

Riparian Management And The Colorado River

By R. Roy Johnson
(Second of two articles)

The Colorado River is probably the single most important resource to several million inhabitants of a large portion of the Rocky Mountain, Colorado Plateau, and Basin and Range (geologic) Provinces. Originating in and near Rocky Mountain NP, the river drains about 245,000 square miles – an area the size of 12 northeastern states from Maine to the Virginias. Major tributaries in the Upper Colorado River Basin include the Green, Gunnison, and San Juan; the Lower Basin is drained mainly by the Little Colorado and Gila. After nearly a century of management, almost no water now flows into the Gulf of Mexico through the nearly dry Colorado River delta.

The region contains some of the most outstanding scenery in the world. In his book, *Physiography of the United States*, Geologist C.B. Hunt calls the Grand Canyon and Painted Desert (on the Little Colorado River) "easily the most colorful part of the United States." National Park areas along the Colorado and its tributaries include six National Parks, four National Recreation Areas and more than a dozen National Monuments. These streams also flow through more than a dozen National Forests, numerous National Wildlife Refuges, and approximately a dozen Indian reservations.

A major strain on this resource is the export of several billion gallons of water daily through hundreds of miles of canals and aqueducts for irrigation, municipal and industrial purposes. This water goes to millions in Los Angeles, the Central Valley of California, the Wellton-Mohawk Irrigation district, the Lower Colorado River Valley in Arizona, and other areas – vastly increasing the area that is dependent on the river.

Management of park resources and visitor activities along the Colorado is one of the most challenging tasks facing the National Park Service today. This challenge is perhaps the most difficult of all at Grand Canyon NP, where bitter disputes among the NPS, river running concessionaires, private whitewater boatmen, and conservation organizations have gone on for a decade. Champions of one cause or another have chosen as their battlegrounds the air waves, newspapers, television, letters, courtrooms, even the floor of Congress. Key issues have included motors vs. oars, user levels, and allocation of use between concessionaires and private users. Actually, even more basic issues of nationwide interest, such as "what constitutes a wilderness experience?" and "what is a proper role of concessionaires on public lands?" are at the heart of the matter.

In 1973, the NPS embarked on three years of research, consisting of approximately 30 separate, multidisciplinary projects, to determine the quality of the whitewater experience as well as the interrelationships between whitewater recreationists and the natural environment. While sociologists attempted to determine visitor attitudes, biologists studied the aquatic and riparian ecosystems. Effects of the Glen Canyon Dam 16 miles upstream often complicated attempts to answer resource oriented questions and these effects *continue* to compound the problems of both the manager and the researcher.

In July, the press announced a new plan by the Bureau of Reclamation – to add turbines at the Glen Canyon Dam that would increase power output, and at the same time reduce the river flow to a trickle for most of the day and then release huge volumes of water in sudden bursts.



Researchers measure amounts of human debris, charcoal concentrations, and sand discoloration to determine impacts on heavily-used recreational sites along the Colorado River in Glen Canyon NRS.



Fire pits pose a serious resource management problem along the Colorado River in Grand Canyon NP and Glen Canyon NRA. Without containerization of fires, debris degrades the surrounding beach area.

Research by NPS and cooperating scientists continues to document changes in the Grand Canyon. A vastly modified river regime has greatly affected the riparian and aquatic ecosystems. Impacts that continue to pose problems include such systemic changes as (1) clear water due to the dropout of sediment in upper Lake Powell, more than 100 miles upstream from Grand Canyon in contrast to the reddish, silt laden pre-dam water; (b) stable, year-round lower temperature (approximately 50°F.) of water released from deep, cold waters of Lake Powell, in contrast to pre-dam waters warm enough for comfortable swimming in summer but freezing in winter; (c) invasion by exotic plant and animal species and expansion of their populations; and (d) change in the river regime from seasonally alternating flows (flood to low water) to daily "yo-yo" fluctuations – the result of increasing decreasing flows related to changes in generation of electricity at Glen Canyon Dam.

These changes have aided the development of a whitewater recreation industry that grosses several million dollars annually; but the native ecosystem, including several threatened or endangered animals, has suffered. Notable is the humpback chub, known to breed now in only one locality – the warmer waters near the mouth of the Little Colorado River.

In addition to dam influenced changes* in the aquatic ecosystem of the Colorado, numerous riparian (streamside) changes have occurred. In Grand Canyon, these consist of (a) increases in non-native plant species; (b) development of new riparian plant and animal communities; and (c) erosion of beaches suitable for camping.

Establishment of stable riparian plant communities in Grand Canyon NP is a post-dam development. Prior to Glen Canyon Dam, frequent floods scoured the streamside, preventing permanent establishment of these plant communities. The new plant communities with their associated wildlife are of great interest to scientists and visitors alike. Birdwatching is one of the favorite activities of a good number of the 15,000

whitewater recreationists who pass through the Park annually. Scientists such as Dr. Steven Carothers at the Museum of Northern Arizona and Dr. Mary Willson, University of Illinois, are aiding NPS scientists in studying the effects of these new plant communities on nesting birds. Bryan Brown, a seasonal biologist, is working with our research staff at the University of Arizona on the importance of these new habitats to migrating birds.

This newly developed habitat is of two principal types – marshy vegetation such as cattails, bullrushes and reeds in wet areas, and riparian scrub, with coyote willow, saltcedar and arrowweed on sandy, dry terraces. Estimates of riparian habitat loss range from 80 to 95 percent for the Colorado River lowlands. Thus, the establishment of new riparian habitat in this region is a major event. The vegetation in these areas is composed to some extent of introduced species such as saltcedar, camelthorn and Russian thistle. Camping, picnicking, and other recreational activities are difficult to impossible where these plants have taken over.

Visitor related problems, include trampling of riparian vegetation, trailing from the river to attraction sites, fires (usually set in vegetation by burning toilet paper), and littering.

Some of the most severe problems arise from complicated interaction between direct man-caused and dam-related factors. Drs. Robert Dolan and Alan Howard, beach erosion experts at the University of Virginia, have conducted studies related to these problems. River-running recreationists spend more time on shore – camping, eating, hiking to attraction sites, etc. than on the water. Before construction of the dam, river terraces (beaches) were eroded away and redeposited by periodic flooding of the river, but with the cessation of seasonal flooding this is no longer the case. Even though great care is taken by most river guides and boat crews to keep these prime campsites clean, ashes from campfires or other debris dropped on the sand remains – almost indefinitely – and creates what Dolan calls "a sandbox condition."



Research raft used by the Museum of Northern Arizona in aquatic and riparian studies along the Colorado River. 1981 photo taken in Glen Canyon NRA 9 miles below Glen Canyon Dam.

Another post-dam problem involves the clear, fast water, coupled with the daily river level fluctuations, which gradually is eroding many of these beaches. As people walk on them, the sand is pushed downslope into the river and washed away.

Management schemes on the Colorado are changing constantly. Joint planning efforts currently are being conducted between NPS, Bureau of Reclamation, U.S. Fish and Wildlife Service, Arizona Game and Fish Department, and others. Of particular concern is the recently proposed generation of up to an additional 250 megawatts of electricity at Glen Canyon Dam; flows through the Grand Canyon would reach approximately 40,000 cubic feet per second (cfs) rather than the approximately 5,000 to 25,000 cfs released during the current rafting seasons. This would affect white-water recreation, the outstanding trout fishery just downstream from the dam, and the newly formed riparian habitats in Grand Canyon.

Thus, combined teams of resource managers and researchers must continue strenuous efforts to develop management schemes that will match the rapidly changing river conditions and preserve as many resource values as possible for the continuing enjoyment of park visitors.

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