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Historical evidence of riparian forests in the Great Plains and how that knowledge can aid with restoration and management.

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a long, long time ago...
Historical evidence of riparian forests in the Great Plains and how that knowledge can aid with restoration and management.

Riparian areas—land adjacent to a streambank or other water body—filtering nonpoint source pollution. Unfortunately the riparian areas of today, include only narrow bands of forests, or no woody vegetation. This greatly minimizes their ecological function. In deciding how to manage these areas, knowing the natural riparian makeup before humans settled in the area is vital. Management essentially is then restoration.

While some argue that the Great Plains were dominated by grasslands and that riparian woodlands were rare, others contend that trees would logically have occurred in riparian areas due to favorable microenvironment conditions. Historically, what native plant communities were found in riparian zones of the Great Plains? The answers to this question depend to a large extent on what time period is used as a reference of pre-settlement conditions.

The U.S. Fish and Wildlife Service (1981) drew upon conditions in 1905 for insight and concluded that trees were "wholly absent" or consisted of scattered cottonwood and willow. However, such a view rests on a flawed and incomplete reading of the record. Indeed, by 1900 most riparian zones in the Great Plains had long since been depleted of their natural woody vegetation component.

However, abundant historical evidence from the 1800's supports a very different picture, with different ecological implications. In fact, to tell the story of this land we need to begin a long, long time ago...prior to the construction of the transcontinental railroad spur lines in the 1860's, before the 1859 Denver gold rush; and before the Great Westward Movement of the 1840's along the Oregon Trail (Ambrose, 2000; West, 1998). These defining events drew many people into and through the Great Plains on their way to seek their fortunes and build their futures.

This, then, is a story of the Great Plains and how riparian areas along major rivers and their tributaries were once significantly forested. They came under great pressure beginning in the mid 1800's from the simultaneous and cumulative impact of Indians, gold seekers, soldiers, railroad crews, and settlers who all played important roles in determining the way riparian areas look today.

The Story...

The Great Plains as a whole hosted far fewer trees than the Missouri valley to the east and the Rocky Mountains to the west. The Arkansas River provides an illustration. Records from the early 19th century indicate that for 150 miles east of the current Kansas-Colorado border only an occasional cottonwood would have been seen. Three conditions occurred that did not favor the persistence of trees: sandy soil, heavy springtime flooding, and the low banks that allowed prairie fires to burn down to the water's edge (Wells, 1965). But at the eastern end of this portion of the river, around present day Great Bend, Kansas, trees lined the aptly named Walnut and Ash Creeks that emptied into the Arkansas.

Field notes from a 1825 surveying expedition, describe those streams as well shaded by stands of hardwoods and report other wooded tributaries downstream from there (Brown, 1913). At the other end of that poorly wooded stretch to the west— about where the river today crosses from Colorado to Kansas—began one of the best-known woodlands of the Plains, the "big timbers" of the Arkansas (See sidebar for additional historical evidence).
The locations for the specific rivers discussed are indicated on the map.

So while the soil and lay of the land gave trees little or no chance to take hold along some streams, conditions on many others encouraged healthy stands of trees—mostly cottonwoods, willows, and hackberries on the western Plains and to the east, a mixture of deciduous species.

These woodlands could be a striking sight after a long crossing of the treeless highlands between watersheds. An Irish private in 1849, after four days of crossing the sea of shortgrass in eastern Colorado, greeted the treetops of the Republican’s wooded bottoms with a joyful cry: “Be Jesus we’re in sight of land again” (Mattes, 1953).

The analogy was insightful, for these riparian groves were safe harbors for some Plains inhabitants during winter, when sudden blizzards and bitterly cold temperatures threatened any warm-blooded creature caught in the open. For Plains grazers—bison, deer, pronghorns, and elk—the even slightly lower elevation of a stream bottom provided some shelter from the wintry blasts. More protective were the stands of timber, which broke the force of the wind and conserved some heat.

From the Quaking Asp River on the northern Plains comes a vivid account of the value of these natural shelters. When a storm caught Alexander Toppanace’s freighting outfit in January, 1866, they took shelter in groves along the river and soon were joined by hundreds of bison. So crowded were men and beasts that many bison remained exposed. They
froze where they stood, and the next spring Toppance found that their bones formed a bleached border to the stand of timber. (Toppance, 1923)

The dependence of people and animals on shelters like these, once understood, is further evidence for timber along Plains watercourses. The year-round presence of people, horses and bison on the high Plains supports the existence of riparian woodlands simply because the one could not have survived without the other.

**Trees play a supporting role in the story**

Given the ample historical documentation from the 19th century, only a fraction of which is presented here, there can be no doubt that trees were commonly found along Plains streams. So why is there still a perception that in the Great Plains, timbered valleys are aberrations and that reestablishment of natural vegetation along rivers should largely preclude trees?

The reason apparently is the historical baseline used to determine normal conditions. The accounts used to describe such conditions date back to the early 20th century. In those reports trees were, in fact, largely absent or thinly represented along many watercourses. No one should conclude from these records, however, that the absence of timber was natural. Rather the lack of trees was the consequence of some of the most rapid and wrenching changes that region has ever known.

Three sequential but overlapping developments help us understand what happened. First, the spread of horses out of the Southwest and the rise of the Plains horse culture led to an increase in Native American population, which in turn wore away at the resources of the river valleys. In 1821, Jacob Fowler estimated that a winter camp in the big timbers of the Arkansas hosted twenty thousand horses; twenty-seven years later an Indian agent reported Cheyenne and Sioux villages along eighty miles of the South Platte River (Coues, 1970; Fitzpatrick, 1848). The amount of wood cut and burned even by these and smaller camps was considerable.

The second development, the overland migration of white pioneers, took a much greater toll on some of the Plains' richest riverine woodlands. The losses were confined mostly to a few major streams—especially the Platte, including the North and South Platte, and the Arkansas—that offered level terrain for ox-drawn wagons as well as water, forage, and (for a while) fuel for cooking fires. While the Indians' use was concentrated...
RIPARIAN AREAS PROVIDE ESSENTIAL ECOLOGICAL FUNCTIONS:
A recent National Academy of Sciences, Natural Resources Council report stated, “Restoration of riparian functions along America’s waterbodies should be a national goal...” (NAS, 2002)

Unfortunately, many of America’s fresh water bodies are too polluted for recreational activities like swimming or fishing. Polluted often by nonpoint source pollution attributed to sediments, fertilizers, and pesticides entering into streams flowing through agricultural lands (USEPA, 2000).

Today, the riparian areas along the rivers and streams within the Great Plains region of the United States typically contain only narrow bands of forests. In some cases, riparian areas have no woody vegetation, and in far too many cases, are farmed up to the edge with row crops and grains.

Nowadays, considerable interest exists in restoring riparian zones to reestablish “native” plant communities that can better provide a range of ecological functions to manage water quality, flooding, and biodiversity. Trees and shrubs have been shown to play an important role in providing microclimate modifications and shading, streambank stabilization, inputs of organic litter and large woody debris to aquatic systems, water and nutrient run over cycling, wildlife habitat, and general food web support for a wide range of aquatic and terrestrial organisms (Sweeney, 1992).

in the winters, the overlanders swarmed up trails between February and July. It was a massive onslaught. Between 1840 and 1860 an estimated third of a million persons crossed the Plains en route to Oregon, California, and Utah, and tens of thousands more passed through on their way to Colorado and Montana from 1859 to 1865 stripping virtually all trees from the Platte valley.

The third development, the advance of the farming and stock-raising frontiers onto the Plains, compounded the effects of the first two. Between 1870 and 1880 sixteen new counties were formed in central and western Kansas and several more in western Nebraska. The population of just four Kansas counties in the watersheds of the Solomon and Republican Rivers increased in that decade from ninety-nine persons to more than forty-one thousand, about twice the peak population of Native Americans on the entire Central Plains (West, 1998). Settlers gravitated to streams for basically the same reasons as Native Americans and overlanders, but unlike the other two groups, they lived there year-round. As the settler population expanded farmers occupied all creeks that offered any significant timber. They did what they could to lessen their dependence on wood—sod houses and barbed wire fences are the best-known adaptations—but for some needs, most importantly winter fuel, trees were an irresistible resource.
These three episodes—the rise of the horse culture, traffic on the overland trails, and the entrenched white settlers—were the most significant in the history of the Great Plains during the 19th century. Different in so many ways, they had this in common: all bore down intensely on valley timberlands. That is not surprising. Humans, whatever their purposes and means of living, found the riparian woodlands to be a resource essential to survival. The same was true for animals.

Fortunately, it is possible to piece together the history of land use in the Great Plains and reconstruct a more accurate picture of what riparian zones looked like and their condition.

Riparian vegetation experienced substantial change during the mid to late 1800's due to human impacts. By 1900 most of the trees and other woody vegetation along the rivers and streams in the Great Plains had been cut and removed by Indians, gold seekers, soldier, railroad crews, and settlers. These riparian zones were once heavily forested with wide bands of trees but are now occupied primarily by herbaceous plants or cropland.

Natural resource restoration efforts that target "natural" conditions need to use pre-1843 scenarios to accurately depict the natural state of riparian zones in the Great Plains. Although historical reference points do not necessarily instruct us in what to do, they can provide valuable insight as to what desired future conditions riparian restoration efforts should strive toward.

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THE REPUBLICAN RIVER –

The Republican River begins its journey in northeast Colorado and flows slightly northeast into the northwest corner of Kansas, then into southern Nebraska. It continues east just slightly north of the Kansas border for about two hundred miles before heading south into Kansas where it joins the Kansas River. Today the Republican flows through what is primarily farm country. West of the 100th meridian most of the crops are under irrigation, while conventional dryland farming is typical to the east. Along the Republican three large dams have been constructed to create reservoirs to store irrigation waters. Along most of its bank there are only narrow strips of forests, and in some instances agricultural fields extend all the way to the river’s edge (Figure 1).

Prior to 1843, the Republican River looked much different than it does today. It runs in a southeastern direction through the northern part of Cloud County in eastern Kansas. Early maps from the 1860’s refer to an area called the “Big Timbers of the Republican” along the western Kansas and Nebraska border. Major tributaries with names like Beaver River and Red Willow pass through this area. An 1878 report by the Kansas State Board of Agriculture describes the riparian zone along the Republican as follows: