Scientists wanted to confirm their predictions about floodwater and sandbars. They proposed releasing extra water from Glen Canyon Dam. They planned how they would measure water flow and collect data that would help them understand sediment movement during floods. Could they rebuild the declining sandbars? They planned a flood to find out.

COLLECTING DATA

The rate of water flowing from the Glen Canyon Dam during the 7-day flood was 45,000 cubic feet per second (cfs). This was as much water as could flow from the dam without using the spillways. The plan was to collect data before, during, and after the flood. U.S. Geological Survey and university geologists collected the data.

Water Flow . The flow of water was monitored at five stations along the river. A harmless red dye was placed in the river. The time it took the dye to reach different stations was recorded. The height of the river was also measured at 40 different sites.

By combining water speed and height measurements, scientists could predict the arrival time of the flood at any location along the river. A flood starting at Mile 0 at noon would not reach Mile 50 until sometime later in the afternoon. Scientists wanted to figure out as precisely as possible how long it would take for the water to flow from one place to another.

Sediment Transport. Before the flood, scientists figured out how much and where sand was distributed along the river. They checked 40 different places. These measurements are called **sand storage.** Sand can be stored in the riverbed under water or deposited above the water level as beaches and sandbars. Beaches are formed by wave action; sandbars are caused by changes in flow of the river.

Scientists wanted to find out what happened to sand storage during and after the flood. Would the beaches and sandbars be washed away? Would the sand on the bottom of the river be deposited as new sandbars and beaches?

Cross sections of the river were monitored to determine rate of change. Eddies (whirlpools) were also monitored for change in flow patterns and sand deposition.

Debris fans, composed of boulders and cobbles, form wherever a side stream enters the main river. Debris fans can dam the river, creating the white-water rapids for which the Grand Canyon is famous. Scientists wanted to know how floods affect the debris fans. Do floods pile up more material in the fan, make the barrier larger, or wash the fan downstream?

To find answers to these questions, scientists drilled holes into 150 basalt rocks. They placed radio tags inside each rock. The rocks ranged from basketball-size to kitchen-stove-size. Other boulder-sized rocks were attached to cables and placed in the path of the flood. Scientists measured the amount of force the water put on these rocks.

River Ecology. Since the dam began slowing the flow of water in 1963, the water temperature in the river has dropped and the force of the flow has lessened. The protective backwaters behind the sandbars have steadily declined in size and number. This has affected the native fishes and plants along the river, a great concern to river biologists.

Another impact on the native plants and animals has been the introduction and success of trout. As trout increase in size and number, they put added pressure on the native species by taking over their habitats.