Sand Bars in the Grand Canyon

Below Glen Canyon Dam, the Colorado River winds for nearly 300 miles through gorges of Glen and Grand canyons in one of the most pristine environments in the world. Bordering the river are thousands of sand bars that provide habitat for a fascinating variety of plants and animals, including some endangered species. Native plants and animals are actively protected by the National Park Service, as are camping beaches and archeological features dependent upon the sand bar habitat. Dam operations and management actions impact the sand bars. The Adaptive Management Work Group develops recommendations to conserve and enhance the sand bars of Grand Canyon.

Glen Canyon Dam's Effect on Sand Bars

- **Glen Canyon Dam collects and retains 95 percent of the river's sediment in its reservoir, Lake Powell:** Glen Canyon Dam regulates the flow of water through Grand Canyon, but does not allow the passage of sediment that once built sand bars and formed an important component of the river ecosystem. The Colorado River was once known for its large annual spring floods of extremely muddy water that were "too thick to drink, too thin to plow." Now, with the settling of the sediment in the reservoir, the dam's turbines release clear water throughout the year, resulting in a sediment-deprived system. Without large annual floods in a sediment-rich river, sand bars are not restored, and vegetation encroachment continues to reduce open sand bar habitat.

- **Water releases from the dam fluctuate daily to meet electrical needs:** This fluctuation tends to erode sand bars, which can have an impact on other parts of the river ecosystem.

- **Aquatic and terrestrial ecosystems:** Together with organic nutrients in the sand, this habitat is crucial for the growth and survival of the intricate food web found along the river. Many species evolved through geologic time in this sediment-rich habitat, including the endangered humpback chub, a species still struggling for survival in what remains of its natural habitat. Backwater ponds behind the sand bars are calm, warm water habitats that may prove crucial for the survival of young fish into adulthood.

- **Campsites for river visitors:** With more than 20,000 river visitors annually and river trips that last from seven to 21 days, river users need numerous and well-distributed sand bars of sufficient size for camping. A rocky, barren shore line or one exhibiting severe vegetation encroachment would make river visitation difficult, if not impossible, in this unique and greatly sought after region.

- **Archeological sites:** Many sites are located on the high sand terraces of pre-dam age. Although located above the normal fluctuation level of dam releases, erosion at a number of these sites may be related to the overall decrease in sediment. Appropriate management of the remaining sediment may help preserve these archeological sites, some of which have been in place for thousands of years.

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Steps Taken to Restore Sand Bars

- **Glen Canyon Dam release fluctuations:** The Adaptive Management Program continues to study various Glen Canyon Dam release fluctuation patterns designed to slow the amount of sand bar erosion and overall transport of sediment out of the Grand Canyon into Lake Mead. This could provide more dry camping area and enhance cultural sites and riparian habitat, while minimizing impacts to power generation.

- **Artificial floods:** Large tributary streams that enter the river below the dam occasionally flood and deliver large amounts of sand, silt and clay into the river. Scientists have shown that a well-timed "artificial flood" release from the dam stirs up this sediment load and allows it to be re-deposited along the river banks as the water drops following the high release.

- **Sediment augmentation:** Pilot studies are being conducted to determine whether sediment can be dredged from Lake Powell and transported around the dam in order to increase the sediment in the downstream environment.

The sand bars of Grand Canyon are an integral part of the river ecosystem. They are critical to the health of the river habitat, to the recreational resources, and to the irreplaceable cultural sites along the river corridor. Through the Adaptive Management Program, we seek and utilize the best scientific knowledge to achieve the program goals. This includes giving voice to the needs of this sand bar habitat while continuing to build our knowledge of the evolving state of Grand Canyon beaches.