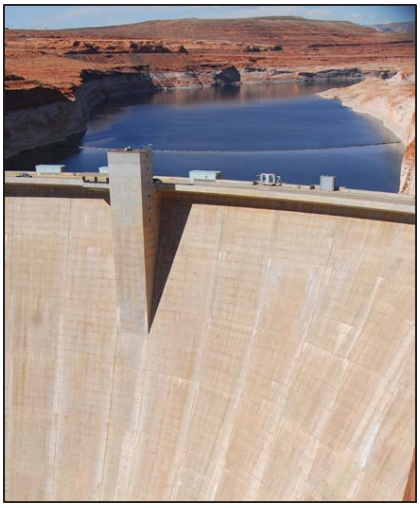
U.S. Geological Survey Stream Gaging along the Colorado River in Canyon National Park

Background



Construction and operation of Glen Canyon Dam has reduced the amount of sand supplied to the Colorado River at the upstream boundary of Grand Canyon National Park by about 94 percent, with the Paria River now being the most important single supplier of sand to the Colorado River in all of Grand Canyon National 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, with a large decrease in the number and size of sandbars important for habitat, protection of archeological sites, and campsites. During the first several years after closure of the bypass tunnels at Glen Canyon Dam (1963–65),U.S. Geological Survey (USGS) 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 results, however, suggest that alternative dam operations consisting of sustained lower releases and short-duration artificial floods (after new sand is supplied from the Paria River and other downstream tributaries) may help rebuild and the sandbars that have eroded during the almost 50 years of operations at Glen Canyon Dam.

To help design future alternative dam releases and to monitor the effects of current dam operations on the Colorado River in Grand Canyon National Park, the USGS operates a number of gaging stations in the park along the Colorado River and its major tributaries. Although you may notice a few of these stations (for example the historic Grand Canyon gage near Phantom Ranch), the USGS has attempted to camouflage most of these stations to minimize the impact on your visit. At these stations, the USGS measures stage, discharge, water temperature, salinity, turbidity, dissolved oxygen, suspended-sediment transport, and suspended-sediment grain size. These measurements are made using a variety of conventional direct methods and newer technologies, such as multi-frequency acoustic-Doppler arrays and automated pump samplers. Much of the data collected at these gaging stations is transmitted out of the canyon via satellite and is available to the public at: http://www.gcmrc.gov/discharge_qw_sediment/?.

Value of Stream Gages and Other Measurements

Since May 1921, the USGS has been measuring stage, discharge, water quality, and sediment transport at gaging stations located along the Colorado River between Lees Ferry and the Grand Wash Cliffs. Before the 1970s, these data were collected primarily to monitor downstream water delivery and to estimate the rate of sedimentation in Lake Mead. Since the early 1980s, these data have been collected to develop alternative operations for Glen Canyon Dam to help mitigate its effects on downstream resources in Grand Canyon National Park. This current effort is funded by hydropower revenue from Glen Canyon Dam under the Department of the Interior's Glen Canyon Dam Adaptive Management Program.

Our Science and Your Visit

On your river trip, you may encounter USGS scientists at work at stream- gaging stations along the river. The USGS is permitted to conduct two river trips per year at 6-month intervals to perform maintenance at stream-gaging stations and collect suspended-sediment and water- quality data. Every year, there is one trip scheduled for late February/early March and a second trip scheduled for August. As part of this effort, velocity and suspended-sediment measurements must be made at various locations in the middle of the Colorado River. Because most of these locations are at remote sites without bridges or cableways, the use of motorized boats is required to make these measurements. As a result, during your river trip, you may find USGS personnel working from a small aluminum motorboat in the middle of the river. Additionally, the locations of gaging stations require USGS scientists to camp at specific campsites (for example, the Cremation Camp near Phantom Ranch). You are welcome to co-camp with USGS stream-gaging trip, if the trip is occupying a camp you need to use. Anywhere along the river that you find a USGS stream-gaging trip, we encourage you to stop by and ask questions about current river discharge, water-quality, and sediment conditions and about the USGS stream-gaging program in Grand Canyon National Park.

For more information, please contact:
Dr. David Topping
Dr. Paul Grams
U.S. Geological Survey
Grand Canyon Monitoring andResearch Center
Flagstaff, AZ 86001
dtopping@usgs.gov
pegrams@usgs.gov

Cooperators: