

# Riparian wetlands and visitor use management in Big Bend National Park, Texas<sup>1</sup>

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**Abstract.**-Wetlands and riparian habitats constitute a small, but nonetheless vital component in the Chihuahuan Desert. Big Bend National Park, 801,000 acres, contains about 27,000 acres of wetland. The park has riparian or wetland habitat distributed around 315 water sources, some perennial streams, and along 118 miles of the Rio Grande. These areas contain unique vegetation components, which provide habitat for wildlife, including resident and migratory birds, and support other wildlife. The same habitats have become increasingly popular as overnight campsites for rafters and boaters on the Rio Grande, or serve as water stops and destination points for backcountry hikers and campers.

Resource impacts, resulting from careless use and overuse, has been documented by several surveys at a number of the more popular areas. This presentation discusses these impacts and the park management actions which are underway or under consideration to deal with them. The management actions are aimed at limiting resource damage to wetland and riparian habitats while permitting visitor use of the resources.

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## INTRODUCTION

Big Bend National Park, with 801,000 acres, is the eighth largest park in the continental United States. The park is located in southwestern Texas, at the "Big Bend" of the Rio Grande, and lies adjacent to the Mexican States of Chihuahua and Coahuila. Big Bend National Park contains about 27,000 acres of wetland and riparian habitat.

Wetlands and riparian habitats constitute a small, but nonetheless vital, component in the Chihuahuan Desert. Wetlands and riparian habitats are not only sensitive areas in Big Bend Na-

tional Park but also are habitats attractive to campers, rafters, boaters, and hikers. The 118 mile reach of the Rio Grande along the southern boundary of the park is the park's popular rafting zone. This stretch of the Rio Grande also supports riverine habitats not frequently found in the Chihuahuan Desert environment, which therefore are critical sites for birds, wildlife, and certain Chihuahuan plant species. The park contains some 315 water sources and several tributary streams, which also are subject to impacts by hikers, off-road travelers, and campers.

The park's wetland and riparian habitats are highly sensitive to the impacts of recreationists. This presentation summarizes the nature of these impacts -with emphasis on the recreational aspects- and reviews some of the management actions underway in the park that aim to limit resource damage while still permitting visitor use of the resources.

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## IMPACTS AND ISSUES IN THE PARK

### Recreation in the park

Big Bend National Park serves the dual purposes of preserving resources and simultaneously providing for recreation. Floating the river is a popular recreational activity in the park. For example, in 1992 about 6000 people took commercially-guided raft trips and about 4700 took private river trips on the Rio Grande. The number of commercial river boating and rafting permits has been relatively stable since 1984, fluctuating between 700 and 900 permits annually. Since 1988, *private* permits have declined and are now generally fewer than the numbers of commercial permits. Commercial outfitters consistently have more people per boat than do private permittees. Roughly half the permits issued are for day trips, and half for overnight trips (Stewart et al., 1993).

Overnight river trips naturally include camping. According to a recent assessment by Williams and Marion (1995), Big Bend National Park has 268 back country campsites in total, including 54 along the Rio Grande accessible from the river. In total, 75 campsites are found near the Rio Grande, including those accessible by a riverside road. In terms of river camping capacities, the Williams and Marion assessment determined that 21 of the river-accessed river sites can accommodate 1-2 boats, 20 up to 3-4 boats, and 13 more than 5 boats camping at a time.

### Recreational impacts along the river

Camping and other recreational activities occurring along the river affect riparian natural resources. For about two decades the park has been observing these growing impacts in beaches, campsites, streambanks, access points, channels, and riverside woodlands along the river and monitoring the changes in vegetation, fauna, and other aspects. The following human-caused disturbances are common along the river:

- littering
- rock moving
- accidental fires
- wood cutting
- exotic plant introduction
- trampling
- campfire effects
- human waste
- vegetation disturbance

These various impacts work in conjunction and are cumulative, and lead to modified habitats and less biological diversity. The park has verified through studies that plant communities have been changing over the decades (Schmidly and Ditton, 1977 and Hughes et al., 1993).

Research has shown that fires initiated by recreationists near the river dramatically affected woody scrub over wider areas, beyond the riparian strip. After fire, wood scrub in the Chihuahuan Desert community normally takes many years to return to its pre-fire habitat.

Away from the river, springs serve as a water source and attraction for 54 campsites in the park. Intense use of these areas leads to many of the same impacts listed for the riverine area, including soil compaction, pollution, littering, and erosion.

### Impacts from livestock grazing

Any recreational impact study must attempt to separate out “non-recreation” effects, such as grazing and flooding; In Big Bend National Park, trespass livestock come across the border from Mexico, causing serious grazing pressure in some areas. They alter the vegetative cover, introduce exotic species, change plant species composition, add nutrients, and physically trample the riverine areas, inciting erosion. Of course manure can affect water quality and introduce contaminants into the river.

Cattle also graze on trees and other sprouts, thereby reducing natural vegetative regeneration. For example, cattle prefer to feed on native cottonwood sprouts, and not exotic *Tamarix* (salt cedar) seedlings, thereby enhancing the opportunity for *Tamarix* to take over grazed riparian habitat. As vegetative cover changes, the composition of wildlife, birds, rare animal species, and other fauna aspects of the ecosystems follow suit, until eventually a less diverse, poorer habitat has replaced the original ecosystem. Studies of plants and animals along the river have demonstrated the degradation in biological diversity occurring over the past two decades (Hughes et al., 1993).

### Impacts related to flooding

At certain times of the year, virtually all of the river's discharge comes from the Rio Conchos in

Mexico (University of Arizona, 1995), and at these times the park has no influence on stream discharge levels or their fluctuations. The Rio Conchos flows into the Rio Grande about 59 miles upstream from the park boundary. River levels in the park are affected by unpredictable water releases from the Luis Leon Dam on the Rio Conchos as well as by intense local storms. These irregular streamflows influence erosion, sedimentation, meandering, and other physical processes in the river channel and riparian area. Riverine biota ultimately are affected by these physical changes. In summary, erratic river flows in the park present a serious threat to the flora and fauna that depend on the unique niche provided by the Rio Grande riparian corridor (Hughes et al., 1993). As with livestock grazing, it is not easy to separate out recreational impacts from the significant effects of flooding along the river.

## **MANAGEMENT ACTIONS AND RECOMMENDATIONS**

The park has a number of actions either underway or planned with a view to reducing the impacts of recreational activities and grazing on the riparian and wetland areas in the park. The following activities or proposals by the park relate to recreational impacts.

- Soon the park will complete its River Use Management Plan and a Water Resources Management Plan. The River Use Management Plan will help park managers understand the extent of recreational pressures at various seasons and provide an assessment of the “demand” on the river. It also will provide information on the essential role of a permit system.
- The Water Resources Management Plan will provide essential data and information on such issues as flooding, water quality, and upstream water releases. This report will provide the water resource database and hydrologic tools that park managers need to better monitor and predict river discharge, water quality, floods, and droughts. This is essential background information for planning water-based recreation in the park and

for managing recreational impacts in the riparian areas.

- The park also is seeking closer ties with Mexican authorities, the International Boundary Waters Commission (IBWC), the Rio Grande Compact Commission, and other upstream authorities, in order to better understand the river management upstream to better predict flows coming in from the Rio Conchos and Rio Grande. This cooperation should allow better prediction of park flow conditions, thereby providing a better basis for the park’s planning and management of recreation along the river.
- The park is seeking to adopt an equitable river permit process to better track and manage use levels.
- An advanced reservation system for river use permits is currently not in effect, but is a possibility if future use levels warrant.
- The park now encourages backcountry visitors to carry all their own water -to avoid impacts on backcountry springs. When recreational information is provided to visitors, spring location is not “advertised,” to reduce impacts on these sites. The park advises all visitors to boil or treat water from backcountry sources.
- Camping in the backcountry is now by permit only, to better control those impacts. In some cases gates and fences are designed to reduce impacts on springs or other sensitive areas.
- Within future budget and time constraints, the park also is considering the following possibilities: restricting campsites along the Rio Grande; placing limits on numbers of individuals to use a specific campsite (via permits).

## **REFERENCES**

- Ames, C.R. 1977. Wildlife conflicts in riparian management: grazing. pp. 49-51 *In* Proceedings, Symposium on Importance, Preservation, and Management of the Riparian Habitat, Tucson, Arizona, July 9, 1977.

- Big Bend National Park. 1995 (in progress). Draft Backcountry Management Plan and Environmental Assessment. Office of Science and Resources Management, Big Bend National Park, Texas **79834. 120** pp.
- Big Bend National Park. 1995 (in progress). Draft River Use Management Plan and Environmental Assessment. Office of Science and Resources Management, Big Bend National Park, Texas **79834.**
- Davis, G.A. 1977. Management alternatives for the riparian habitat in the Southwest. pp.59-66 *In* Proceedings, Symposium on Importance, Preservation, and Management of the Riparian Habitat, Tucson, Arizona, July 9, 1977.
- Hughes, B.G., K.J. Mickey, J.F. Scudday, and A.M. Powell. 1993. A reanalysis of recreational and livestock trespass impacts on the riparian zone of the Rio Grande, Big Bend National Park, Texas. Report to the National Park Service, Southwest Region, Santa Fe, NM. 144pp.
- Kennedy, C.E. Wildlife conflicts in riparian management: water. pp. 52-58 *In* Proceedings, Symposium on Importance, Preservation, and Management of the Riparian Habitat, Tucson, Arizona, July 9, 1977.
- Schmidly, D.J., and R.B. Ditton. 1977. A survey and analysis of recreational and livestock impacts on the riparian zone of the Rio Grande in Big Bend National Park. Department of Wildlife and Fisheries Sciences and Department of Recreation and Parks, Texas A&M University. Report for the National Park Service. Big Bend NP. 159pp.
- Stewart, W.P., B.S. Anderson, and P.S. Dunfee. 1993. A user study of the Rio Grande river corridor in Big Bend National Park. Final report for Big Bend National Park (CA 7029-1-0013). Department of Recreation, Park and Tourism Sciences. Texas A&M University, College Station. 149pp.
- University of Arizona. 1995. Draft underway for a Water Resources Management Plan; Big Bend National Park. Personal communications with Robert MacNish, University of Arizona.
- Whitson, P.D. 1974. The impact of human use upon the Chisos Basin and adjacent lands. National Park Service Scientific Monograph Series. Number 4. NPS 117. (Supt. of Docs. no. I 29.80:4). 92pp.
- Williams, P.B. and J.L. Marion. 1995. Excerpts from draft report on "Assessment of backcountry campsite conditions in Big Bend NP" (Personal communication with J.L. Marion, Virginia Tech, Blacksburg, VA, July, 1995).