

# Monitoring Sand Storage to Conserve Sandbars in Grand Canyon National Park

## Background



Scientists track the amount of sand on the bed of the river that is available for redistribution to higher elevations along the shorelines during controlled floods. Because most of the sand in Grand Canyon is stored in eddies and in the river channel below the water surface, measurement of the available sand requires mapping of the riverbed in addition to mapping the sandbars along the shoreline. The mapping is accomplished by ground-based surveying and boats equipped with sonar devices to measure depth. These measurements are repeated periodically to compute changes in stored sediment. This information will be used to determine whether dam operations, including high flows, result in the increase, loss, or conservation

of the fine sediment in the Colorado River in Grand Canyon National Park. These channeling-mapping data will also be used to support improved flow models, sediment transport models, and aquatic habitat classifications.

## Value of Stream Gages and Other Measurements

Because Glen Canyon Dam traps all of the up-stream sediment supply in Lake Powell, the amount of sand supplied to Grand Canyon National Park has been reduced by about 94 percent. The Paria River, a tributary to the Colorado River downstream of the dam, is now the single most important supplier of sand to the Colorado River within the park. This large reduction in sand supply combined with hydropower operations at Glen Canyon Dam has resulted in substantial erosion of sand from the Colorado River in Grand Canyon National Park. Erosion has resulted in large decreases in the number and size of sandbars. These sandbars provide important aquatic and riparian habitats, are the source of sand that may help protect archaeological sites, and serve as campsites for recreationists.



Between 1963 and 1965, the period immediately following the completion of Glen Canyon Dam, the U.S. Geological Survey's stream gaging and sediment-transport measurements indicate that operation of the dam resulted in the erosion of about 16 million metric tons of sand from the bed and sandbars of the Colorado River between Lees Ferry and Phantom Ranch. For Perspective, this amount of eroded sand is roughly equivalent to the volume of a 100-story building covering the area of six NFL football fields. Operation of the dam since 1965

has resulted in continued, but slower, erosion of sand from the Colorado River in Grand Canyon National Park. Recent research suggests that changing current dam operations to a pattern of sustained lower dam releases and short-duration controlled floods (after new sand is supplied from the Paria River and other downstream tributaries) may help rebuild and maintain the sandbars that have eroded during the 50 years of operations at Glen Canyon Dam.

## Our Science and Your Trip



You may encounter USGS and cooperating scientists at work during the course of your river trip. This USGS project takes measurements of the sand on the bed and along the bank of the Colorado River. These measurements require the use of surveying equipment to ensure the measurements are accurate and repeatable. They also require the use of motorized boats to transport and move equipment into position. You may notice motorized snout or cataraft boats moving slowing back and forth across the river. These boats are equipped with echo-sounding instruments that allow scientists to map the bed of the river in great detail. Most years, this work

will be conducted between the Little Colorado River (LCR) confluence and Phantom Ranch. Additionally, the nature of this Work requires USGS scientists to camp in specific areas. You are welcome to camp with a science trip if the trip is occupying a camp you need to use. Anywhere along the river that you encounter a USGS science trip, we encourage you to stop y and ask scientists questions about the work that they are doing and about the USGS sediment and sandbar monitoring program in Grand Canyon National Park.

For general information, please contact:

Dr. Paul Grams  
Dr. David Topping  
U.S. Geological Survey  
Grand Canyon Monitoring and Research Center  
Flagstaff, AZ 86001  
[pgrams@usgs.gov](mailto:pgrams@usgs.gov)  
[dtopping@usgs.gov](mailto:dtopping@usgs.gov)

Matt Kaplinski  
Northern Arizona University  
Flagstaff, AZ 86011  
[Matt.kaplinski@nau.edu](mailto:Matt.kaplinski@nau.edu)

## Cooperators:

