

How Much Room Does a River Need?

Concepts and Approaches
from the Pacific Northwest

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Floodplains are Critical and Endangered

Riverine flood plains: present state and future trends

KLEMENT TOCKNER^{1*} AND JACK A. STANFORD²

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Biodiversity hotspots

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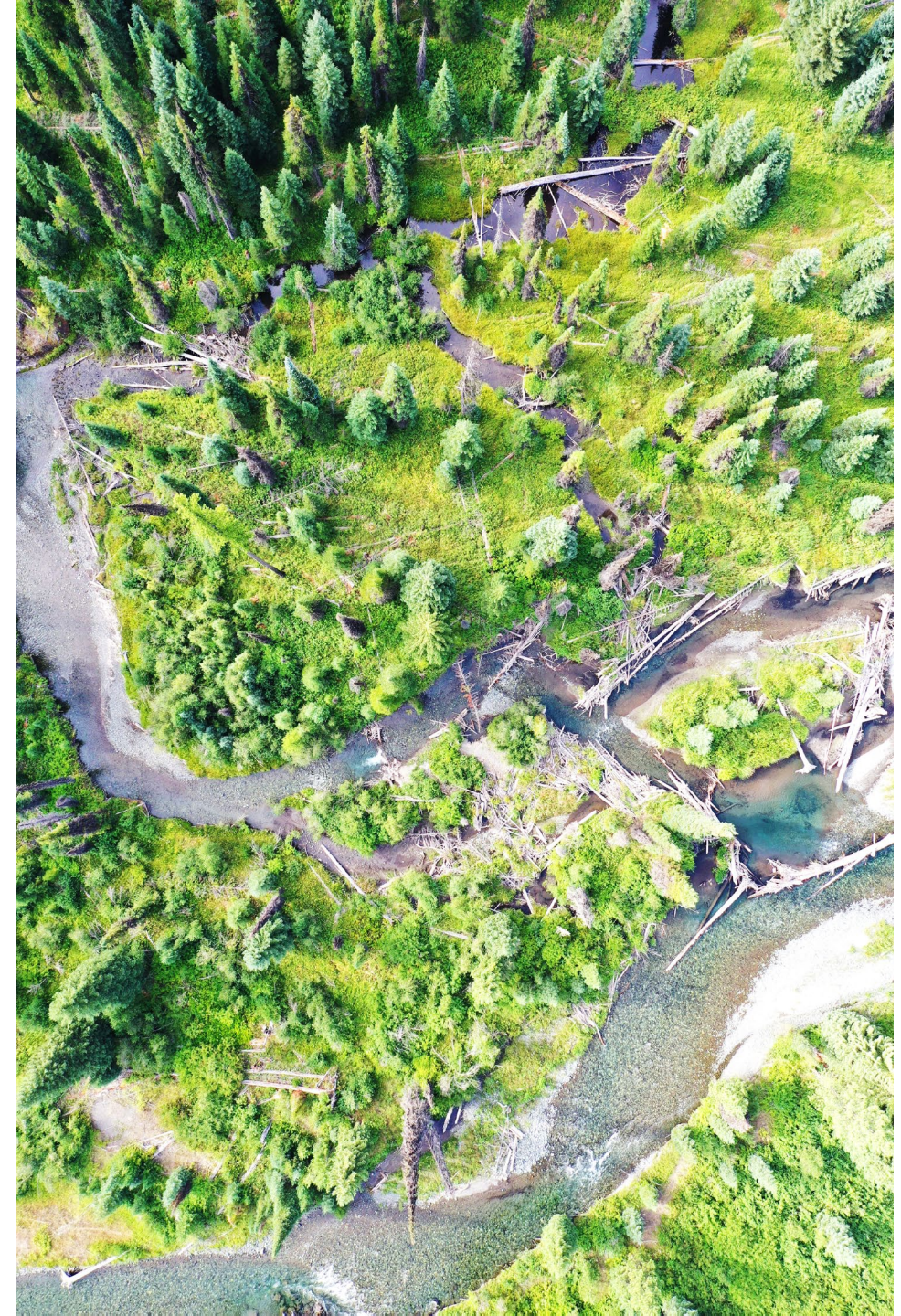
Highly impacted (~90% in North America)

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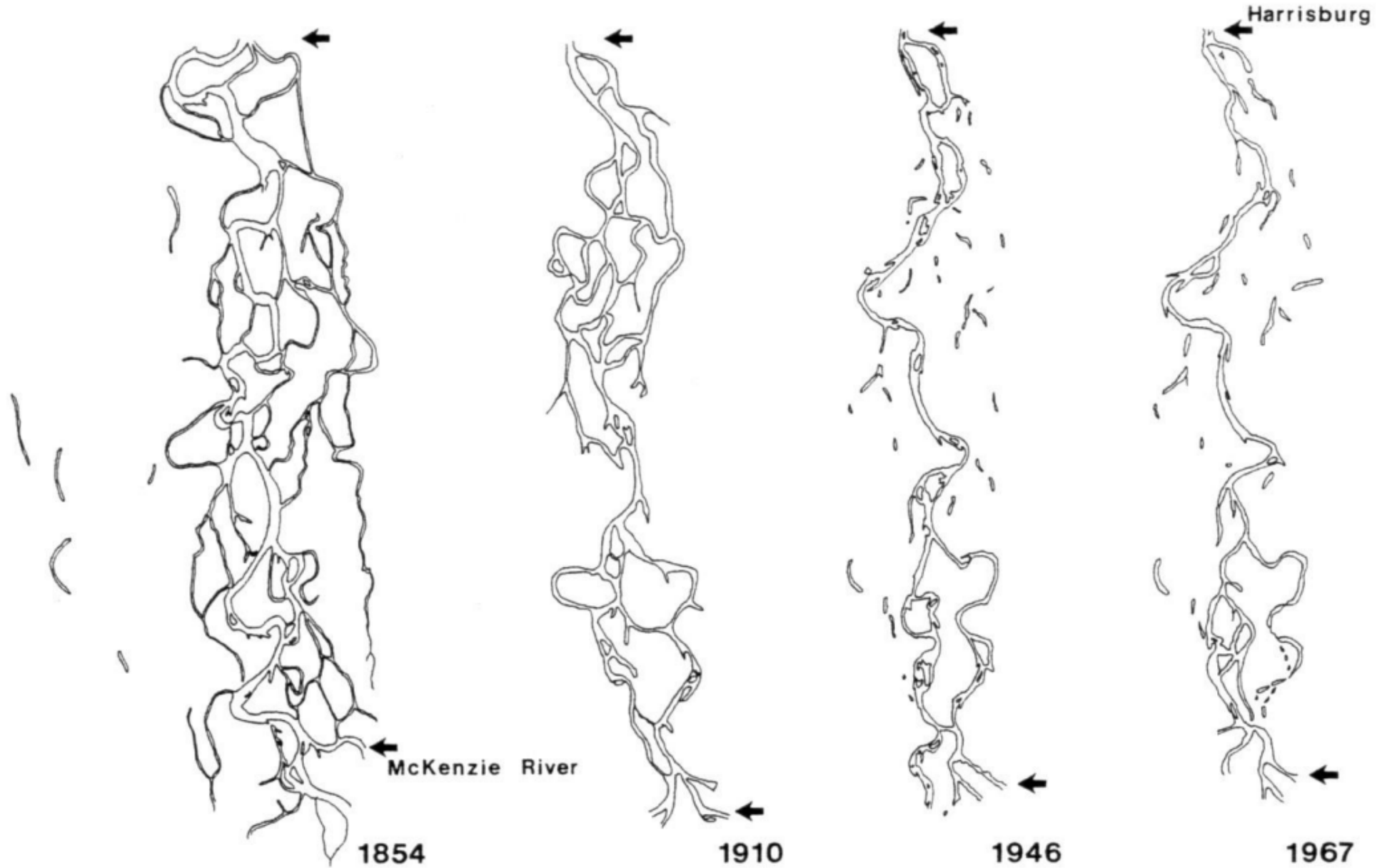
Increasing pressure

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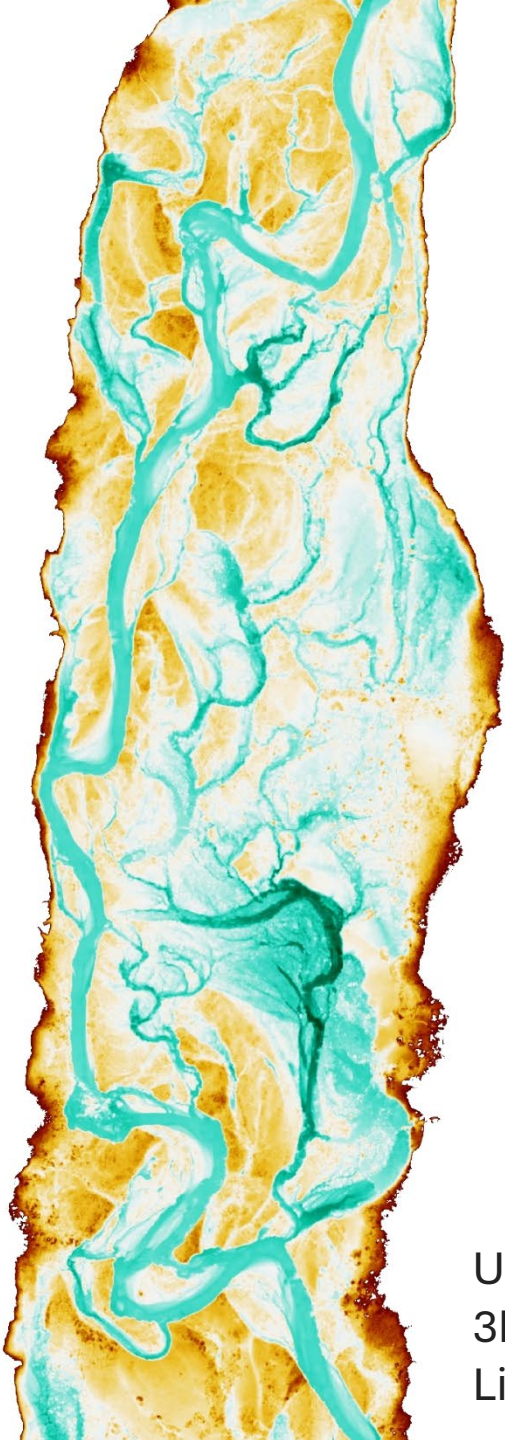
Major Conservation and Restoration Targets



Development Has Disconnected Floodplains



This is What We Want (as restoration practitioners)

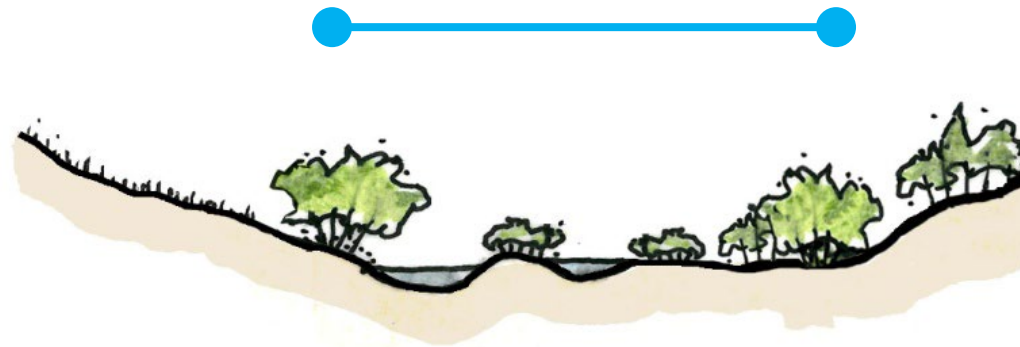


USGS
3DEP
LiDAR

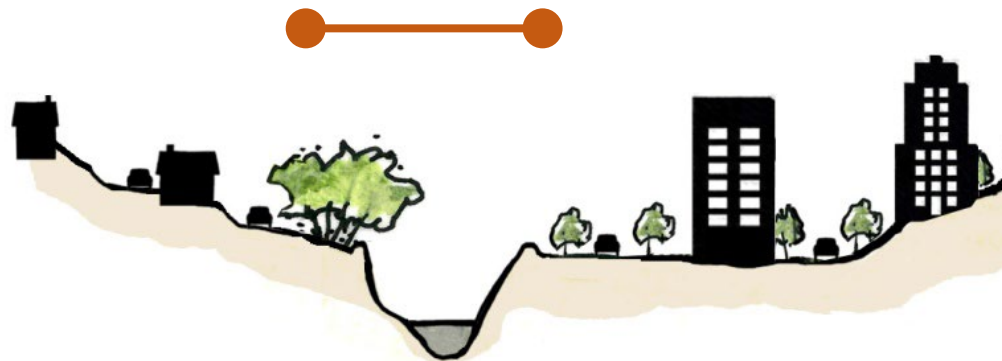
How Much Room Does the River Need?
How Much Room Do We Need for the River?

Room = Floodplain Width

Wide and Natural
Floodplain

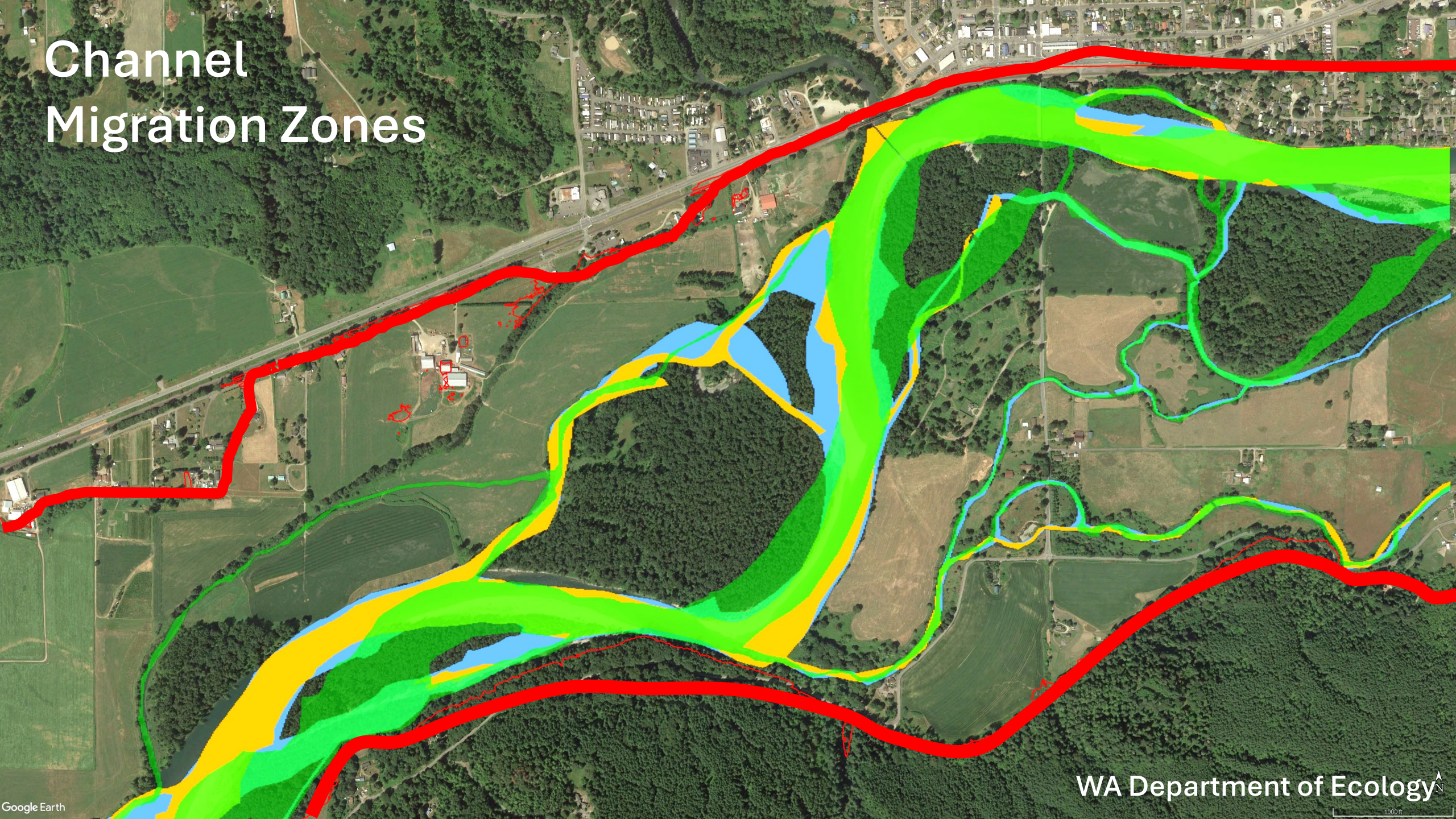


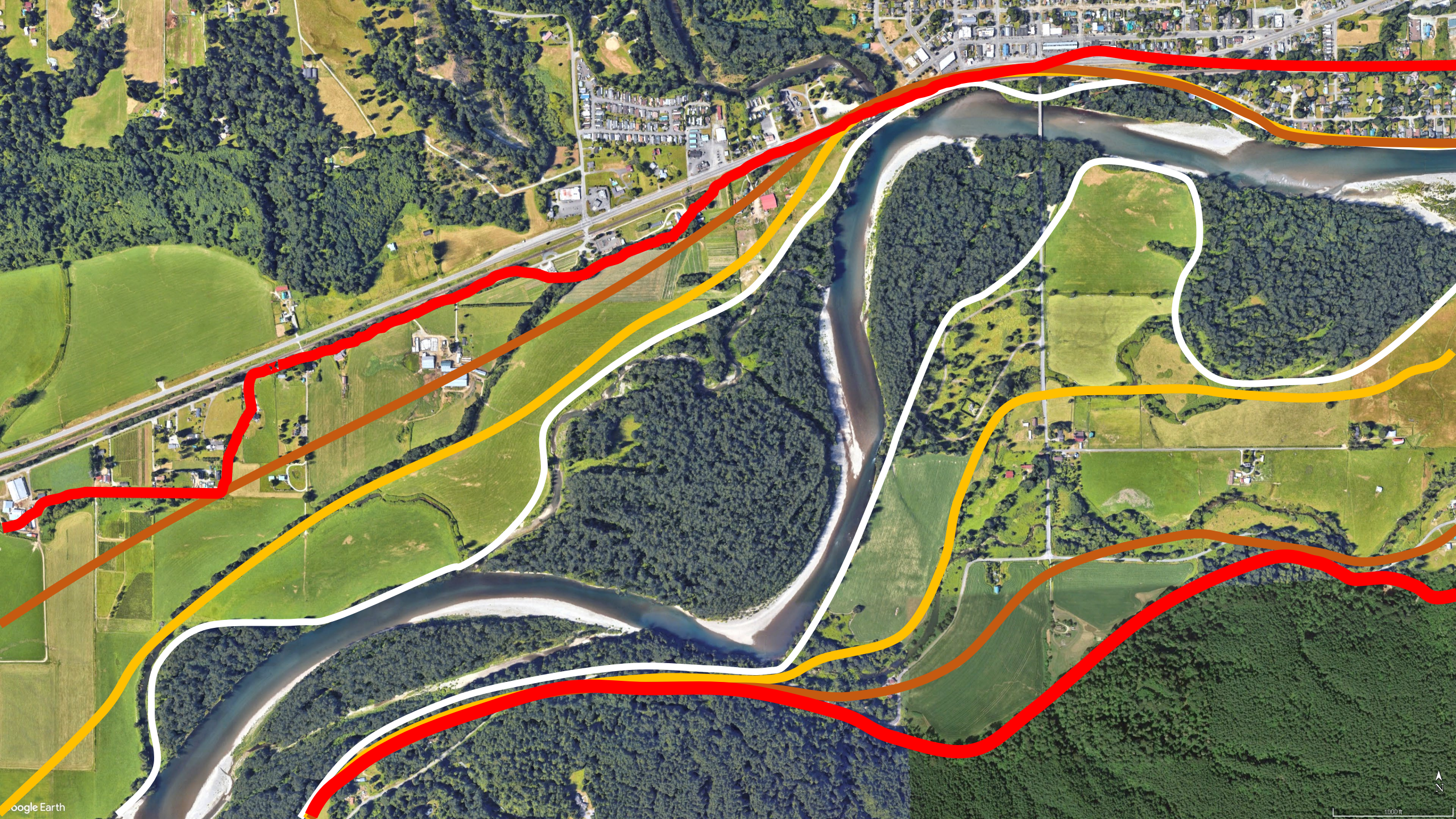
Narrowed
(Encroached)
Floodplain



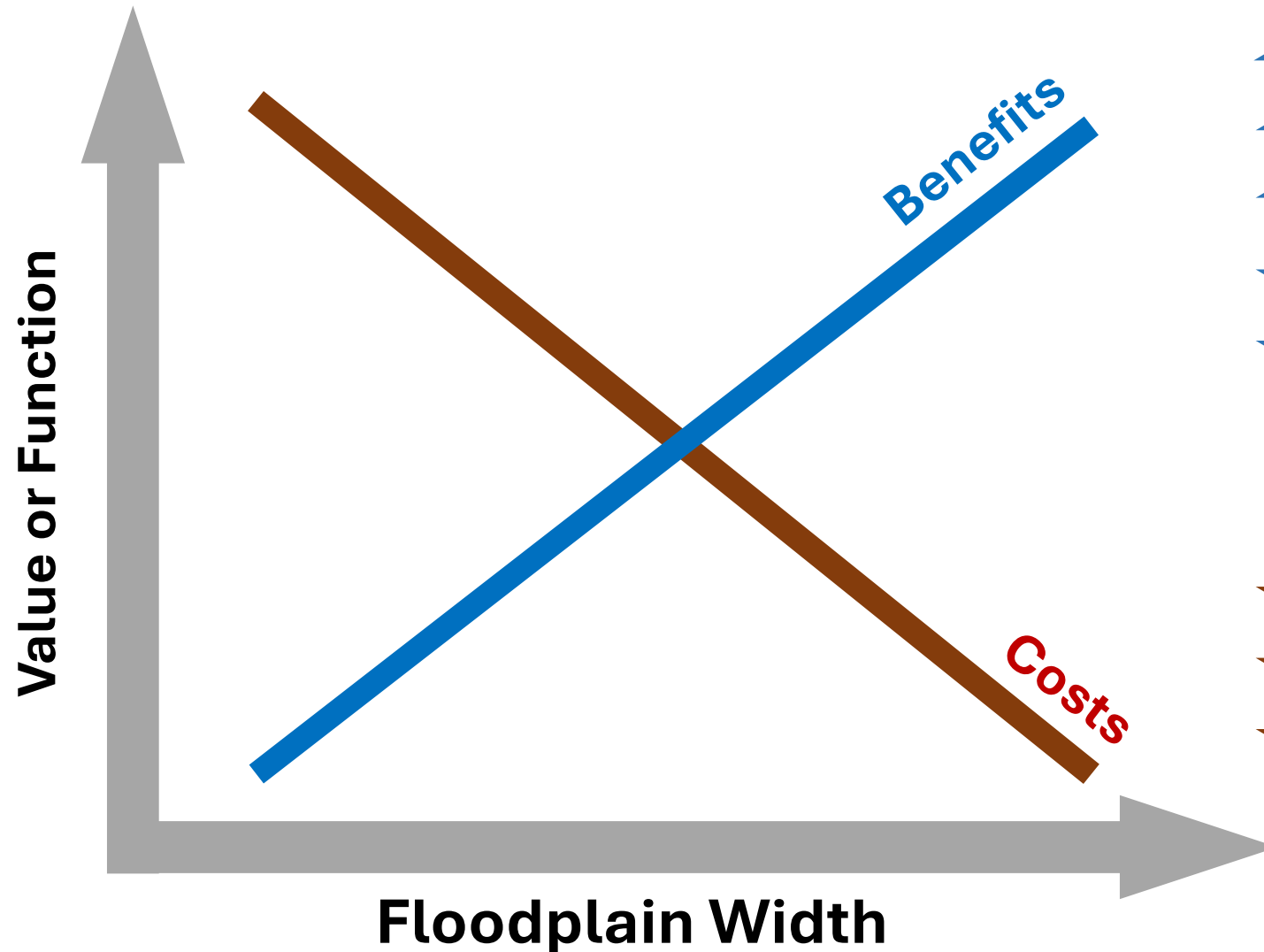


Channel Migration Zones





Functions and Values Vary by Floodplain Width



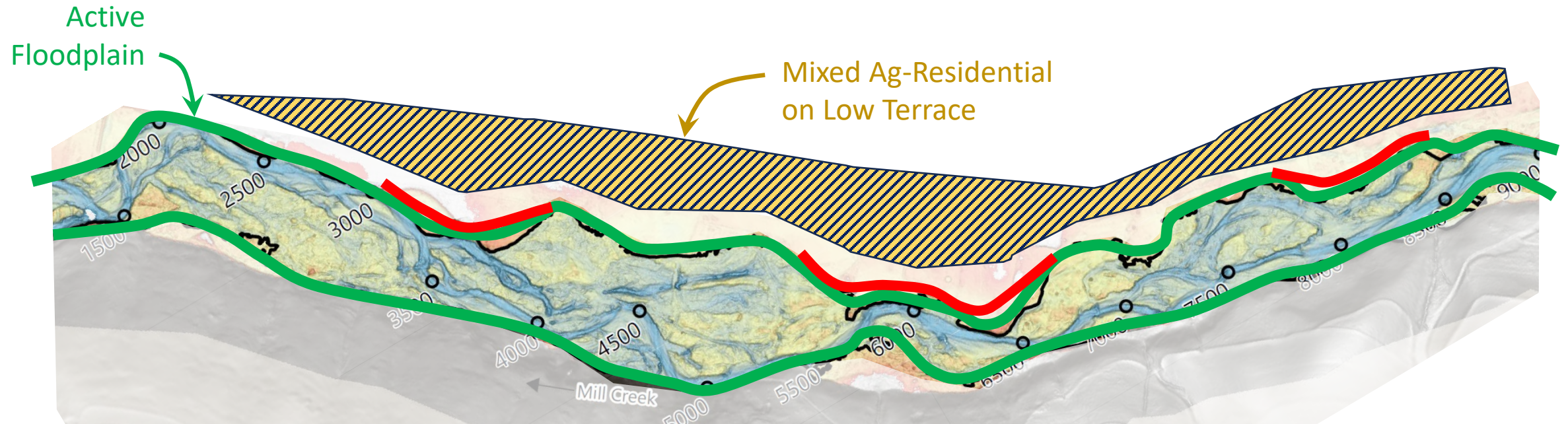
Benefits of a Wider Floodplain

- ↑ River Function
- ↑ Biodiversity/Fisheries
- ↑ Recreation
- ↓ Risk
- ↓ O & M

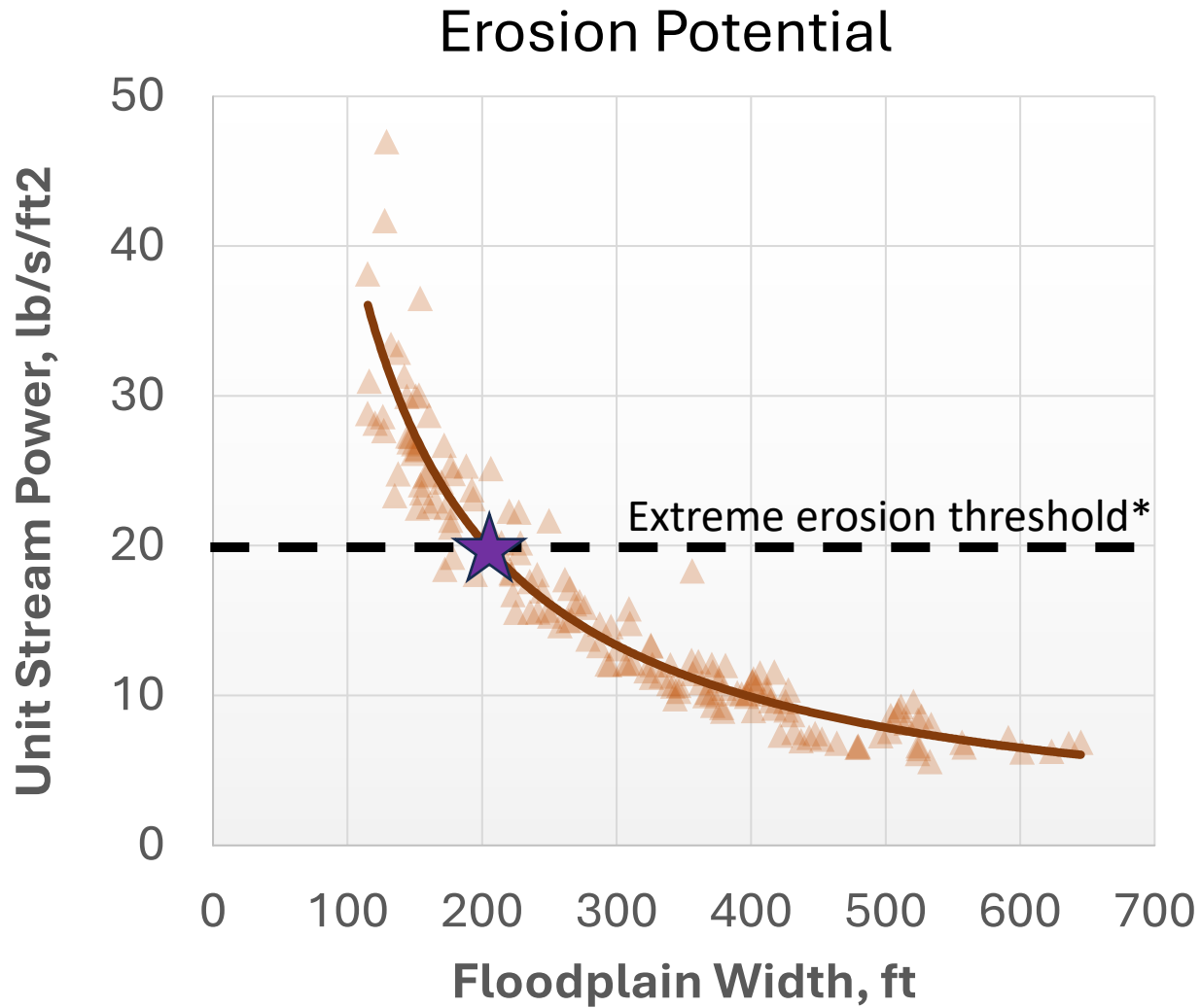
Costs of Wider Floodplain Preservation

- ↓ Farmland
- ↓ Developable Land
- ↓ Transportation Corridors

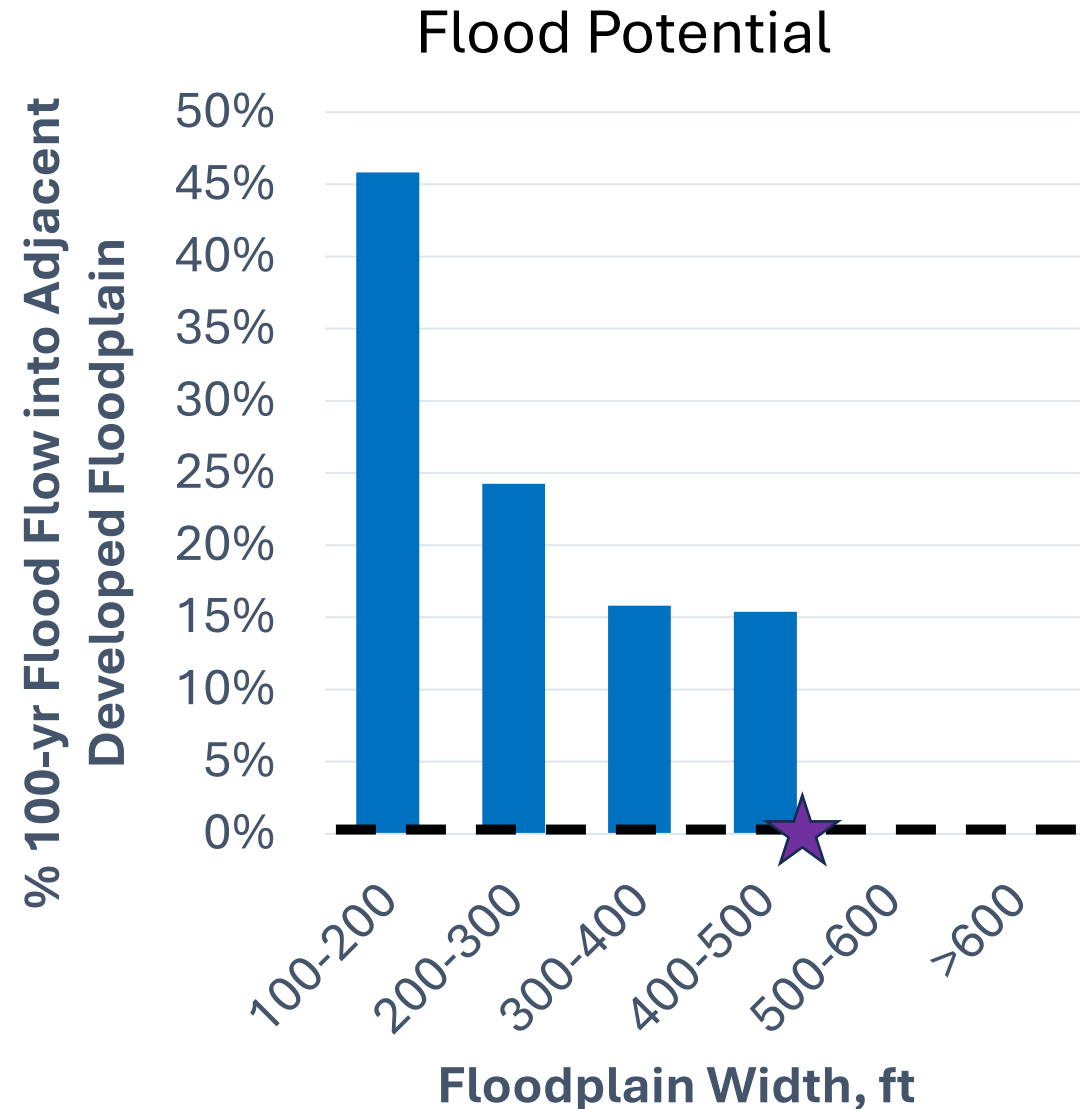
Example: Integrated Decision Making with Benefit Curves



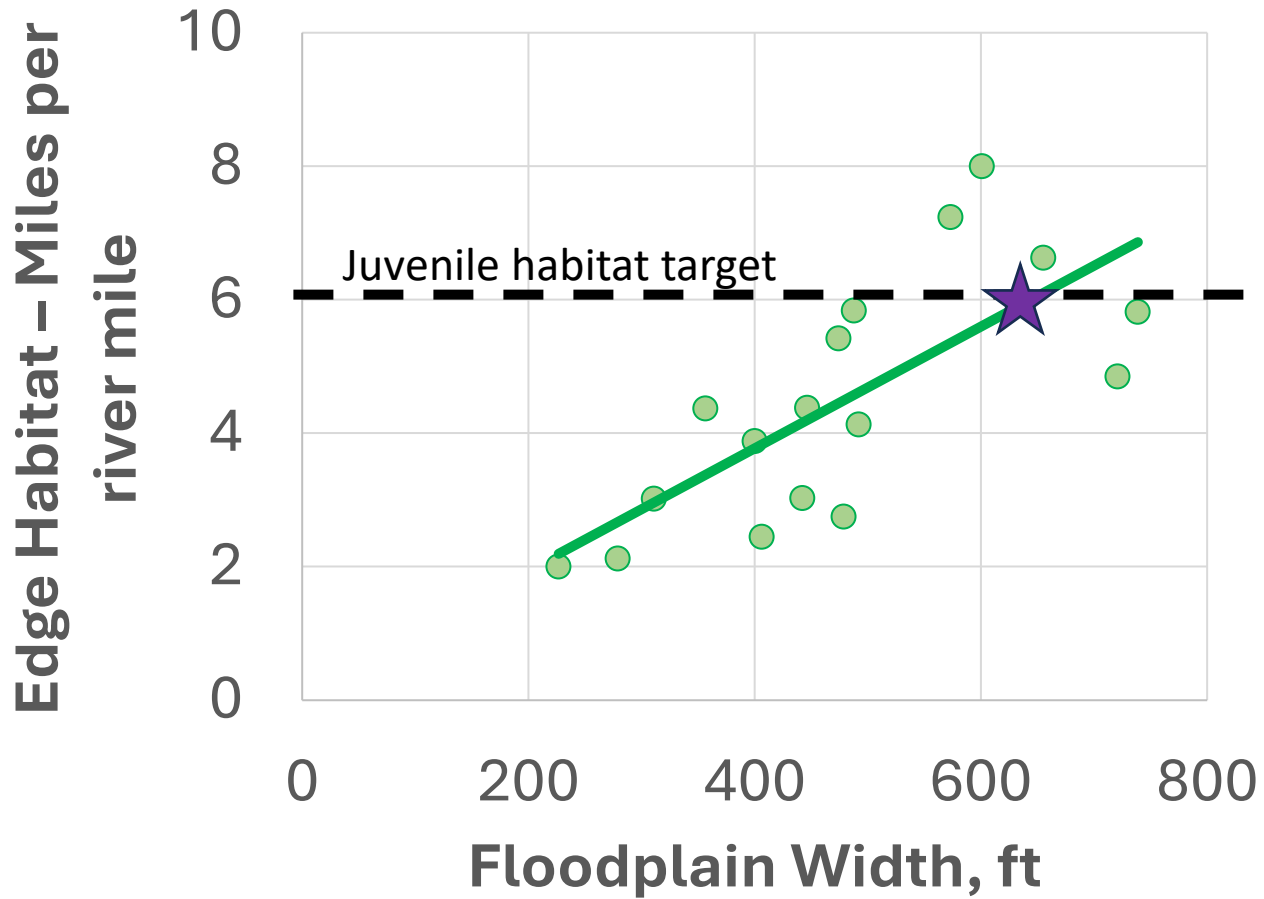
Benefits Curves: Wider Floodplains Reduce Erosion and Flood Risk (100-yr Flood)



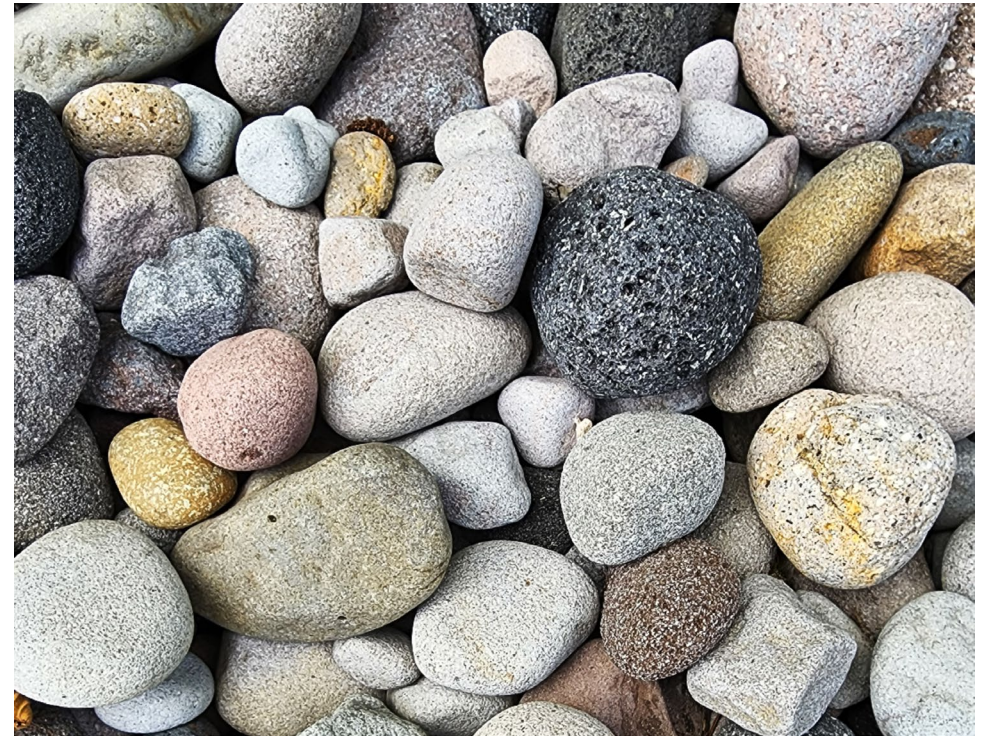
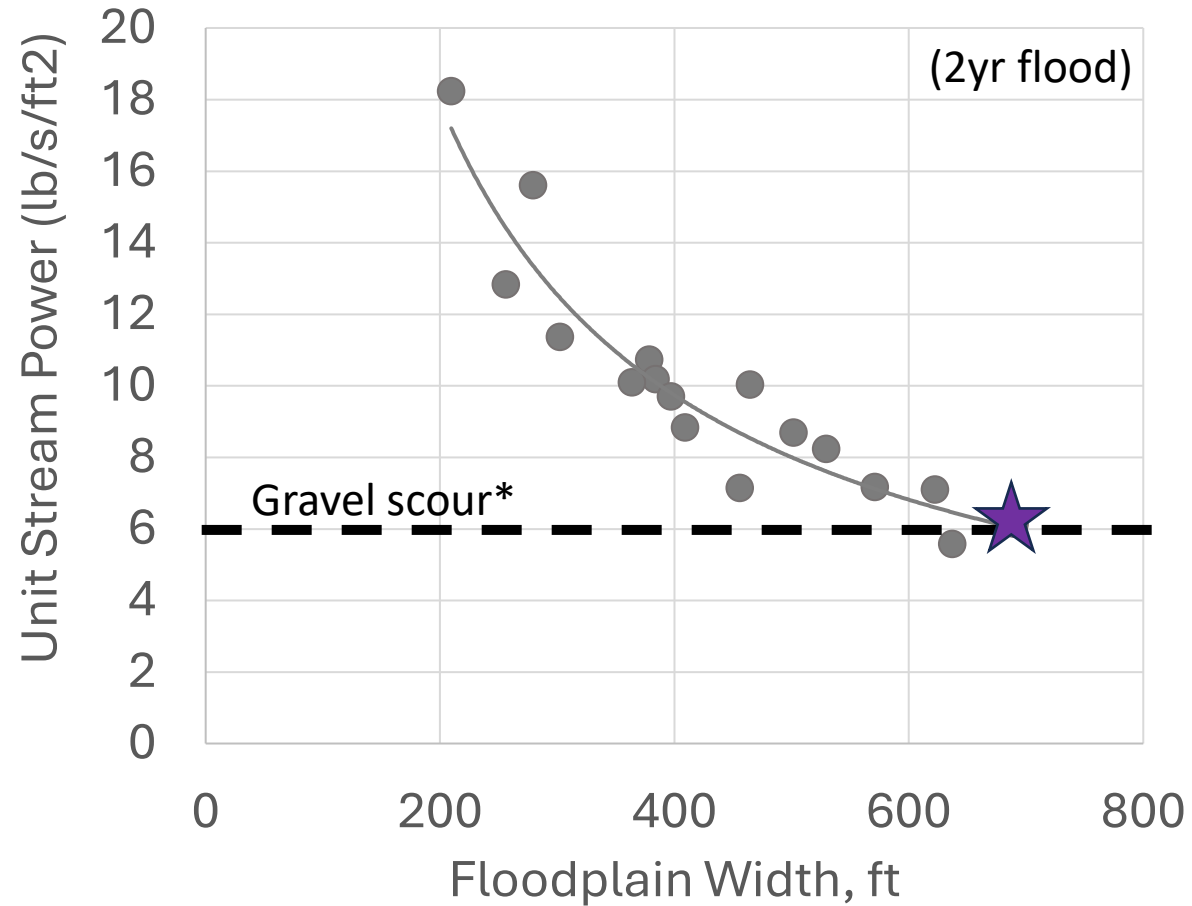
*Magilligan, 1992



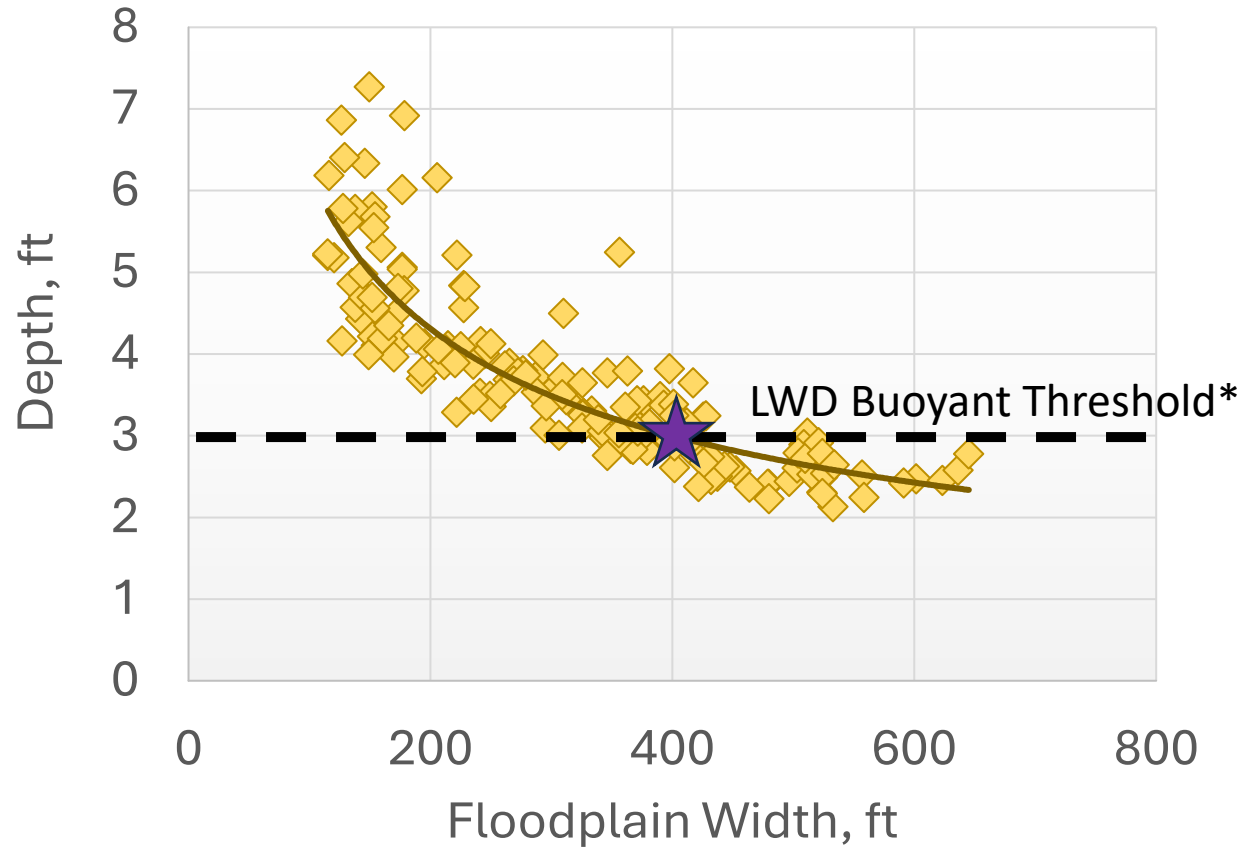
Benefits Curve: Juvenile Salmon Habitat Increases with Width



Benefits Curve: Spawning Gravel Retention Increases with Width

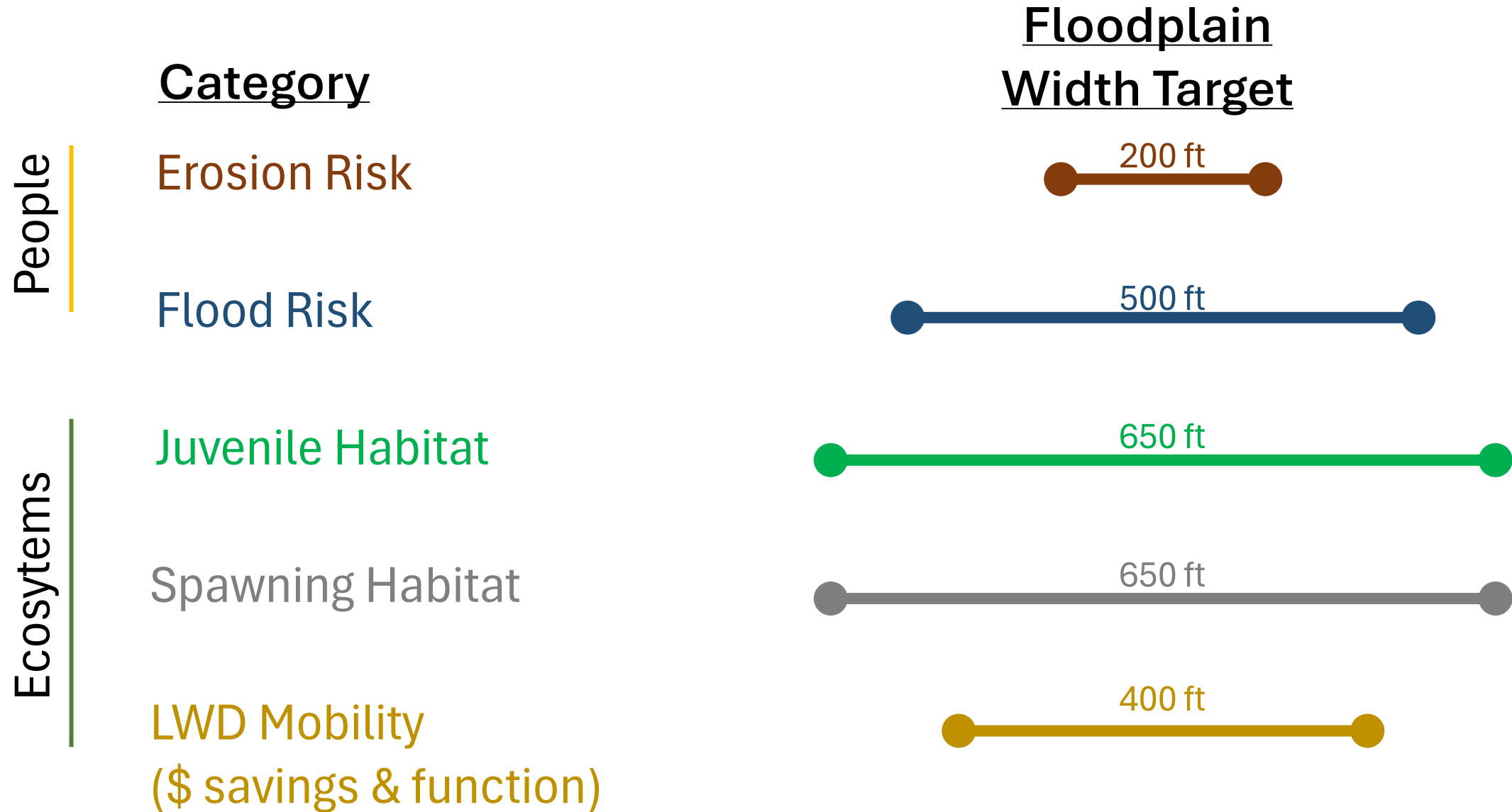


Benefits Curve: Wood Mobility Decreases with Width (Saving Costs for Engineered LWD)



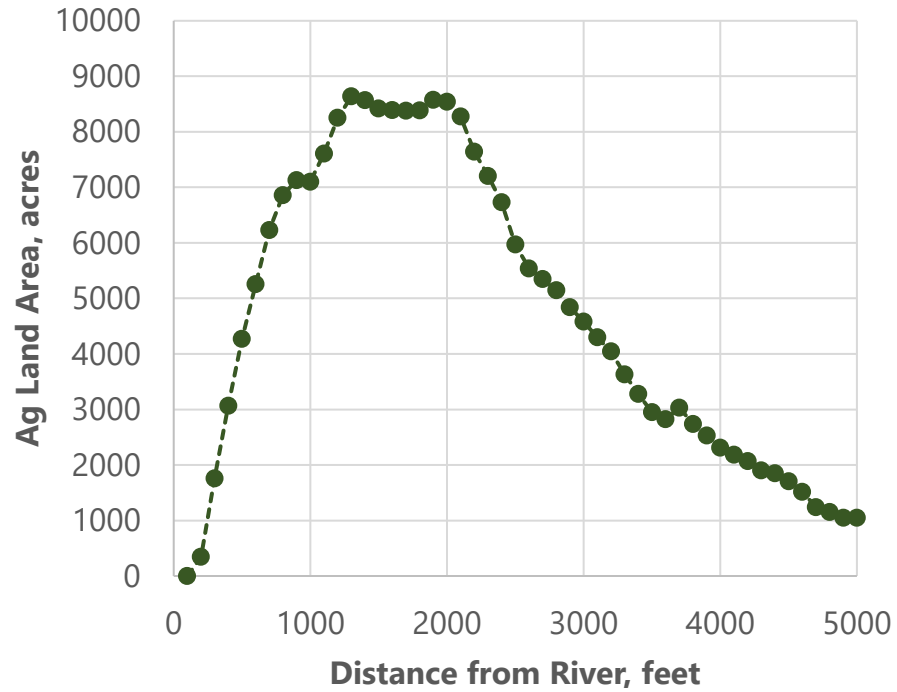
* Depends on stem diameter, tree species (density), and rootwad size –Braudrick and Grant (2000)

Floodplain Width: Common Currency for Integrated Floodplain Management

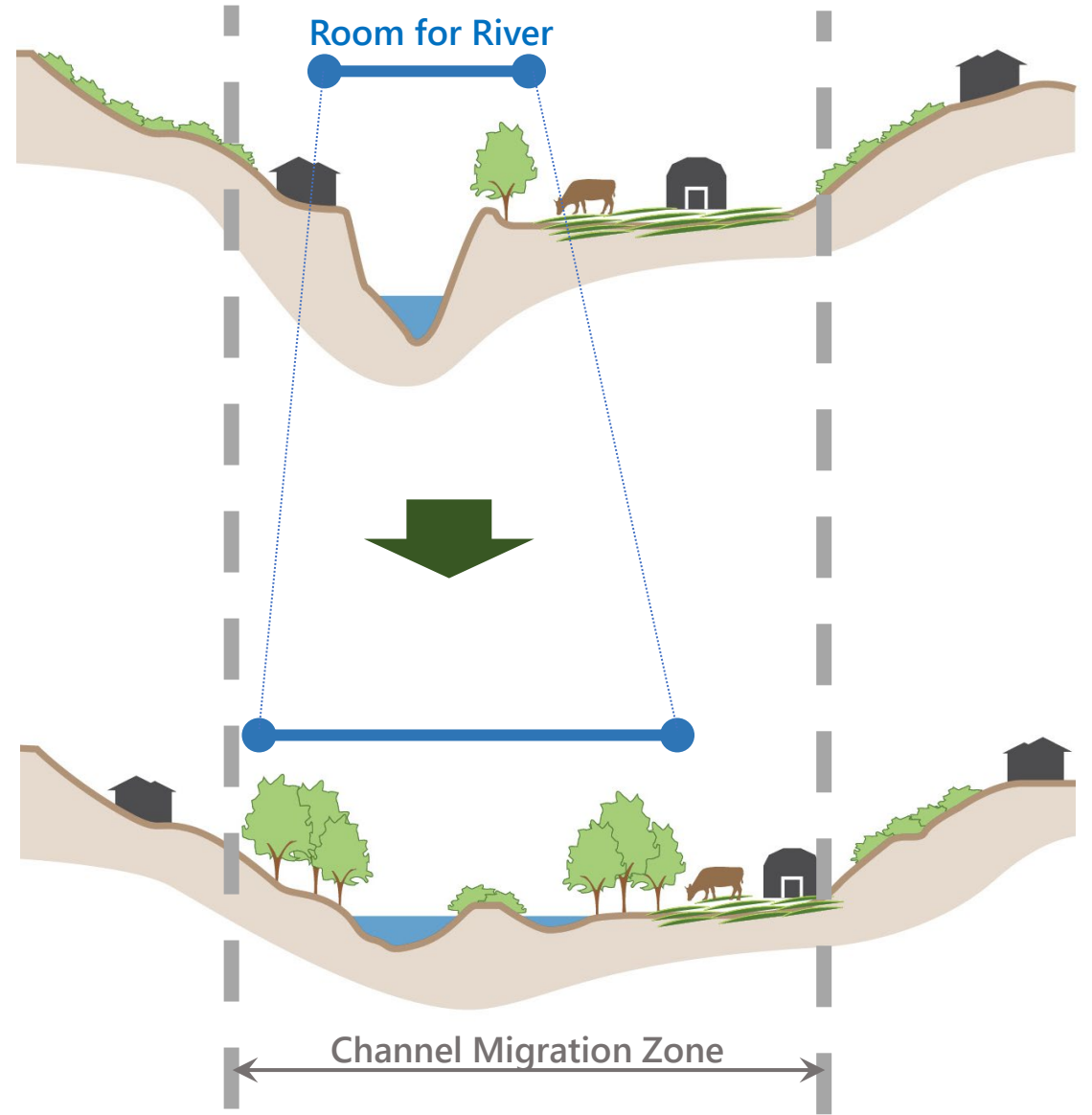




Moving Forward



Current Floodplain



Future Floodplain

Summary

- Room for the river matters - for ecosystems and people
- Floodplain width is a common currency to measure benefits and costs of floodplain restoration actions, informing strategy
- Common currency creates space for conversation, collaboration, mutual understanding of needs



Thank You!

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