Tucannon River PA 5-15 Project

Space Targets Discussion
February 11, 2025

Presenting: Nick Legg, LG (Lichen Land and Water)

Wolf Water Resources did hydraulic modeling

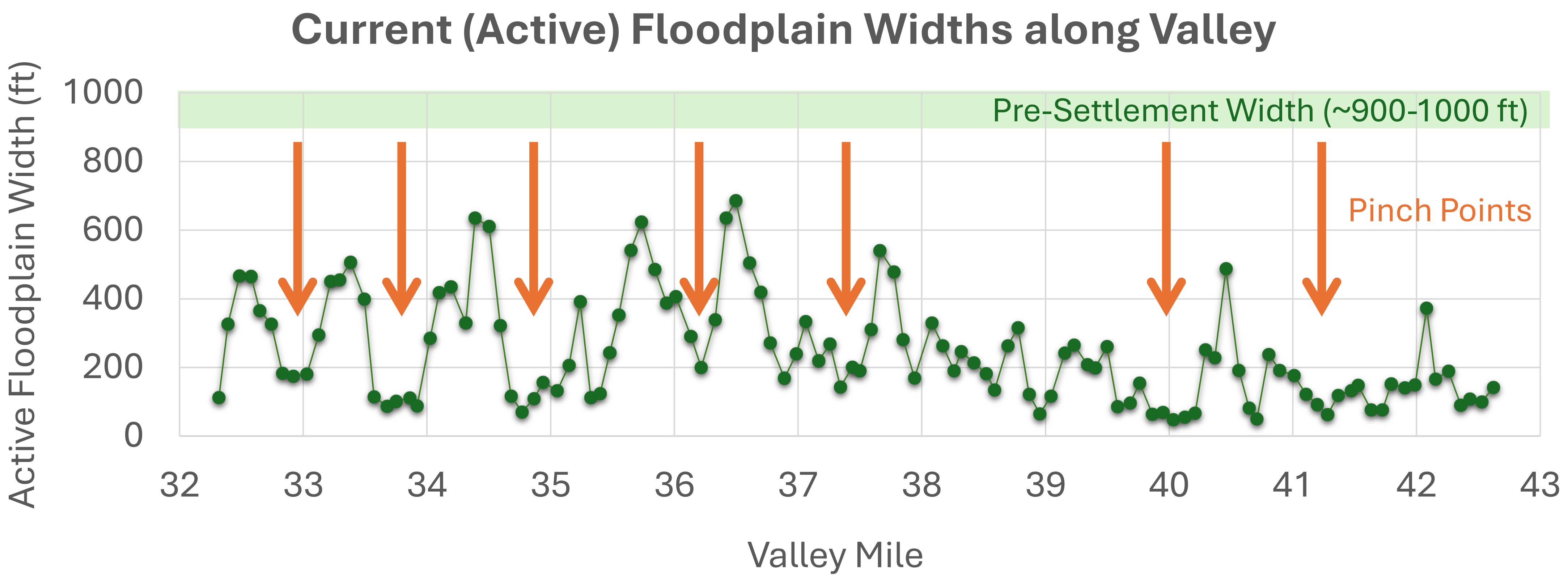
The Key Question in This Presentation:

How Much Space Does the River Need?

...In other words, what is our "low bookend" space target?

Need = Low Bookend Space

Want = High Bookend Space



Current (Active) Floodplain Widths along Valley
Pre-Settlement Width (~900-1000 ft)
Pinch Points
Active Floodplain Width (ft)
1000
800
600
400
200
0
32
33
34
35
36
37
38
39
40
41
42
43
Valley Mile

Proposed Low Bookend (Space Need) Framework:

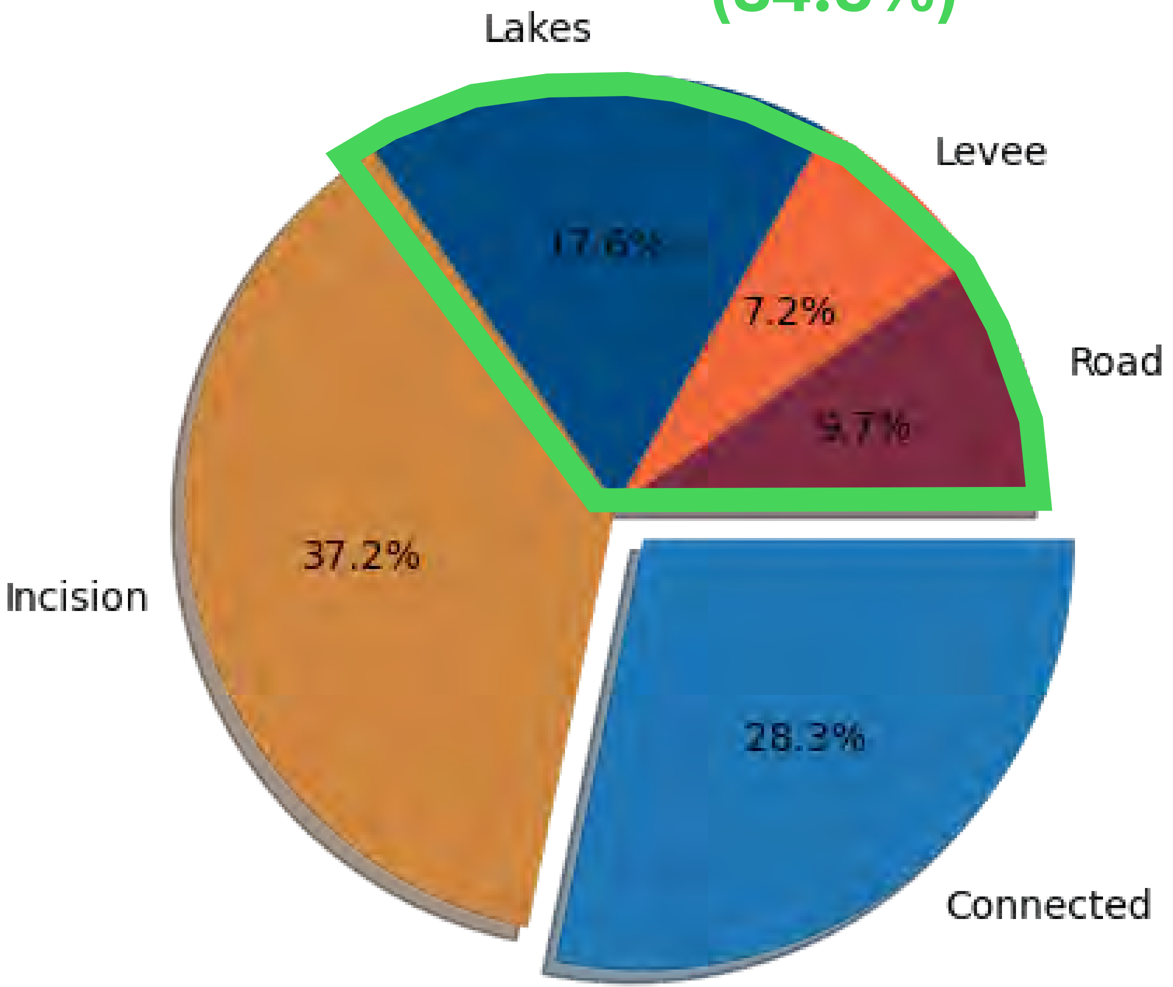
1. Define low bookend target to achieve **sustainable (durable)** function in the whole floodplain corridor.

2. ***We need to address incision***, the primary threat to a sustainable functional floodplain.

3. **Therefore, the low bookend space should be defined to address (limit) incision potential**

State of the Floodplain

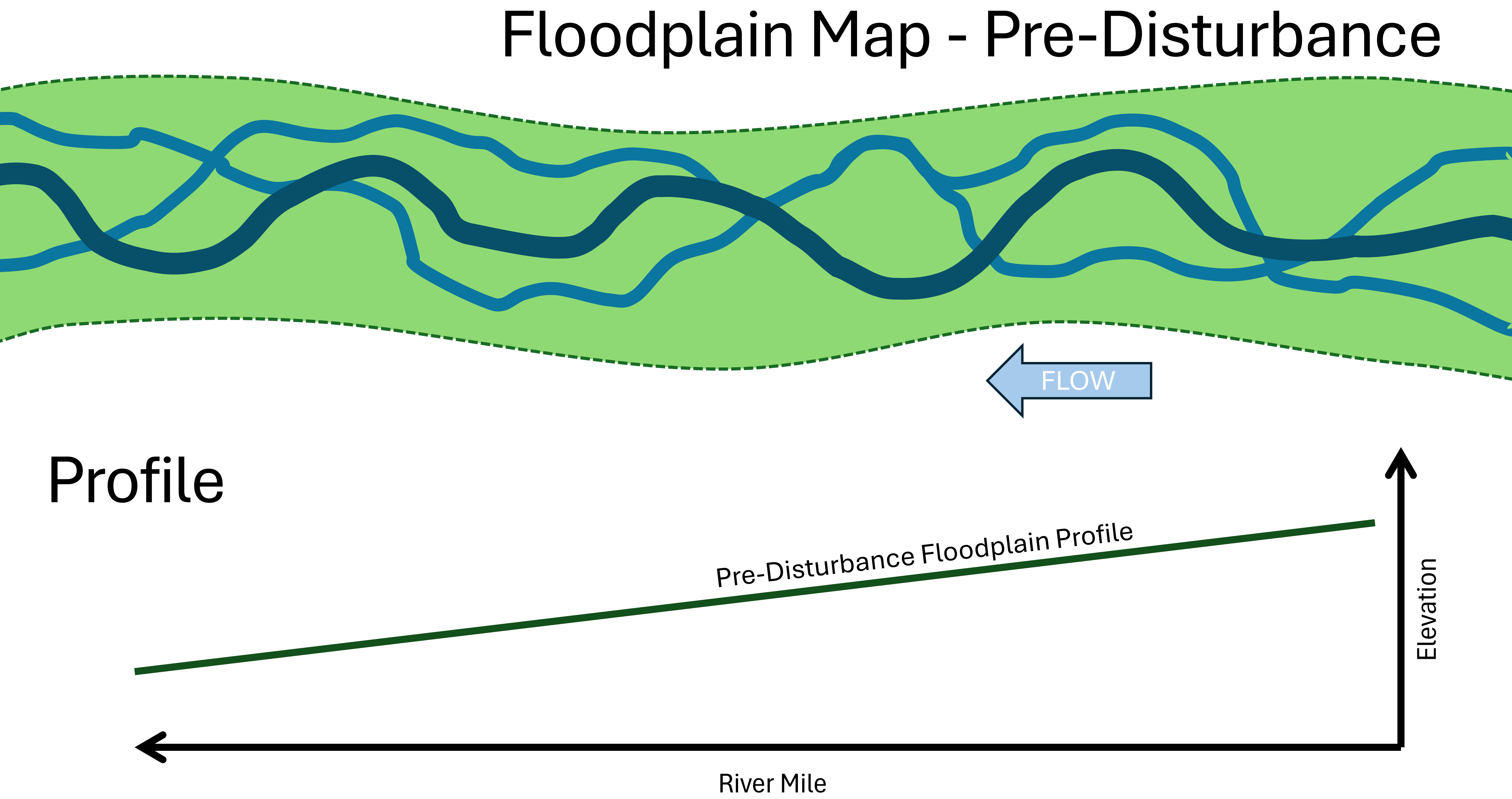
Lateral Disconnection (34.5%)



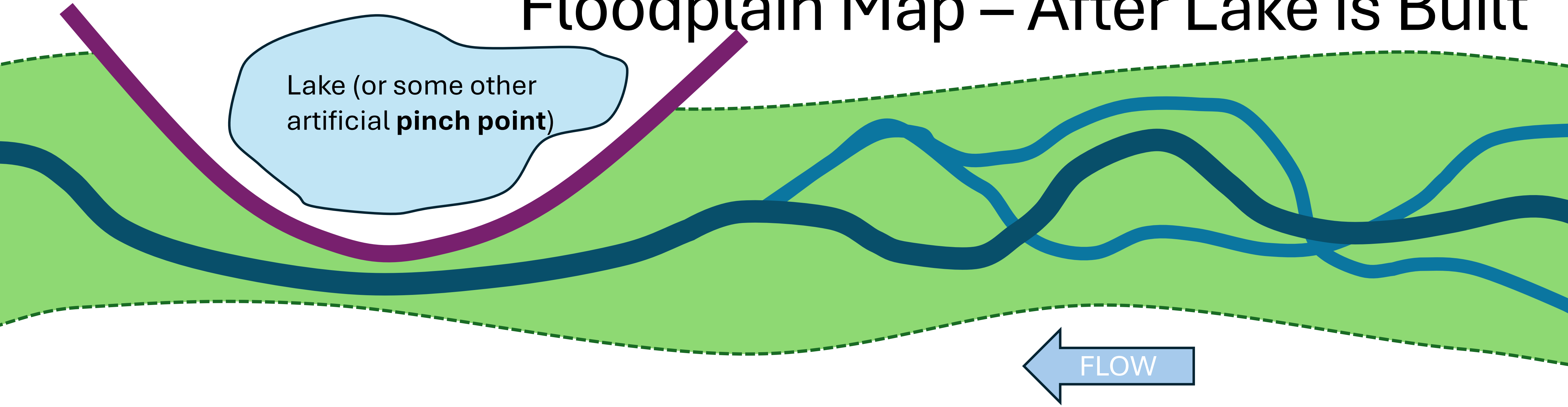
Incision (Vertical Disconnection)

Connected

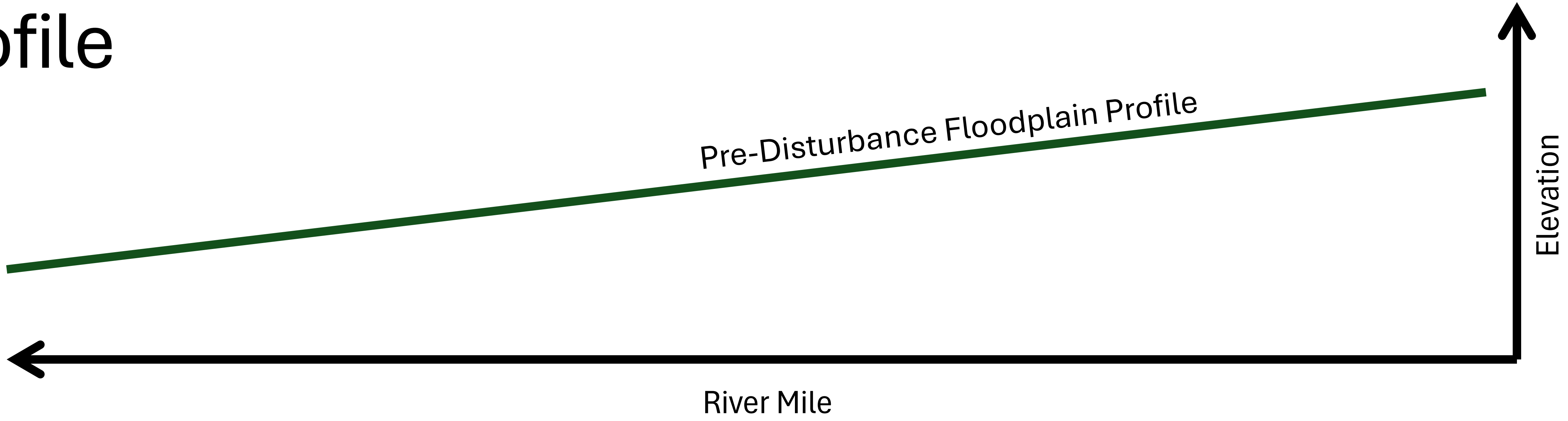
Wolf Water Resources led this work


Floodplain Map - Pre-Disturbance
FLOW
Profile
Pre-Disturbance Floodplain Profile
Elevation
River Mile

Floodplain Map – After Lake is Built

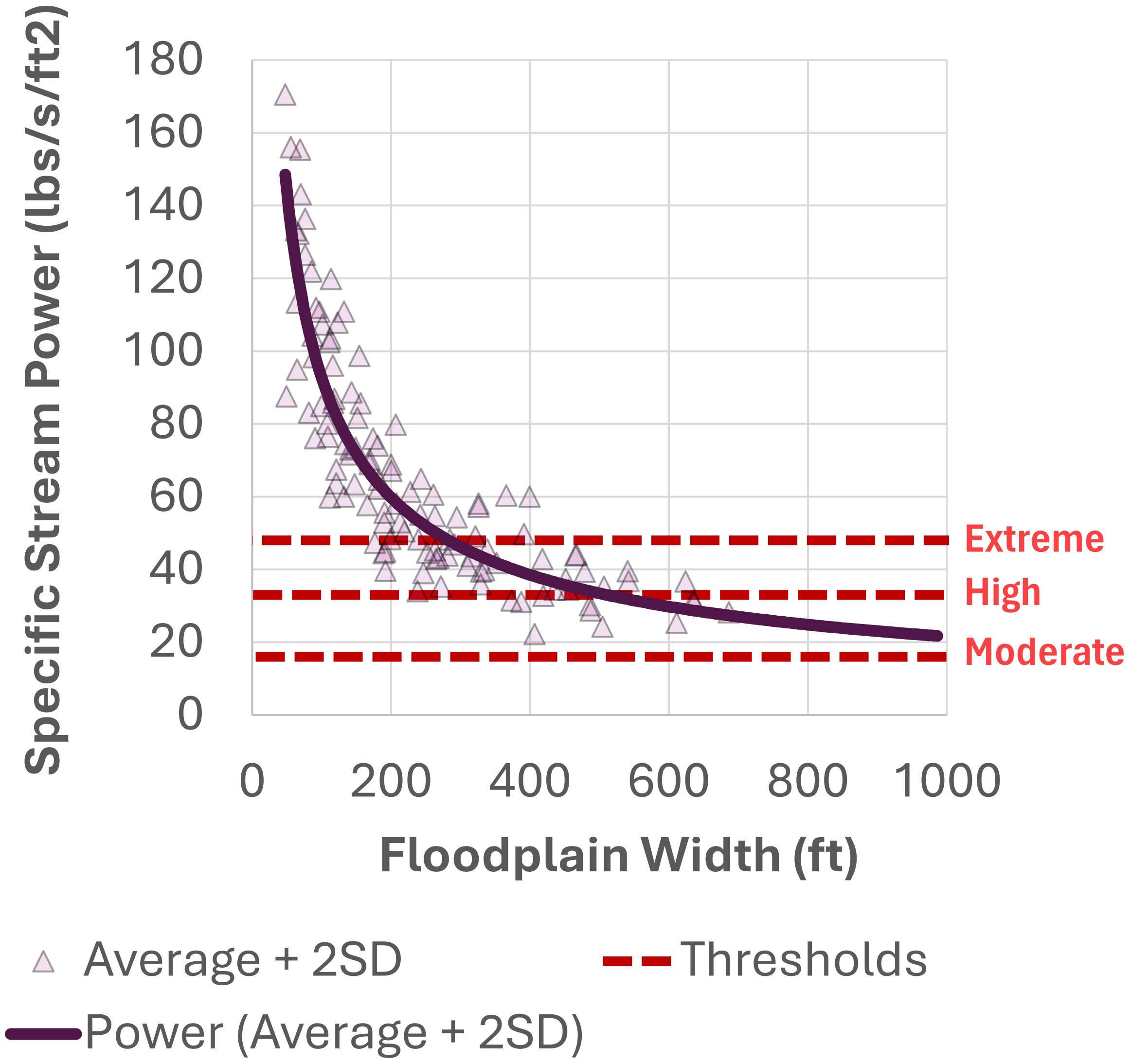


Profile

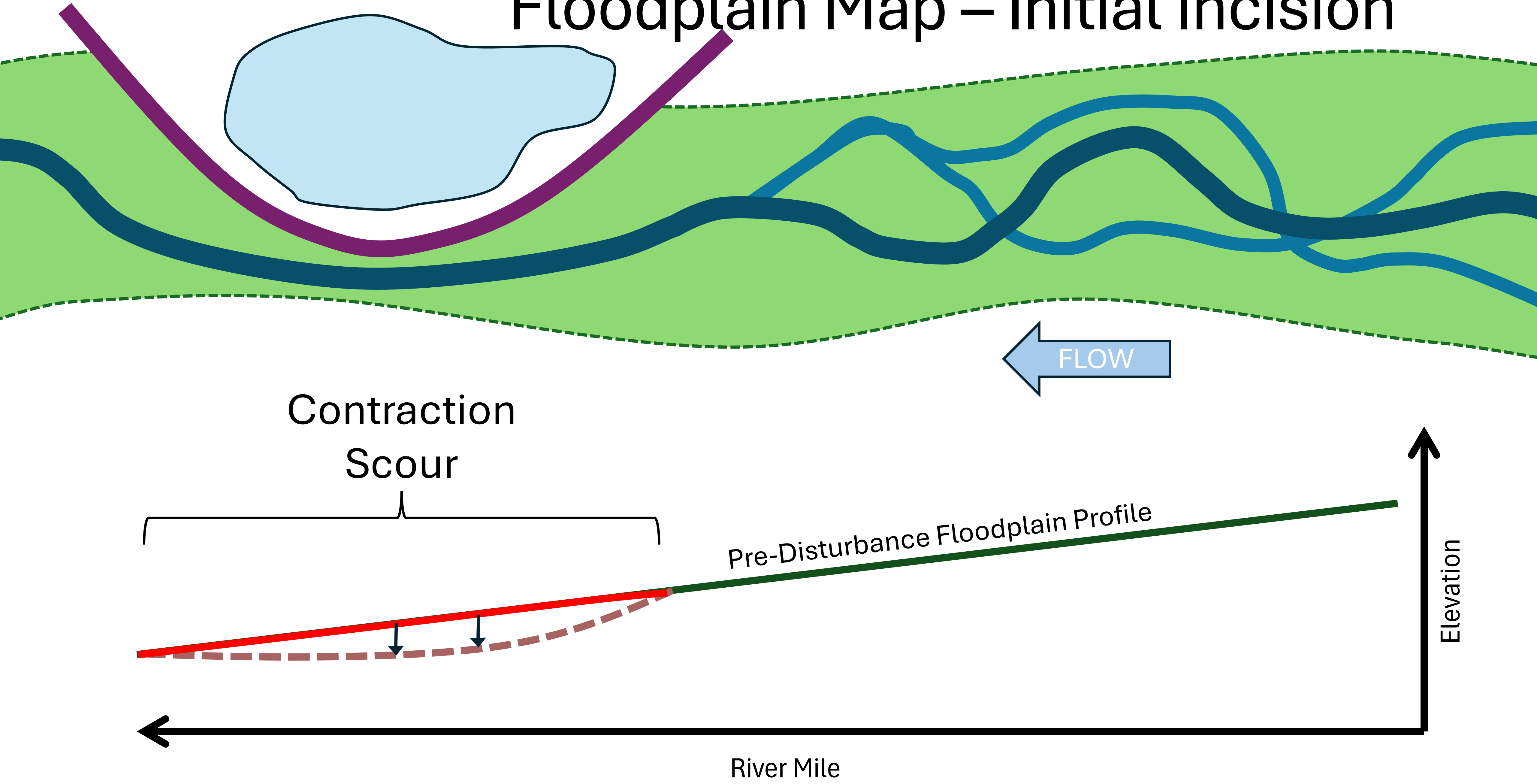


Constricted Floodplain → Increased Erosive Energy

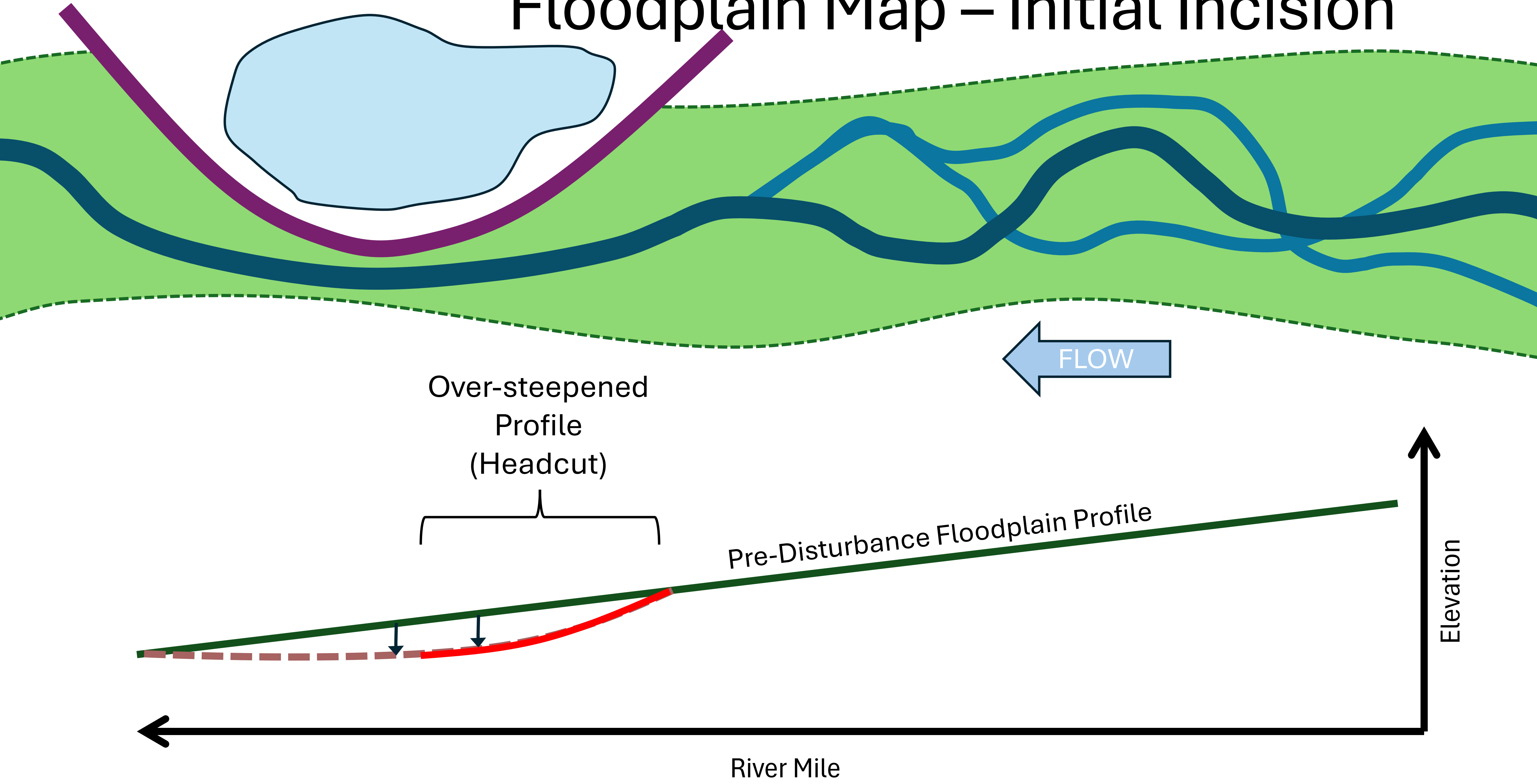
(Review from last meeting)



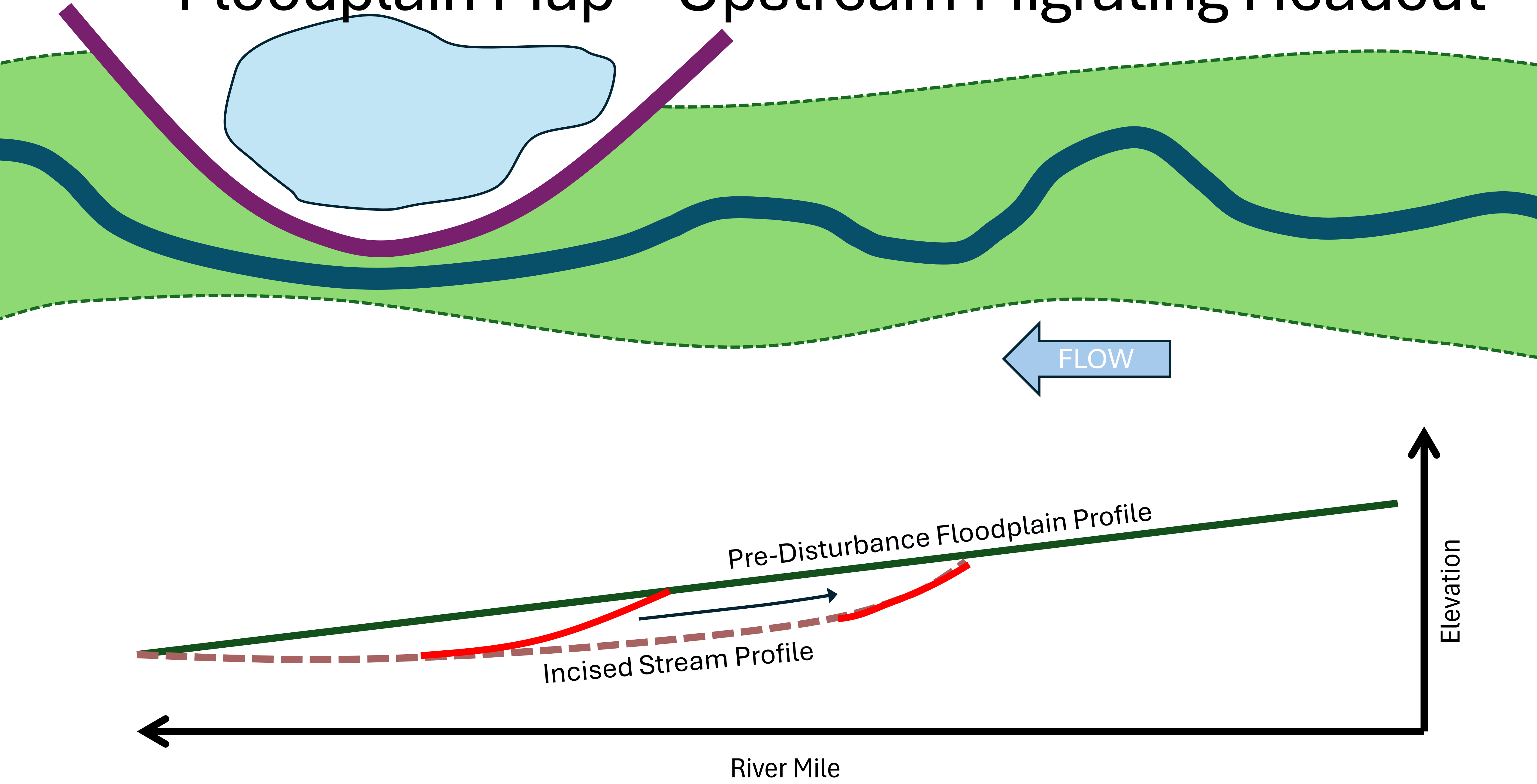
Floodplain Map – Initial Incision



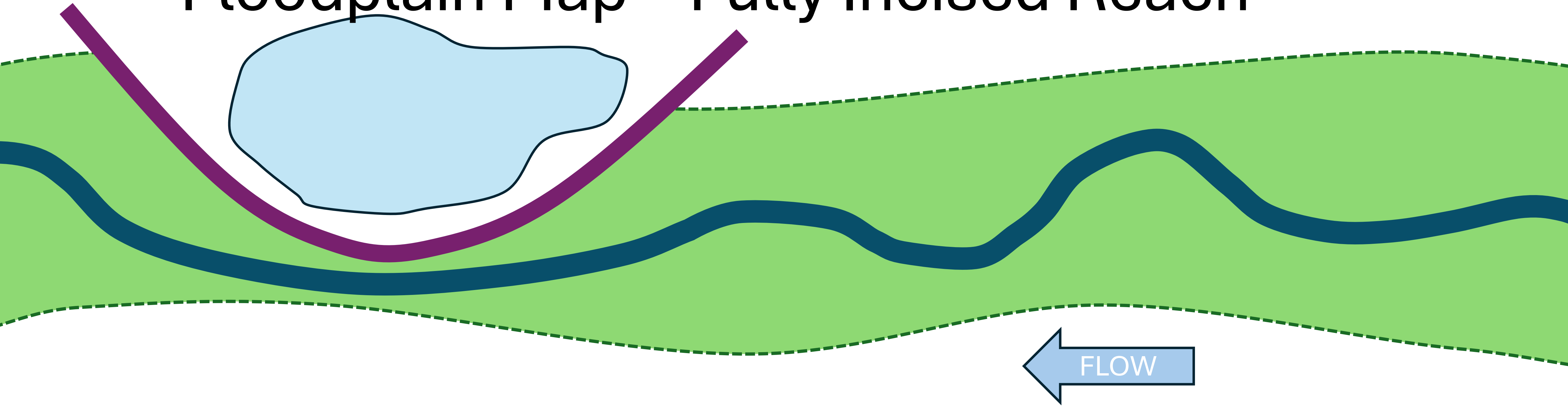
Floodplain Map – Initial Incision



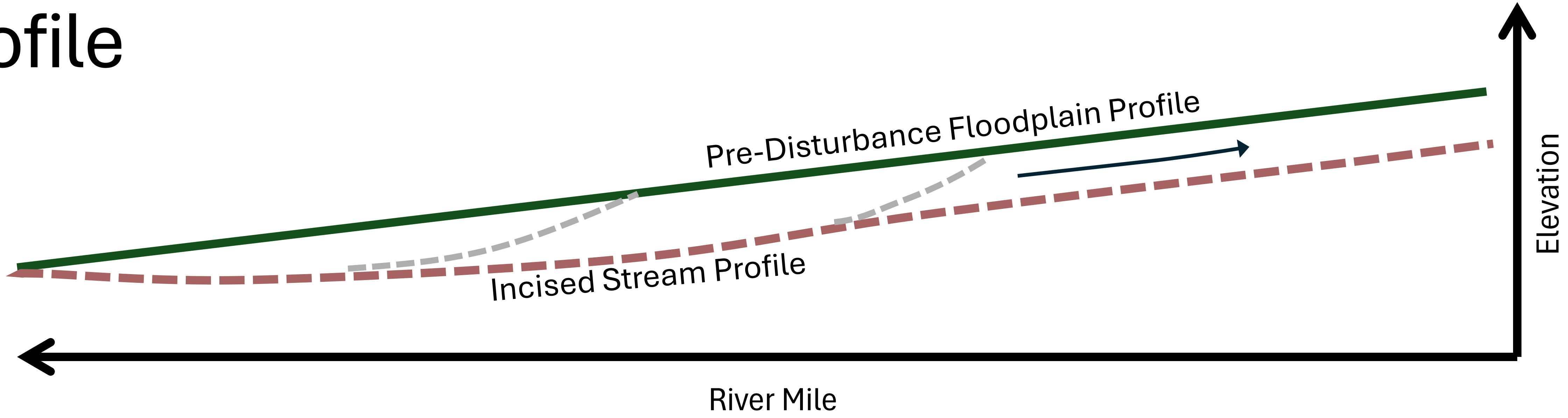
Floodplain Map – Upstream Migrating Headcut



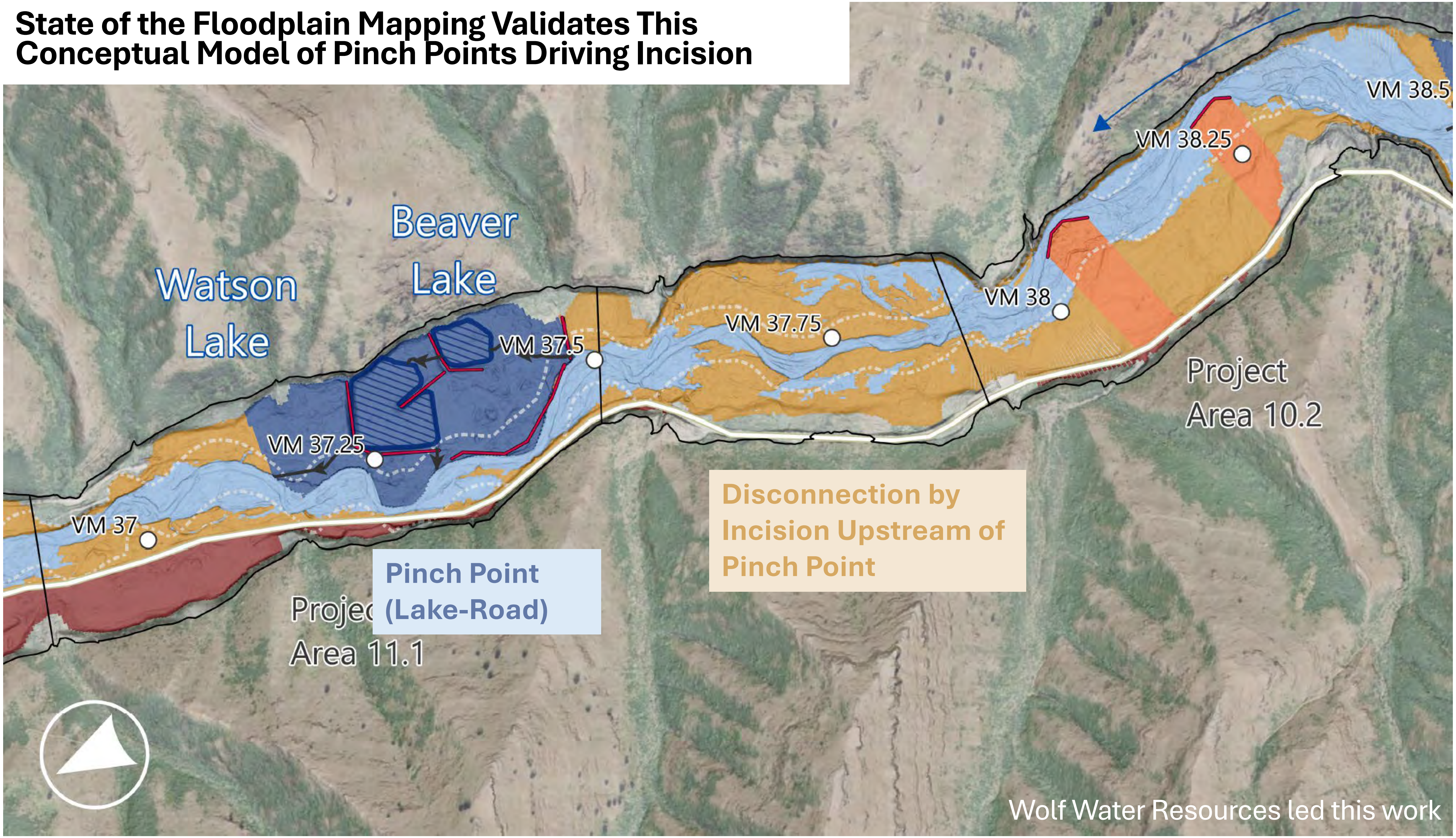
Floodplain Map – Fully Incised Reach



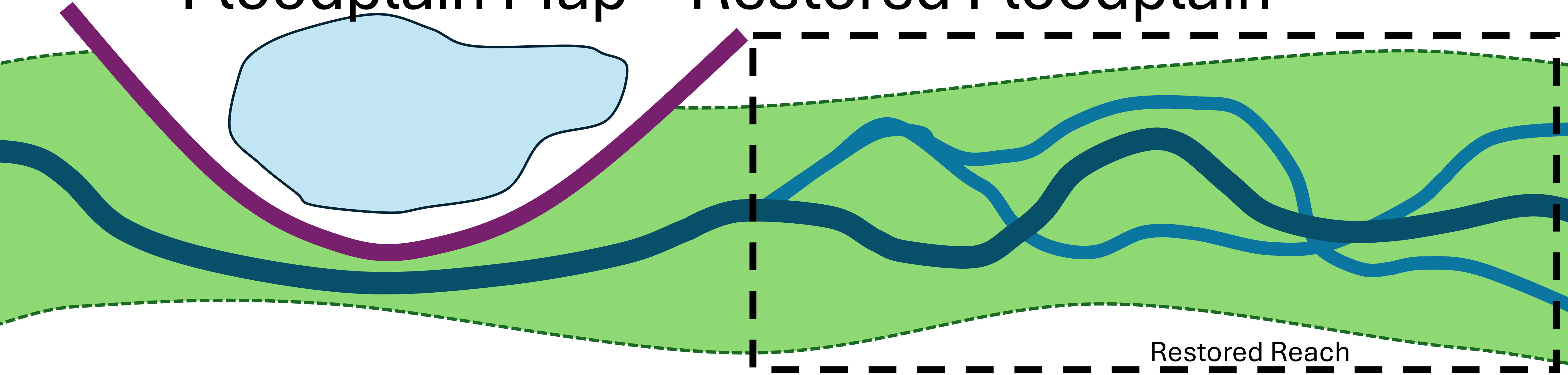
Profile



State of the Floodplain Mapping Validates This Conceptual Model of Pinch Points Driving Incision



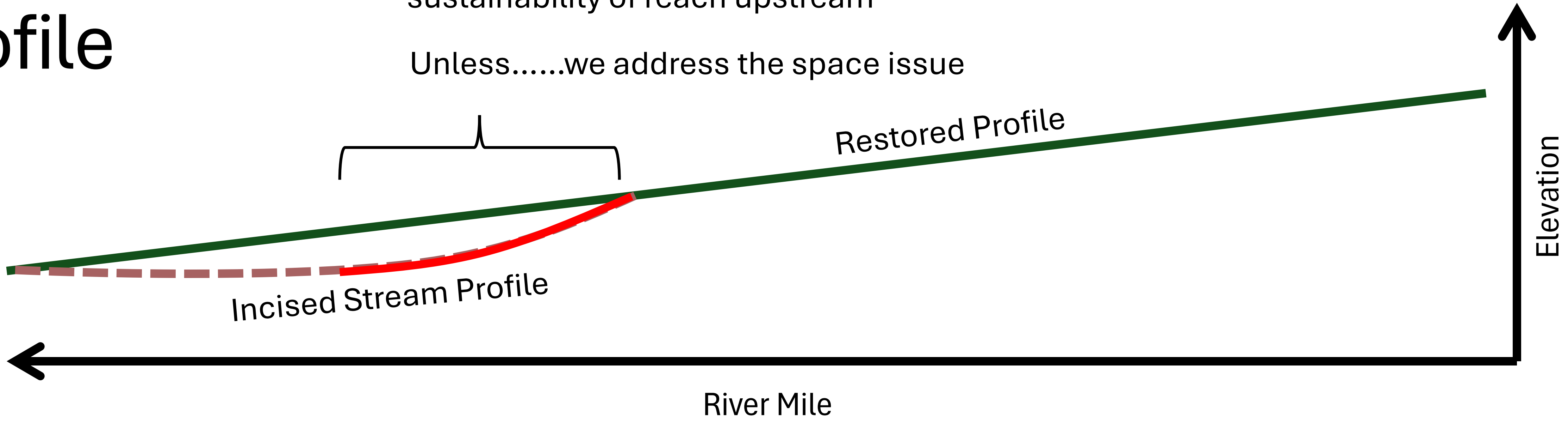
Floodplain Map – Restored Floodplain



Over-steepened profile continues to threaten sustainability of reach upstream

Profile

Unless……we address the space issue

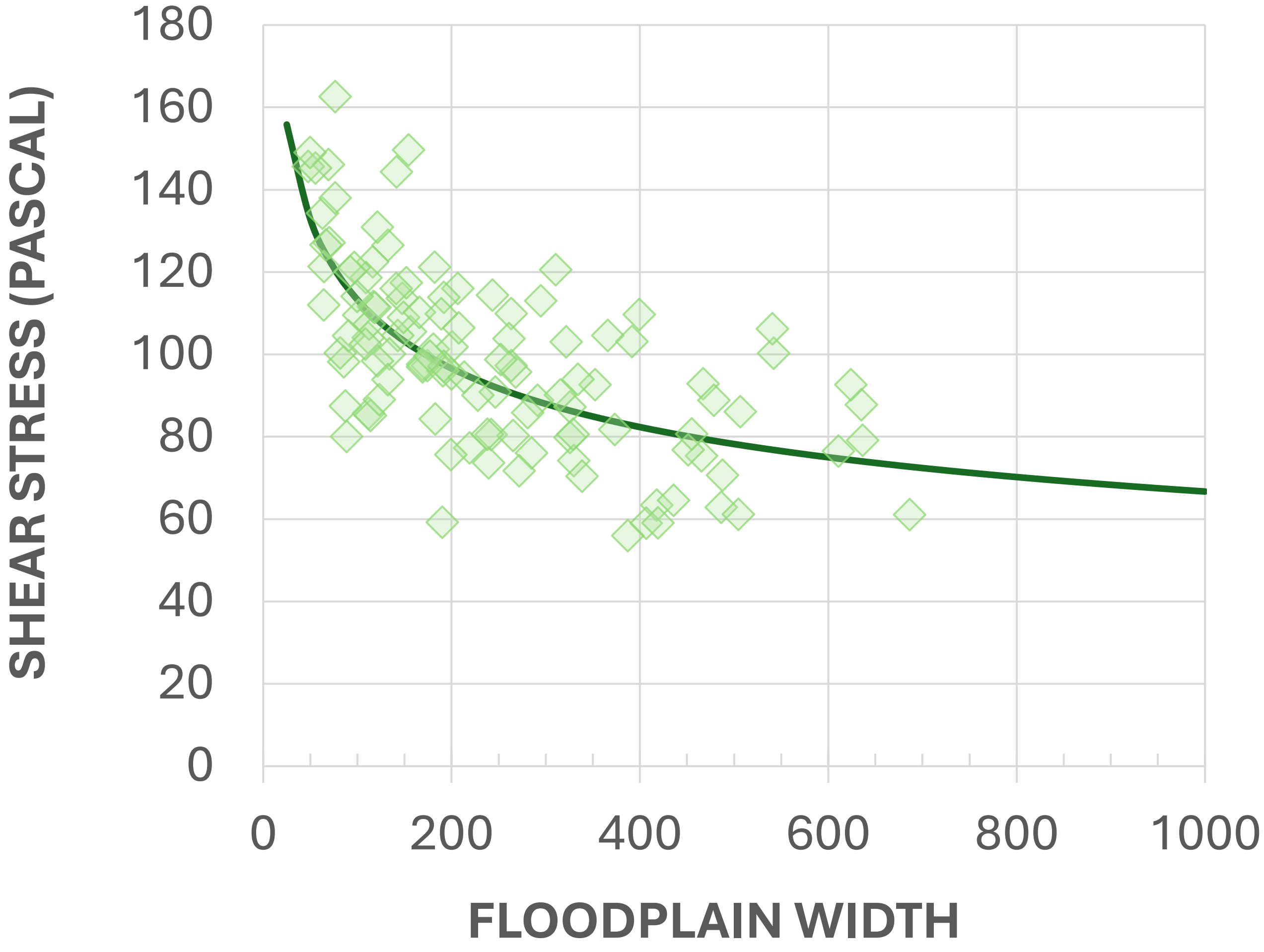


What mechanisms and processes reduce incision potential?

- **Stability of Bed**- Infrequent erosion of bed
- **Deposition** of incoming gravels
- **Retention of Roughness** (LWD)

Sediment Stuff Available

Our shear stress v. floodplain width benefit curve (10-yr flood)



Pebble count data (n = 5)
(Del Groat and Dowdy, 2008)

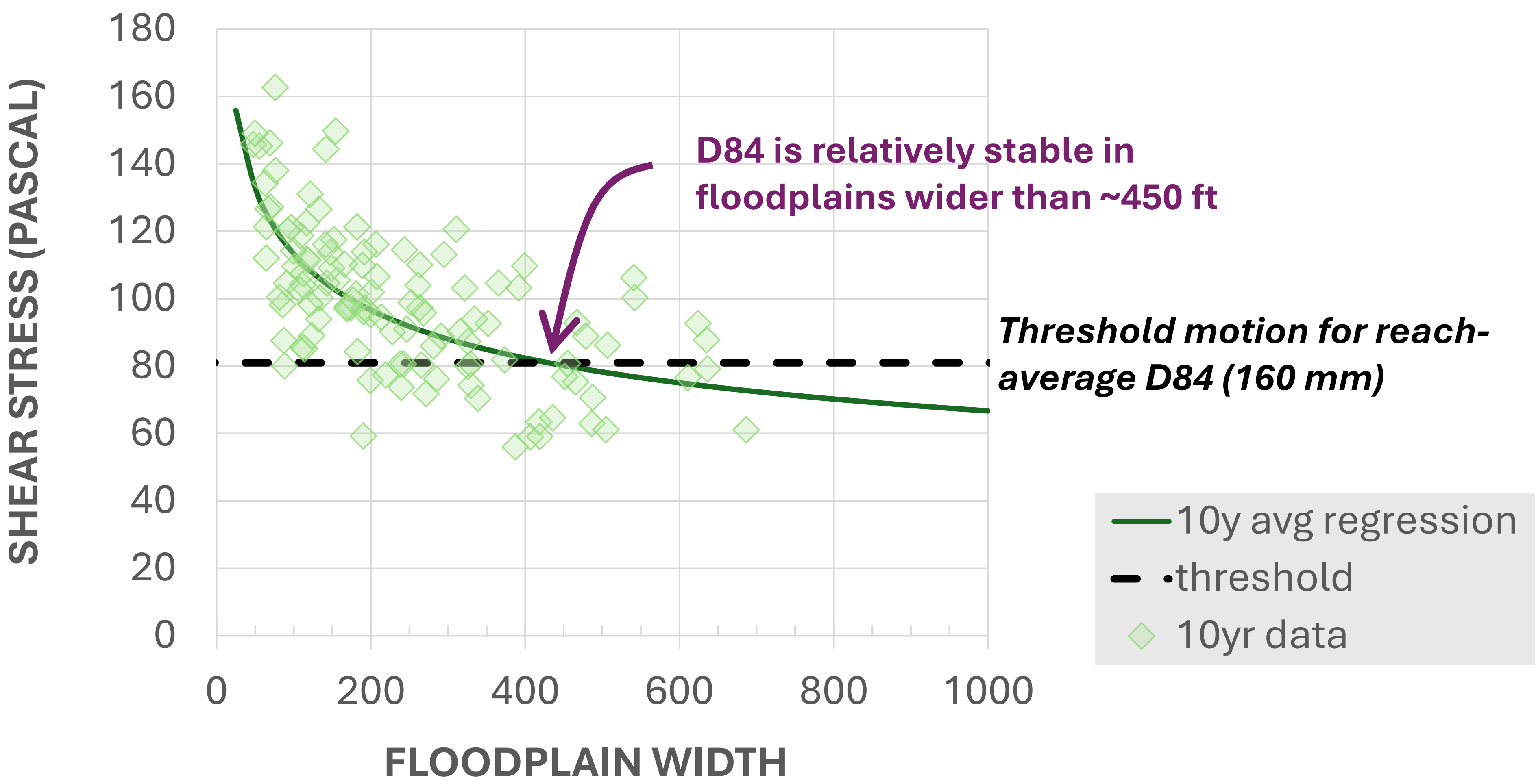
	Average of the Five	Finest of the Five
D50	70 mm	52 mm
D84	160 mm	125 mm

Used for bed stability analysis (Average of the Five, D84)

Used as estimate of active supply and deposition analysis (Finest of the Five, D84)

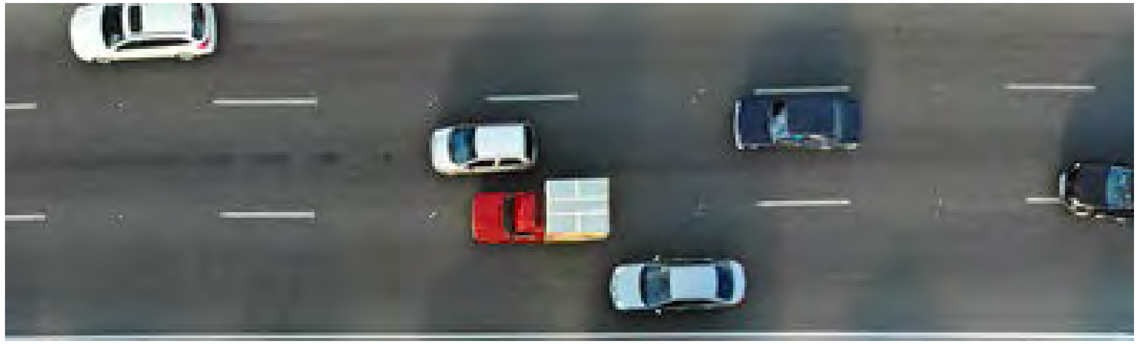
Bed Stability (10yr flood)

**Full movement of the bed tends to occur when the largest sediment grains (~D84) have mobilized*

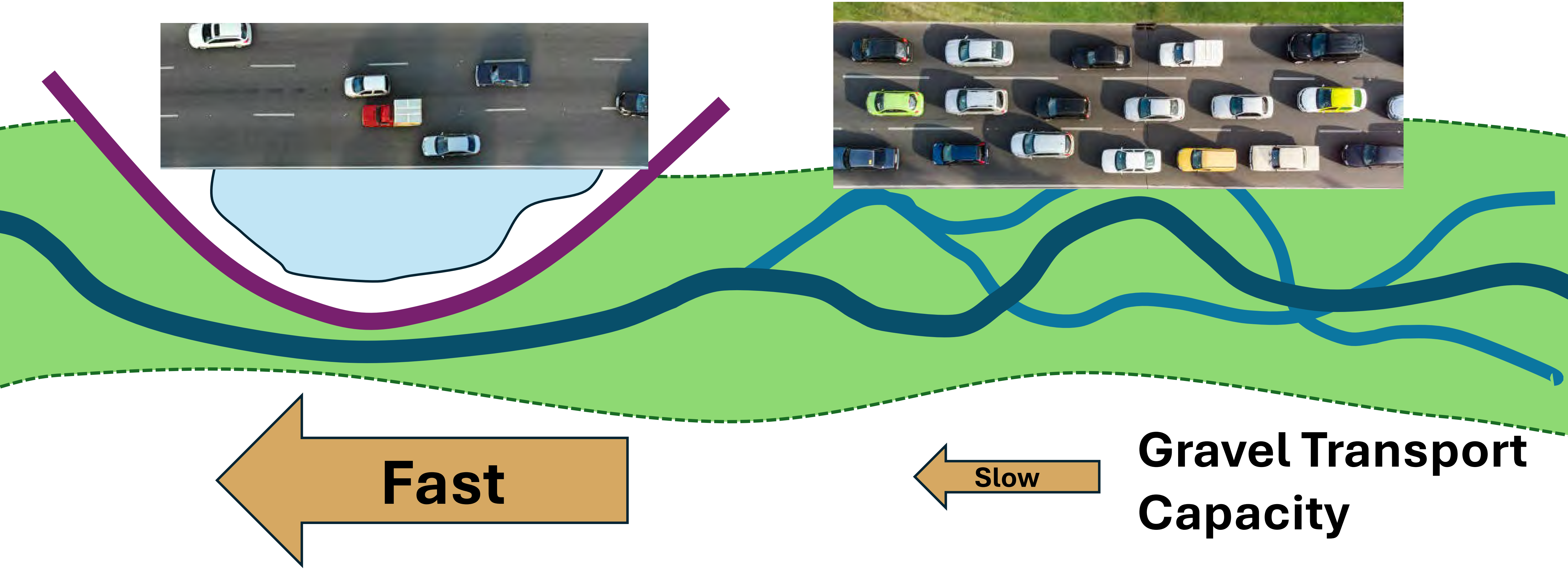


*Olsen, D. S., Whitaker, A. C., & Potts, D. F. (1997). Assessing stream channel stability thresholds using flow competence estimates at bankfull stage 1. *JAWRA Journal of the American Water Resources Association*, *33*(6), 1197-1207.

*** Shields parameter assumed 0.03*




Reach Scale Deposition Dynamics



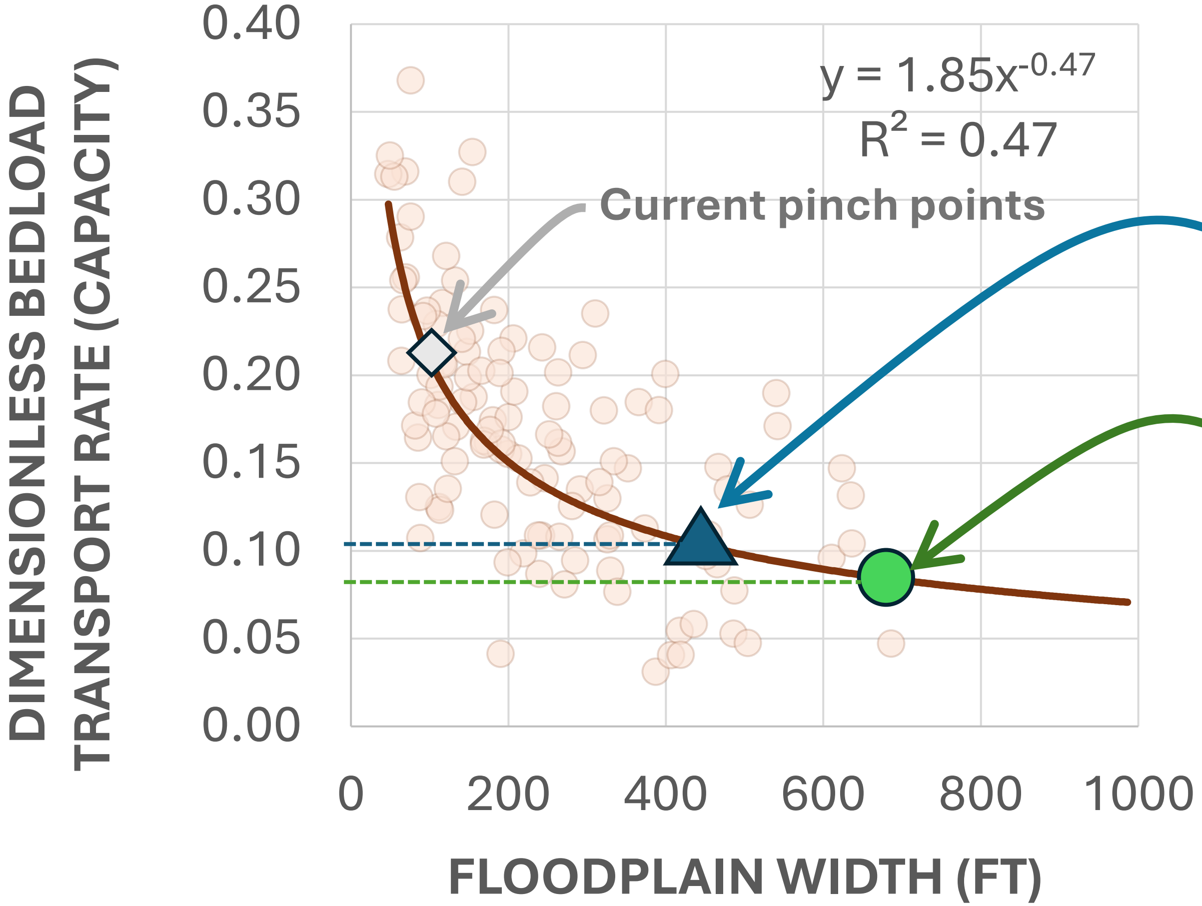
Transport Capacity >> Supply
(Erosion)

(also regulates sediment supply
to reach downstream)

TO PROMOTE DEPOSITION IN PINCH POINTS, REDUCE DIFFERENTIAL!

Deposition Potential (10yr Flood)

Dimensionless bedload transport rates - used Wong and Parker (2006) relationship
→ Assumed D50 of 52 mm



Hypothetical pinch point at "low bookend" space of 450 ft

Assume restored reach upstream of pinch point is ~700 ft wide

Transport capacity in pinch-point is only ~25% more than restored reach

- **→ Current pinch-points have 150% more capacity**
- **→ We've reduced differential!**

Summary

- Addressing incision potential at the “pinch points” enables sustainable floodplain restoration in the unconfined (“high bookend” space) reaches

- A “**low bookend” space target of 400-500 feet** significantly reduces incision potential and promotes reach-scale connectivity and functioning