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Salish Sea Ecosystem Conference

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(Seattle, Wash.)

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## Potential interactions of sea level rise and sedimentation in the lower Puyallup River

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# Potential interactions of sea level rise and sedimentation in the Lower Puyallup River

Jeff Parsons, Herrera Environmental Consultants

# Talk Outline

- What happened
- Sequence stratigraphy model
- What a sequence stratigraphy model says about future conditions
- What can we do about the consequences



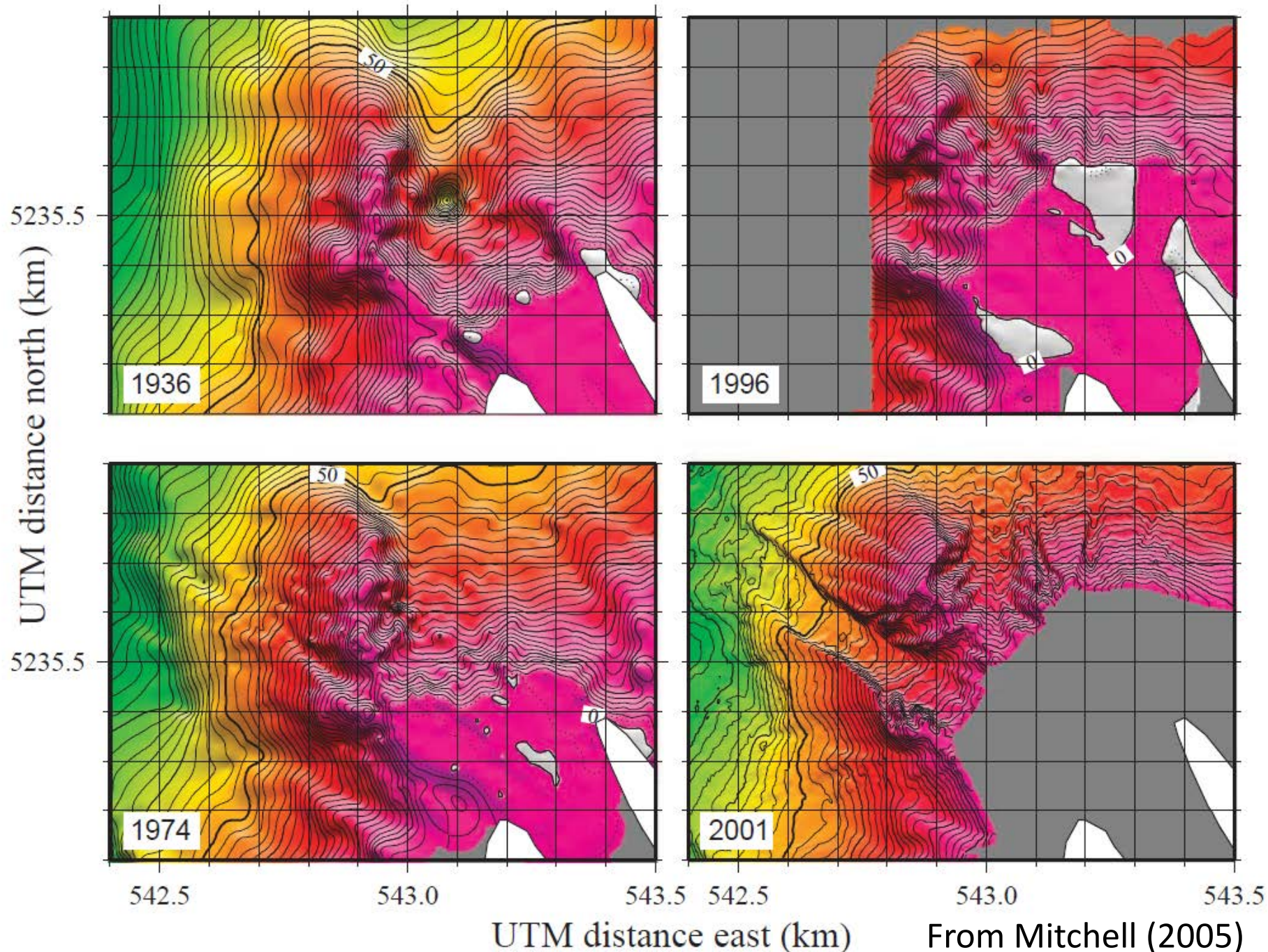
# Historical Context

From USCS 1877



# What happened

- Fill of intertidal areas
- White River diverted
- Straightening of channel
- Leveeing banks
- Regular dredging of channel
- Dredging ceased

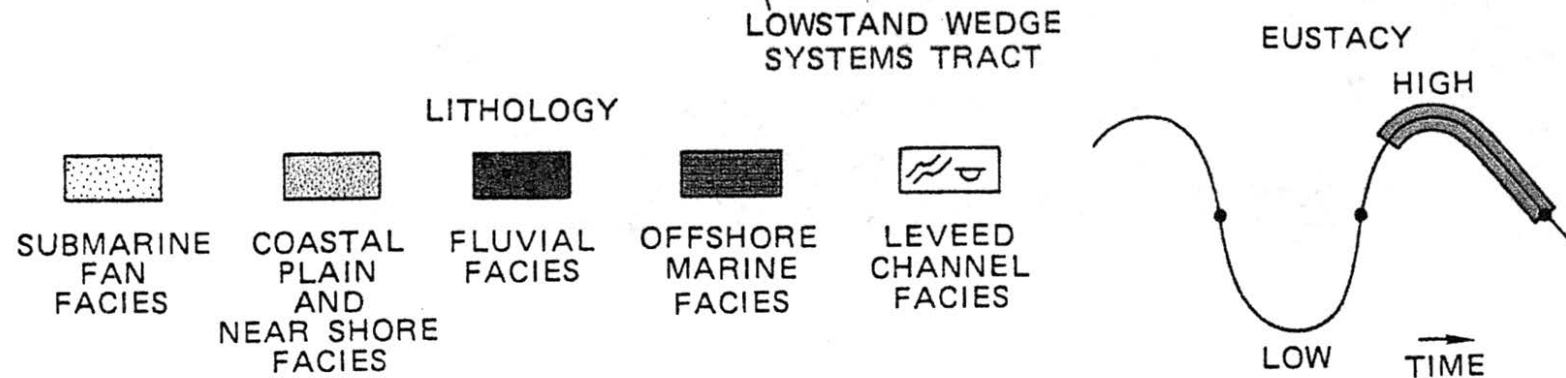
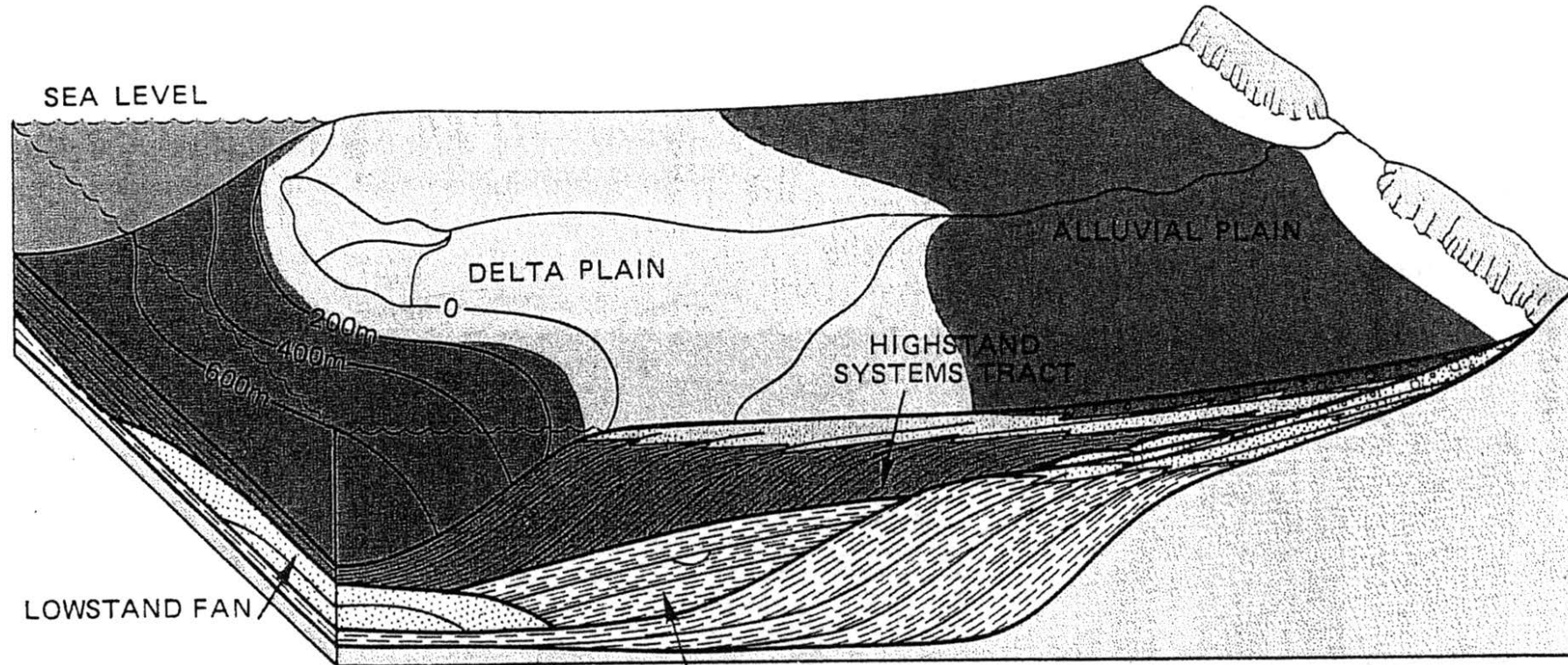


Progradation of ~20 m per year between 1943 and 1951 , during dredging

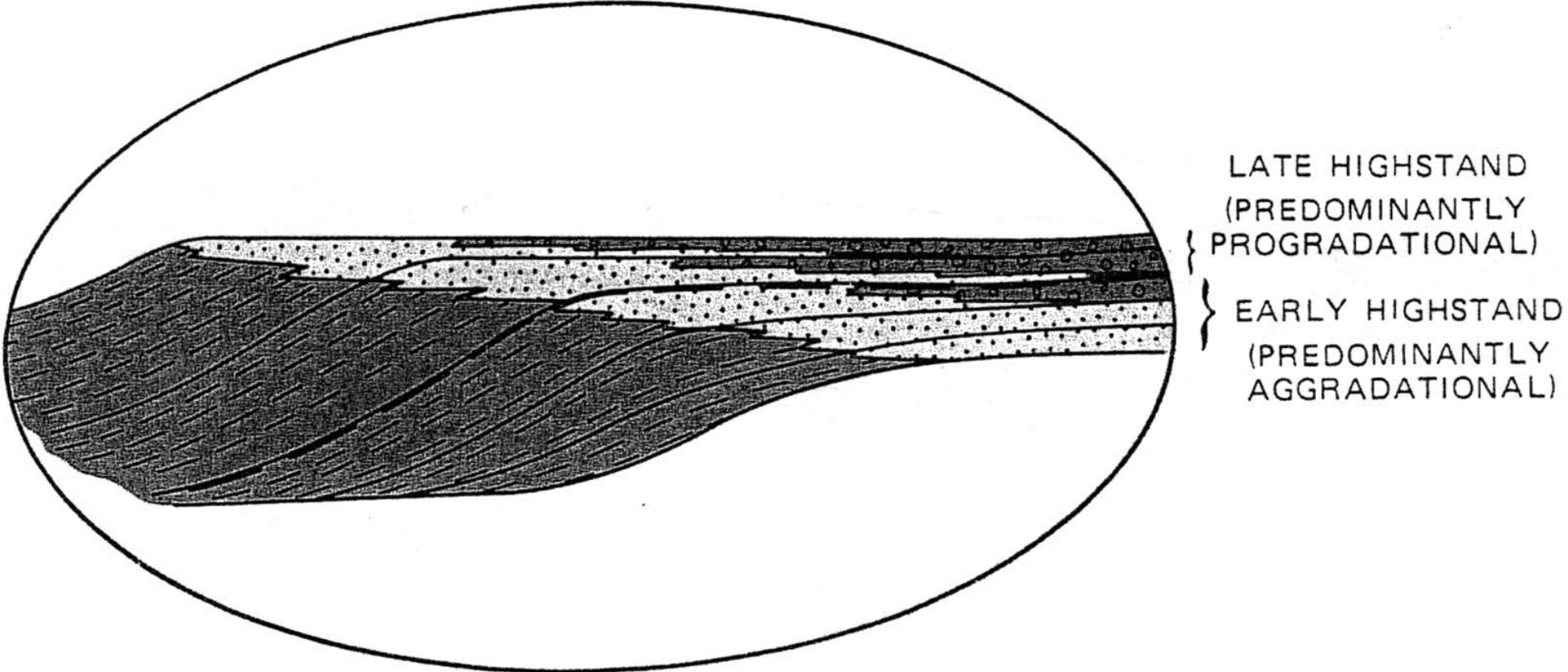
More recent progradation is less, most sediment is transported into deeper water due to gravity

*“extreme low tides may be needed to ensure that coarse sediment is transferred vigorously to the edge of river mouth platforms” [Mitchell 2005]*

# The lower Puyallup interpreted via sequence stratigraphic model



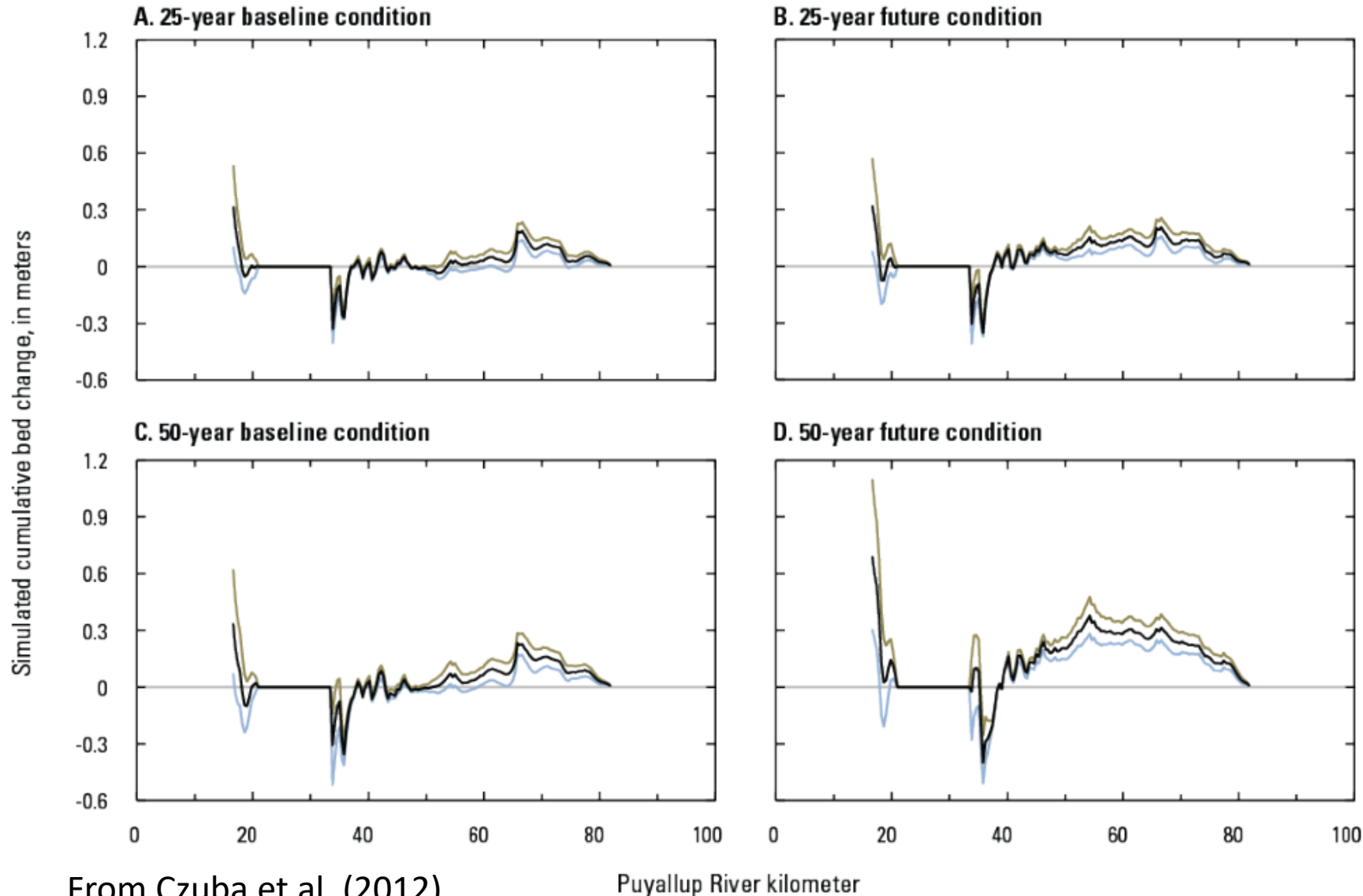
# Deposition is enhanced and focused inland when relative sea level is rising





## EXPLANATION

— Simulation result    — Simulation result +10 percent sediment supply    — Simulation result -10 percent sediment supply



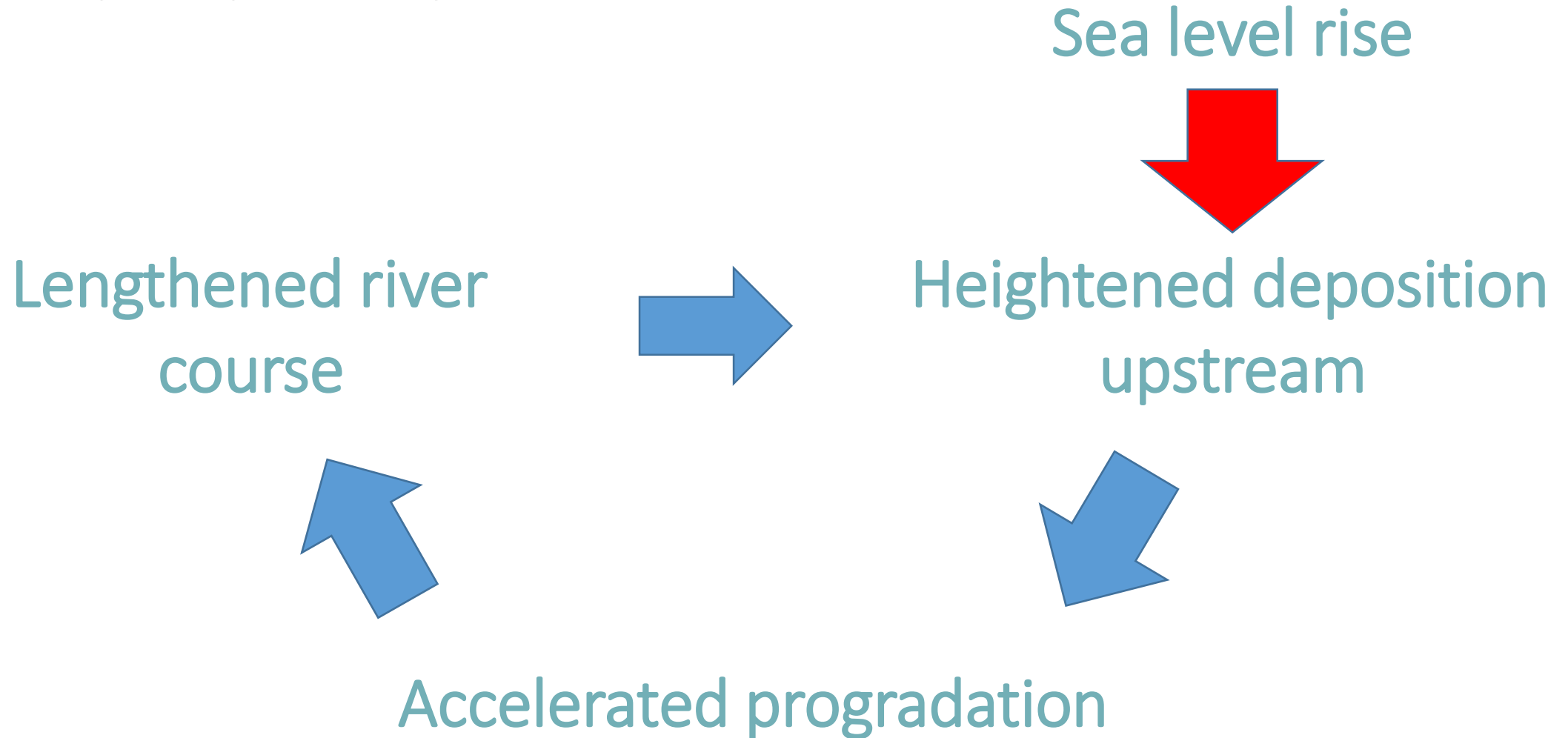
From Czuba et al. (2012)

Puyallup River kilometer

# Is that what we see?

Yes, both models (left) and observations (not shown) indicate aggradation in lower river

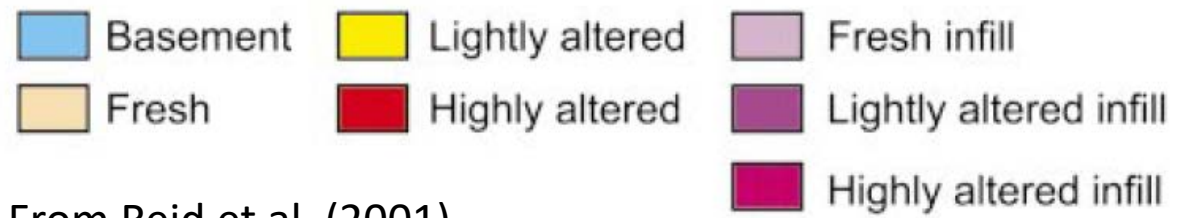
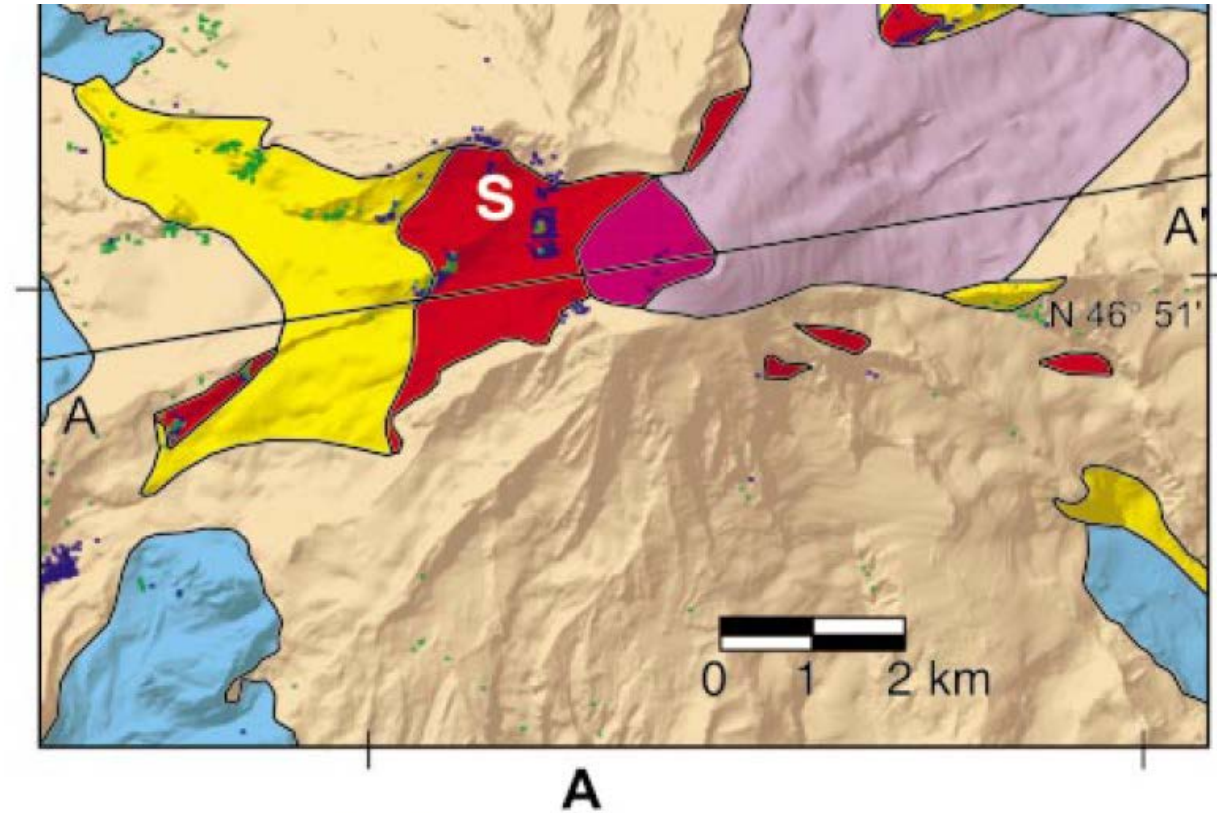
# The Puyallup Merry-Go-Round



# What about Mount Rainier?

According to Reid (2001)...

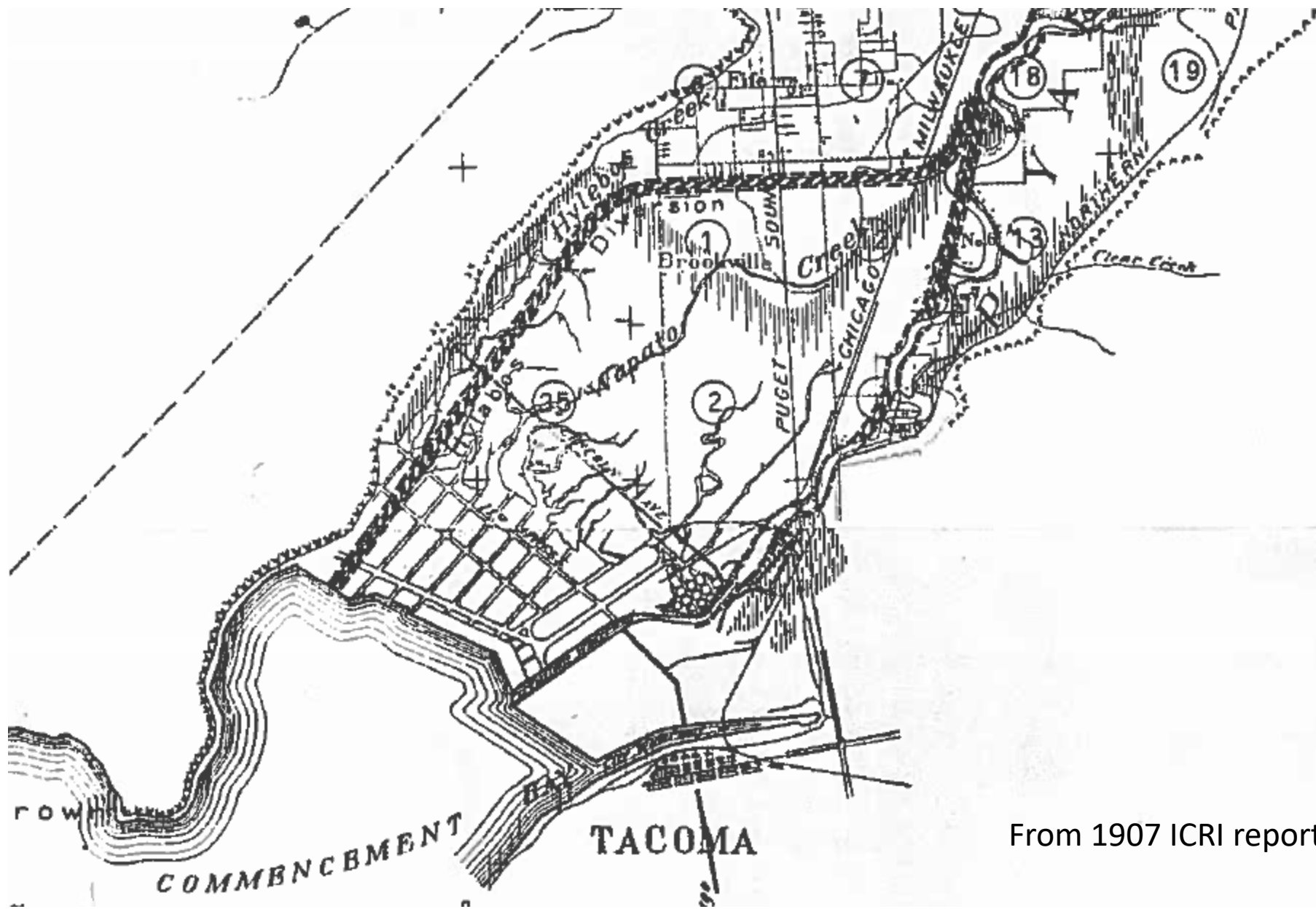
*“our analysis predicts that the least stable part of the volcano is its upper west flank, where intensely altered rocks are widely exposed”*



From Reid et al. (2001)

# What do we need?

- A better, more fundamental understanding of the dynamics of sediment in the estuarine portion of the Puyallup River.
  - In other words, how bad is the problem?
- Unfortunately, existing sediment transport models may not be up to the task.
- Two options: 1) raise the levees, 2) attempt to restore process
- An alternative to “raise the levees” approach
  - “Yolo Bypass type” corridor for floodwaters and sediment
  - Simulates pre-development condition
  - Requires considerable space and **agency/jurisdiction coordination**



From 1907 ICRI report

# Extremely Rapid Development and Impervious Surface Installation

