

Research Update

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Bottom Line

The Federal Interagency Sedimentation Project researches effective and consistent ways to measure sediment transport and ensures uniformity in collection techniques and methods.

Better, Faster, Cheaper

Federal, state, and local agencies need unbiased, standard testing technologies to measure or infer select fluvial sediment characteristics for comparable and reliable sediment transport data.

Principal Investigator

Robert C. Hilldale
Hydraulic Engineer
Sedimentation and
River Hydraulics Group
Technical Service Center
303-445-3135
rhilldale@usbr.gov

Research Office Contact

John Whittler
Science and Technology
Program Manager
303-445-2241
jwhittler@usbr.gov

Four hand-held versions of pressure difference bed load samplers used in laboratory flume experiments: (C) BL-84, (D) Helley-Smith, (E) Elwha, and (F) TR-2.

Federal Interagency Sedimentation Project

Coordinating effective research into sediment measurement solutions

Problem

Measuring how much sediment a river transports is difficult and hazardous, but the information is priceless to planners determining the amount of sediments transported into reservoirs and shaping rivers. Most of the sediment is transported during floods, and thus it is hard to mobilize and deploy equipment safely. Having people measure sediment is costly and necessarily intermittent.

Moreover, the Nation needs standardized techniques and equipment for fluvial sediment data collection to ensure that data collection is uniform in its collection and processing. Fluvial sediment data can only be meaningful if all parties are held to the same standard. Additionally, equipment used for such data collection must be standardized.

Solution

This Reclamation Science and Technology Program research project partners with the Federal Interagency Sedimentation Project (FISP). Reclamation has been a partner with FISP since its inception in 1939. FISP has conducted research, development, fabrication, and evaluation of instrumentation and methods for sediment data collection, analysis, testing, storage, distribution, and interpretation of information related to sediment and the sampling of surface waters and sediments for analysis of their chemical, biological, and physical properties. FISP develops physical sediment samplers, sampler deployment protocols, and analytical methods that are the standards by which most Federal agencies collect sediment and water quality samples from rivers. FISP equipment and methods are also accepted as the standards used by public and private practitioners collecting sediment data in the United States, and by a number of countries and organizations around the world.

FISP has expanded its traditional role to include research, development, and evaluation of indirect (surrogate) methods and instruments produced by others for potential acceptance. The goal of FISP has been and is to develop and promote the use of standardized sampling and monitoring technologies and methods that produce fluvial sediment and water quality data that are representative, consistent, and comparable. Without such data, technically supportable evaluations of changes in the quality and content of our Nation's waters would not be possible.



New technologies and methods for surrogate monitoring of fluvial sediment can provide much greater temporal- and spatial-data resolution with increased data quality at lower long-term costs. The cooperative efforts of all Federal agencies involved in sediment data collection, analysis,

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and distribution are needed to ensure the integrity of the Nation's sediment data and effective responses to sediment-related issues.

Application and Results

During the semiannual FISP meeting held December 2 and 3, 2015, the committee evaluated and ranked 10 proposals for funding in 2016. The top four proposals were awarded and are described below:

- 1. Testing the Effect of Different Mesh Sizes of Three Bed Load Samplers.** This testing will take place in a laboratory flume to gain an understanding of the effect the opening size has on the hydraulic efficiency of the bed load sampler. To obtain a representative bed load measurement with a pressure difference sampler, flow conditions at the nozzle (entrance) of the sampler must closely match the ambient flow conditions. To date, the BL-84 is the only pressure difference sampler approved for use by FISP. This testing is for FISP approval of larger pressure difference bed load samplers, such as the Elwha and TR-2.
- 2. Quantifying and Comparing the Sampling Efficiency of Four Pressure Difference Bed Load Samplers: Helley-Smith, BL-84, Elwha, and TR-2.** The flume testing for this study has been completed and the proposal addresses the analysis of the testing. This is also required information for FISP approval of additional pressure difference bed load samplers.
- 3. Investigation of Sound Propagation and Flow-Induced Noise in Gravel-Bed Streams for Sediment-Generated Noise Measurement.** This research works directly with research being conducted jointly by Reclamation and the University of Mississippi's National Center for Physical Acoustics to determine a method for measuring coarse bed load with hydrophones (funded by Reclamation's Science and Technology Program, Project ID 2559).
- 4. Analysis of Side-Looking Hydroacoustic Backscatter for Suspended Sediment Concentration in the Rio Grande, Albuquerque, New Mexico.** This research will investigate a possible point of saturation for acoustic backscatter measurement of suspended sediment for very high concentrations. A potential solution for measuring suspended sediment in very high concentrations is the use of densimetric methods, making use of a dual orifice bubbler. As densimetric methods measure pressure differences to determine the concentration of suspended sediments, the ability to measure suspended sediments using this method improves as concentrations increase.



Full-size TR-2 used in the field.

“FISP is an effective partnership with Federal, State, and other agencies to find the best ways to obtain comparable, meaningful sediment information using common instruments, standards, and procedures.”

Robert C. Hilldale
Hydraulic Engineer
Reclamation's Technical Service Center

Collaborators

FISP is an interagency committee that is funded by each partner agency, which are currently:

- Bureau of Reclamation
- Bureau of Land Management
- U.S. Geological Survey (USGS)
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture's Agricultural Research Service
- U.S. Environmental Protection Agency

The committee and related funding is managed by USGS. USGS provides a full-time position for the FISP Chief, who is currently Dr. Mark Landers.

More Information

www.usbr.gov/research/projects/detail.cfm?id=2559

<http://water.usgs.gov/fisp/>

Future Plans

The committee puts out a Request for Proposals once a year to solicit research toward surrogate sediment measurement and other sediment measurement-related topics. FISP occasionally specifies certain topics for which answers are needed.

This committee also addresses regular business issues related to standards, methods, and procedures for sediment measurement and sharing that information with the sediment community. FISP plans to continue its function and operation well into the future.