Surface Cover Changes in the Rio Grande Floodplain, 1935-89

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Riparian (streamside) vegetation communities provide valuable habitat for wildlife, particularly in the arid and semi-arid Southwest, where such communities make up less than 1% of the landscape (Knopf et al. 1988). Agricultural conversion, urban and suburban expansion, water development, recreation, and invasion by non-native species such as Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix* spp.) have severely reduced the extent and quality of these habitats. Despite such impacts, the floodplain of the Rio Grande in central New Mexico supports one of the most extensive cottonwood (*Populus fremontii*) gallery forests (bosque) remaining in the Southwest (Howe and Knopf 1991), and interest in ensuring the long-term health and viability of native communities along the Rio Grande has been steadily increasing (Crawford et al. 1993). This article documents changes between 1935 and 1989 in cover types of the floodplain of the Rio Grande in central New Mexico.

Study Area

The study area covers the historical floodplain of the Rio Grande from Velarde, New Mexico, to the narrows at Elephant Butte Reservoir, New Mexico, a distance of nearly 250 river mi (402 km; Figure). The historical floodplain in this reach encompasses more than 95,000 ha (nearly 236,000 acres); about 9,650 ha (24,000 acres) were omitted from the analysis because 1989 photography was unavailable.

Classification

Wetlands were classified according to the system used by the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (Cowardin et al. 1979). Wooded riparian (nonwetland) areas were classified according to an unpublished system developed by the USFWS and the Arizona Riparian Council. The remaining uplands were classified according to a system developed by the U.S. Geological Survey (Anderson et al. 1976).

These classification systems provided more than 160 cover classes, an unmanageable number for an analysis of change. Thus, we aggregated the original classes in our geographic information system (GIS) into 11 broader types.

Expansion of saltcedar is of great concern in the Rio Grande valley in New Mexico, and

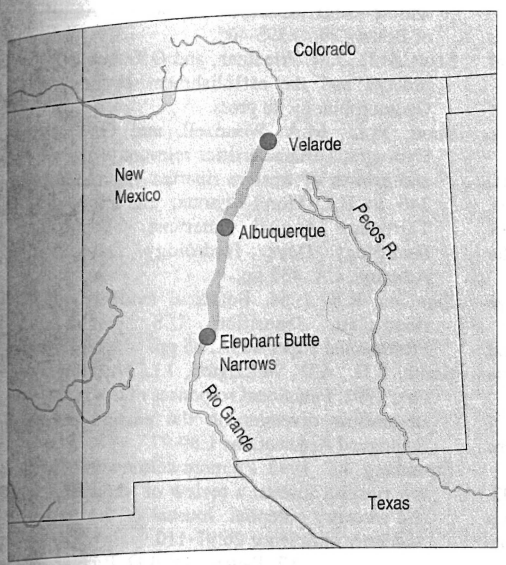


Figure. The Rio Grande study area.

separating saltcedar from other scrub-shrub types would have been desirable. Unfortunately, saltcedar could not be distinguished from other scrub-shrub types on the 1935 photography used to classify the area and was therefore included in the riparian scrub-shrub and wetland scrub-shrub classes.

Trends

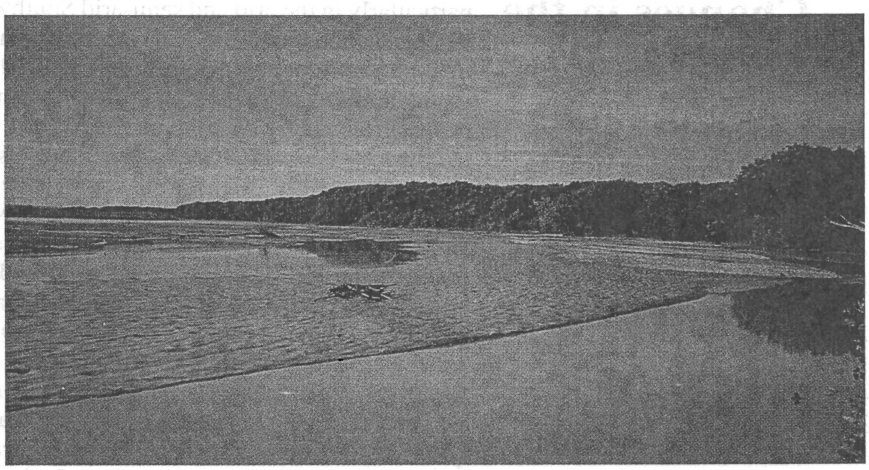
Major changes in surface cover occurred on the floodplain of the Rio Grande between 1935 and 1989 (Table). Five of eight wetland or riparian types declined by about 17,000 ha (42,000 acres), including 5,453 ha (13,475 acres) of river or artificial channel; 4,015 ha (9,921 acres) of wet meadow, marsh, or pond; 2,638 ha (6,519 acres) of riparian scrub-shrub; 2,507 ha (6,195 acres) of riparian forest; and 2,482 ha (6,133 acres) of wetland scrub-shrub. Upland range also declined by 5,217 ha (12,891 acres).

The largest gains occurred in urban (11,389 ha; 28,143 acres) and agricultural (5,395 ha; 13,331 acres) cover types. Only three wetland or riparian cover types (lake, wetland forest, and dead forest or scrub-shrub) increased. Higher water levels in Elephant Butte Reservoir and construction of Cochiti Reservoir, New Mexico, produced a gain of 2,552 ha (6,306 acres) of lake. Wetland forests increased by 1,779 ha (4,396 acres). Most of this increase occurred between the levees and the stream channel, which has become narrower and straighter because of levee construction and channel stabilization. Dead forest or scrub-shrub increased by 1,197 ha (2,958 acres). Most of this mortality was at the upper end of Elephant Butte Reservoir because of high water in the mid-1980's.

The total forested area (wetland plus riparian) declined only slightly between 1935 (9,861 ha; 24,367 acres) and 1989 (9,133 ha; 22,568 acres), but this does not mean that concern for the long-term future of the woodlands is unwarranted. Only about 27% of the area forested in 1935 still supports forests, indicating that significant changes have occurred even in cases where the net change in area has been small. As noted before, much of the cottonwood forest is now confined between the levees and the river channel. The flow regime of the Rio Grande, however, has been altered significantly (e.g., lower peak flows) since most of these stands were established, and conditions favorable for germination and establishment of cottonwood now occur only rarely. Russian olive and saltcedar are likely to continue to replace cottonwood, especially under current hydrologic conditions (Howe and Knopf 1991).

Table. Surface cover changes in the Rio Grande floodplain, Velarde to Elephant Butte Reservoir, NM, 1935-89.

Cover type	Area (ha)		
	1935	1989	Change
Lake	32	2,584	+2,552
River or artificial channel	10,673	5,220	-5,453
Wet meadow, marsh, or pond	5,527	1,512	-4,015
Scrub-shrub (wetland)	9,070	6,588	-2,482
Scrub-shrub (riparian)	7,804	5,166	-2,638
Dead forest or scrub-shrub	0	1,197	+1,197
Forest (wetland)	4,683	6,462	+1,779
Forest (riparian)	5,178	2,671	-2,507
Agriculture	19,614	25,009	+5,395
Range	20,179	14,962	-5,217
Urban	3,006	14,395	+11,389



Courtesy R. Milnous, NBS

Rio Grande floodplain.

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