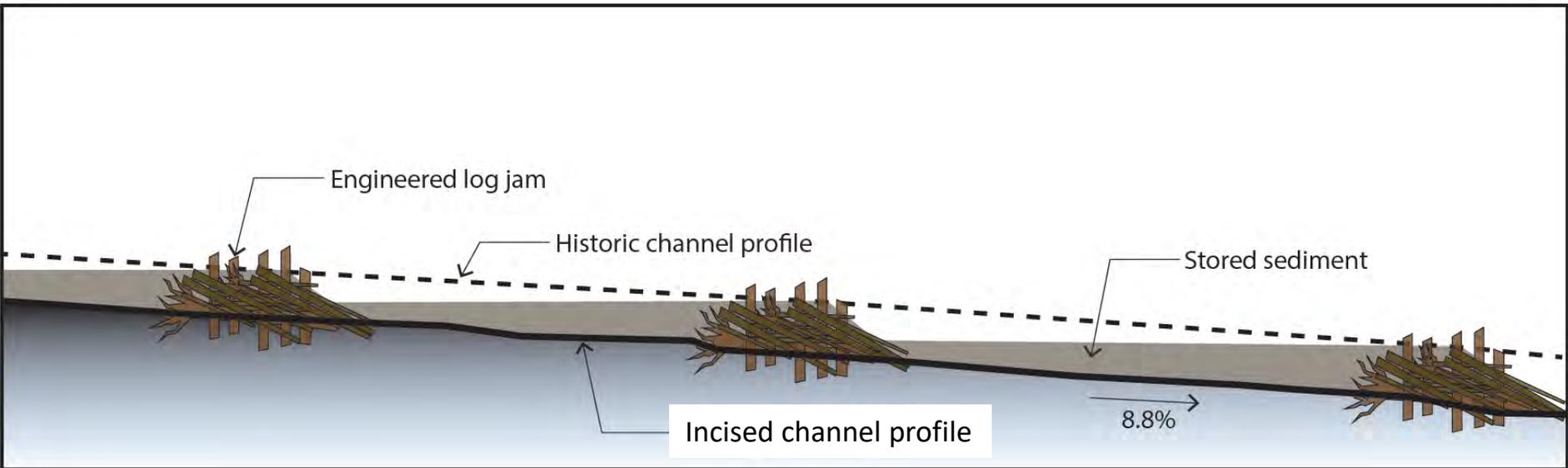
Valley scale comparison



Historic valley

Eroded valley

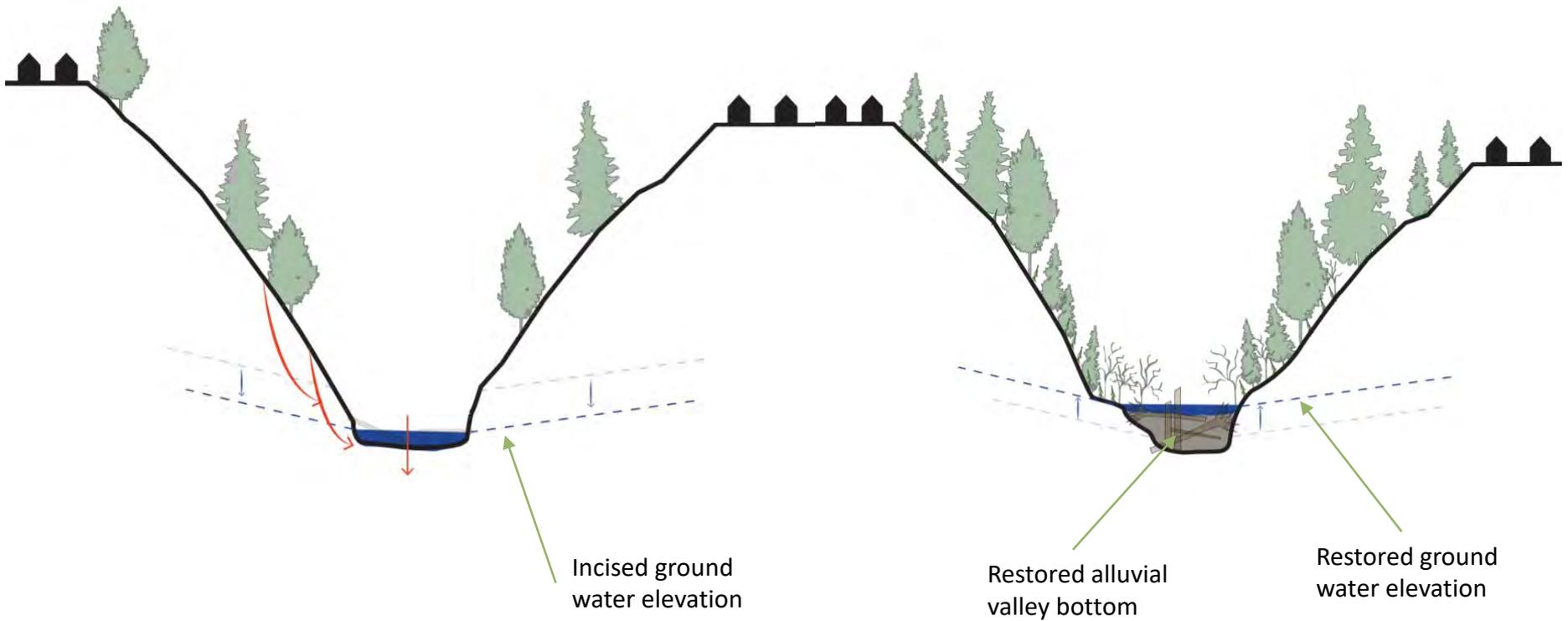
Increased Sediment Storage



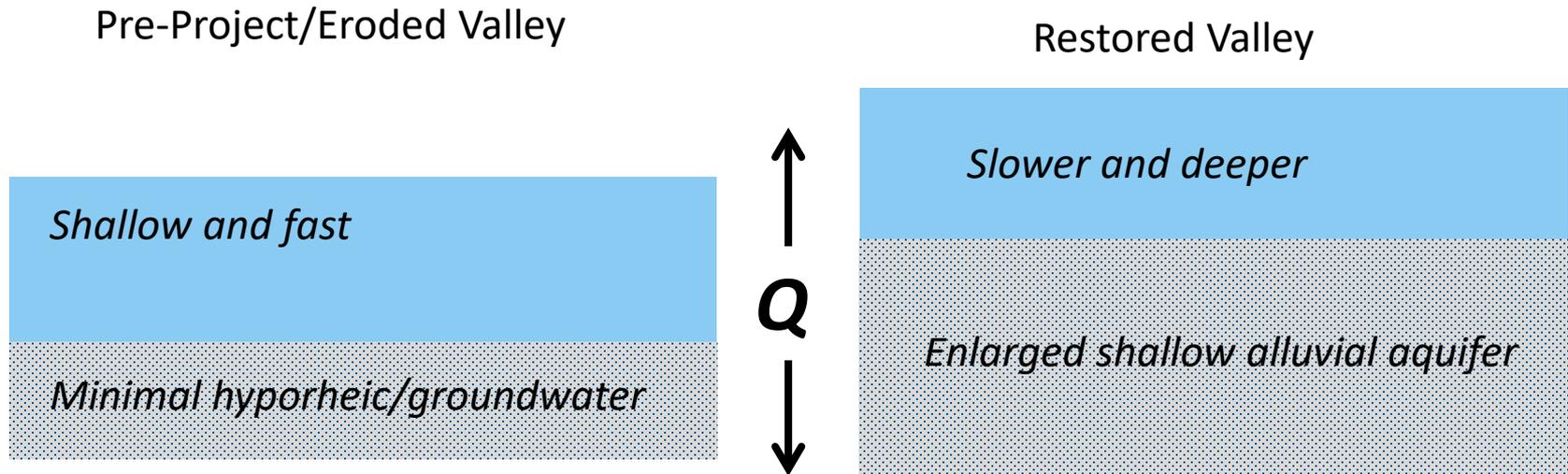
Increased Water Storage

Pre-Project/Eroded Valley

Restored Valley



Increased Water Storage



$$Q_{open\ channel} \propto n, A, R, S \text{ (cf/s)}$$

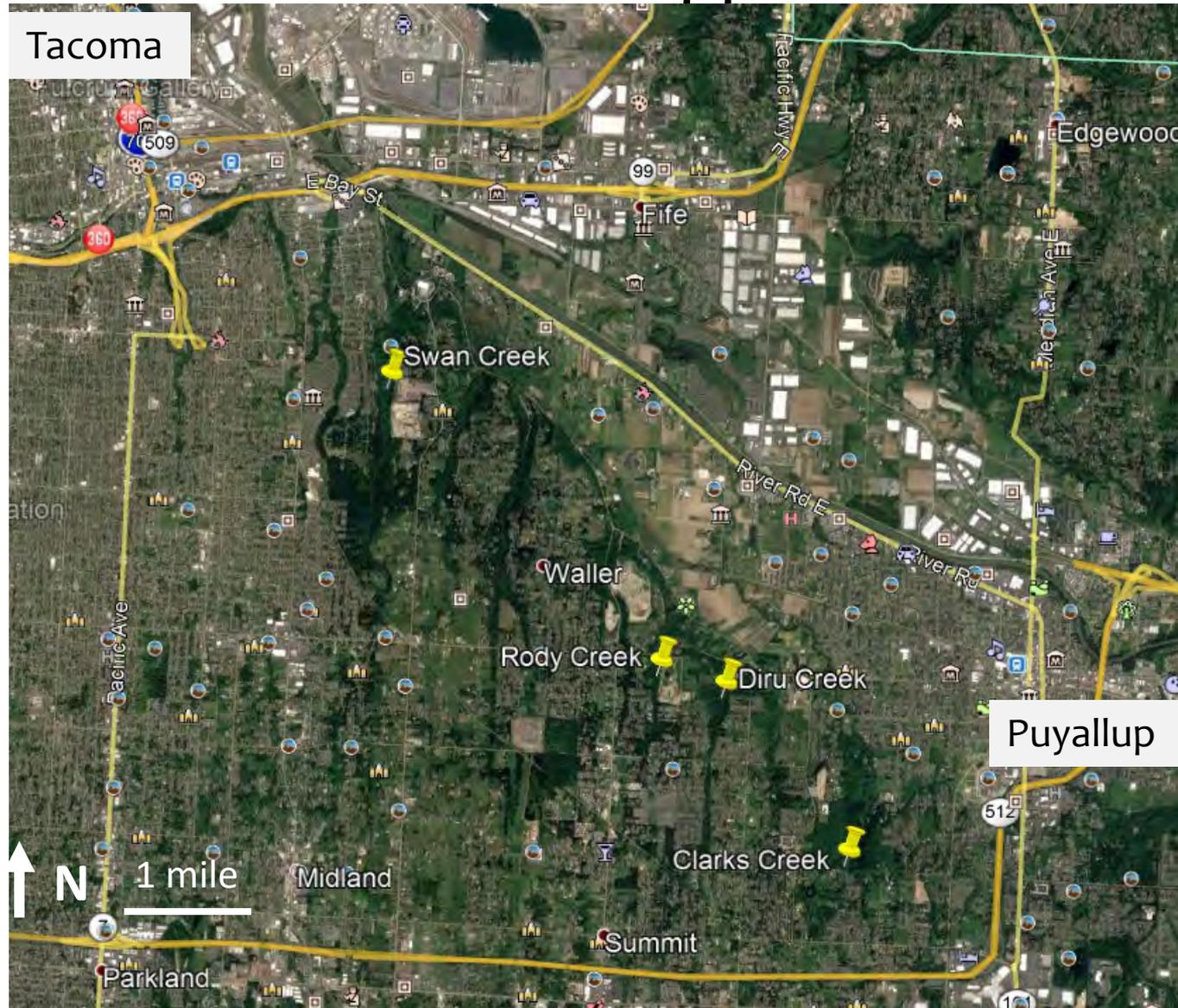
and

$$Q_{porous\ media} \propto i, K \text{ (cf/month)}$$

therefore,

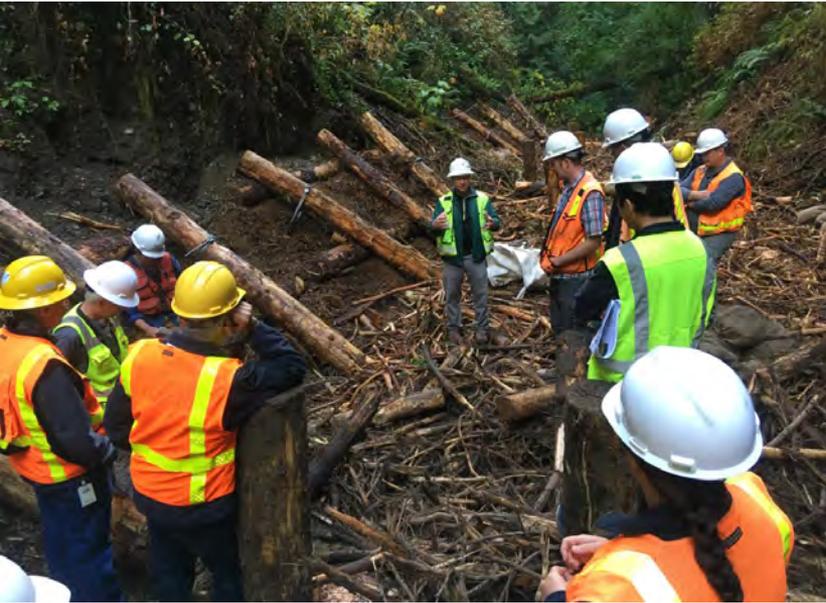
$$T_{residence,porous\ media} \gg T_{residence,open\ channel}$$

Where are there more opportunities?



Thanks!

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The Puyallup Tribe



of Indians



Pierce County

Public Works and Utilities
Surface Water Management