

INOVATIVE METHODS FOR RESERVOIR SEDIMENT MANAGEMENT

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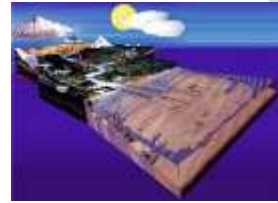


Innovative solutions for a safer, better world

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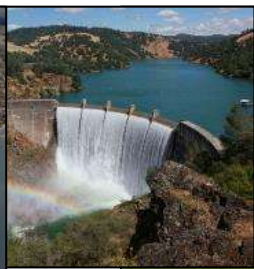
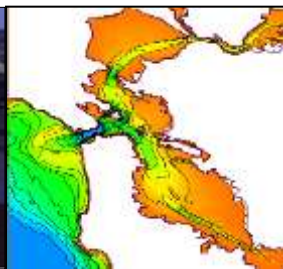
Regional Sediment Management

Established 1999, CERB Charge



“A systems approach using best management practices for more efficient and effective use of sediments in coastal, estuarine, and inland environments for healthier and more resilient systems.”

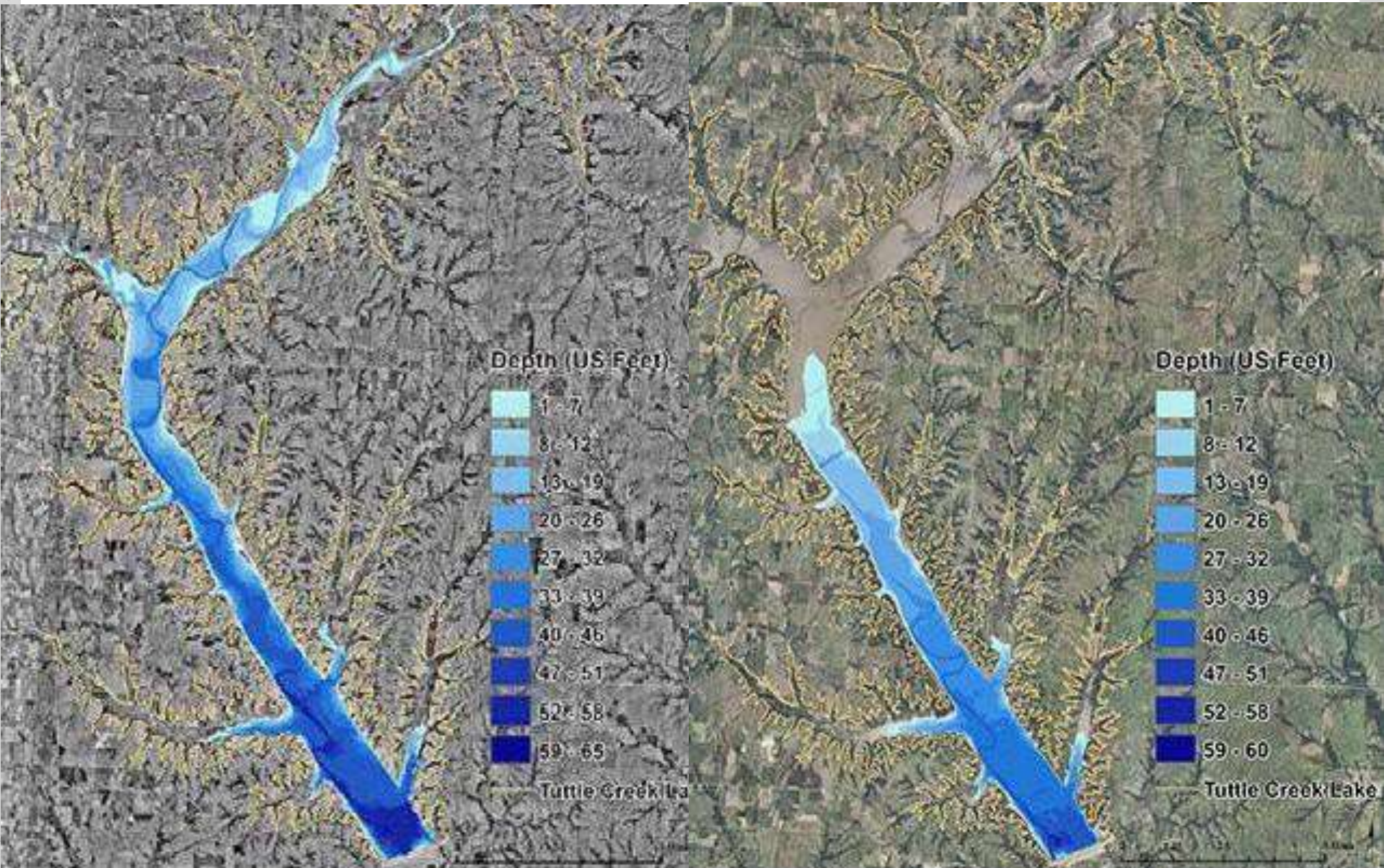
- Recognizes sediment as a valuable resource
- Work across business lines, projects, and authorities to create short and long-term economically viable and environmentally sustainable solutions
- Improve operational efficiencies and natural exchange of sediments
- Consider regional implications of project scale actions and benefits
- Apply/Enhance tools and technologies for regional approaches
- Share lessons learned, information, data, tools, and technologies
- Communicate and collaborate



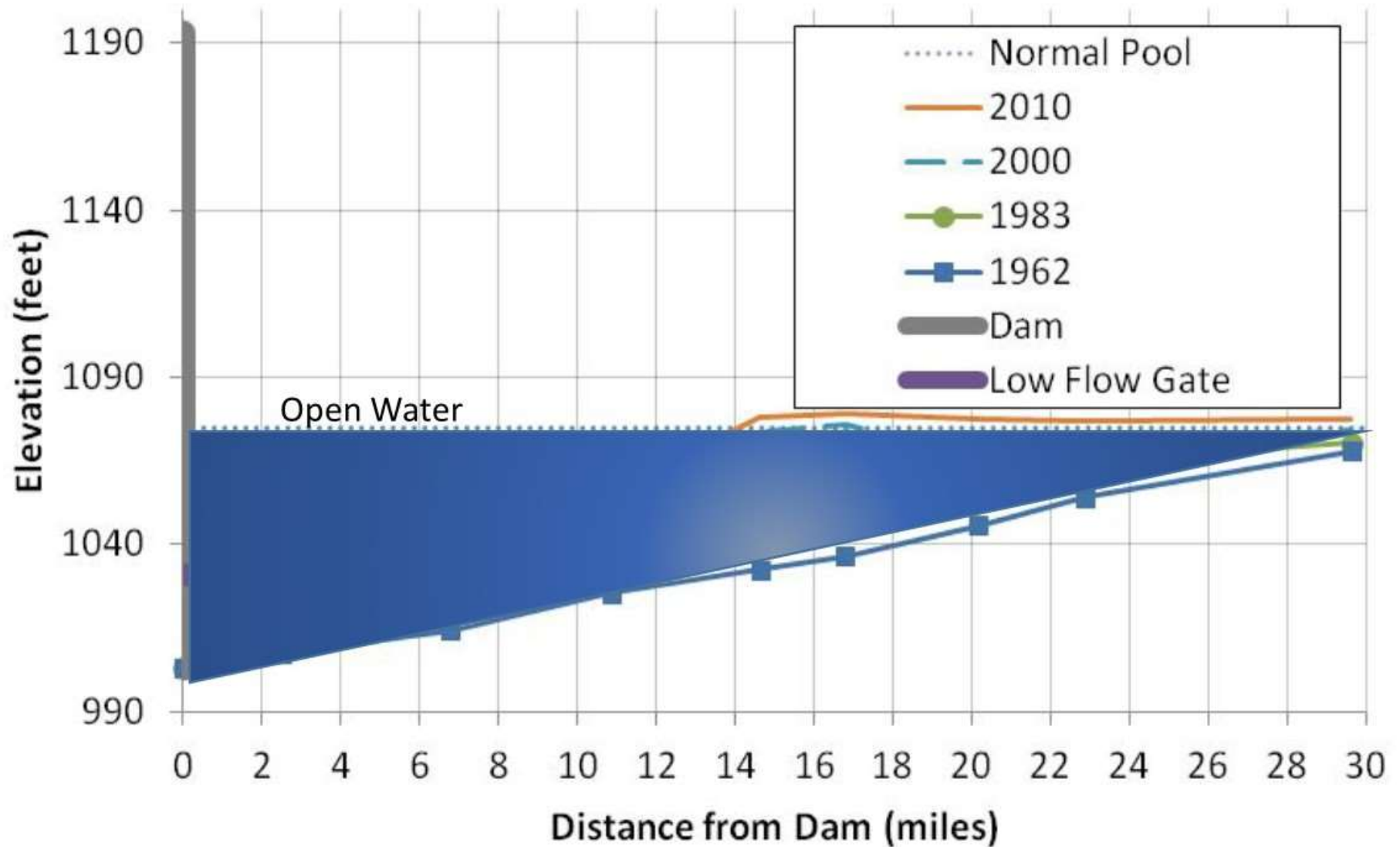
Purpose

To inform about the innovative ways sediment is or can be managed at reservoirs in order to motivate you, the dredging industry to engage with this issue

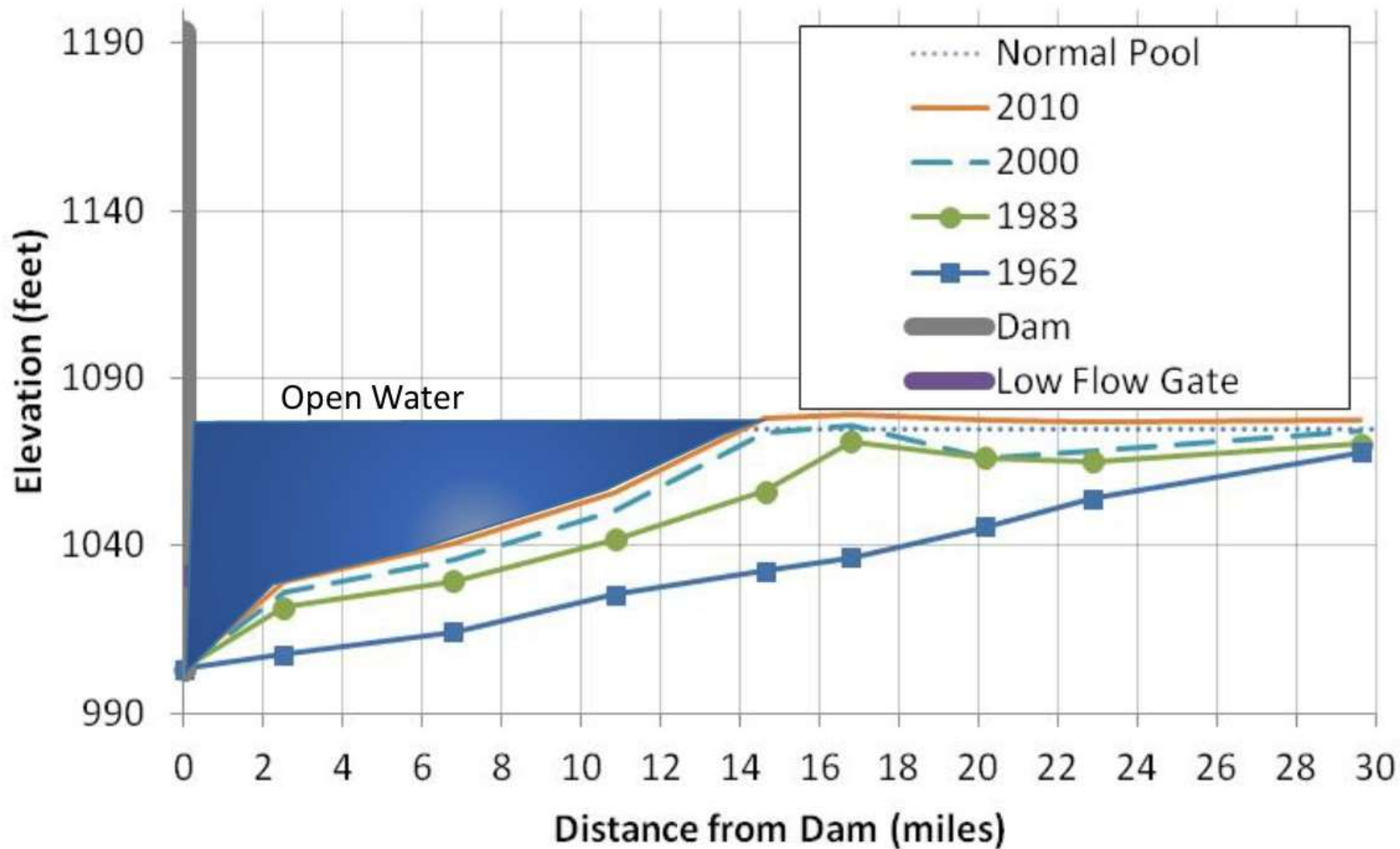
Tuttle Creek Lake: 1962 - 2010



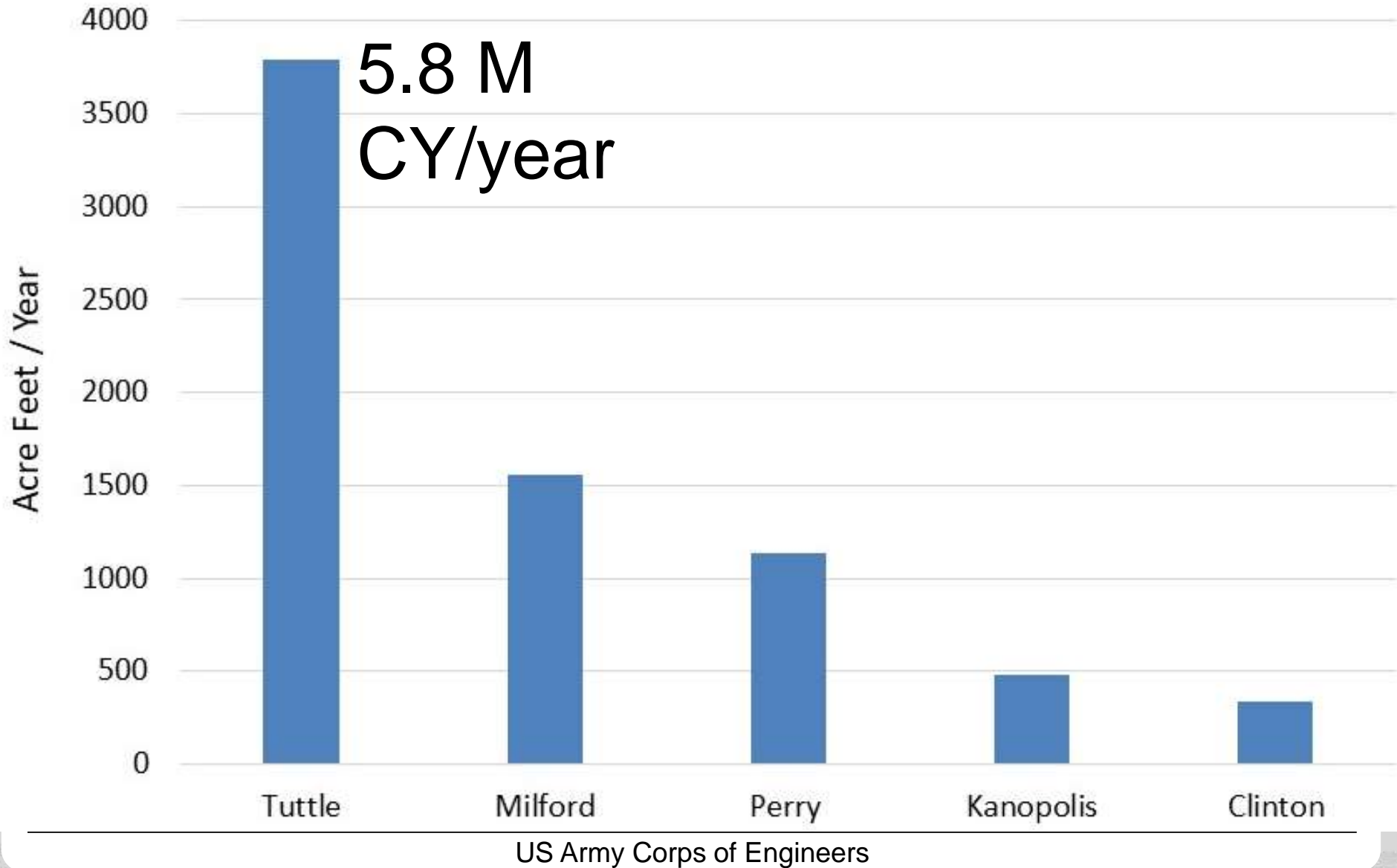
Tuttle Creek Lake: 1962



Tuttle Creek Lake: 2010



Sediment Accumulation in the Multipurpose Pool



Downstream on the Kansas River

Shoal Chub



Plains Minnow



Flathead Chub



Western Silvery Minnow



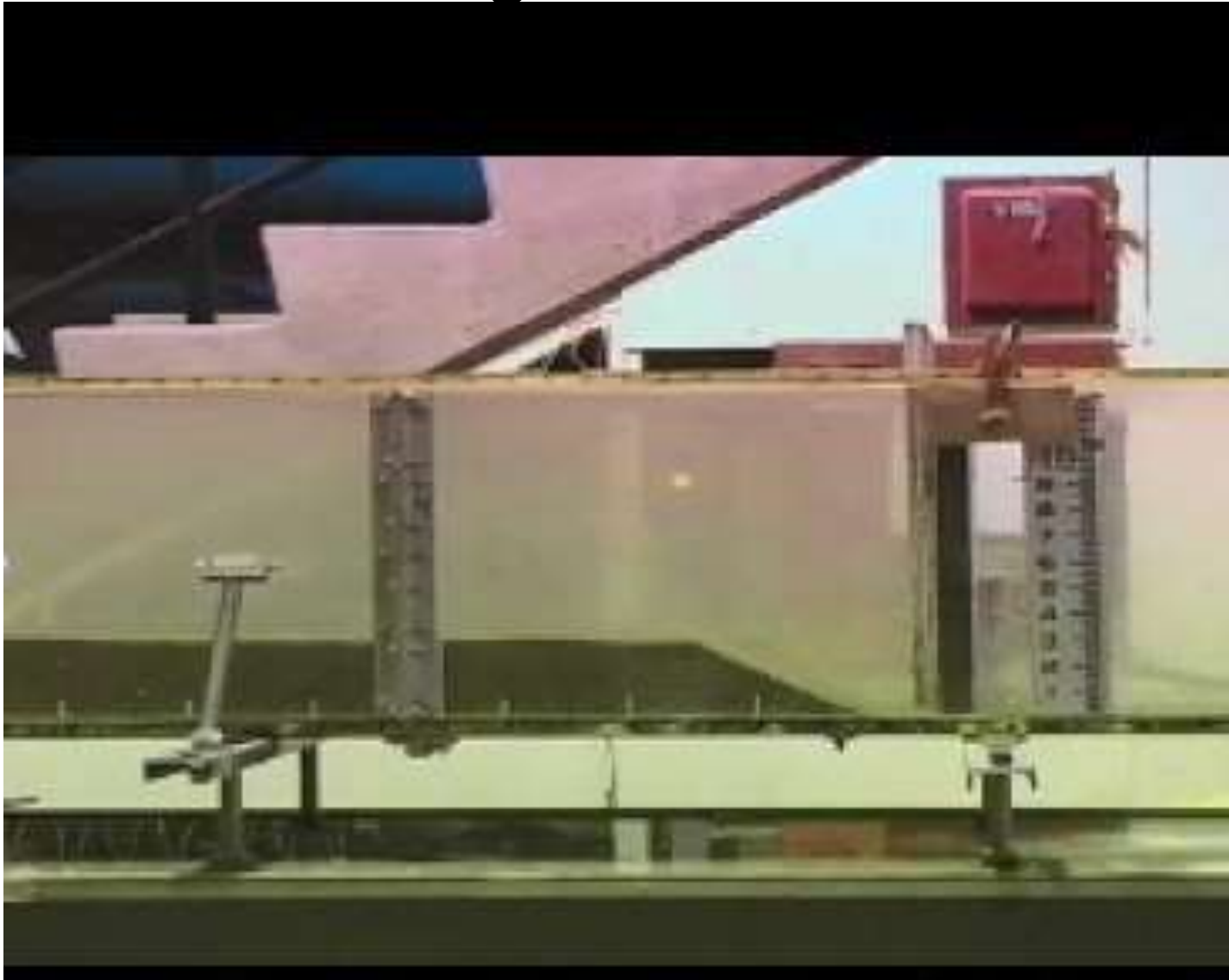
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“The only way to sustainably manage the nation’s reservoirs is to **pass the sediment downstream.”**

**-- Dr. Rollin Hotchkiss, USACE
Environmental Advisory Board,
Speaking at the Kansas Water
Conference**

Pressure Flushing



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Pressure Flushing



Photo: Gregory L. Morris

Cherry Creek Flush

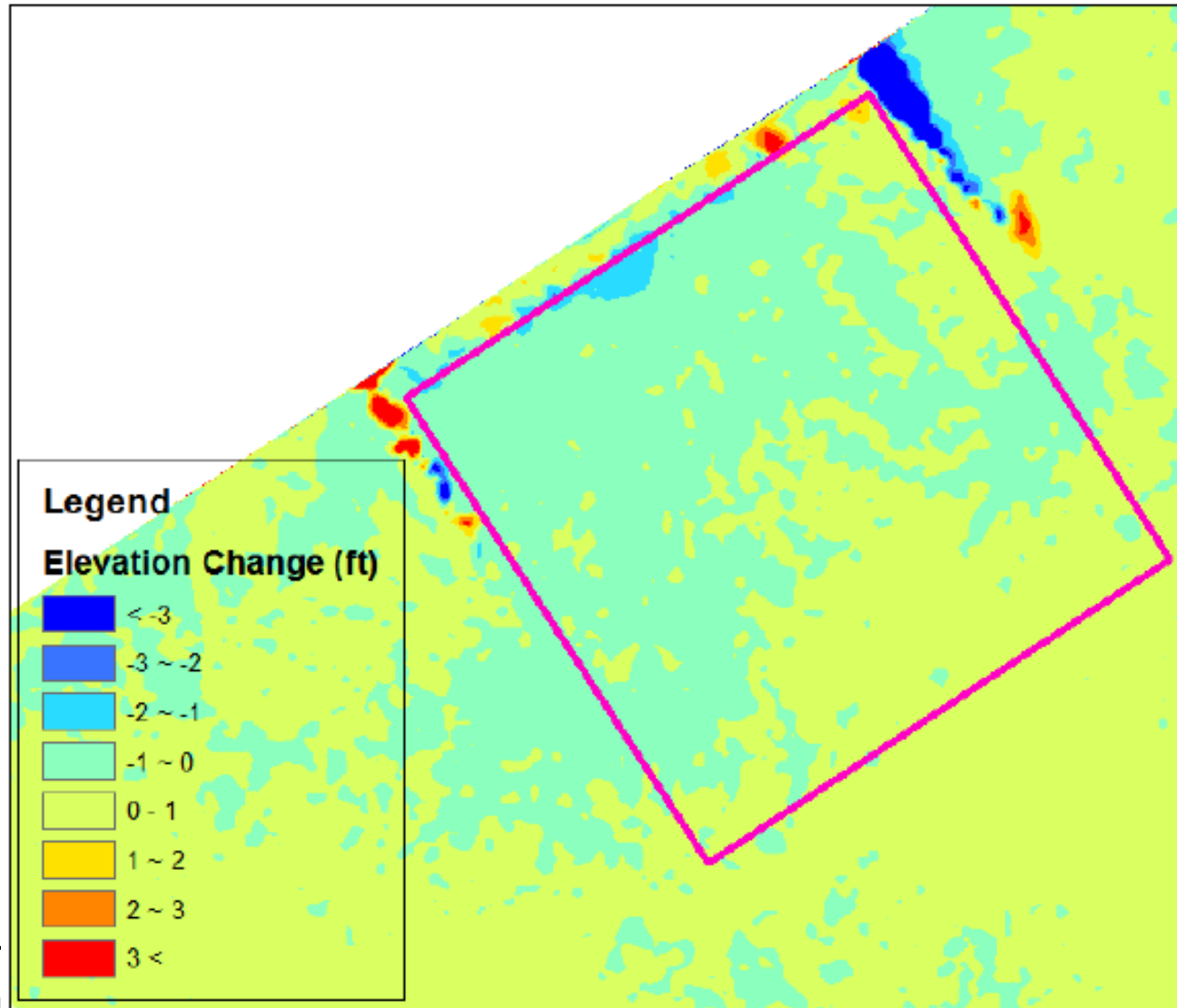
- Pressure flush to maintain operational capability at low level outlet
- Every year alternating high (1300 cfs) and low (250 cfs) flow





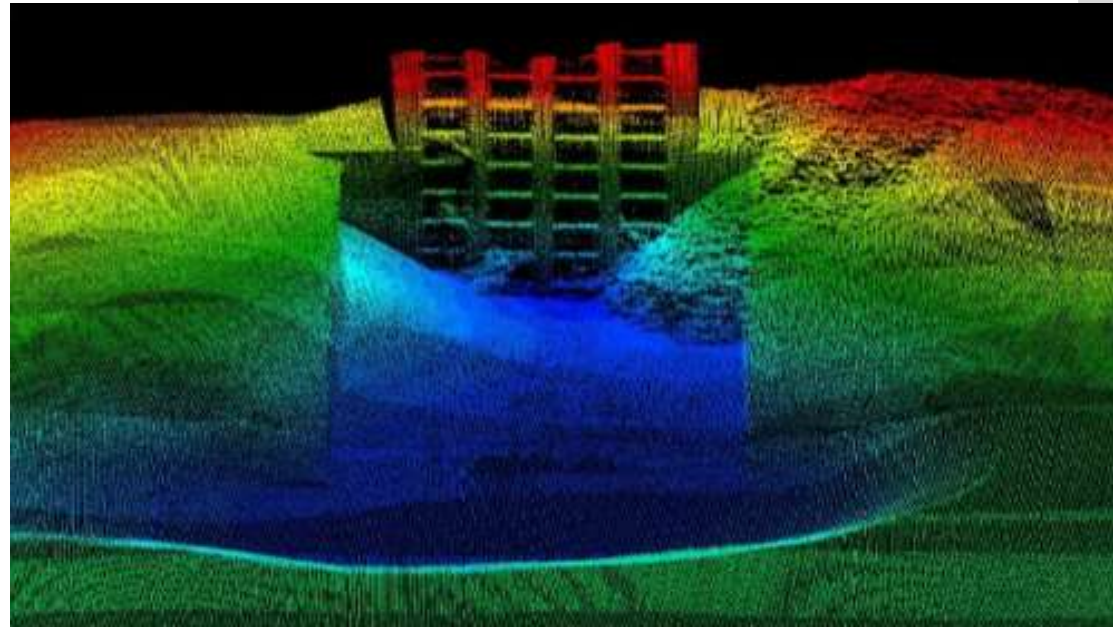
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Cherry Creek Flush: Elevation Change for small flush undetectable



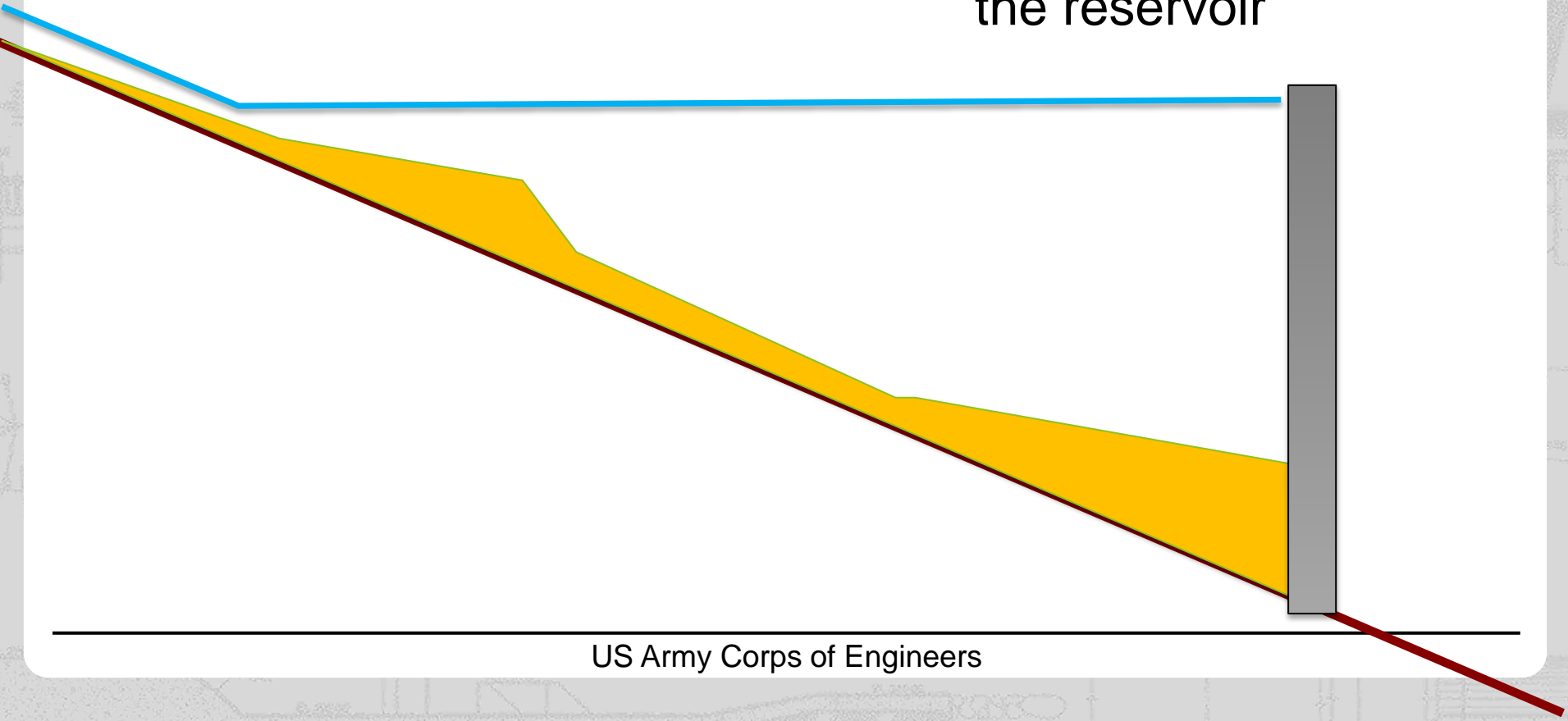
Not Effective at Every Lake

- Kanopolis Lake, KS
- What about water injection dredging or agitation dredging?
- Huge market for small-scale dredging to make pressure flushes more effective



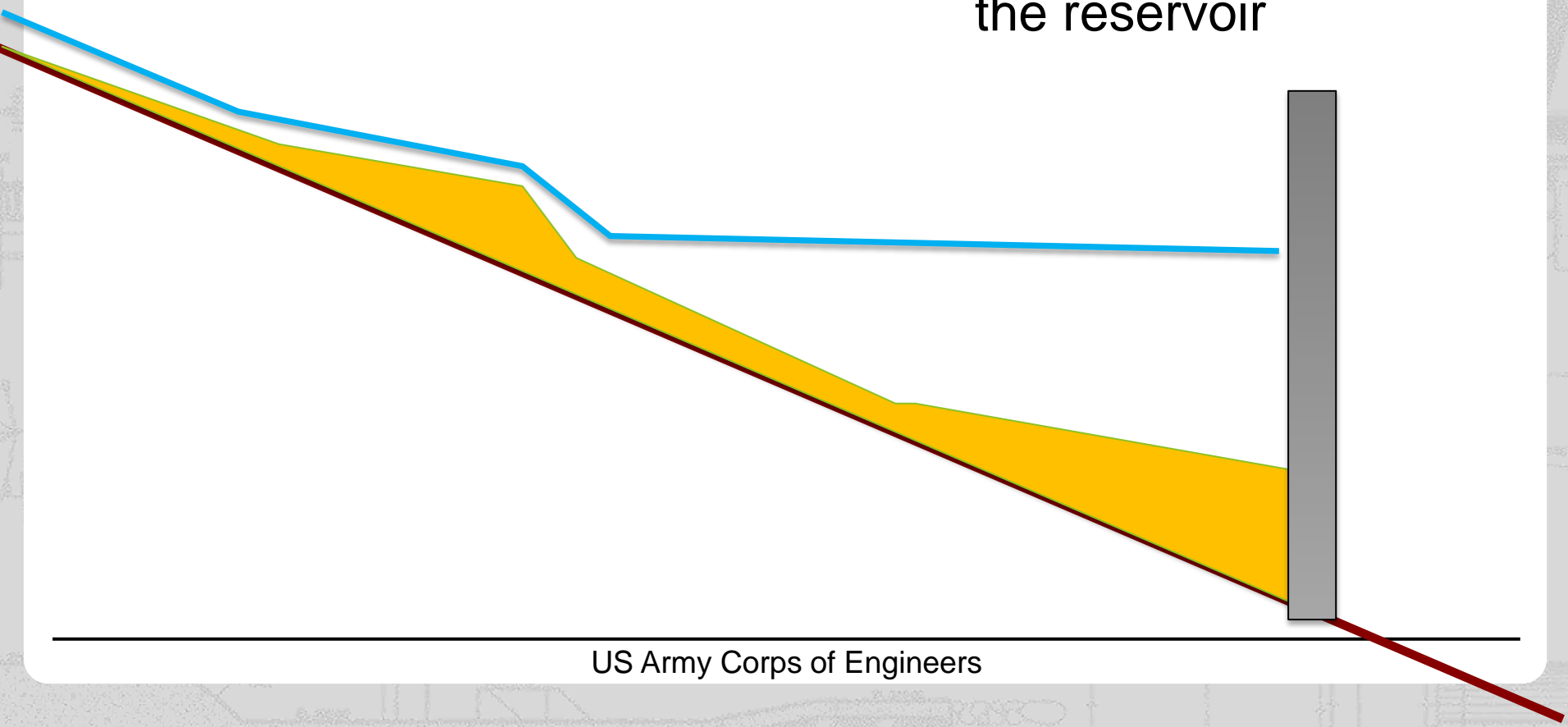
Reservoir Drawdown Flushing

Draw down
the reservoir



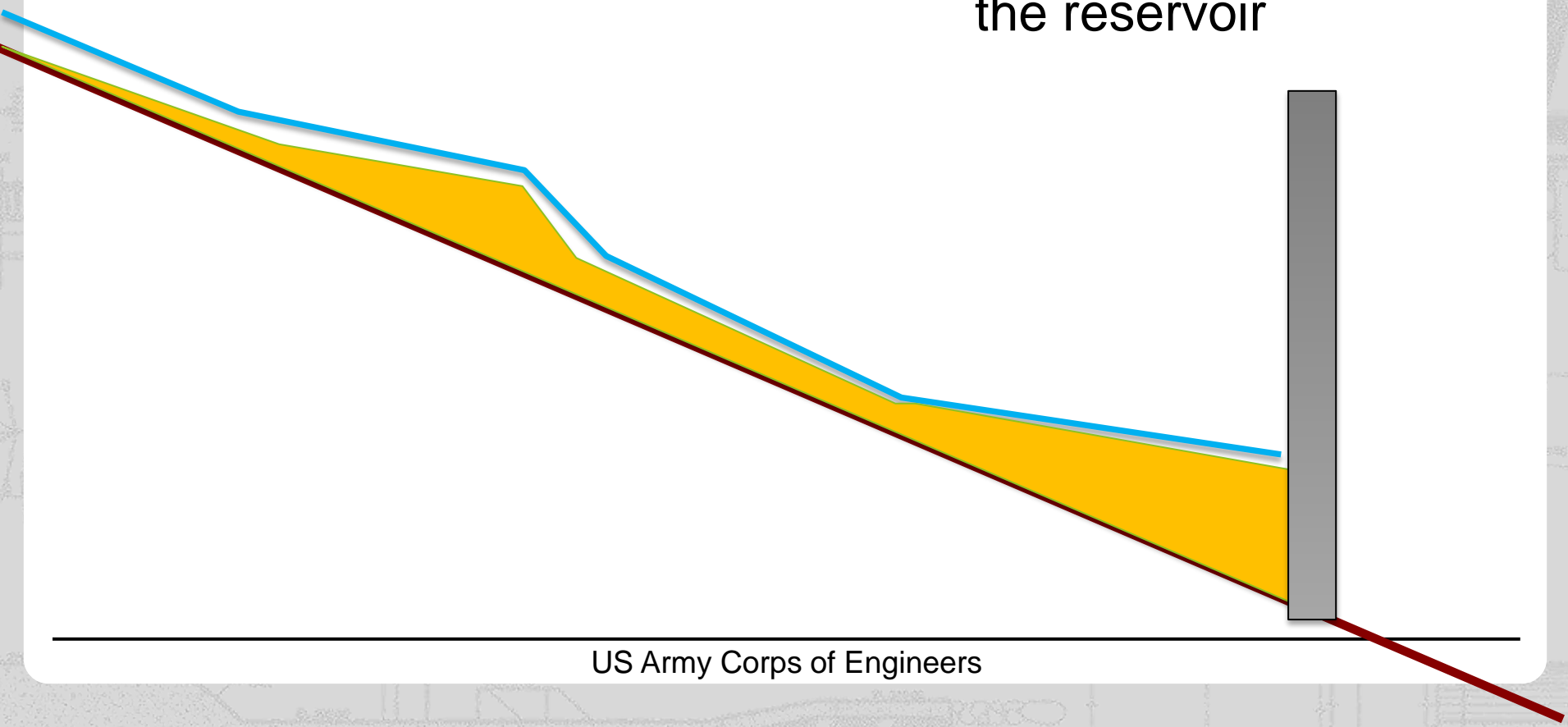
Reservoir Drawdown Flushing

Draw down
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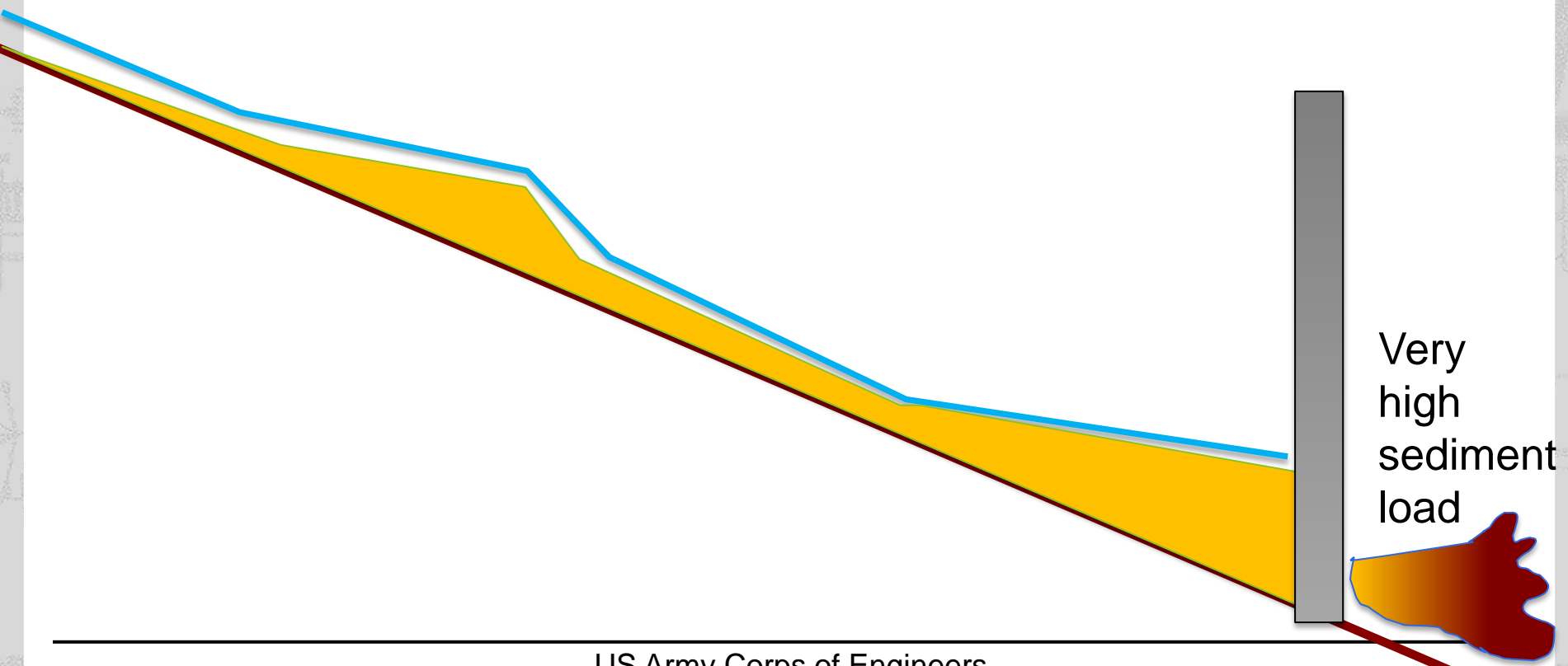


Reservoir Drawdown Flushing

Draw down
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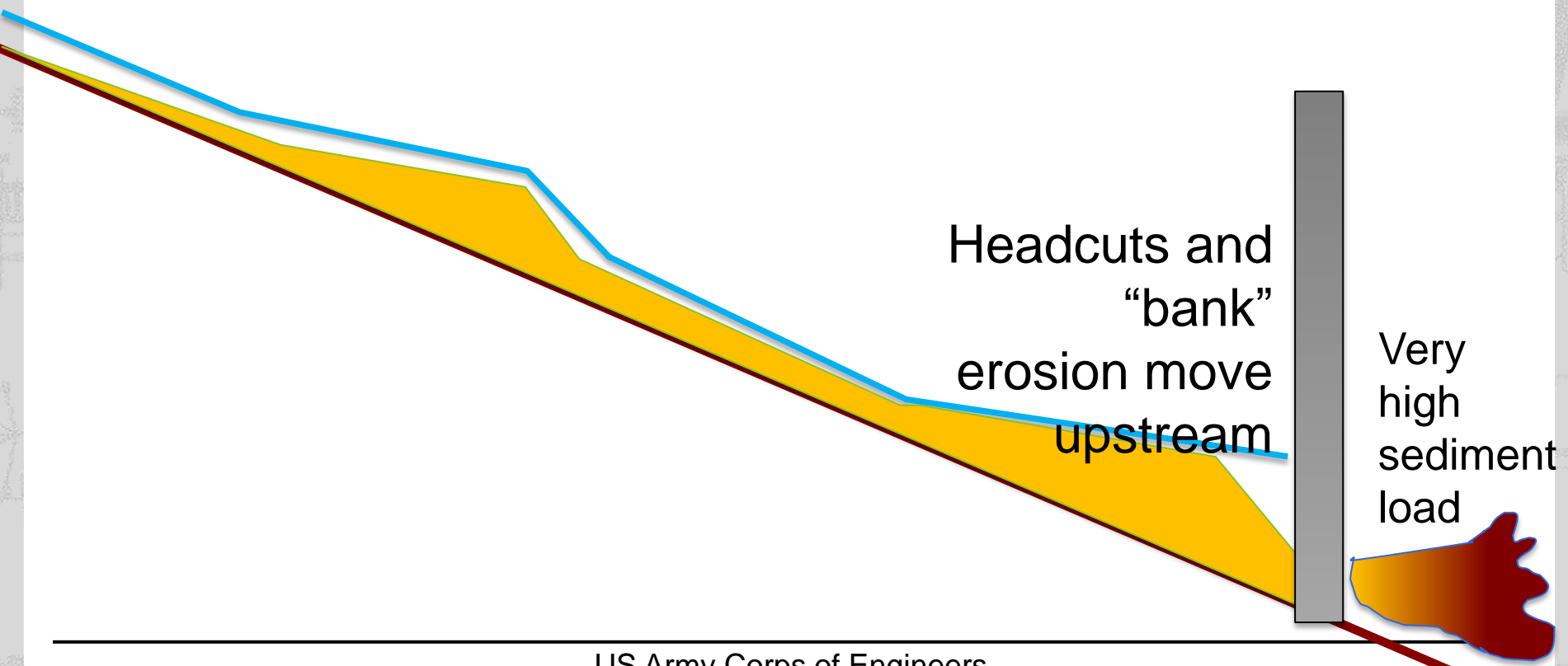


Reservoir Drawdown Flushing

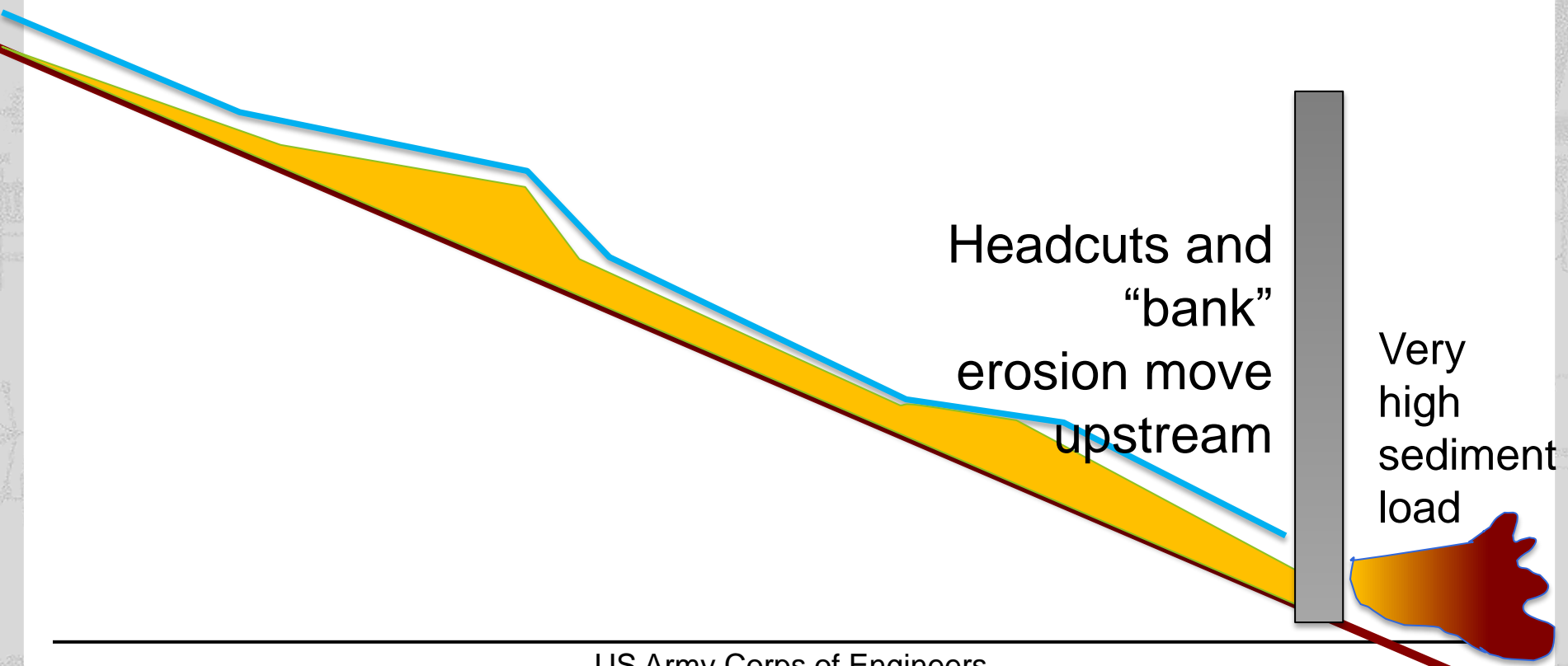


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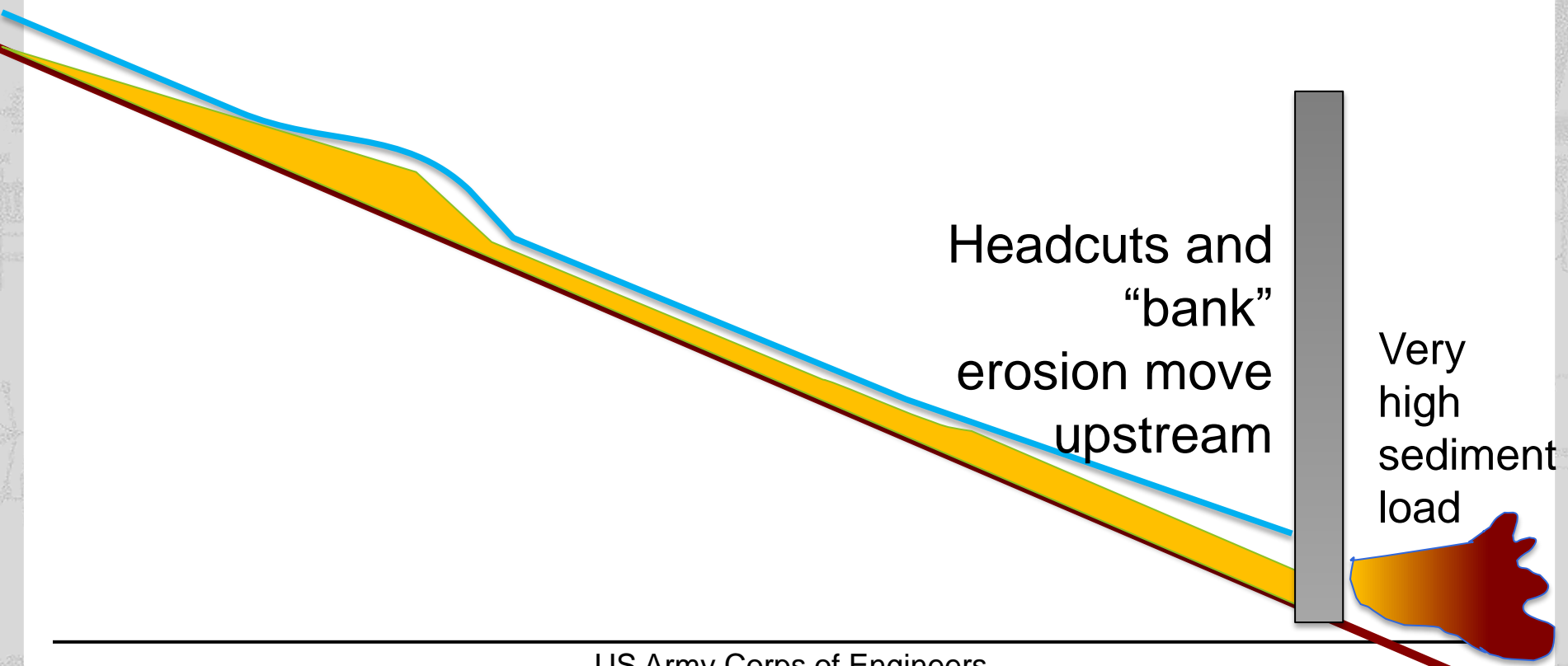
Reservoir Drawdown Flushing



Reservoir Drawdown Flushing



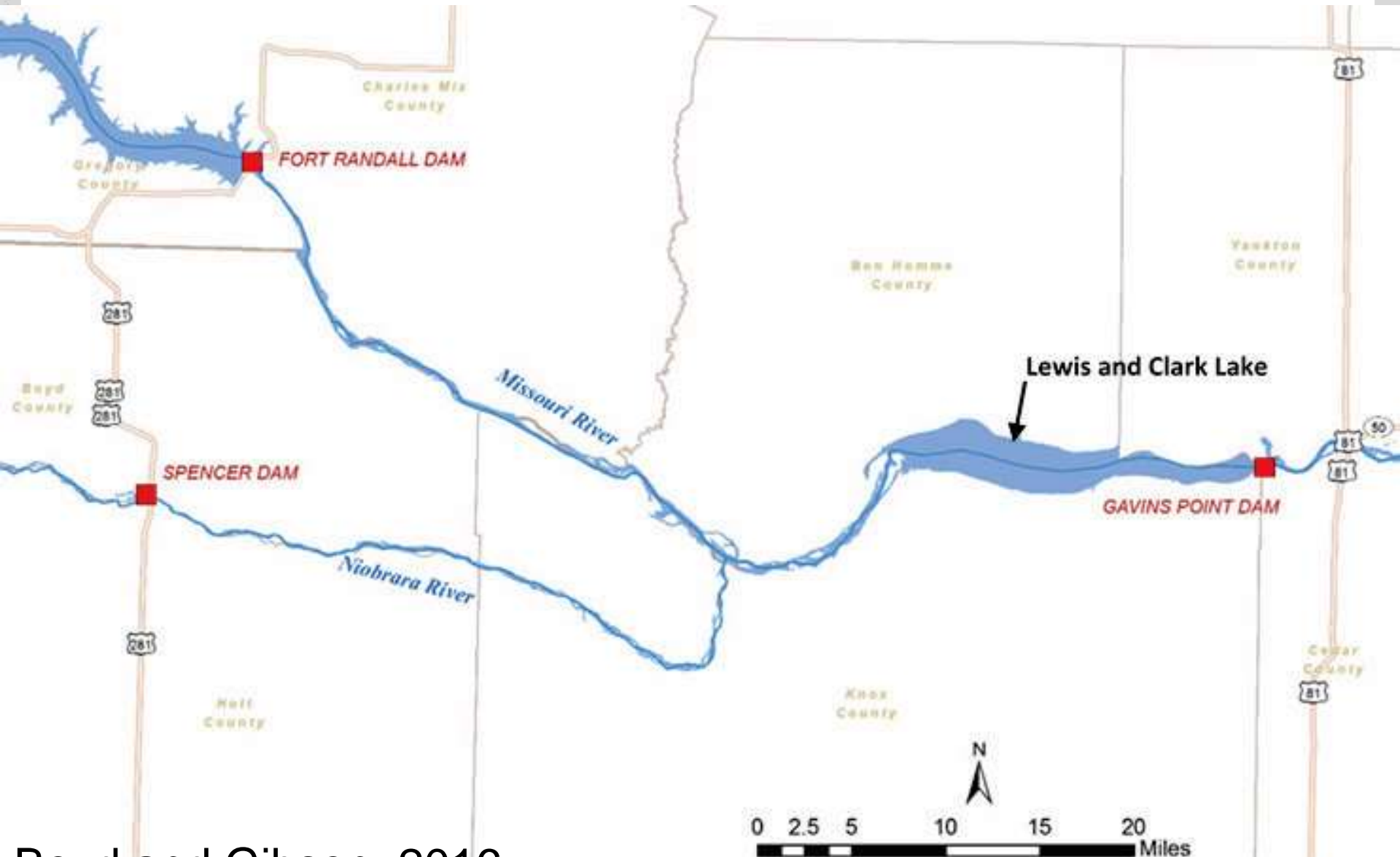
Reservoir Drawdown Flushing



Reservoir Flushing: Fall Creek



Reservoir Flushing: Spencer Dam



Reservoir Flushing: Spencer Dam



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Reservoir Flushing Challenges

- Must have a low-elevation gate
- Uses ALL the water
- Will not usually flush out the “floodplain” i.e. maintained reservoir storage typically much less than the original
- Sediment-laded effluent – high concentration short duration

Gebidim Dam Flushing



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Drawdown flushing is for small (typically hydropower) reservoirs

- **Spencer Dam was able to maintain 10% of its original storage by flushing twice a year for two weeks**
- **If agitation, water injection, or some other type of dredging were employed along with the flush, a larger pool could have been maintained.**

Dredging Example - Millsite Reservoir



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Dredging Example – Millsite Reservoir



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Dredging Example – Millsite Reservoir



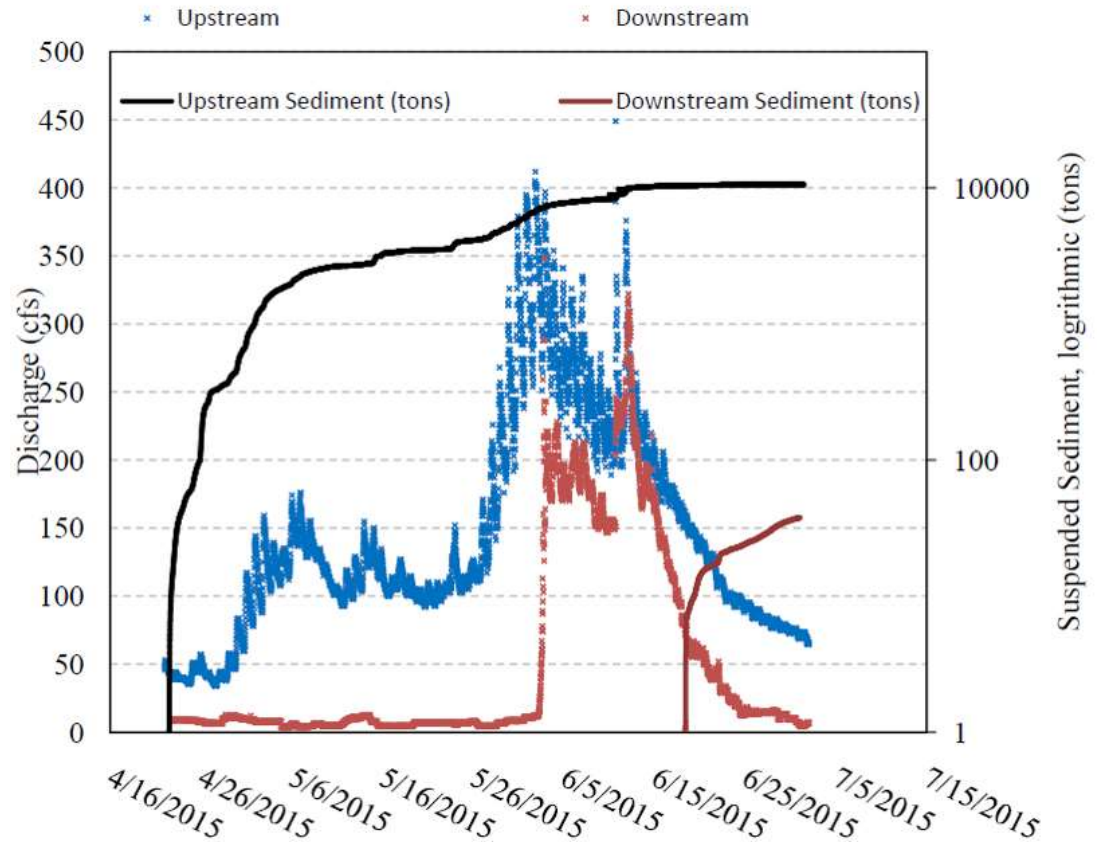
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Dredging Example – Millsite Reservoir

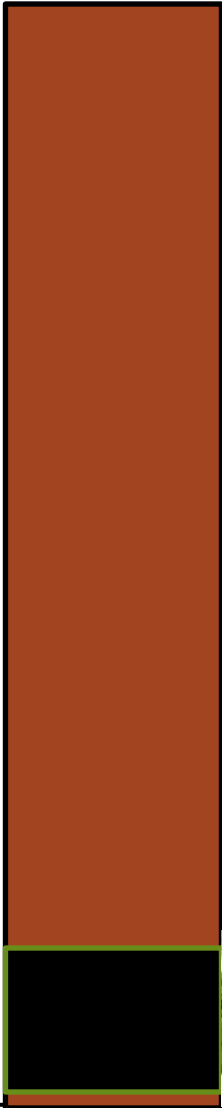
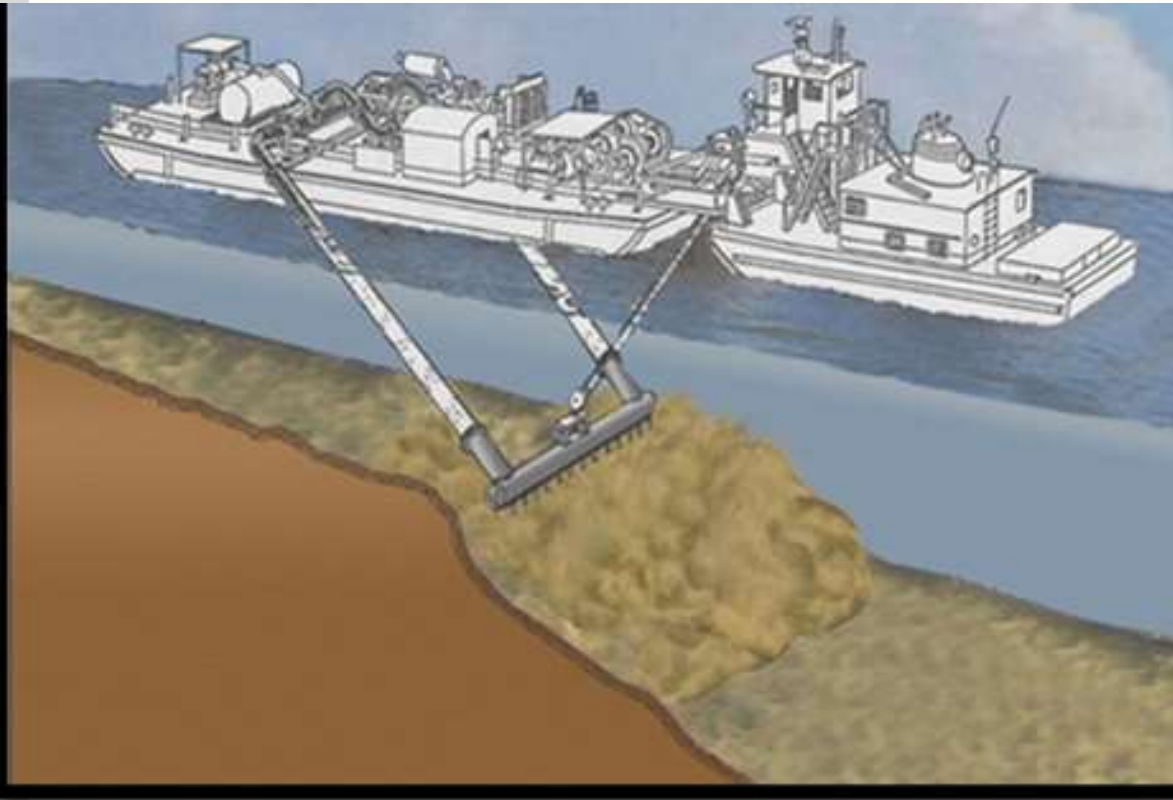
Saves 40% - 60% of total project cost

Potential for positive ecosystem benefits

But you'll still have to go to battle to get your permit!



Water Injection Dredging (WID)



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Water Injection Dredging

- Able to introduce sediment into
 - Low-elevation gate releases
 - Pressure flushes
 - Drawdown flushes
- Market is huge
- State of Kansas seeking to do a WID pilot project at Tuttle Creek Lake
 - Email Josh.Olson@kwo.ks.gov if you are interested

Conclusion

- **Reservoir dredging: So much more than “trap and store”**

- **Pass the sediment downstream**
 - Pressure flushing
 - Drawdown flushing
 - Hydraulic dredging with discharge downstream
 - Water injection dredging

- **The need is HUGE**