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THE PLATTE AS A PRAIRIE RIVER: A RESPONSE TO JOHNSON AND BOETTCHER

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ABSTRACT—Johnson and Boettcher (2000) question the status of the presettlement Platte River as a prairie river, and they argue that it was “a wooded river traversing a prairie landscape.” Here we review evidence in support of the prairie river concept, suggesting the channels of the Platte were predominantly open and largely absent of trees. Direct support for a prairie river is found in the detailed map drawn by Lieutenant Woodbury in locating the site for Fort Kearny in 1847. Woodbury showed a thin strip of timber, located in an area that appeared to be elevated above the influence of active river flows. Woodbury also illustrated the main channel as having vegetated islands only in one location, with only a “scattering [of] trees” along the banks. Historical accounts, an examination of historical perspectives, the distribution of land survey witness trees, a lack of regeneration of trees following supposed deforestation, and population changes in bird distributions over the past 100 years also support the prairie river concept. We argue woodland development is not true restoration in this area. Given current conditions, we suggest that long term management should be for a mosaic of habitats for migratory birds and other species including 10% open river channel in the Big Bend reach of the Platte River in central Nebraska.

Introduction

In this paper we respond to Johnson and Boettcher’s (2000) suggestion that the Platte River in central and western Nebraska was historically a forested rather than a prairie river. In their paper, historical information is extracted to argue it was a river system dominated by trees. We interpret the historical record to show just the opposite—that the active river channel was dominated by open channel sandbars and non-arboreal vegetation. There is no question that trees and woodlands existed along the Platte River in central Nebraska at the time of settlement. The historical accounts of Fremont (1845), Woodbury (1847 *in* Willman 1930) and other explorers, as well as accounts from numerous settlers and immigrants passing through

the Platte River Valley, establish that some trees were present. Because many of these accounts are qualitative in nature, however, there has been a debate about how extensive these woodlands were and whether they were a dominant feature along and within the banks of the historic presettlement river. Our interpretation of much of the same literature referenced by Johnson and Boettcher (2000) is that trees, and in particular large forests, were a scarce commodity along the Platte River and that long stretches of the Platte's active river channel were predominantly void of trees and woodland vegetation.

The historical accounts of Townsend (1839), the Woodbury Expedition (1847 *in* Willman 1930), Robert Stuart's Expedition of 1812-1813 (Rollins 1995), the Long Expedition of 1822-1823 (James 1823), and the Fremont Expedition of 1842 (Jackson and Spence 1970) support a long-held interpretation of the Platte as a prairie river—a predominantly open, wide, sand bottomed river channel bordered by marshes, sloughs, prairies, and limited woodlands (Williams 1978; Eschner et al. 1981; Currier et al. 1985). These historic references, and previous analyses of the historic record, define a river where hydrologic forces characterized by wide fluctuations in flow resulted in movements of great quantities of sediment on the streambed, continually changing its configuration, and maintaining a largely non-arboreal vegetation within and adjacent to the active channel. Below we review evidence in support of this prairie river concept.

Results

Historical Accounts

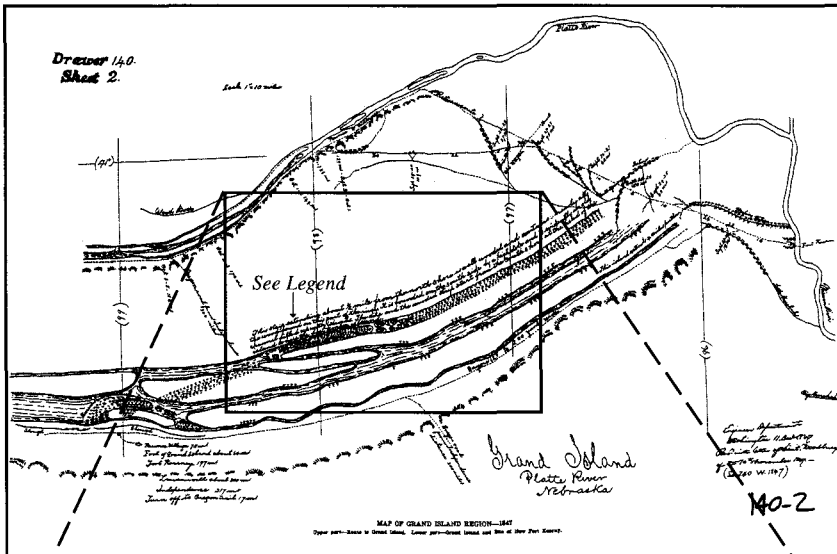
The most striking evidence in support of a prairie river is the information presented by Lieutenant Woodbury in 1847, some 20 years prior to the beginning of major settlements along the river, in a letter to Colonel Joseph G. Trotten, chief engineer, Washington, DC (Willman 1930). While searching for a location for Fort Kearny, Lieutenant Woodbury traveled along the Platte River in central Nebraska adjacent to what he called Grand Island. He indicated that Grand Island was really a series of islands extending about 60 miles from the head located near the eventual location of Fort Kearny, just downstream of the current location of Kearney, Nebraska. He located the Fort at the head of the island specifically because it was the only location where timber was available in quantities needed to supply building materials and fuel for cooking and heat. He lamented that, unlike the forests on the



Missouri River where the trees were large and “so good for building purposes,” the trees on the Platte were “scrubby.” He further noted that “we can not safely adopt as a common dimension a length [of timber] greater than 20 feet,” because of the small-sized trees found along the Platte River.

Woodbury described the surrounding river channel in 1847 (Willman 1930) and identified a source of timber in a “wooded strip about 1/2 mile wide” extending from the head of Grand Island for a number of miles toward the foot of the island. This strip was described as being “bounded on the south side by a high dike and is evidently an old channel filled up with islands” (Woodbury *in* Willman 1930: 251). He further described the wooded strip as “the best and most abundant wood seen upon the river,” and that it “contains all the wood that can be relied upon for building purposes” (Willman 1930: 251-52). The active or main channel of the river, on the other hand, was described as a 3/4 mile (1.2 km) wide channel with a scattering of trees and with “a prairie island bottom nearly one and one-half miles wide” on each side of the main channel and a bayou [marsh] “from 125 to 200 yards wide on the south side”—in short, a prairie river. The most telling evidence presented by Woodbury, however, is not the words of his letter, but in the map of the river channels that he drew and sent along with his letter (Reproduced in Fig. 1).

The map (Fig. 1) clearly showed only a narrow strip of woodland, north of the main river channel. It also showed an open main channel, with only a “scattering [of] trees” along the banks. Woodbury took great pains to draw a number of wooded islands in the woodland strip. He indicated no such islands elsewhere in the main river channel. Woodbury also described the south edge of the river as treeless—stating it could not provide enough wood to “supply emigrants or troops with fuel” (Willman 1930: 251). The “bayous,” denoted on the map indicated extensive open wetlands along the river. These he stated unfortunately would have to be crossed to get to the timber on the north side of the channel. Thus, the map of 1847 clearly shows an active river channel, bounded by grasslands and wetlands. The only timber shown is in the one relatively narrow, 1/2 mile (0.8 km) wide strip previously described. In Woodbury’s words the banks and the channels of the river were described as:

being very low—5 to 7 feet—and still even the low bottom presents no appearance of being overflowed. The reason of this is readily found in the great aggregate width of the channels—nearly 2 miles . . . There are many low islands and edges of prairie still in process of formation. These of course are overflowed (Willman 1930: 253).



Legend:  = tree;  = wetland. Original scale: 1" = 10 miles (6 km)

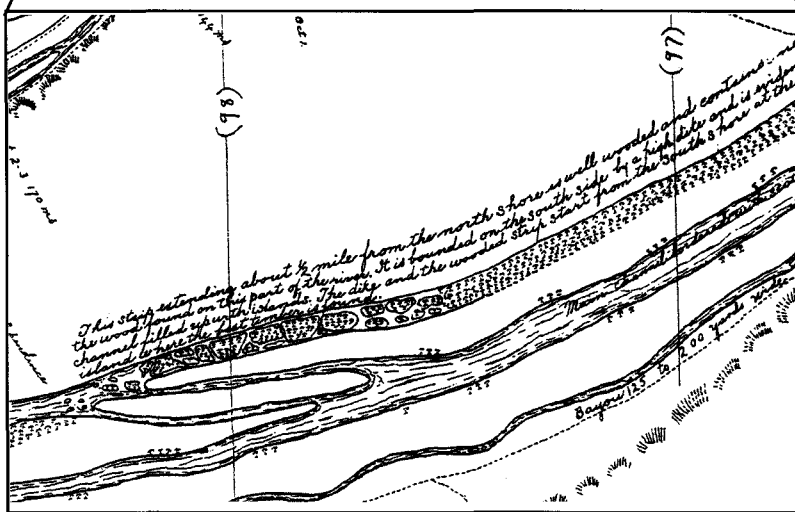


Figure 1. Lieutenant Woodbury's 1847 map of the Platte River between Kearney and Grand Island, Nebraska, showing an open main river channel bordered by a "scattering [of] trees" and locating a 1/2 mile-wide strip of timber within an abandoned river channel (Willman 1930) (see enlargement). Handwritten script along the one treed channel reads as follows: "This strip extending about 1/2 mile from the north shore is well wooded and contains nearly all the wood found on this part of the river. It is bounded on the south side by a high dike and is evidently an old channel filled up with islands. The dike and the wooded strip start from the south shore at the head of the island where the best timber is found."

The interpretation of other historical accounts without the benefit of maps such as Lieutenant Woodbury's is more tentative, since it depends to a large extent on a reader's visualization of what various authors meant when they used such terms as "island," "bars," "sandflats," "woodland," "trees," "timbered," and "forest." Because the descriptions are qualitative, it is not always clear what was meant. How large and dense were tree stands? Were they primarily shrub growth or forests? Were islands vegetated or simply unvegetated sandbars? These are just a few of the questions raised in examining the qualitative historic record. For instance, Cole (1905: 29) described the river channel in 1852 as:

Looking out along the long stretch of river either way were islands and islands of every size whatever, from three feet in diameter to those which contained miles of area, resting here and there in the most artistic disregard of position and relation to each other, the small and the great alike wearing its own mantle of the sheerest willow-green.

Likewise, Townsend (1839) stated:

On the 18th of May [1834] we arrived at the Platte River. It is from one and a half to two miles in width, very shoal; large sandflats, and small, verdant islands appearing in every part (Townsend 1839: 157).

The references to "willow-green" and small "verdant" islands could simply mean a mix of annual or perennial herbaceous growth, not shrub or tree growth. Even in the contemporary active channel, many areas that become vegetated with low growth during the growing season become scoured and eventually are replaced by open channel sandbars (P. J. Currier, personal observation).

James' (1823) descriptions of the Long Expedition (1822-23) near what must have been the present day location of Kearney, Nebraska, also indicated many islands. These descriptions suggest that the islands were covered by low herbaceous and shrub growth, as well (Vol. I: 457-58):

. . . we arrived at an old Indian encampment, opposite an island, on which was some wood, and perceiving that none would be met with for many miles ahead, we determined to halt here for the night. . . . We had now arrived at a point about two hundred miles distant from

the confluence of the Platte and Missouri, yet the character of the former river was but little changed. It was still from one to three miles in breadth, containing numerous islands, covered with a scanty growth of cotton wood, willows, the *Amorpha fruticosa*, and other shrubs.

These descriptions are consistent with a prairie river concept, with annual and perennial growth that was not a permanent feature of the river bed, but instead, transitional between episodes of high, scouring flows in the river. Indeed, there are also many historical accounts describing the Platte River channel as a sandy bed. Eschner et al. (1981) quoted extensively from historical accounts on this point:

Evans wrote in 1849 that the Platte was a wide sheet of water running over a vast level of bed of sand and mica . . . continually changing into short offsets like the shingled roof of a house.

The account of the Long Expedition (James 1823) stated of the Platte . . . "Its bed is composed almost exclusively of sand, forming innumerable bars, which are continually changing their positions and moving downward [downstream]" . . . In their travels, members of the Long Expedition observed on the floodplain . . . "extremely numerous natural, elevations of earth, of some considerable degree of regularity . . . of a more or less oval outline" with lengths of about 30 m and heights of 0.6 to 1.5 m. These elevations were presumed to have been former sandbars [and] "their existence is doubtless due to the action of water" (Eschner et al. 1981: A14).

Based on their extensive review of historical accounts, Eschner et al. (1981) concluded that although the river had nine large islands that were well wooded (Grand, Brady, Willow, Elm, and five other unnamed islands), timber was a scarce commodity. It was found on the large islands above the influence of annual floods, and it was confined to limited, discontinuous areas along the channel. Eschner et al. (1981) did not conclude that timber was widespread along the Platte River, as implied by Johnson and Boettcher (2000). The notion that the large islands were elevated above the influence of the river's flows, allowing trees to grow, is also supported by observations of the Fremont Expedition in 1842 (Jackson and Spence 1970 (Vol. I: 283)):

On the 18th [Sept.] we reached Grand Island, which is fifty-two miles long, with an average breadth of one mile and three quarters. It has on it some small eminences, and is sufficiently elevated to be secure from the annual floods of the river. As has already been remarked, it is well timbered, with an excellent soil, and recommends itself to notice as the best point for a military position on the Lower Platte.

Bias in Historical Perspectives

Much of the information referenced in historical accounts by Johnson and Boettcher (2000) is written from an understandably biased perspective. Authors wrote extensively about trees in their journals because trees were a resource that was necessary for human survival. The Great Plains were described as the “Great American Desert,” and thought to have such poor soils that they could not support trees. Grasslands were viewed as “wasteland” areas that could not be converted effectively to productive cropland (Eschner et al. 1981). We now know that this perspective was incorrect; in fact backward, however, at the time of settlement, trees were viewed as a necessary resource for immediate use for construction, as well as fuel. Trees were secondarily valued as indicative of potential lands for crop production. It is no wonder that whenever trees were encountered they were mentioned in historic journals. The extensive documentation of trees in notes accompanying the General Land Office surveys of the 1860s and 1870s may also have over emphasized the relative importance of trees in the overall landscape. The use of witness trees to identify section corners, however, is probably an unbiased record of tree distributions.

Witness Tree Data

The data that Johnson (1994) and Johnson and Boettcher (2000) use to build the woodland view of the presettlement Platte River also provide evidence for the alternative view—that the prairie river really had a very limited distribution of woodlands. The General Land Office survey indicates that witness trees were abundant in only a few stretches of the river—in particular just south of Grand Island (Fig. 2 in Johnson 1994). Johnson and Boettcher (2000) show that throughout a 5-mile (8 km) reach of the river in this location, isolated witness trees were scattered along the north and middle channels, and surveyed timber occurred on portions of Indian and

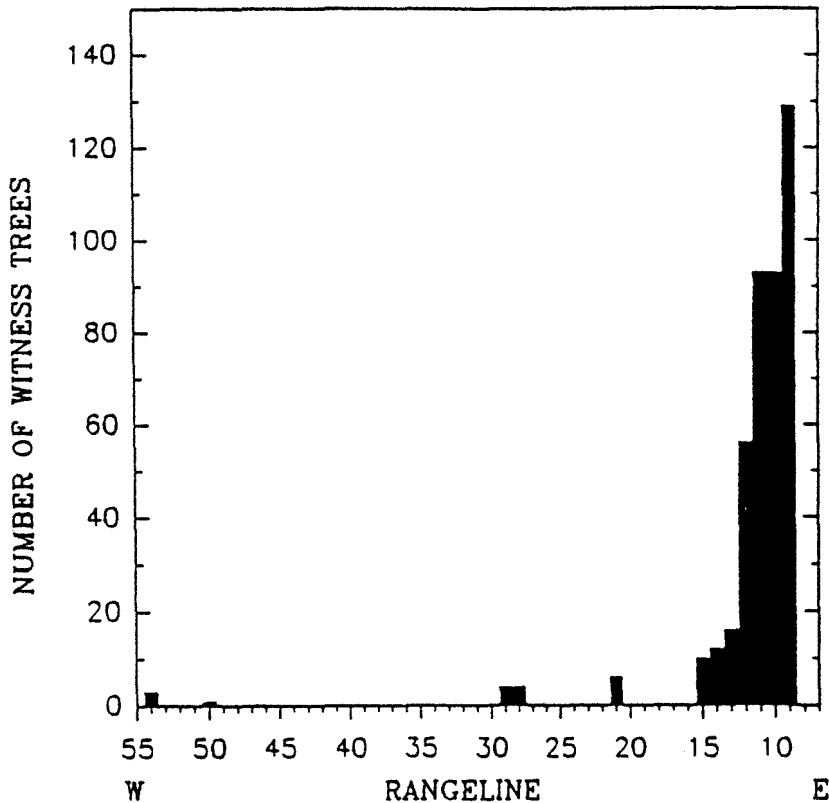


Figure 2. Geographical distribution of witness trees from the General Land Office land surveys conducted from approximately 1859 to 1877 in central Nebraska (from Johnson 1994) (Range 9W near Grand Island, Nebraska, to Range 54W near the Nebraska-Wyoming State Line).

Mormon Islands. However, the main channel did not have surveyed timber, and only limited witness trees occurred on the south side of the channel (see Fig. 3 in Johnson and Boettcher 2000).

There is a further explanation for the development of trees along the Platte River just south of Grand Island. The Wood River empties into the Platte River a few miles upstream of this location. Because the Wood River is fed from groundwater and local runoff, it was probably a perennial stream and without the wide fluctuations in flow that characterized the snowmelt-dominated Platte. With a constant source of moisture feeding into the Platte

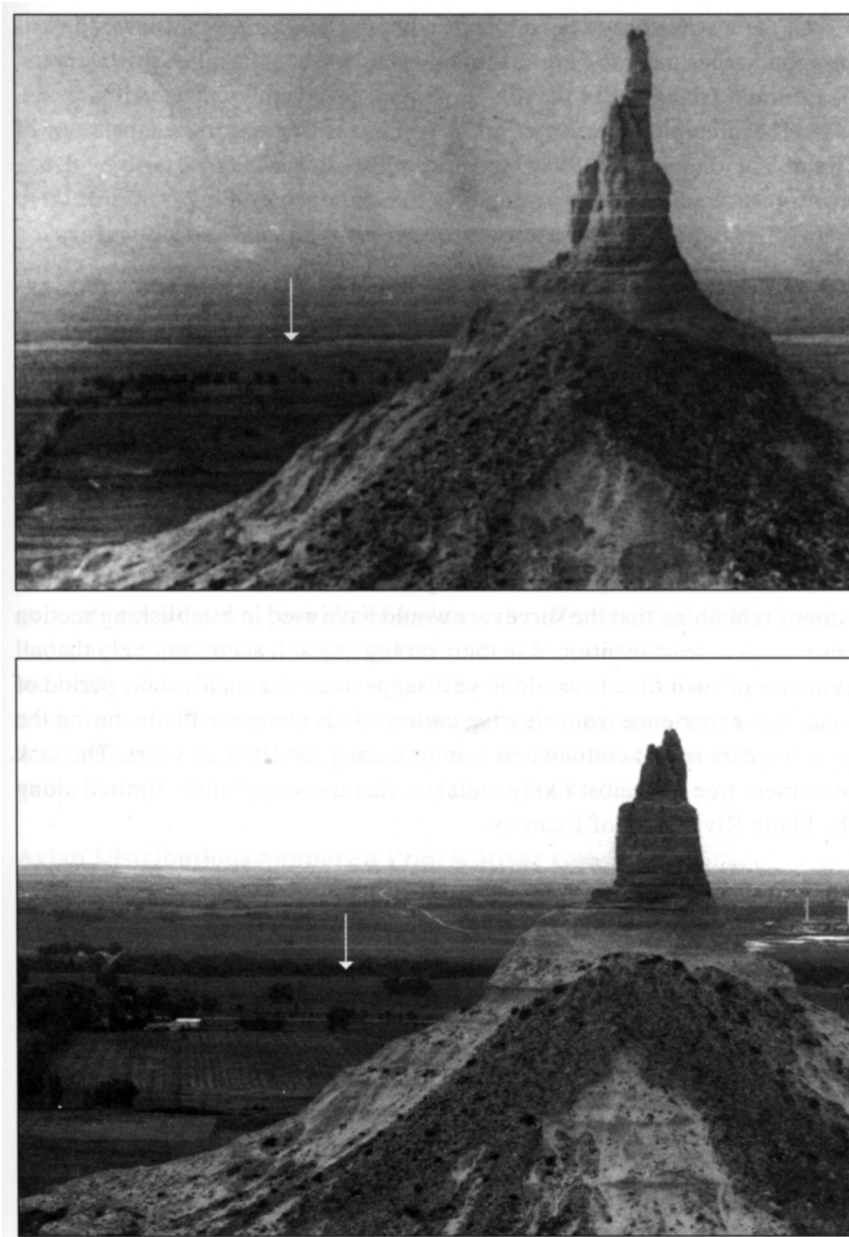


Figure 3. Comparison of a section of the North Platte River near Chimney Rock in 1898 (top photo) and 1998 (bottom photo) showing an increase of trees along the river. Note arrow marks North Platte River. 1898 photo courtesy of Kenneth Schneider. 1998 photo courtesy of James Stubbendieck.

River, there would have been increased opportunities for cottonwood, willows and other trees to germinate and establish 5 to 10 miles downstream, near Grand Island.

The precipitous decline in the number of witness trees upstream of Grand Island (Johnson 1994; Johnson and Boettcher 2000) is also evidence that forests were not widespread along the Platte River (Fig. 2). While there were 50 to over 100 witness trees recorded in the Grand Island area (Johnson 1994), there are only a few such trees in western Hall County (where Grand Island is located), and in Buffalo County (the next county to the west). Also, continuing west to the Nebraska-Wyoming State Line, documented witness trees are nearly absent. Johnson and Boettcher (2000) suggest that this lack of trees to the west may have resulted from a delay in conducting the General Land Office surveys. By 1877, when the western surveys were conducted, they theorize that much of the forest may have been removed already by early settlers. However, they also note that "The 1877 survey notes lacked information on trees and woodland distribution." We argue that, if trees had been cut 10 to 15 years earlier, there would have been stumps remaining that the surveyors would have used in establishing section corners, or at least mentioned in their survey notes. It seems unlikely that all evidence of such forests would have disappeared over such a short period of time. Our experience from clearing cottonwoods along the Platte during the past 20 years is that cottonwood stumps persist for 10 to 15 years. The lack of witness tree data most likely indicates that trees were quite limited along the Platte River west of Kearney.

Lack of Tree Regeneration

One curious aspect of Johnson and Boettcher's (2000) forest distribution theory is the idea that trees were widespread along the Platte River, but were largely removed and used at the time of settlement for construction, fence posts, and fuel. If this were true, one would expect natural regeneration and replacement after a decade or so. It is clear from the historical record, and available photos at the turn of the century (e.g., Fig. 3), that trees were not abundant during the period when regeneration would have been expected (Eschner et al. 1981).

Johnson and Boettcher's (2000) analysis of witness tree data indicates some age structure (based on tree diameters) that they interpreted to mean that the forests were regenerating. In other words, for particular species, there were many different aged trees, indicating establishment over a num-

ber of years. However, if forests were so widespread, the woodlands should have continued to replace themselves following initial cutting by settlers. The fact that such regeneration apparently did not occur on the Platte River in central and western Nebraska supports the view that the forests were never very widespread and that the river's flow regime was not very conducive to cottonwood and willow forest establishment. In other words, stabilized sandbar or channel sites where forests could develop do not seem to be a very prominent feature of the presettlement river or during the period following tree removal. What regrowth occurred was confined to scattered woodlands along the river.

It was not until 80 to 100 years after initial settlement that widespread development of forests began along the Platte River (Currier 1981; Currier et al. 1985; Johnson 1994). Forests became widely established in the Big Bend reach of the Platte River during the drought periods of the 1930s and 1950s, after extensive water development had taken place in Colorado, Wyoming, and Nebraska (Currier 1981; Sidle et al. 1989). An estimated 50-75% of the historic flows of the river had been re-regulated and diverted to generate power and to provide irrigation water (Currier et al. 1985; O'Brien and Currier 1987). It was not until this dramatic environmental change was well-established that the river began changing from a prairie stream to an anabranching stream bordered by extensive forests. We argue that this change was not a secondary phase of tree expansion; rather, it was the first phase of extensive woodland growth over much of the Platte River.

Avian Distributions Support a Prairie River Concept

Finally, the distribution of birds along the historic Platte River provides biological evidence that the Platte in central and western Nebraska was primarily a prairie river. Johnson and Boettcher (2000) assert that the contemporary Platte River avifauna is the same avifauna that was present during the time of the Pawnee. However, Knopf (1986) contended that it is probable that nearly 90% of the contemporary riparian avifauna in the western Great Plains was not present prior to 1900. Many woodland species (e.g., red-bellied woodpecker [*Melanerpes aurifrons*], wood duck [*Aix sponsa*], and northern cardinal [*Cardinalis cardinalis*]), which are now common in riparian forests along the Platte, did not occur along the Platte River prior to 1920 (Ducey 1988). Moreover, these species only recently have been documented in riparian forests along the North Platte River and along the South Platte River in eastern Colorado (Knopf and Scott 1990). If

forests had been as abundant along the Platte River as Johnson and Boettcher (2000) contend, then the ranges of the woodland species, such as those only recently documented in eastern Colorado, should have already been established there. Many of these species never reached eastern Colorado until recently because the broad expanse of open prairie created an ecological barrier that prevented these species from expanding westward from the riparian forests along the Missouri River. It was not until the relatively recent development of riparian forests along the Platte River that woodland species expanded westward into Colorado (Knopf 1986).

Discussion

Our review of the historic record and contemporary biological information suggests that forests were not widespread on the Platte River at the time of settlement. This conclusion is based on Woodbury's map of the river channel near Kearney, descriptions of the river channel from early expeditions, distributions of witness trees established at the time of General Land Office surveys, the lack of tree regeneration following tree removal, and the expansion of woodland bird species into the Platte River Valley. There were woodlands along the Platte River in selected areas, particularly on nine islands identified earlier (Eschner et al. 1981). However, these timbered areas were confined to old channels and raised areas, outside the active channels of the river. The main active channels of the Platte River at the time of settlement were described as 1 to 3 miles (1.6-4.8 km) in width and characterized by extensive sandbars and open river channels. A few trees were scattered along the banks of the main channel and in a few locations, such as at Kearney, tree-covered islands were present in the river. But this condition is far from being a highly wooded river, as proposed by Johnson and Boettcher (2000). For the majority of its length the river was clearly an open channel, a prairie river bordered by wetlands and prairie grasslands.

Based on their view that the Platte River was a forested river, Johnson and Boettcher (2000) suggest that the practice of clearing woodlands to restore crane and waterfowl habitat should be re-examined. Their contention is that habitat is being "created" with such actions rather than being restored toward the original presettlement condition. Based on our assessment, suggesting that the Platte River was basically a prairie stream, we strongly disagree. We contend that the selective clearing of woodland areas on the river channel, and the redevelopment of wetlands and wet meadows adjacent to the river, is a restoration process.

This debate raises broader issues about restoration and habitat enhancement. We can never fully restore the Platte River. The dramatic changes in river flows that have occurred over the past 100 years make restoring the Platte River to its former state virtually impossible. At best, we can only restore some semblance of the historic condition. Dozens of reservoirs, diversions, and irrigation systems, and an extensively developed agricultural economy would have to be dismantled to restore the effect of historic flow conditions. This is not likely. Instead, over the past two decades conservation efforts have been directed at maintaining pockets of habitat that resemble the historic Platte River to provide habitat for the millions of migratory birds that use the system.

Sandhill cranes (*Grus canadensis*), for instance, have abandoned large areas of the Platte River which formerly contained open channel habitat (Faanes and LeValley 1993). A large portion of the river between the towns of Overton and North Platte, Nebraska, is no longer used by sandhill cranes. In fact, sandhill cranes rarely were seen in the Grand Island area 20 to 30 years ago. Their distribution has moved eastward as the open habitat upstream has become choked with trees during the past 50-60 years (Faanes and LeValley 1993; Davis 2000). The same is true of the federally-listed whooping crane (*Grus americana*). Recent sightings of whooping cranes on the Platte River have increased in the area between Kearney and Grand Island, where the channels have remained most open. In terms of management, it makes the most sense to protect and manage open channel habitat for these species in the last relatively open reach of the river, i.e., between Grand Island and Kearney. The fact that a portion of this habitat near Grand Island may have had some trees on it at the time of settlement is irrelevant since other portions of the previous habitat are becoming encroached with trees. Attempts need to be made to maintain the habitat for cranes, waterfowl, and other native species of concern wherever habitat is currently located.

Protection of the Platte's forests, particularly in the name of neotropical migrants, as suggested by Johnson and Boettcher (2000), is not a restoration process. As we have argued above, these forests do not represent the native condition, and thus the guilds of birds they support are not native either. Most of the woodland species currently using the Platte River are habitat generalists whose populations are increasing or are stable (Breeding Bird Survey Data: Sauer et al. 1999). In contrast, populations of many prairie-adapted birds found along the river, and in particular the species that nest in grasslands, are declining and are in need of protection. This argues strongly

for the maintenance and protection of non-woodland habitats on the Platte River.

Overall, we believe that contemporary management should to be directed at maintaining a mosaic of habitats and high biodiversity along the Platte River, even though that was probably not the native condition. The Platte landscape has been forever altered by development, settlement, water regulation, species introductions (e.g., windbreak trees such as Chinese elm [*Ulmus pumila*] and Russian olive [*Elaeagnus angustifolia*]), and by species expansions into the Platte River Valley (e.g., woodland-associated birds, Canada thistle [*Cirsium arvense*], leafy spurge [*Euphorbia esula*], purple loosestrife [*Lythrum salicaria*], smooth brome [*Bromus inermis*], and red-top grass [*Agrostis stolonifera*]). Given these facts, our goal should be to manage the river to maintain habitat for listed species and to provide the greatest diversity of habitats for birds and other organisms. That has been, and continues to be, the Platte River Trust's goal and direction—to protect the migratory birds, especially listed species that depend on the Platte River, and their habitats along the river.

Management employed by the Trust and other conservation agencies is directed at maintaining a diversity of habitats. Currently, clearing pockets of channel habitat and protecting roosting and open channel areas for cranes and other native birds are high management priorities. Tracts of woodland are being protected as well. Of the approximately 50,000 acres of channel and floodplain within the Big Bend reach of the river (Kearney to Grand Island), we have proposed maintaining open channel areas and clearing on about 10% of that habitat. Ninety percent of the habitat would remain woodland and forest. In addition, grassland habitats are being managed with grazing, haying and prescribed burning to enhance their value for prairie-adapted birds. Active restoration of associated wetlands, an estimated 75% of which have been drained and converted to agriculture, is also an important aspect of the Trust's management. With these efforts it is hoped that significant habitat enhancement can be made for the whole suite of migratory birds found along the river.

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