# RSM-U Workshop on Reservoir Management

## August 15-17, 2017 RMC, Lakewood, CO



US Army Corps of Engineers BUILDING STRONG®

# Sedimentation Impacts to Reservoirs



## What we planned for...

#### Flood control pool

#### Multi-purpose pool

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#### Flood control pool

Multi-purpose pool: Water storage under contract

50 – 100 years of sediment accumulation

## In other words...

- We knew the reservoirs would fill with sediment.
- We only contracted out the volume of water supply storage we thought would be left at the end of 50 – 100 years.

The reservoirs are filling with sediment.So what's the problem?





The path we're on in pocked by increasing costs for reservoir operations.

Problem #1

## Problem #2

The path we're on leads to the eventual complete loss of reservoir benefits.

And a steady reduction until that point.





# Supply – Demand Graphs

# 2% drought condition

#### Kansas Basin Projected Water Supply Storage and Demand

Supply (Available - MGD) - - Supply (State-Owned - MGD) - Demand (MGD)



## Problem #3

For some (but not most) reservoirs, the actual rate of sediment accumulation has far exceeded the design rate.

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		Sedimentation Rate (ac-ft/year)		
		Design	Measured	Ratio
	John Redmond	404	765	1.89
	Clinton	190	337	1.77
10	Perry	930	1081	1.16
	Tuttle	4,151	3,594	0.87
	Kanopolis	451	422	0.94

John Redmond Reservoir, KS

## Problem #4

The longer we wait, the harder the sediment is to remove.







## Paonia Reservoir, 1961





# Paonia Reservoir, October 2014

Reservoir is 25% full of sediment

Source: Collins and Kimbrel, 2015

# Why does it matter to RSM?

- Many of our inland river systems are sediment starved
- That sediment is being collected in reservoirs
- The reservoir and river system are interconnected – any management action for reservoirs has a direct regional effect on downstream river channels, including navigation channels and ports, marinas,





# Why Do a Workshop on Reservoir Management?

- Significant growth globally in active management of sediment in reservoirs – likely the result of reduced benefits due to age.
- Management agencies (USACE, Reclamation, NRCS, States) are increasingly looking to regain reservoir storage capacity to slow the loss of benefit
- Education of decision makers on the benefits/impact of the sediment management methods can lead to more flexible
  implementation.





# Who it is for?

- The content will be focused on the methods most commonly used for reservoir management.
- Regulatory, Planning, Ops Managers are the focus audience (non-Fed partners at Fed invite)
- An engineering workshop on assessment and numerical modeling of reservoir management methods is expected in 2018.

## Management Options w/Case Studies

- Sediment yield reduction
- Sediment bypass
- Sediment pass-through (routing, sluicing)
- Drawdown flushing
- Pressure flushing
- Hydrosuction

sediment downstream

Pass

Reactionary

- Inlet extension
- Density current venting
- Hydraulically assisted density current venting
- Sediment focusing
- Dredging
- Reallocation
- New reservoirs/dam raises







# Workshop Details:

- August 15-17, 2017
- 4<sup>th</sup> FI. Large Conf. Room @ Risk Management Center – Lakewood, CO
- No tuition!
- Instructors:
  - ► Dr. John Shelley, NWK
  - ► Dr. Paul Boyd, NWO
  - ► Dr. Ian Floyd, ERDC-CHL



Mr. Travis Dahl, ERDC-CHL



- Two days of classroom instruction
- Working demos
- Tour of the Reclamation Physical Modeling Lab at Denver Fed Center
- Site Visit and Case Study review of Pressure Flushing at Cherry Creek Dam





# Getting the word out!

- Promotional materials
- Distribution through RSM list
- Regulatory and Planning Chiefs in NWO will push to district counterparts
- Set up a registration site w/RSM



