

January 17, 2018
ACWI 2017 Annual Meeting

Subcommittee on Sedimentation

Eddy Langendoen, PhD – Chair and presenter
USDA, Agricultural Research Service

John Remus, MS, PE – Vice-Chair
DOD, US Army Corps of Engineers

Purpose

The Subcommittee on Sedimentation of the Advisory Committee on Water Information:

- Promotes collaboration on the sediment issues
- Advances in information gathering, storing, and sharing; for decision making about natural resources management and environmental protection.

SOS Committee Members

- ASCE
- CIRES
- CUAHSI
- CWRRI
- DA, ARS
- DA, FS
- DA, NRCS
- DOC, NOAA, NMFS
- DOD, USACE
- DOE, FERC
- DOI, BLM
- DOI, NPS
- DOI, USBR
- DOI, USGS
- DOT, FHWA
- EPA
- MWRRRC
- TVA

Outline of SOS Efforts – Work Groups

Reservoirs:

- Reservoir Sustainability
 - Tim Randle (USBR)
 - Reservoir Sedimentation Database, USACE & USBR collaboration
- Dam Removal Analysis Guidelines for Sediment
 - Tim Randle (USBR)

Stream Integrity:

- NSMDE – The National Stream Morphology Data Exchange
 - Eddy Langendoen (ARS)

Outline of SOS Efforts – Work Groups (cont.)

- Environment and Infrastructure
 - Tim Randle (USBR)
- Climate and Sediment
 - Matt Collins (NOAA-NMFS)

Technology Transfer:

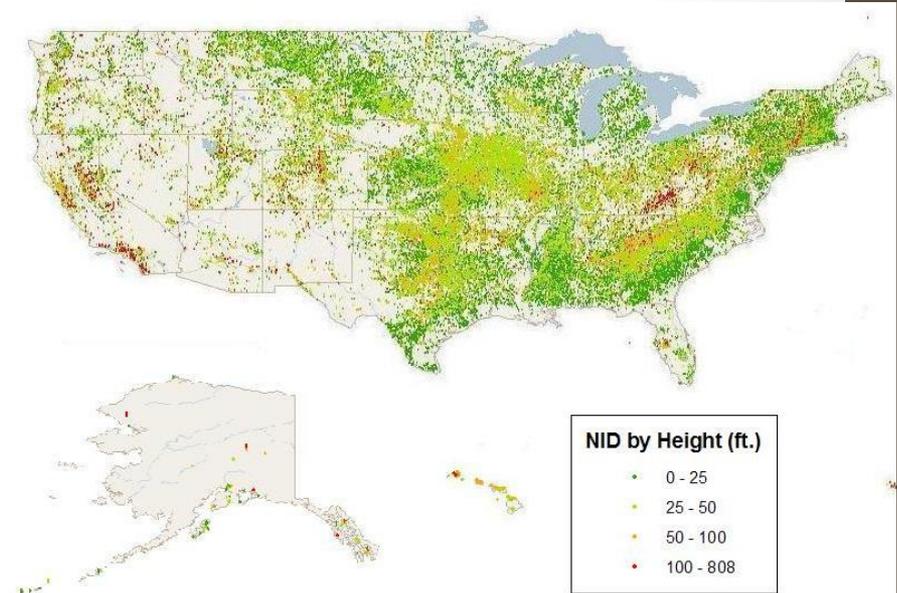
- Joint Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference – planning for 2019
 - Tim Randle (USBR) lead; SOH; committee

SOS Meetings

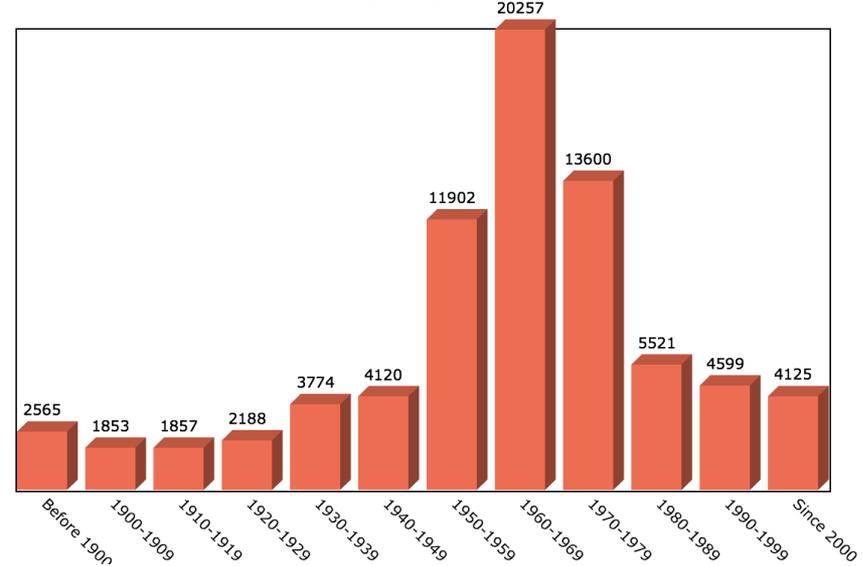
- Quarterly conference calls and
- Semi-annual face-to-face meeting
 - Member reports
 - Work group reports
 - Federal Interagency Sedimentation Project (FISP) report
 - SEDHYD 2019 (June 24-28) planning
 - Field trip
 - Technical presentations
- Work group meetings weekly to quarterly

Concerns wrt Reservoirs

- Age
 - Physical integrity
 - Maintenance
- Storage capacity reduction
 - Failure risk
 - Water availability



Dams By Completion Date



Work Group on Reservoir Sustainability

- Goal: to develop and describe practical options for managing sediment for long-term reservoir sustainability in the US
- Alliances and subcommittees:
 - Task Committee on Reservoir Sedimentation and Sustainability
 - National Reservoir Sedimentation and Sustainability Team – NRSST (wider membership). Raise awareness of reservoir sedimentation issues and present ideas for achieving reservoir sustainability
 - ASCE, Task Committee on Managing Reservoir Sediment

Matilija Dam, Ventura River, CA



Work Group on Reservoir Sustainability (cont.)

- US Society of Dams
- Products:
 - Technical updates and webinars
 - Reservoir Sustainability Resolution (approved by ACWI after last year's meeting)
 - Frequently Asked Questions
 - Reservoir Sustainability Position Paper (to be approved by ACWI for this year's meeting)

Paonia Dam, Muddy Creek, CO



Work Group on Reservoir Sustainability (cont.)

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Paonia Dam, Muddy Creek, CO



NRSST Tasks

- Provide training on reservoir sedimentation and sustainability
 - Reservoir sediment and capacity surveys
 - Projection of future reservoir sedimentation and impacts to facilities
 - Options to achieve reservoir sustainability or increase the useful life of the reservoir
- Provide a web-based resource to help answer questions from agencies and the public
- Develop interagency protocols for web-based storage and retrieval of reservoir survey datasets
- Encourage storage of existing and newly acquired capacity information in the national reservoir database
- Formulate a white paper on reservoir sedimentation and sustainability

NRSST Activities – FY17-18

- FAQ
- Webinar series on RSM
 - Jan 18 – Importance
 - Feb 22 – Options & Needs
 - Mar 22 – Federal reservoirs
 - Apr 26 – Permitting
 - May 24 - Economics
- Position paper

**Frequently Asked Questions about
Reservoir Sedimentation and Sustainability**
Contribution and review by the
Subcommittee on Sedimentation

National Reservoir Sedimentation and Sustainability Team:

Timothy Randle, Sean Kimbrel, and Kent Collins, Bureau of Reclamation
Paul Boyd, Meg Jonas, Rene Vermeeren, Darrell Eidson, Deborah Cooper (retired), and John Shelley, U.S. Army Corps of Engineers
Kyle Juracek, U.S. Geological Survey,
Jon Fripp, USDA-Natural Resource Conservation Service
Mustafa Altinakar, University of Mississippi
Rollin Hotchkiss, Brigham Young University
Matt Kondolf, University of California, Berkeley
Peter Nelson, Colorado State University
Frank Weirich, University of Iowa
Greg Morris, Gregory Morris Consultants
George Annandale, George W. Annandale, Consultant
Kevin Jensen, McMillen Jacobs Associates
Michael Whelan, Anchor QEA, L.L.C.

April 9, 2017

[Click on the following questions below to hyperlink to the answers:](#)

1. **What is a dam and reservoir system, and what are the benefits provided by dams and reservoirs?**
2. **How do dams and reservoirs function?**
3. **How many dams are there?**
4. **What is the process of reservoir sedimentation?**
5. **What are the problems associated with reservoir sedimentation?**
 - a. **When and where do these problems occur?**
 - b. **How is safety of the dam affected?**

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CIRES and the Western Water Assessment sponsor a webinar series on Reservoir Sedimentation and Sustainability.

The nation's 90,000 dams and reservoirs constitute a critical component of the country's infrastructure ensuring the stability of water and energy supplies and flood risk management. However, the reservoir storage capacity, essential to meeting these purposes, has been filling with sediment (clay, silt, sand, gravel, and cobble).

The Subcommittee on Sedimentation's National Reservoir Sedimentation and Sustainability Team presents on sustainable solutions to reservoir sediment management.



Thursday, January 18, 2018:
[Reservoir Sedimentation Management – Big Deal! Why should we even care about it?](#)
Dr. George Annandale, P.E.

Thursday, February 22, 2018
[Reservoir Sedimentation Management Options and Data Needs](#)
Dr. Greg Morris, P.E.

Thursday, March 22, 2018
[Sediment management for multi-purpose Federal reservoirs](#)
USACE & Reclamation

Thursday, April 26, 2018
[Permitting for reservoir sediment management](#)
Dr. Rollin Hotchkiss, P.E.

Thursday, May 24, 2018
[Economics of Sustainable Reservoir Sediment Management](#)
Dr. George Annandale, P.E. and
Dr. Rollin Hotchkiss, P.E.



**Webinar Times: 11:00 AM, MDT | 1:00 PM, EDT
12:00 PM, CDT | 10:00 AM PDT**

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Management of Reservoir Sedimentation for Long-Term Sustainability
Subcommittee on Sedimentation
National Reservoir Sedimentation and Sustainability Team
June 1, 2017

The nation's 90,000 dams and reservoirs constitute a critical component of the country's infrastructure. These dams and reservoirs serve both to provide fundamental societal needs such as ensuring the stability of water and energy supplies and flood risk management for much of the country. This extensive system of hydrologic stability and control structures ensures water supplies for municipal, agricultural, and industrial use and for hydropower, flood risk management, navigation, and recreation. The system of dams and reservoirs, just as other critical aspects of the country's infrastructure such as the interstate highway and bridge system, affects virtually every part of this country in a profound and in many instances at an existential level. In many situations, the ability of communities to continue to exist in relative safety or grow crops is dependent upon such structures. Essential to our ability to ensure the capacity of this system to continue to meet these purposes, now and into the future, is the need to maintain adequate storage capacity. However, this capacity has been steadily degraded, at times at an alarming rate, as the nation's dams and reservoirs have been and are filling with sediment (clay, silt, sand, gravel, and cobble). Simply put, this pattern of continued, and in many instances, accelerated sedimentation threatens both the storage capacity and operational control of many reservoirs. Over the long-term, maintaining existing reservoir storage capacity and operational control may be the most cost effective and feasible strategy to maintain capacity, rather than having to construct more dams to replace lost capacity. In addition, failing to manage reservoir sedimentation can lead to downstream environmental and societal impacts. Reservoir sedimentation prevents sediment from reaching the downstream river, which can lead to erosion of the downstream channel. This erosion leads to the impairment of habitat for fish and wildlife, and a reduction of sediment delivered to coastal deltas and, in many instances, coastal shoreline erosion issues.

All rivers naturally transport sediment particles that are eroded from the upstream watershed. These sediment particles tend to deposit and accumulate in downstream reservoirs over time because of the reduced flow velocity and increased travel time of water through the reservoir pools. The long-term process of sediment accumulation is known as reservoir sedimentation. Sediment erosion and transport is a natural process, but erosion rates can be accelerated by human activities that disturb soils (e.g., mining, construction, tilling, grazing, etc.). The use of best land-management practices throughout the watershed can reduce erosion to rates that are closer to background levels. An increase in hydrologic variability, such as more severe and more frequent droughts and floods will typically lead to increased sediment erosion rates. Droughts cause additional stress to vegetation (possibly through increased incidence of wildfire) that would otherwise protect the soil from erosion. Floods erode and transport sediment at rates that are much greater than rates during lower-flow periods.

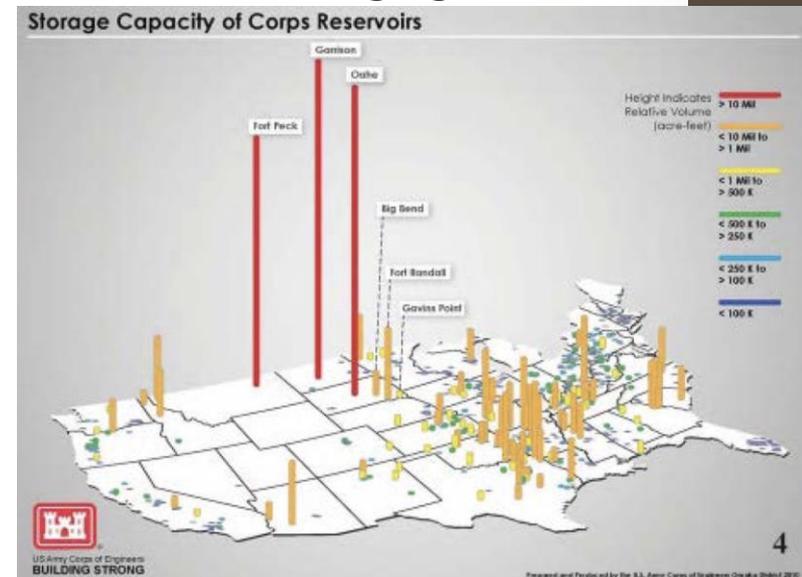
Reservoirs cannot physically trap sediment indefinitely. As the reservoir becomes filled with sediment, inflowing sediment will be transported through the reservoir and delivered to the downstream channel in an uncontrolled manner. A prudent, long-term sustainable goal for reservoir management is to pass

Reservoir Sedimentation Databases

- RESSED :
 - Original Reservoir Sedimentation Database included 6,618 surveys of 1,824 reservoirs
 - Based on a paper form from the Soil Conservation Service (Form 34)
 - RESSED is online (<https://water.usgs.gov/osw/ressed/>)
- RSI (Reservoir Sedimentation Information):
 - Store and display to assist with evaluation of sedimentation trends and reservoir life expectancy with respect to a changing climate
 - Capability of storing and analyzing survey data
 - Collaborative effort with USBR

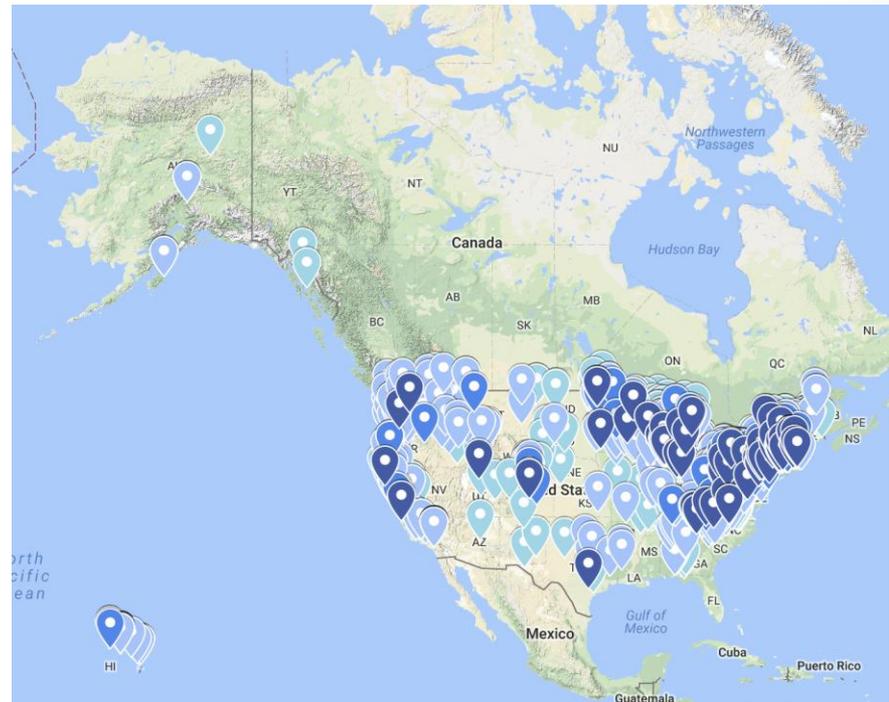
Uses of Reservoir Sedimentation Data

- Determine remaining useful life of reservoirs
- Determine impacts to public water supply and other purposes
- Fine-tune water releases to minimize capacity-loss effects on flooding
- Design reservoir sediment-storage allocations
- Manage sediment deposits
- Rehabilitating aging or damaged structures
- Designing sediment-sluicing and other sediment-management structures
- Sediment yield data; complements fluvial sediment gage data
- Estimating mass of captured sediment and associated solid-phase constituents, such as carbon
- Assessing resource conditions related to land cover, land use, and rates of erosion and sediment production



Work Group on Dam Removal Analysis Guidelines for Sediment

- What to do when dams no longer serve their purpose?
- Dam removal very often the better option.
- 1384 dams removed through 2016.
- 72 dams removed in 2016.
- Need for guidelines how to evacuate the stored sediments.



www.americanrivers.org/DamRemovalDatabase

Work Group on Dam Removal Analysis Guidelines for Sediment

- Provide a 10-step decision framework to determine the level of assessment needed to evaluate dam removal sediment impacts.
- Determine the type and level of
 - data collection,
 - analyses,
 - modeling, and
 - monitoring

Dam Removal Analysis Guidelines for Sediment

Advisory Committee on Water Information
Subcommittee on Sedimentation

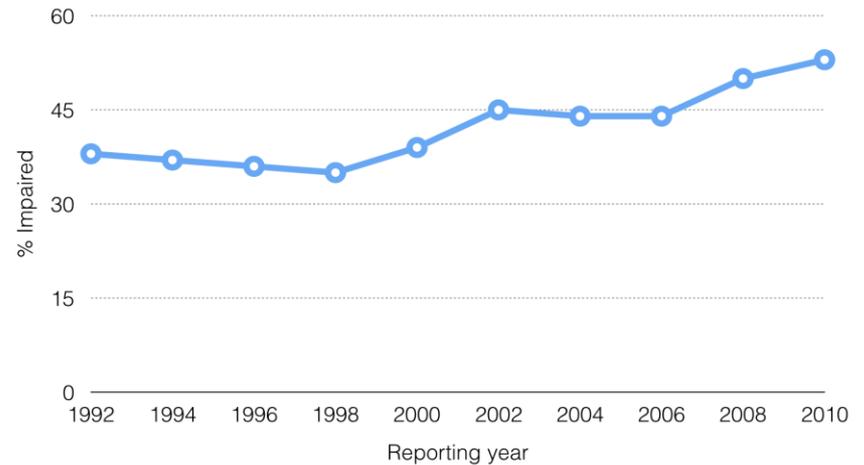


U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

Concerns wrt Stream Integrity

- Sediment load & bed material: TMDLs
- Channel form/stability
- In-stream and near-stream resources

History of Impaired Stream Miles



National Stream Morphology Data Exchange – NSMDE

- Need: development of national common reporting standards and a strategy for exchanging consistent stream morphology observations
- Primarily channel and floodplain geometry and bed material size measurements
- Wide range of applications and uses for stream morphology data
 - culvert/ bridge design
 - rainfall-runoff modeling
 - flood inundation mapping
 - channel stability/sediment source investigations
 - climate change studies
 - navigation studies
 - habitat assessments
 - landscape change research



NSMDE Activities

- Working Group comprised by SOS members supplemented by members from academia and state agencies
- Convened an ad hoc subcommittee to make specific recommendations for advancing a national stream morphology data exchange
- Pursuing a fully-funded study to more deeply examine the data needs of the community and existing databases
 - Critically review available morphology data and their origin
 - Critically review databases and information systems relevant to the NSMDE
 - Conceptualize and formulate the design specifications for the NSMDE
 - Assemble an NSMD blueprint for an actual watershed using existing resources
- Several development proposals have been submitted, and the subcommittee is considering responding to other solicitations

Work Group on Environment and Infrastructure

- Goal: To produce a white paper describing how to make infrastructure more resilient to changing river conditions and compatible with the environment with respect to sediment.
- Funding provided by USBR West-wide Climate Risk Policy Assessment Team.

Managing Infrastructure in the Stream Environment

Advisory Committee on Water Information
Subcommittee on Sedimentation
Environment and Infrastructure Working Group



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado



U.S. Department of Agriculture
Natural Resources Cons. Service
National Design, Construction,
and Soil Mechanics Center
Fort Worth, Texas



U.S. Department of Agriculture
Forest Service
National Stream and Aquatic
Ecology Center
Fort Collins, Colorado

September 2017

Work Group on Climate and Sediment

- A charter statement was drafted and approved unanimously by the SOS.
- This work group will support the efforts of the SOS and other work groups.
- Provided review of climate change section of the Infrastructure and Stream Environment guidance document.
- Draft outline of a White Paper on the Impact of Extreme Events on Stream Morphology

ACWI SOS, Climate and Sediment Workgroup

DRAFT document

Draft title: Impact of extreme events and climate change on sediment dynamics and geomorphology in the U.S.

Possible Outline

1. Introduction
 - a. Research problem: No sediment in National Climate Assessments
 - b. Research objectives: Determine previous studies and knowledge gaps on climate and sediment
2. Methods
 - a. Which journals looked at:
 - b. Search terms:
 - c. Etc.
3. Results
 - a. State of the science: scope of existing research, current projections, and adaptation strategies in the U.S.
 - i. Nationwide studies (if applicable)
 - ii. Regional studies – West, Central, East (section on each region)
4. Discussion:
 - a. Knowledge gaps
 - i. Nationwide
 - ii. Regional studies – West, Central, East (hot topics, gaps specific to each region)
 - iii. Research needs
 - b. Synthesis
 - i. Nationwide
 - ii. Regional studies
 - iii. Implications for resource management (target audience: local, state, federal resource management agencies and researchers)
 1. Infrastructure
 2. Reservoir sustainability
 3. Dam removal
 4. River restoration
 5. Hazard response (flooding, landslides)
 6. Ecology

Joint Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference

- The last SEDHYD took place April 19-25, 2015 in Reno, NV.
 - 10th FISC (first in 1947), 5th FIHMC. 400 registrants; 240 technical presentations, 31 posters, 11 computer model demonstrations; 11 short courses, 3 local field trips
- Next SEDHYD will be held from June 24-28, 2019.
 - Tim Randle (USBR) leads planning committee.
 - RFP was revamped; it went to 130 venues in 17 cities. 37 proposals received.
 - Airfare analysis for 13 major airports.
 - Awarded to the Peppermill Resort, Reno, NV.

Planning Committee

Positions	Staff
Conference chair	Jerry Webb
Conference operations chair	Jennifer Bountry
Conference technical program chair	
Sedimentation chair	Tim Randle
Sediment technical program chair	Eddy Langendoen
Hydrologic modeling chair	
Hydrologic modeling technical program chair	
Registration coordinator	
Web site coordinator	
Proceedings coordinator	Bob Boyd
AV equipment & student assistants coordinator	
Exhibits coordinator	
Short course coordinator	
Field trip coordinator	
Poster and model demonstration coordinator	
Student program coordinator	Amanda Cox
Young professionals program coordinator	

Thank You