

Riparian Resources And Endangered Ecosystems

By R. Roy Johnson

(First of two articles)

Nowhere is the term "conserve and enjoy" more appropriate than for the rivers of our National Park System. A national park without a river is a rarity indeed. Some of the most magnetic park attractions are along rivers: the grand canyons of the Colorado and the Yellowstone, the Rio Grande in Big Bend and the Merced River in Yosemite Valley. Falls along these rivers are among our most photogenic sites. Yosemite Falls, the falls of the Yellowstone, and in the Grand Canyon, Lava Falls — the king of North America's navigable whitewater rapids.

Thus, riverine landscapes are an important part of our National Park System. Other areas that have been designated specifically because of rivers include such national recreation areas as Lake Mead, Lake Powell, and Flaming Gorge. Outstanding rivers named as national or wild and scenic riverways vary from small streams such as the St. Croix to "the nation's river" — the Potomac.

Great emphasis has been placed on management of aquatic resources and water based recreation. Millions of visitors annually engage in whitewater recreation, fishing, swimming and other stream based activities. They launch, beach, camp and picnic on the banks of those streams. Thus, riparian (streamside) research and management is at once one of the most important and most neglected of the natural resource areas today.

A computerized bibliographic search of biological literature, conducted recently through a joint effort by the Eisenhower Consortium of the Rocky Mountain Forest and Range Experiment Station and the NPS/CPSU at the University of Arizona, found tens of thousands of citations referring to papers on aquatic or upland biology. For riparian literature, the count was in scant hundreds. Eight aquatic fishery biologists and six coastal specialists are listed in the NPS "1980 Science and Technology Directory" while only one riparian ecologist made the pages. In a riparian symposium by Johnson and Jones (1977), published by the U.S. Forest Service, David Patton pointed out that of 24,000 research resumes in the U.S. Department of Agriculture's Current Research Information System (CRIS) only 10 related to riparian habitat.

A situation similar or worse in many other resource management agencies despite the undeniable importance of riparian resources, points strongly to the need for more and better research in this vital area.

NPS natural areas have been established for the preservation and maintenance of natural processes that occur in native ecosystems. The Grand Canyon (one of the original seven wonders of the world),



Brandy Creek Beach provides a swimming area and a popular picnic spot on the tributary to Whiskeytown Lake at Whiskeytown NRA.

Everglades, and Yellowstone NPs are world renowned for their scenic grandeur, and large numbers of visitors flock to these parks. In addition, riverine environments in many of our recreation areas such as Curecanti and Whiskeytown-Shasta-Trinity, support outstanding riparian habitats... prime arenas for a variety of visitor activities including camping (permitted in many of the areas), hiking, picnicking, photography, and "nature watching" in general.

Since the natural attributes of these areas are what make for their recreational value, a lessening or loss of any of these natural values leads to a correlated loss in recreational opportunities. Yet we tend to expend large percentages of the manpower and budgets in our natural areas for visitor services with very little reciprocal effort toward a commitment to *resource* management in recreational areas.

This can allow for neglect of the very set of natural factors that originally led to establishment of the recreation area.

Protection and proper management of riparian areas on NPS lands loom as critical when one considers that these areas are high on the list of the most endangered native ecosystems of North America.

Riparian areas are preferred habitats for wildlife, cattle, and recreationists, both consumptive and non-consumptive. Such areas also serve as choice sites for farms, cities, vacation lands and parks. Most of the population centers in the U.S., or the world for that matter, occur along rivers. Overuse has led to

drastic reductions in the extent of riparian habitat. Swift and Barclay, U.S. Fish and Wildlife Service, estimate that at least 70 percent of the original riparian ecosystems have been destroyed. This may be an optimistic figure. An interagency team estimates that less than 2 percent of the original riparian habitat of the Sacramento River Basin of California remains. At the 42nd North American



Young visitor enjoys the cool spray of a waterfall from astraddle a log over upper Brandy Creek at Whiskeytown NRA, California.

Wildlife and National Resources Conference (1977), Korte and Fredrickson estimated that more than 95 percent of the riparian lowland forests in Missouri have been cleared. Only about 5 percent of that state was covered by this type of forest when Missouri was settled. Now only 98,000 of the original 2.4 million acres, or .4 percent of the state supports this important habitat type. The rest has been replaced largely by agricultural and urban developments, making the picture particularly bleak in lowlands and agricultural areas.

Why then, the discrepancy between the obvious importance of riparian areas and the lack of a concomitant effort in research and resource management? First, perhaps, has been the multipurpose, often conflicting demands for this limited resource coupled with an "ostrich-like" approach of not recognizing values that would be destroyed by certain uses. Second is the complexity of these ecosystems, baffling even those who have honestly attempted to determine the best methods for *using* these areas while *preserving* them a mandate sometimes referred to as "the National Park Service dilemma."

These riparian habitats support some of the world's richest ecosystems. The "bottomlands" along creeks in Redwood National Park produce the greatest biomass (pounds of living matter/unit area) of any place in the world, even exceeding production in tropical rain forests. Studies by Johnson and Carothers published in the *American Zoologist* in 1974 disclosed that the highest known populations for non-colonial nesting birds in North America occur along Southwestern streams. Numerous other examples of the outstanding productivity in these scarce ecosystems occur throughout riparian literature.

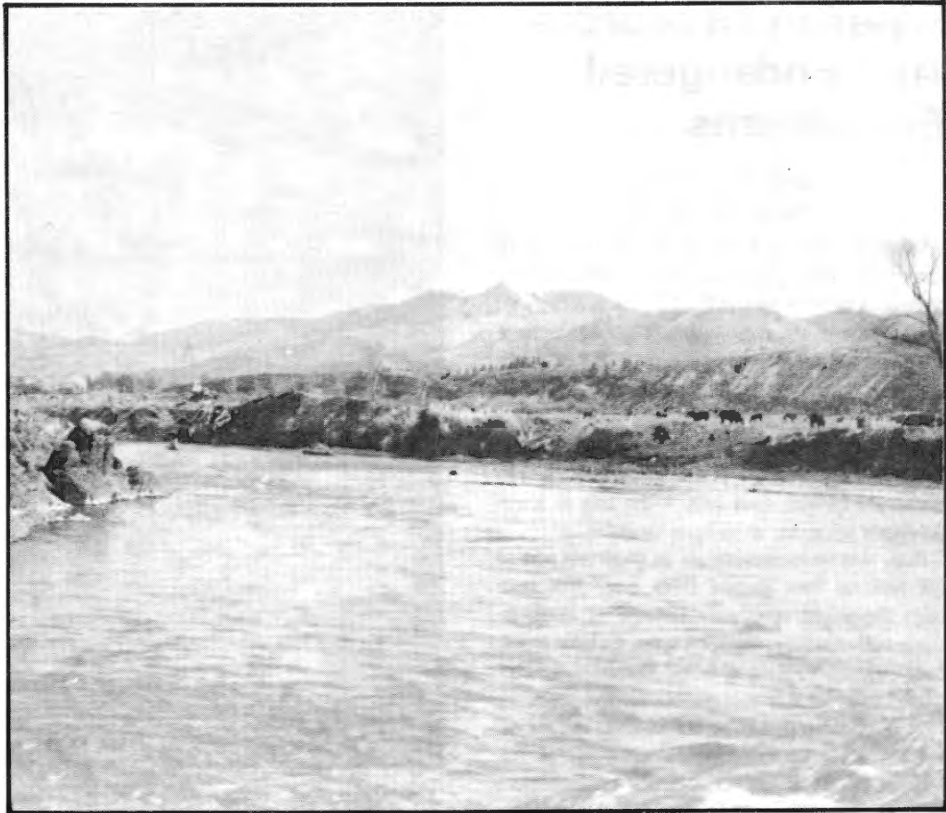
Riparian areas serve as ecotones between aquatic ecosystems on one side and upland ecosystems on the other. This results in an "edge effect," defined by ecologist Eugene Odum as, "the tendency for increased variety and density at community junctions." Thus, riparian areas are commonly composed of a two-sided, complex assemblage. From one side come characteristics and organisms of the adjacent aquatic habitat (such as increased soil moisture and wetland plants), and from the other side, characteristics and organisms representative of the upland ecosystem (such as terrestrial vertebrates and upland plants). In addition, the unique environmental conditions of these riparian ecotones support many species of plants and animals that occur *only* in riparian ecosystems.

Recent studies show that numerous officially listed endangered species, both aquatic and terrestrial, are dependent on riparian ecosystems. Johnson, Haight, and Simpson recently published an analysis of habitat requirements of the 166 nesting species of birds in the Southwest Lowlands. They found that 45 percent of these species were absolutely dependent on riparian habitat and adjacent

wetlands while an additional 26 percent preferred riparian to upland habitat. The loss of riparian habitat in the Southwest has directly affected almost $\frac{3}{4}$ of the nesting avian species. Continued loss of riverine ecosystems, including riparian, may lead to the extinction or significant reduction of species not currently listed by the U.S. Fish and Wildlife Service as threatened or endangered.

Our mandate clearly states that we are to perpetuate the living systems in our charge. It thus becomes the job of researchers and managers alike to work for the understanding, intelligent use, and preservation of these riparian ecosystems on National Park Service lands.

Roy Johnson is senior research scientist and leader of the NPS/CPSU at the University of Arizona. The next issue will carry an article by Dr. Johnson on the NPS resource management problems posed by the riparian systems of the Colorado River.



Cattle graze and discharge wastes alongside the John Day River near the John Day Fossil Beds, NM in eastern Oregon, comprising a classic scene of abused riparian habitat.