What can we learn from the removal of small dams?

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Percentage of Dams over 50 years Old

Percentage of Dams over 50 years Old by 2020

Number of Dams Over 50 Years Old by 2030


most likely to be removed
Sediment management issues:

• To dredge or not to dredge?
• How do we quantify potential downstream impacts?
• What about possible sediment contamination?

Key scientific questions:

• How will reservoir sediment erode?
• When will it go?
• How much sediment will erode?
• Where will it end up?
• What are the ecological implications?
How will it erode?

Maple Gulch Dam - November 2002
Maple Gulch Dam - December 2002

Maple Gulch Dam – New Years Eve 2002
When will it erode?

Dinner Creek Discharge

Incipient motion for surface $d_{50} \sim 109$ cfs
Dinner Creek Dam – October, 2003

Dinner Creek Dam - November, 2003
How much will erode?

Sediment Volume ($V_{\text{max}}$) = $L \times H \times W \times 0.5$
Where will it end up?

Diffusion

Sediment Thickness

Distance Downstream

Translation

Diffusion

Sediment Thickness

Distance Downstream
Geomorphic reservoirs (i.e., pools, riffles, floodplains)

Maple Gulch Deposition – November 2002
Water quality issues

- Turbidity
- pH
- Nutrients
- Dissolved oxygen
Conclusions:

- Knickpoint migration is a dominant erosional mechanism following dam removal
- Knickpoint erosion is rapid and punctuated
- Volume estimates may over-estimate erosion if the channel has been displaced
- Patterns of coarse grained deposition suggest diffusion with geomorphic imprints
Conclusion cont…

• Bio-geo chemical impacts are short-lived and episodic.

• Analyses must address the ecological implications of physical environmental changes.

• Methodology

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