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# GREAT PLAINS RESEARCH

A JOURNAL OF NATURAL AND SOCIAL SCIENCES

VOLUME 22, NUMBER 2 FALL 2012



CENTER FOR GREAT PLAINS STUDIES  
UNIVERSITY OF NEBRASKA-LINCOLN

# CENTER FOR GREAT PLAINS STUDIES

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**THE CENTER FOR GREAT PLAINS STUDIES** was established in 1976 by the University of Nebraska Board of Regents to promote a greater understanding of the people, culture, history, and environment of the Great Plains through a variety of teaching, research, and outreach programs. Under the administration of the College of Arts and Sciences at the University of Nebraska–Lincoln, the Center encompasses nine divisions: the Great Plains Art Museum, three academic journals (*Great Plains Quarterly*, *Great Plains Research*, and *Plains Song Review*), Plains Humanities Alliance, undergraduate and graduate programs, editing projects, research support, outreach programs, interdisciplinary symposia, and Fellows and Associate Fellows.

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**Back cover image:** Mount Rushmore National Memorial. Photograph by Ian C. Ratcliffe. See the article by Robert Pahre on page 99 in this issue for research on reconsidering national park interpretation.

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**GREAT PLAINS RESEARCH** is a peer-reviewed, biannual, multidisciplinary science journal, which publishes original research and scholarly reviews of important advances in the natural and social sciences with relevance to the Great Plains region and with special emphases on environmental, economic, and social issues. It includes reviews of books.

### Articles include:

- **original research findings**, such as have been published in *GPR* since 1991;
- **synopses** of the “state of the science” on topics relevant to the Great Plains;
- **overviews** of critical environmental, economic, and social issues for the plains;
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The editor encourages those submissions in particular that report general findings in the sciences relevant to this vast region. Articles should include thoughtful reviews of critical scientific findings and issues relevant to the Great Plains, whether the research was done in the Great Plains or not. The key to acceptance will be how well the findings are related to the region, and how well the science is communicated to other scientists outside the specific discipline, in the style of *Scientific American*, for example. The Board of Governors’ Publication Committee will select annually the best paper in natural sciences and the best paper in social sciences. The author/s of the winning papers will be presented cash prizes for the **Charles E. Bessey Award** (natural sciences) or the **Leslie Hewes Award** (social sciences).

Scientists doing interesting work with important implications for this region are invited to synthesize their significant research results and present them to our readers. The overall goals are to develop *Great Plains Research* as a centralized outlet for science of regional importance, to communicate important scientific findings to as wide an educated audience as possible, and to help keep scientists, interested citizens, and leaders of this region up-to-date on scientific progress relevant to the Great Plains.

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# RECONSIDERING NATIONAL PARK INTERPRETATION OF THE GREAT PLAINS AND TRANS-MISSISSIPPI WEST

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**ABSTRACT**—The National Park Service has generally interpreted its sites in the Great Plains in terms of a Eurocentric narrative of westward expansion. Though some sites are changing (e.g., Little Bighorn), others are not (e.g., Scotts Bluff). Even those sites that have changed still retain important elements of traditional narratives, which often date to the 1930s or to the Mission 66 period (1956–66). The newest sites, such as Washita Battlefield, tell newer stories that resonate well with today’s visitors. These provide a model for revising older sites. Giving greater attention to causes and consequences, aiming for a richer mix of disciplinary perspectives, including a wider range of historic and prehistoric peoples, and providing more balance in cases of war or cultural conflict will all improve interpretation. Exploring multiple meanings of resources such as wilderness will bring the National Park Service’s practices closer to modern academic literatures. Engaging both controversial histories and modern controversies over policy constitutes good pedagogy and should also be part of updated interpretative programs.

**Key Words:** westward expansion, interpretation, national parks

## INTRODUCTION

Though rarely recognized as such, the national parks constitute one of the largest programs of adult education in the United States. At these sites, visitors who may have slept through history class rediscover the human stories of the past.

The National Park Service (NPS) tells those stories at national parks, national battlefields, national historic sites, and other park units. Traditionally the park service has told these stories with an authoritative narrative product that it develops through the procedures of a hierarchical administrative agency. Only the ephemeral ranger talk has had the space to move outside a single narrative, with each ranger having the discretion to tell the story in somewhat different ways (Fine 1988; cf. Handler and Gable 1997 outside the NPS).

Many of those stories are inherently political at both the national and local levels. They address foundational stories of the nation, its people, and their government. Gen. George A. Custer at Little Bighorn has potent mythical value to many people. Nicodemus National Historic Site interprets a living community, which includes descendants of past residents. National historic sites such as Fort Laramie or Fort Scott may include descendants of

soldiers in the current community. Former landowners at Big Bend may still live in the region.

Sometimes the National Park Service navigates these political battlefields well, and sometimes not. Political mandates, including establishment acts and park service policy manuals, also guide interpretation in particular directions. Expert staff are not without blinders that reflect their own values, social environment, and disciplinary training (Pahre 2011b). They also face severe budget constraints. Once built, visitor centers, exhibits, signs, pamphlets and brochures, audiocassettes, and other interpretive material remain unchanged for long periods. Even when staff revamps the old interpretation, many legacy objects carry over as interpreters take incremental approaches to changing their stories. Moreover, the decentralized nature of the National Park Service means that park administration has the discretion to just leave things the way they are, for decades.

The cumulative effect of such processes has given us an interpretation of the trans-Mississippi West that focuses on “westward expansion.” Across many sites, European Americans move across the Plains, interact with Native Americans in war and peace, conquer a wilderness, and build a nation. Units whose interpretation program began in the 1930s, including Scotts Bluff, Fort

Laramie, and Jefferson National Expansion Memorial, continue that narrative in a very obvious way.

Non-Anglo stories are made to fit that story. African American buffalo soldiers assimilate to the army's story, while blacks at Nicodemus become part of the homesteading movement. Minority groups that fit less well into those narratives tend to be overlooked, such as Mexicans and Mexican Americans at Fort Davis or Fort Larned. Fresh approaches tend to appear only at new sites that lack legacy effects, such as Washita Battlefield and Sand Creek Massacre.

Yet even the new units face potential pitfalls reflecting wider currents of American thought. The National Park Service continues to present humans as generally separate from nature, a "dualist" conception that has attracted considerable criticism in the literature on wilderness (Callicott and Baird 1998).

In addition, the site-specific nature of most park interpretation tends to neglect whatever happens off site: the broader economic and political forces that produced westward expansion, the long-term consequences for the United States and its neighbors, and the human toll for Native Americans. The park service could make interpretation better by thinking about larger causes and consequences, by making more complex the relationships between people and nature, and by opening up the stories about different groups of people and how they interacted with one another.

### THE STUDY AREA

To explore the pitfalls of past interpretation and the promise of alternative approaches, this article examines the national park units from the Mississippi River to the Rockies (see Fig. 1). This study area captures the Great Plains and the mythological West of the nineteenth century, with its settlers, ranchers, soldiers, and Indians (Utley 1979).

This study area includes a group of "threshold" parks on the front range of the mountains, from Guadalupe Mountains National Park in Texas to Glacier National Park in Montana. These parks are important because the region's wilderness interpretation is clustered where the High Plains meet the foothills. The study area also includes a few sites not traditionally associated with westward expansion, such as two Civil War battlefields in the Ozarks—both fought along an early route to the West. Jefferson National Expansion Memorial on the Mississippi River in St. Louis seeks to provide an overview of westward expansion more generally.

As Figure 1 shows, most sites in the study area lie near the western trails, near the Black Hills, or they preserve battlefields of the Indian Wars. These evoke the "Wild West" that still carries important symbolism for many Americans. This gives the stories at those sites political weight that occasionally erupts into overt conflict over interpretation.

### THE HISTORY OF HISTORY IN THE NATIONAL PARK SYSTEM

The first national parks and monuments preserved monumental scenery, generally in uninhabited "wilderness." Because inhabited landscapes were mostly absent from the parks, interpretation focused on geology, wildlife, and other natural history. This interpretation began outside official management by pioneers such as Enos Mills in Rocky Mountain National Park, John Muir and the Sierra Club in Yosemite, and the unsung stagecoach drivers of Yellowstone.

There were few historic sites in the park system until the 1930s, when new sites were added as part of the wider New Deal expansion of government. The Franklin D. Roosevelt administration worked to make Americans feel good about themselves during both the Great Depression and World War II, giving interpretation a strongly patriotic flavor. This continued through the Mission 66 period (1956–66), when many visitor centers and other facilities were built. That infrastructure continues to shape interpretation today.

The breakdown of social consensus in the 1960s posed a challenge to the moderately conservative National Park Service. Civil rights, feminism, Latino/a activism, the American Indian Movement, and gay liberation brought the country a growing concern with diversity that lay outside traditional park service concerns. Since then, interpretation has worked in a political environment characterized both by New Left concerns and a political backlash on the Right.

### Custer Battlefield National Monument

In the national parks, this social turmoil washed up against existing infrastructure, visitor centers, and exhibits. Custer Battlefield National Monument had long celebrated George A. Custer and his men, memorializing their sacrifices and largely ignoring the Indian victors of the battle. In the late 1960s and early 1970s, park service staff, members of Congress, and even some Custer buffs had begun to talk about this bias, discussing ways to tell



Figure 1. National park units in the study area.





Figure 2. The Indian memorial at the Little Bighorn Battlefield National Monument.

the Native side of the story. As often happens, a lack of funding kept these ideas from fruition.

American Indian Movement activist Russell Means then forced the issue over several years, disrupting the centennial ceremonies in 1976 and installing his own memorial plaque in 1988. That “desecration” forced Congress to pay attention. In 1992, it passed legislation changing the site’s name to Little Bighorn Battlefield National Monument. It also provided funds for an Indian memorial (Fig. 2) to be placed on Last Stand Hill (Linenthal 1993; Greene 2008).

### Pea Ridge National Military Park

Little Bighorn has unusually high symbolic value in the American West. More typical is Pea Ridge National Military Park in Arkansas, whose interpretation dated to a Mission 66 program in 1963. The Trail of Tears, which follows the Telegraph Road along which the battle was fought, was not interpreted for decades. A \$25,000 donation from Wal-Mart (headquartered in nearby Bentonville) allowed the National Park Service to install new wayside exhibits in 2006. After receiving more funds from park service sources, management was able to revamp the visitor center exhibits in 2010 (Pahre 2012). Among other changes, it now features more visibly the role of the First and Second Cherokee Mounted Rifles (Fig. 3).

Many other sites resemble Pea Ridge in depending on visitor centers, wayside exhibits, historic resource studies, and other physical and intellectual infrastructure dating to the 1960s. This characterizes Wilson’s Creek National Battlefield, not far from Pea Ridge. It has not obtained funding for new programs and it continues the kind of outdated interpretation previously found at Pea Ridge. Differences between sites such as Pea Ridge and



Figure 3. Second Cherokee Mounted Rifles at Pea Ridge National Military Park.

Wilson’s Creek often reflect superintendents with different interests or skills working within a decentralized national park system. The local political environment also matters, since Pea Ridge is close to both Wal-Mart and the Cherokee Nation, and each contributed to the new interpretation in its own way.

Without a superintendent who decides to update interpretation, sites often reflect approaches to substance and pedagogy from the early 1960s or before. As David L. Larsen (2011:37) notes, many historic sites have strong traditions about what they are “supposed” to say. Civil War battlefield interpreters have long believed that they should focus on the location of units on the landscape and the tactical movement of troops during the battle. This “chess game” approach to battles neglects larger historical context and impact (Sutton 2001), and is also found in accounts of the frontier army (Smith 1998).

In the Great Plains, the preserved forts share an interest in the daily lives of soldiers. National historic sites at Fort Davis, Fort Laramie, Fort Larned, and Fort Scott have all restored the original buildings as funds allowed. Rooms display original, replica, and off-site period furnishings (Fig. 4). Visitors see how the smithy worked, how the stables were organized, what the enlisted men’s barracks and mess halls looked like, how officers’ quarters appeared, and so on. Despite the presence of stacked rifles, the occasional cannon, and the sound of bugles over the public address systems, the forts convey a sense of historic domesticity rather than impressing the military functions upon visitors (Sellars 2011a, 2011b). Displaying differences between officers and enlisted men is an interesting approach that reflects some newer scholarship on class distinction in the frontier army (e.g., Adams 2009).

Writing for professional interpreters, Larsen (2011) argues that better practice requires that we rethink such interpretative offerings and ask, “What will be meaningful



Figure 4. Infirmary at Fort Larned.

to audiences in the time they have to spend?" That rethinking lies at the heart of this paper. Giving greater attention to causes and consequences, developing a richer conception of the historic players, and providing a more complex understanding of human relationships with nature provide major themes for rethinking interpretation.

#### INTRODUCING THE NARRATIVE OF THE WEST: JEFFERSON NATIONAL EXPANSION MEMORIAL

To understand the overall National Park Service narrative, we must begin in St. Louis, France's inland outpost in Louisiana Territory, the base for the Lewis and Clark expedition, the fur trade, and expansion up the Missouri. The Gateway Arch symbolizes its role in expansion, a triumphal arch in the Roman tradition. The arch is the best-known part of Jefferson Expansion National Memorial, founded in 1935 as part of an ideology of expansion and nation building. Like Mount Rushmore National Memorial in South Dakota, it is an artificial national park unit, an unhistorical object masquerading as a historic site.

A subcommittee of the National Parks Advisory Board developed the vision for the site, concluding in 1937 that it should "signify the realization on the part of the nation, in its early youth, that it was destined to occupy an important position in the family of nations, and that . . . it was justified in trying to arrange its estate according to [a] conception of its ultimate maturity" (cited in Rothman 1998:156). This patriotism would help raise American spirits in the middle of the Great Depression and, not incidentally, provide construction jobs. It retained its latter purpose from the depression era into the 1960s, when its building projects were drawn into the Mission 66 program of park improvements and a national agenda of urban renewal.

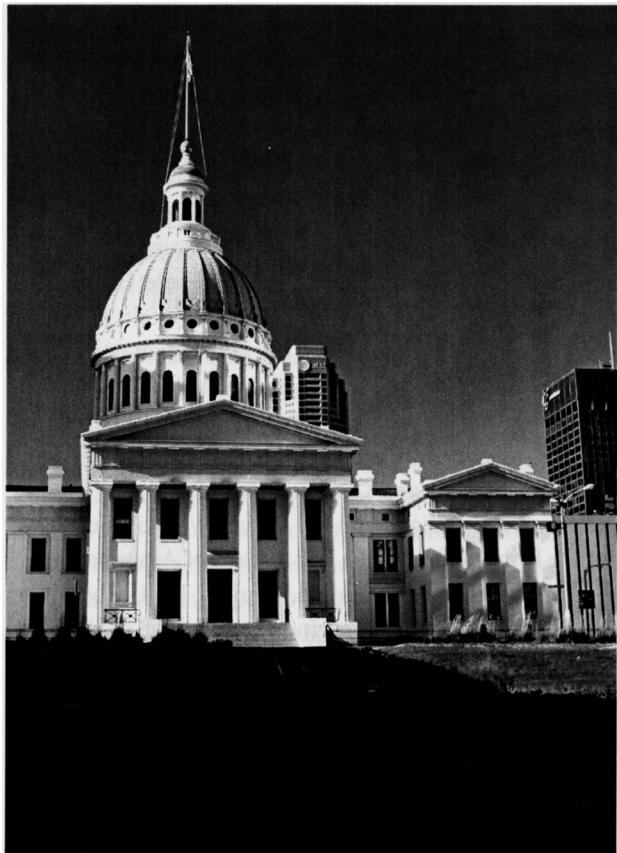


Figure 5. The Old Courthouse.

Meanwhile, in 1943 a "temporary" exhibit was opened in the Old Courthouse (Fig. 5). This emphasizes the building's history and architectural significance along with St. Louis history (Brown 1984: Chapter 8, "1968-1980"). Because the *Dred Scott* case began here, and slave auctions sometimes occurred out front, it now emphasizes slavery and the African American experience.



Some kind of museum was always planned for the main site on the river, but there were many ideas: a museum of the fur trade, of architecture, natural history, westward expansion, science and progress, an aquarium or planetarium. Eero Saarinen, the architect of the Gateway Arch, wanted one museum on the history of the West and a second on the architecture of old St. Louis (Bellavia 1996:109). They were thinking big—park service director George Hartzog said that “[i]t is entirely probable that we will be creating the outstanding memorial of the 20th century” (cited in Brown 1984:7).

In 1968 the idea was to focus “on the land; how it was acquired; the men who mastered it; and the significance and meaning of westward expansion to our nation and our people” (JNEMA 1968:10). But plans changed again at meetings in 1971 and 1972. The new idea was to tell the story of the West through different groups of people (trappers and traders, soldiers, settlers, cattlemen, miners, and Indians), interpreting both typical individuals and specific major figures such as Custer or Jefferson (Brown 1984; see also Utley 1979). Construction began in 1974, and the museum opened in August 1976.

The legacies of these various plans are still evident in the museum today. Lines of interpretation radiate out from the entrance at the center of a semicircle. Each line is built around a type of person such as mountain men, soldiers, or Indians; in addition, a tipi and Indian pony stand in the center of the layout. As the visitor walks forward she moves through time, with decades marked on the ceiling. The back wall displays large modern photographs of sites that Lewis and Clark visited. Linking Jefferson’s purchase of Louisiana and the Indian Wars of the 1880s, the site brings together the key threads of American identity, the American Revolution, Oregon Trail, Civil War, and manifest destiny, carrying the story of exploration forward to the moon (Fig. 6).

The museum is Anglocentric in vision, not only because Congress mandated a focus on westward expansion. African Americans appear as buffalo soldiers, instruments of expansion. Buffalo soldier Sgt. Robert Banks comes to life as an animatronic figure telling of his life (Fig. 7); his presence underlines the essential unity of the frontier army. American Indians, including an animatronic Chief Red Cloud, appear as chiefs who covet the medals given them as friends of the president (Fig. 8). The Spanish Empire, Mexican Americans, and the Southwest are absent, as are the Russians on the West Coast, conflicts with Canada and the United Kingdom over boundaries, or Chinese and Japanese immigration to the West in the 19th century.



Figure 6. Stagecoach to the stars.



Figure 7. Sergeant Robert Banks.



Figure 8. Chiefs and medals at Jefferson National Expansion Memorial.

The park brochure acknowledges Jefferson National Expansion Memorial's tradition of Anglocentrism and its earlier failure to interpret American Indians and African Americans, as well as Spanish, French, Russian, Asian, and other explorers. It claims that "[t]oday the park pays tribute to the multicultural aspect of the peopling of America," but beyond the buffalo soldiers the new arrivals are pretty hard to find.

Nowhere does the museum detail the cost of expansion for Native peoples. Nor does it consider the political consequences of expansion, a launching pad for American colonialism in the Pacific, a major war with Japan, and ongoing controversies over its global role today. Only in glorifying exploration does it carry the story forward, with a large photo of the moon and another of an astronaut standing on the moon. Perhaps most glaringly, the museum does not explain the causes of westward expansion. Its main explanation is that the motives for going west were as varied as the people who did it.

Jefferson National Expansion Memorial extends to the city's historic waterfront, with some statues and signs interpreting the role of St. Louis in inland navigation. The Old Cathedral of St. Louis King is an active church partnered with the expansion memorial. The church's interpretation of the site—which is not official park service interpretation—states that the Old Cathedral “stands in the center of the memorial as a reminder of the expansion of faith throughout the west” (Basilica of Saint Louis 2011). This clearly resonates with the expansion memorial's own themes.

To unify the interpretation found at these several sites, the National Park Service uses the overarching theme of “dreams”—dreams of expansion, power, and wealth; dreams of great engineering works; dreams of freedom for Dred Scott; and whatever dreams the visitor brings.

The gift shop, of all places, develops the dream theme for each group. In front of the DVDs, the gift shop tell us, “On this spot, a filmmaker dreamed of capturing the worker's dedication on a monumental job”; above the books on American Indians, “Native people dreamed of peace with the exchange of gifts”; and above the books on white settlers, “Frontier lawmen dreamed to enforce peace in the American West.” The gift shop also asks, “What do you dream?” and offers answers such as, “I want to build a strong community” and “I want to drive across America.” The park service does not include more provocative dreams such as “I dream of reparations for slavery” or “I dream that the white man will leave the Americas.” More realistically, adding text from Martin Luther King's “I have a dream”

speech might provide counterpoint from within the modern American canon.

Of course, Jefferson National Expansion Memorial's legal mandate limits the park service somewhat. That history begins with Roosevelt's charge to the U.S. Territorial Expansion Memorial Committee to develop plans for a memorial “to Thomas Jefferson, the Louisiana Purchase, the Lewis and Clark Expedition and other important movements in the achievements connected therewith in the Mississippi Valley or elsewhere in the United States” (cited in Rothman 1998:155).

Though its mandate probably explains why it is more triumphalist than other western national park units, Jefferson is not particularly unusual. Like many historic sites, it was shaped in the 1930s and 1950s, with key decisions made in 1971 and 1972—before the cultural changes of the 1960s and 1970s really began to change park interpretation. Those cultural changes helped cause Americans to think more critically about their country's history, yet that critical thinking is not reflected in the accounts at Jefferson.

#### INTERPRETING WESTWARD EXPANSION AT HOMESTEAD NATIONAL MONUMENT OF AMERICA

The National Park Service misses a big opportunity at Jefferson National Expansion Memorial, where it could have taken a broad view on the largest of scales. In contrast, the new visitor center and revamped interpretation at Homestead National Monument of America take a significant step toward examining some of the larger consequences of expansion. Congress gave this national monument a broader mandate in 1976 amendments to its establishment act, quoted in the visitor center:

The purpose of Homestead National Monument of America is to: Interpret the history of the country resulting in and from the Homestead Act . . . [and] Commemorate the people whose lives were forever altered by the Homestead Act and settlement of the West.

By including “the people whose lives were forever altered,” the legislation invites the park service to consider consequences.

The visitor center's 25-minute film (Dunkerly 2009) always returns to the consequences of homesteading. From the opening sequence it juxtaposes the European



American transformation of the land and the Native societies who had lived there. By using many off-camera voices instead of a single narrator, the film contrasts statements such as “The French sold the land to the United States government” and “We never put our land up for sale” or “Their dreams were to see a community spring from the ground up” and “We’ve been on this land from time immemorial.” Those many voices also provide a wide range of perspectives that no single, authoritative narrator could provide.

The film then tells of European American settlement and the resulting clashes with the Native peoples who were forced onto reservations. It notes that many of these reservations were themselves homesteaded by the allotment of the Dawes Act, opening them to non-Indian settlers. It tells of the settlers’ hardships, successes, and failures, concluding with the impact of the homesteading movement. Smiling white families hold photos of their homesteading ancestors and say, “It was all worth it.” Stoic Native peoples tell of the destruction of their cultures and the struggles to keep families and societies together. The film invites a conversation.

Though the themes are found most fully in the film, similar ideas are also evident in the exhibits of the new visitor center. The center includes panels asking “Whose Land Was It?” and explaining how the Dawes Act turned into a form of land grab, whatever its (debated) intentions may have been. The center recognizes American Indian responses to the homesteaders that varied by time and place. A panel entitled “Vanishing Land, Vanishing Hopes” explains that “[r]eactions were as complex and varied as the American Indians themselves. Some looked for new opportunities. Many hoped to adapt. Others fought to hold onto their traditional ways of life.”

Older approaches to these subjects persist in other places. In spring 2012, the education center included a large mural placing the homestead movement in a wider context of exploration from the Vikings to outer space, not unlike the view at Jefferson. This triumphalism does not admit of differing views. Neither do the banners hanging outside the visitor center that celebrate the descendants of homesteaders such as Whoopi Goldberg, Jewel Kilcher, Tom Osborne, or Lawrence Welk—even Wa gi ma wub, a Bois Forte Ojibwe chief who ceded his people’s lands before being granted a homestead on those same lands under Minnesota law.

While the film and the revamped exhibits are open about the consequences of expansion, Homestead struggles to explain the causes of homesteading in both the film and the visitor center exhibits. The main brochure’s

explanation of expansion is as good as any at the site: “George Washington’s words in 1784 were prophetic: ‘The spirit for emigration is great.’” It is not at all clear from the interpretation why this was true.

The visitor center, brochure, and website all provide some legislative background to the 1862 Homestead Act, noting previous acts and explaining that the 1862 act could pass only after southern politicians had left the U.S. Congress. Locating the act within the Civil War also provides one of the few senses of a wider context for the homesteading movement in relation to other historical forces and events.

The interpretation provides a greater sense of what individual settlers wanted. A panel entitled “A Promise of Paradise” notes that

Homesteading meant many things to many people. For factory workers it offered escape from crowded cities. For those who had been enslaved it represented freedom. For single women it was a path to autonomy and economic independence. For immigrants it promised a new life.

That recognizes the diversity of homesteader motives but only hints at the political economy of westward expansion. The story of immigration and the homesteaders, too, receives more hints than explanation.

Interestingly, the other homesteading national park unit, Nicodemus National Historic Site, has a stronger sense of causes because it focuses on only one small community. It commemorates the first group of African American homesteaders after the Civil War, a group who left Kentucky in the face of growing repression as Reconstruction came to a close. Interpretation there explains clearly the causes of their emigration, and connects it to the context of Reconstruction. However, it struggles to explain the lasting consequences of these events as the town has declined since the Great Depression.

Seen in comparison to Nicodemus, Homestead has an incomplete notion of causes and context. Still, its attention to consequences gives it a much richer interpretation of expansion than Jefferson or Nicodemus. It has taken a mandate focused on homesteading to talk more widely about settlers and Natives, successes and failures, costs and benefits, and to begin to explore legacies both good and bad. As a result, it tells a wider range of stories than those found at Jefferson, whose more encompassing subject would have allowed it to do even more.

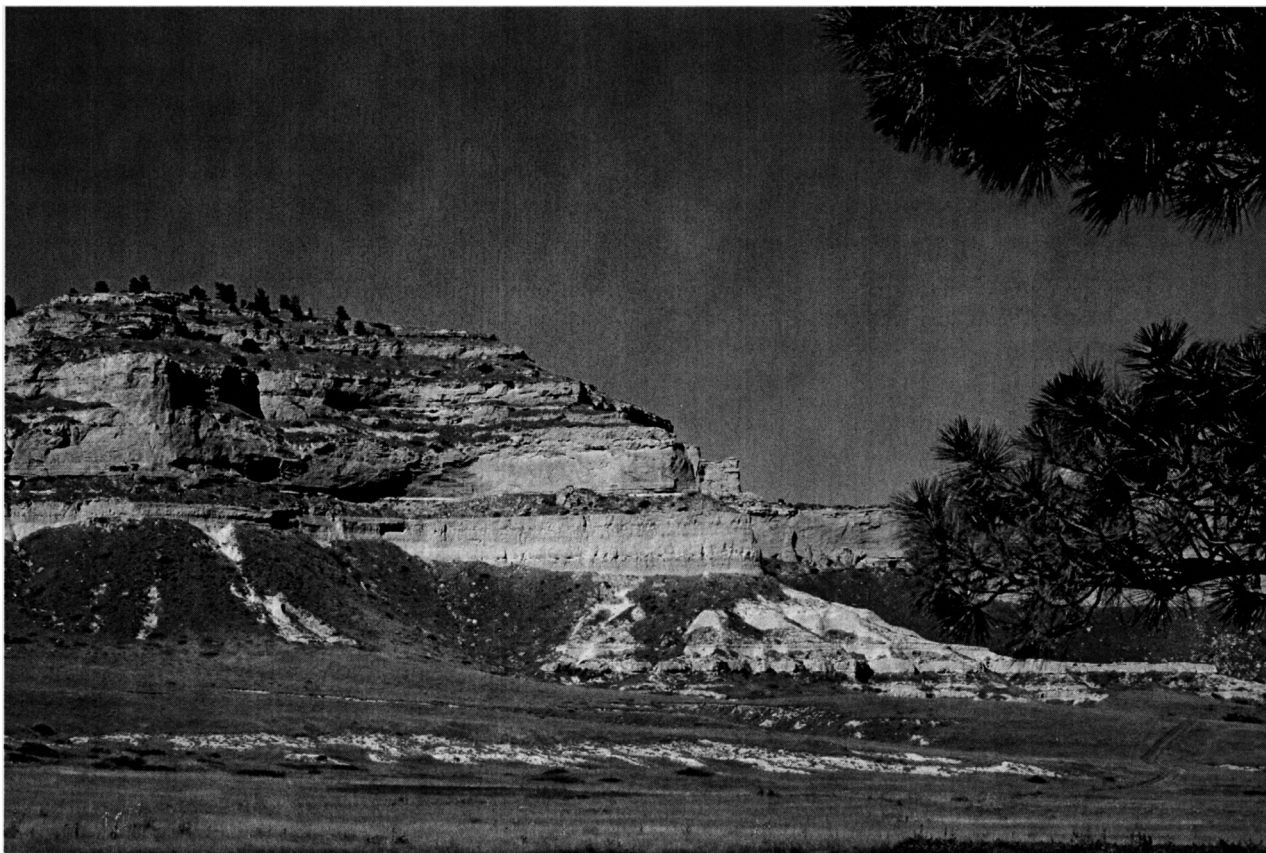


Figure 9. Scotts Bluff from the visitor center.

### INTERPRETING WESTWARD EXPANSION UNDER NARROWER MANDATES

While Jefferson National Expansion Memorial and Homestead National Monument have broad mandates, other sites in the Great Plains manage only a piece of the larger mosaic. At these other sites, National Park Service interpretation generally focuses on the site at hand and on the historical period of the site's greatest importance. This narrow focus tends to push historical context even farther into the background. A focus on the site often downplays the site's ultimate consequences. As at Jefferson, non-Anglos are assimilated to Anglo narratives of expansion, and one does not often see dissenting views like those at Homestead.

#### Scotts Bluff National Monument

These tendencies are evident at Scotts Bluff National Monument, among other sites (Fig. 9). President Woodrow Wilson proclaimed Scotts Bluff National Monument in 1919 to commemorate this landmark on

the Oregon Trail and the emigrants who passed this way, as well as to preserve the geology and other scientific resources of the monument. The visitor center has a narrow, traditional focus on the emigrant story and on the art of William Henry Jackson, reflected in a small book that serves as an in-depth guide to the motivated visitor (Knudson n.d.).

The monument's main brochure (Scotts Bluff National Monument 2009) is more modern. While emphasizing emigrants and geology, its view of the resource includes historic peoples, though not prehistoric ones. The brochure gives the "Indian" name of this formation, Me-a-pa-te. It does not specify that this is the Lakota name (nor give its meaning, "hill that is hard to go around"). After this, the park service gives its attention to the European American movements through the area—explorers and trappers, emigrants to Oregon, the California gold rush, the Pony Express, and the Mormon Pioneer Trail. Aside from the gold rush, the monument does not explain these movements but simply assumes westward expansion. Like Jefferson National Expansion Memorial, it also does not examine the consequences.

The brochure features three images, a wagon train crossing the prairie, a Pony Express rider, and a scene of Plains Indians hunting bison around emigrant wagons. Two smaller images show Mormon handcarts on the fur traders meeting Indians, and Mormon handcarts on the Mormon Pioneer Trail. While showing a good mix of the peoples for whom this site was important, it is striking that Indians appear only when interacting with European Americans in wagon trains or as fur traders. Interpretation also tends to homogenize settlers, for example, mentioning only briefly how Mormon migration differed from others.

### **Fort Laramie National Historic Site**

Nearby Fort Laramie National Historic Site (2007) tells a similarly incomplete story. Its brochure begins with this account:

As America expanded westward, this outpost in the Wyoming wilderness played a crucial role in the transformation of the West, first as fur-trading center, then as military garrison. For over five decades, it was a landmark and way station for the cavalcade of trappers, traders, missionaries, emigrants, Pony Express riders, and miners wending their way west. It was also an important staging point for the U.S. Army in its dealings with the plains tribes displaced by migration and settlement.

Like Scotts Bluff, it does not explain why westward expansion occurred nor why it displaced Plains tribes, but simply takes these things as given. Natives exist only in reference to European Americans. The violence of the period is hidden by describing army “dealings” with the tribes.

### **Theodore Roosevelt National Park**

This pattern of nonexplanation also appears in sites not connected with emigration or the military. Theodore Roosevelt National Park tells of Theodore Roosevelt heading west to escape personal loss, but it doesn’t put Roosevelt’s decision in a wider context: “He was looking for a taste of Wild West adventure. But something about the badlands made a deeper impression” (sign titled “Dude on the Frontier,” Painted Canyon). The park does not explore the question why the West had spiritual meaning for easterners.

Like Theodore Roosevelt, most homesteaders in the Dakotas failed. And yet they kept coming. What

economic, political, and social forces were so strong to drive European Americans westward on a mission unlikely to succeed? This implies, of course, a major ethical question: why displace Native peoples, kill bison herds, transform all the rivers, and engage in many other destructive activities in a project that was doomed in its own economic terms?

The National Park Service misses important educational opportunities when it ignores these larger questions. Thinking about causes and consequences places individual people, events, and processes within a larger context. Contexts help learners make sense of new information and motivate learners by answering the question, “Why is this important?” (Tilden 1957; Larsen 2011). Such questions suggest themselves at Theodore Roosevelt National Park’s interpretation of Custer’s 1874 Black Hills expedition that did not even pass through the park (Fig. 10).

The park service has recently come to understand that failing to examine larger social forces has weakened interpretation at its Civil War sites. As Robert Sutton (2001:xvi) has noted, “People should expect to visit a Civil War battlefield and come away with an understanding of not only who shot whom, how, and where, but why they were shooting at one another in the first place.” Civil War sites have made considerable progress in this direction over the last decade, and the sites of westward expansion should take a cue from them. History makes more sense with causes and consequences.

### **IMAGES OF WILDERNESS AT GUADALUPE MOUNTAINS NATIONAL PARK**

The story of western expansion rests on an image of civilization subduing nature (see Sale 1990; Nash 2001). This story implies subduing the people who lived in that “wild” nature, while appropriating the wildlife, rivers, land, and other resources for one’s own use. At Tallgrass Prairie National Preserve, for example, the park service explains that Native Americans lived in harmony with the natural resources until homesteaders replaced the native prairie ecosystem with grasses for cattle and other livestock. As a result, the park service and its partners must now “reconstruct” the original prairie ecosystem at Fox Creek and other locations, though apparently without returning Native peoples to the site.

This idea rests on notions of wilderness that are more problematic than generally recognized. According to Mark David Spence’s (1999) seminal analysis, eighteenth-century European Americans imagined “wilderness” as a



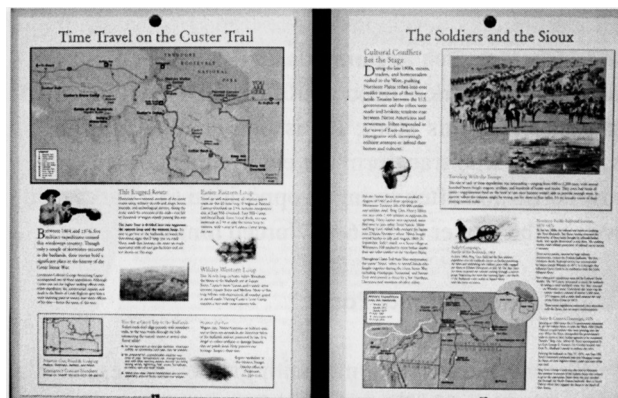


Figure 10. Custer's story at Theodore Roosevelt National Park.

place with both wild animals and “wild” Indians, that is, as an inhabited place. By the end of the next century, they had reimagined wilderness as *uninhabited*, with Indians removed to reservations that were not wilderness. Wilderness itself was similarly reserved, in national parks and then, after 1964, in designated wilderness areas (see also Catton 1997).

All three of these notions—inhabited, uninhabited, and legally designated—are found in park service interpretation. Indeed, all three are found in Guadalupe Mountains National Park, where the plains of Texas meet the Rockies. Established in 1972, and thus after the Wilderness Act, Guadalupe Mountains National Park emphasizes the Permian geology of the region and the wilderness character of the park. In sites such as the Frijole Ranch museum, the Mescalero Apaches appear as inhabitants of this natural wilderness. These people can trammel a wilderness without civilizing it, almost like a form of wildlife. When European Americans wanted to bring civilization here, in the form of transportation corridors and ranches, a “clash of cultures” ensued. The whites exterminated the Apaches in the wilderness—the park service even uses the word “genocide”—and removed them to reservations. Thus, the inhabited wilderness became an uninhabited wilderness.

The main visitor center picks up this story of Guadalupe Mountains National Park as a natural, uninhabited wilderness (Fig. 11). The high country remains as it was before humans because the mountains were too rugged, with too little water, for European American settlement. This natural wilderness, with intact ecosystems across several life zones, is presented as a key reason why the park was established. To see the park and its wilderness, the park service tells the visitor to hike.

On most of the trails, the hiker will encounter the legal definition of wilderness on a sign near each of the

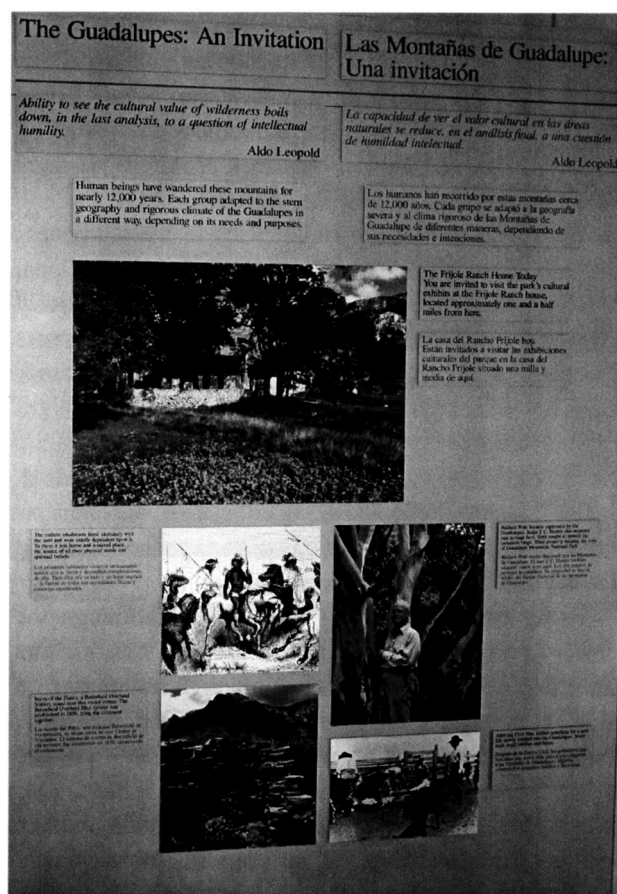


Figure 11. An invitation to the Guadalupe Mountains.

boundaries of the Guadalupe Mountains Wilderness Area. It explains the Wilderness Act of 1964 and encourages hikers to tread lightly in this place. The main brochure (“Guadalupe Mountains National Park” 2010) provides more detail:

Wilderness is meant to protect forever the land's natural conditions, opportunities for solitude and primitive recreation, and scientific, educational, and historical values. In wilderness people can sense being a part of the whole community of life on Earth. Preserving wilderness shows restraint and humility and benefits generations that follow us.

Without recognizing it, then, Guadalupe Mountains interprets three kinds of “wilderness”—the inhabited wilderness, the natural and uninhabited wilderness, and the legal wilderness.

There are obvious contradictions among the three conceptions here. Is wilderness inhabited or not? Must



nature be fenced off to be wilderness, or is fencing an unnatural limitation of it? If an untrammelled place is set aside for recreation, is it still untrammelled? Could we imagine a legally bounded wilderness dominated by natural processes in which Apaches or Anglo ranchers somehow lived off the land's resources?

Those questions are commonplace in the wilderness literature (see Callicott and Baird 1998), but the National Park Service treats all three as individually and collectively unproblematic. Juxtaposing these definitions of wilderness against one another would enrich the visitor's understanding of the wilderness theme and the park. Multiple levels of understanding are central to park policy on interpretation and good professional practice (Tilden 1957; Moscardo et al. 2007; Larsen 2011). Thinking critically about concepts is also good pedagogy, especially in an experiential setting (Dewey 1997) such as a national park.

Using better pedagogy would also challenge the viewer to connect these stories to her own life. Visitors can reflect on their own relationship with nature and on popular ideas such as "sustainability." They can think about the human costs of subduing the people who lived in that "wilderness." Visitors from different backgrounds can also reflect on their relationships with one another, both in terms of history and in terms of how our use of natural resources affects our relations with other people.

### COWBOYS AND INDIANS

The contradictory notions of wilderness at Guadalupe Mountains carry over to the National Park Service's treatment of humans on the western landscape. American Indians were part of the original wilderness for a very long time, but they vanish from the parks without explanation. In contrast, ranchers worked these lands for a few decades after the Indian wilderness. Often the ranchers sold out to the federal government directly or to the state government, who then donated the land to the federal government. The park service often preserved these ranch buildings and obtained oral histories and other documentation from their previous owners, making interpretation easier. If the ranchers still live in the community, they often retain an active interest in the parks, its resources, and stories (Pahre 2011b).

#### Theodore Roosevelt National Park

Ranchers assimilate easily to the human-nature dualism described in the previous section. They convert arid land to productive ranchland, just as settlers subdue wil-

derness, miners develop resources, and businesses build infrastructure such as railroads and stagecoach lines. At his namesake park, Theodore Roosevelt's ranching years fit easily into this story. He is one of many European Americans who transform the environment, overcoming adversities and often living in opposition to a harsh land, even as the winter of 1886–87 forced him to give up.

#### Big Bend National Park

Ranchers apparently met with greater success at Big Bend. The Sam Nail Ranch, Rio Grande Village, Dugout Wells, and Castolon all interpret the simple idea that when Anglo ranchers dig wells or build irrigation works, the desert can be made to bloom. American Indian survival strategies on the same landscape apparently do not warrant discussion. Nor, apparently, does the precarious nature of the Anglo solution—after only a few decades, the Great Depression made ranching sufficiently unprofitable that many residents willingly sold out.

Though it lies on the border, Big Bend tends to downplay Spanish-Mexican and Mexican-American stories. The brochure available at the Castolon center tells the story of the U.S. Cavalry and Anglo storekeepers at the site (Big Bend National Park 1997), not the Spanish and Mexican peoples who had lived there for centuries. The visitor center emphasizes Anglo-American history there instead. Its eight panels of history cover 1901–61, thereby excluding both Spaniards and Indians while including Anglo ranchers. The panels do mention "raids" by Natives and the later "subjugation" of the Natives. The center also displays a few Indian artifacts, including a large grinding stone, accompanied by some interpretation of Native uses of plants for medicines.

The sign for the nearby La Harmonia Store mentions that life on the border was "chaotic" during the Mexican Revolution (1910–ca. 1921), when Howard Perry and Wayne Cartledge of nearby Terlingua opened the store here. Perry and Cartledge catered to farmers and ranchers on both sides of the border, and they named their store in hope for good Mexican-American relations. The sign manages to fit the Mexican Revolution into the narrative of two Anglo shopkeepers.

Elsewhere in Big Bend, American Indians make only a brief appearance. Prehistoric use of Hot Spring is evident, alongside Anglo settlement. Rock art at the site is less visible than the historic ranch, but receives significant attention. The Persimmons Gap Visitor Center interprets the nearby Comanche Trail, mostly through temporary exhibits (in January 2010).



Figure 12. The death of Mni Akuwin.

The major development center at Chisos Basin misses a major opportunity to tell historic stories of Native lives. The mountains' elevation, shelter from the sun, and springfed wetlands and streams make the Chisos Basin a natural center for visitors, as it was for the Mescalero Apaches. Yet the Chisos Basin visitor center emphasizes the wildlife of this region, instead of discussing Mescalero use of the water and wildlife. Because the wildlife story is told elsewhere in the park, the lack of Native stories here is difficult to justify.

#### Fort Laramie and Scotts Bluff

At other sites, the National Park Service includes Natives by fitting them into the Anglo story. At Fort Laramie, the Sioux and Cheyenne peoples first appear as participants in the fur trade. They make sporadic appearances elsewhere at the site, but interpretation remains sharply focused on European Americans. For example, the summer 2010 issue of the *Prairie Sun* newspaper for the three "Wyo-Braska" national park sites (Agate Fossil Beds, Fort Laramie, and Scotts Bluff) describes Fort Laramie as having rangers in reproduction historic clothing to represent fur traders, emigrants, laundresses, soldiers, and officers' wives. Though the fort had a significant Indian community, they are not part of the reenactment—perhaps to avoid having non-Indians playing Indian roles. However, the death and funeral of Mni Akuwin, daughter of Sinte Gleska (Spotted Tail), appears on a sign as a token of U.S.-Indian reconciliation (Fig. 12).

Such interpretation reflects a long-standing tradition at both Fort Laramie and Scotts Bluff as it was developed by Merrill Mattes. Mattes served for several decades as regional historian at both park units, and he was closely involved in developing the initial interpretation at both sites. For Mattes, there were three important phases of Fort Laramie history—the fur trade, the migrations, and the military. He believed it inappropriate to give Native history or prehistory "equal time" because the "physical remains at the post are entirely of the military period" (Mattes 1980:113–14). This judgment overlooks the fact that the local Indians were the reason why Fort Laramie was built in the first place. Something of Mattes's attitudes toward the subject can be inferred from his following observation about the site (Mattes 1980:140): "Because Fort Laramie is blessed with an unspoiled environment in all directions, one can look out of Elizabeth Collins' window and feel the atmosphere of a make-do home in the Indian-infested wilderness." Mattes's juxtaposition of an "unspoiled environment" and "Indian-infested" wilderness shaped the stories at Fort Laramie and Scotts Bluff. The role of Mattes at both sites is a good example of how the decentralized nature of the National Park Service shapes interpretation and allows older models to persist for decades.

#### Fort Larned and Fort Scott

Analogous stories are evident at Fort Larned and Fort Scott, though the interpretation has been significantly modernized at both. Natives appear throughout the sto-

ries but usually in terms of their interaction with U.S. soldiers and settlers. Their precontact histories, or the effects of expansion on their subsequent cultures, do not get much attention compared to the daily lives of soldiers stationed at the forts. The visitor center at Fort Larned has one large panel with several signs and glass exhibit cases that tell of Plains Indian culture, and the contact period makes up part of the film.

Fort Scott also emphasizes the daily lives of soldiers in the restored buildings of the forts. In the visitor center museum, the fort's role on the "permanent Indian frontier" receives treatment along with the Mexican-American War, Bleeding Kansas, and the Civil War. In its breadth of historical coverage, Fort Scott gives a richer sense of context than most frontier forts and analyzes more fully the causes and consequences of the events in which it played a role. Its discussion of causes and consequences rests on the links between the fort's important periods: American victory over Mexico opened the frontier and led to Bleeding Kansas, which contributed to the Civil War. Interpreting several significant periods at the site, instead of just one, provides a straightforward way to make the stories richer.

### **Guadalupe Mountains**

In other cases, the National Park Service tells stories of both settlers and Indians with very different kinds of narratives. At Frijole Ranch in Guadalupe Mountains National Park, a brochure tells visitors that "[e]arly settlement in the trans-Pecos area was restricted by limited water and timber, poor transportation routes, and conflicts with Apaches." One might as easily say that Apache settlement of the trans-Pecos was limited by the sudden arrival of European Americans who promptly seized the limited water and timber in order to improve transportation routes. The brochure also states that "the scarcity of resources in the desert limited the number of settlers and presented a constant challenge to those few who came." One wonders what the Apaches were doing there.

### **Badlands National Park**

We see a similar story across the Plains at Badlands National Park. It explains how settlers tried to homestead the White River Valley but failed because conditions were too harsh. Modern ranchers require thousands of acres, not 160-acre homesteads. Of course, Natives had successfully lived here before the ranchers arrived, using different survival strategies that the park service does not

discuss. The park service also does not make the obvious connection that this land, too harsh for white homesteaders, now makes up the Pine Ridge Indian Reservation. A different agency in the federal government now expects this land to provide a living for the people of the Oglala Sioux Tribe.

### **Tallgrass Prairie National Preserve**

At other sites the park service does explore the survival strategies of Native Americans, often describing them as living in harmony with a challenging natural environment. As the brochure at Tallgrass Prairie National Preserve (2008) puts it,

American Indians knew well the value of the prairie and of human harmony with nature. Tribes of Kansas, Osage, Wichita, and Pawnee made this region their home and hunting grounds. Millions of bison roamed the plains, providing food, shelter, and ceremonial life for the tribes.

This text lays the foundation for a comparison with Euro-American strategies on the same land, as part of a wider natural history of the place.

### **Carlsbad Caverns National Park**

Visitors who explore the surface of Carlsbad Caverns National Park will also see such stories about Native peoples. Along the entrance drive, visitors can take a short walk to Indian Rock Shelter, an archeological site with evidence of many cultural groups, from prehistory through the Mescalero Apache. The trail highlights the plants of the Chihuahuan Desert and how the Indians used them, while the park interprets a grinding pit and Native food preparation at the rock shelter itself. A little farther up the road the Walnut Canyon overlook interprets watering holes and their importance for both wildlife and the peoples who hunted it. The interpretation continues at the natural entrance of the caverns, where a sign explains that American Indians explored some distance into the cave and that many different material objects have been found nearby.

### **Wind Cave National Park**

Even without the distraction of ranchers, the park service often fails to emphasize important non-Anglo

stories associated with its sites. For example, Wind Cave National Park is one of the country's oldest national parks. Protecting the landscape above the cave turned out to be critical—it was large enough to serve as a wildlife refuge. Many species, notably bison and wapiti (elk), found a home here when they were near extinction everywhere else. Prairie dogs are still welcome, though persecuted outside park boundaries. Black-footed ferrets, once extinct in the wild, have been reintroduced here to prey on the prairie dogs. Park service interpretation fully exploits the park's natural diversity, where eastern tallgrass prairie meets western shortgrass prairie.

Yet Wind Cave is the origin site for the Lakota, and the cave is sacred to many tribes. As a result, the park could have a much more developed Native story. The park service mentions the origin story but does little else with it.

### Mount Rushmore National Memorial

Some of those issues appear at Mount Rushmore National Memorial. Interpretation of Native issues is present, but somewhat thin, in the visitor center and on the trails. However, the park newsletter (*Granite Journal*) of winter 2009–10 shows a picture of then-superintendent Gerard Baker (Mandan-Hidatsa). His welcome message begins, "Greetings and welcome to the sacred *Paha Sapa* and Mount Rushmore National Memorial, the Shrine of Democracy" (Mount Rushmore National Memorial 2009–10). Remarkably, Superintendent Baker puts the Lakota name of the Black Hills before the name of his park unit. He continues,

The faces on this mountain remind some of the founding fathers and the birth of this nation. For others these faces remind them of cultural injustices and the loss of land and heritage. The Black Hills, or *Paha Sapa*, are considered sacred by many cultures in American and Indian Tribes alike.

Mount Rushmore did not look this way before Baker's appointment. An entrepreneurial superintendent, especially one such as Baker with wide support in the National Park Service, can make significant differences to interpretation.

### Devils Tower National Monument

Much more than Mount Rushmore, Devils Tower National Monument suggests what revised interpretation at Wind Cave and other sites might look like. The Devils

Tower brochure (Devils Tower National Monument n.d.) emphasizes the geology of the tower, but it begins with Indian legends and offers extensive interpretation of Native perspectives of the site. A flyer titled "Current Issues" (Devils Tower National Monument 2001) describes debates over the name of the tower and of the national monument. Many Natives believe that using the name "Devils" to refer to a sacred site is offensive. Natives also maintain that the tower should not be climbed, though it represents a world-class recreational rock-climbing destination for other people.

These issues are also found on interpretive signs around the visitor center and on the trail that goes around Devils Tower. Another flyer titled "American Indians and the Tower" (2005) discusses the question of names, the debate over climbing, and interprets religious objects such as prayer cloths for a non-Native audience. That flyer also introduces relevant legislation such as the American Indian Religious Freedom Act of 1978 and the 1996 Executive Order No. 13007, which reinforces land managers' duty to accommodate American Indian ceremonial use on federally managed sacred sites.

Wind Cave could do likewise. It could interpret debates over the ownership of the Black Hills, which fell into U.S. hands as a result of Custer's machinations, a gold rush, and federal unwillingness to honor treaties at the cost of forcing newly arrived European Americans off the land. Big Bend, Fort Davis, Fort Laramie, Scotts Bluff, and other sites could also adjust the balance of their interpretation, giving less attention to a few decades of ranching history and more attention to centuries of historic Natives and millennia of prehistoric peoples. Those Native people receive significant attention in the parks of the Southwest, where they often make up part of the legislative mandate for parks, but they could appear in the Great Plains as well.

It is important to remember that the park service inventories all the natural, historical, and cultural resources in its park units, and almost every park of any size has some archeological sites in it. The park service could educate its visitors on the Native history of almost every site. Like Natives, ranchers are often not mentioned in establishment legislation as a justification for the park. The same discretion the park service uses to tell ranchers' stories could be used to Natives' stories.

### WARFARE AND THE "CLASH OF CULTURES"

The National Park Service's interpretive treatment of ranchers and Indians in the Great Plains is asymmetric,



giving more attention to ranchers than to Natives, despite the short length of the ranching period and the smaller number of people it included. In contrast, when it comes to the conflict between Anglo and Native cultures, the park service prefers a kind of symmetry: conflict reflects differences between both sides, not aggression by either. The park services explains these wars as a “clash of cultures” or “collision of cultures.” This term is odd in part because the basic struggle was more accurately a “clash of political economy” or “material culture”—a rapidly industrializing, capitalist market economy confronted peoples who were mostly hunter-foragers, a conflict in which the European Americans could support many times more people on the same acreage as the Natives could. That land productivity and access to better military technology and organizational forms account for the outcome of the wars.

Focusing on a clash or collision implies a kind of symmetry and perhaps moral equivalence. That too seems odd, in that Native Americans were not trying to bring their culture to Europe in the way that European Americans were bringing theirs to the Americas. Clearly, in the process of action and reaction that produced wars, the United States provided the initial action in each case, even if variation in Native reactions produced different end results in different times and places. Whether that is a moral issue depends on one’s criteria, a question familiar from Thucydides’ (1934) *Melian Dialogue* and many subsequent texts.

### Fort Laramie National Historic Site

The “clash of cultures” trope often yields strange-sounding interpretation. For example, Fort Laramie describes the relationship between emigration and conflict in a way that seems to attribute blame to the Cheyenne and Lakota: “Early relations between Indians and whites were peaceful enough, but as immigration increased, young warriors began to harass wagon trains, leading to calls for protection [of white settlers from Indians by U.S. soldiers]” (Fort Laramie National Historic Site 2007). In response, the park service brochure tells us, the army bought the fur trading post in 1849 and made it a military post. “Indian troubles” escalated in the 1850s and 1860s, and finally Fort Laramie became the staging area for Indian campaigns after the Civil War.

In the same brochure, the park service provides a somewhat different account of soldier-Indian relations. It notes that the fort served as a social and economic center for about 7,000 Sioux (Lakota) in the 1830s and 1840s.

For reasons unspecified, the original trade relationship “gradually deteriorated into one of dependency, resentment, and finally, hostility.” The process here is not explained but clearly refers to the “Laramie Loafers,” who depended on treaty payments and rations for survival after having ceded land to the United States. The brochure also describes the two treaties of Fort Laramie (1851 and 1868); the Fetterman, Hayfield, and Wagon Box fights in Red Cloud’s War of 1866–68; and American violations of latter treaty in the Black Hills in 1874.

The theme also encourages the park service to provide an overly simplistic notion of culture clash on the frontier. For the Blackfoot, Ojibwe, and a few others, British Canada complicated the clash with the United States. In the South and especially in the Southwest, interaction with Spanish Mexico played an important role in North American history. Spanish-Mexican relations with the Comanche and other tribes also shaped U.S. expansion. Defining the collision in terms of several European cultures and many Native cultures would be more accurate, and would move interpretation away from its current dichotomization.

The park service could also explore the diversity of the Anglo side in much more detail. The New Western history has called attention to questions of race, ethnicity, gender, and class on the frontier (Smith 1998; Adams 2009). These issues are already evident in the buffalo soldiers and in the “officers’ wives cookbooks” available in gift shops in the forts. Little Bighorn now mentions Indian scouts that worked for Custer, and memorializes their dead. The park service consistently points out that the buffalo soldiers were black troopers led by white officers, but it does not explore whether the pattern extends to, say, Mexican enlistees. The frontier forts all interpret the difference between the officers’ quarters and the barracks of the enlisted men (of all races and ethnicities), but they do not yet connect this to questions of class in the Gilded Age.

### Fort Larned and Fort Davis National Historic Sites

Mexico also tends to be overlooked even where relevant. Despite the significant Mexican trade on the Santa Fe Trail, the museum at Fort Larned does not mention Mexicans in the permanent exhibits, although some rangers’ programs do.

Fort Davis also does not tell of the region’s Spanish and Mexican history. Nor does it tell of those Mexican residents who provided food and other services from just

outside the fort's grounds. The focus on officers' wives also tends to overlook the enlisted men who found Mexican laundresses as partners (Pahre 2011a).

Other immigrants, such as Chinese railroad workers, were also part of the cultural mix in the American West, but they tend to be slighted at most park service sites. I have never found Asian immigrants mentioned at a park service site in the Great Plains. Non-park service sites sometimes tell of them, such as the Eiteljorg Museum of American Indians and Western Art in Indianapolis.

Women's efforts to build a home life on the frontier give Fort Davis and Fort Larned, like Fort Laramie, a major interest in displaying Victorian furnishings (Sellers 2011a, 2011b), and their domestic life is recounted in several cookbooks available in the gift shop. Both African Americans and women are assimilated to the story of American soldiers at these forts.

In short, the "clash of cultures" narrative has trouble taking into account many aspects of Great Plains history. It does not easily structure stories that make sense of the Industrial Revolution, environmental constraints such as water, the role of women other than wives, Spanish-Mexican histories and peoples in parts of the Plains, Chinese immigrants, or the legacies of slavery and the Civil War for westward expansion. With buffalo soldiers it begins to explore the internal complexities of the frontier army, but there is more work to do. In addition, the "clash of cultures" theme studiously avoids some words that we might use, including colonialism, imperialism, racism and genocide. It reflects views tied up with particular notions of human relations with nature, described in previous sections.

#### **A DIFFERENT NARRATIVE: AT WASHITA BATTLEFIELD NATIONAL HISTORIC SITE**

Washita Battlefield National Historic Site is an example of how to rethink park interpretation in the Plains. Washita preserves the site where Custer's Seventh Cavalry launched a dawn attack on the village of Black Kettle, leader of the Southern Cheyenne peace party and survivor of the Sand Creek Massacre. Twenty cavalrymen and 58 village residents, including Black Kettle, died in this clash. Custer's men also took many women and children prisoner and shot more than 800 of the Indians' horses while torching the material objects of the village.

Various local groups and the state of Oklahoma had commemorated the site since 1868 with metal and granite markers. After agreement with the state in 1996, the site became a national park unit of 320 acres (Greene 2004).

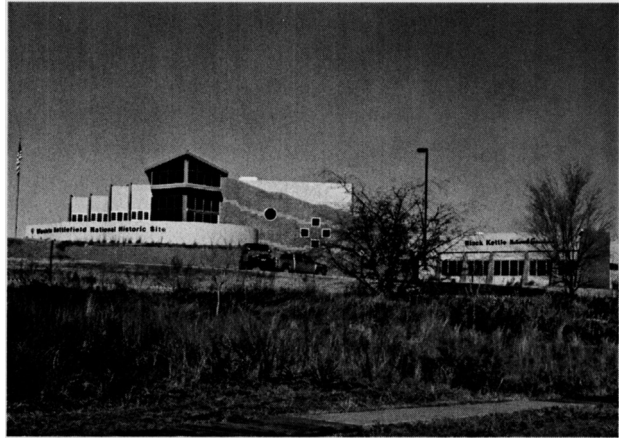


Figure 13. Washita Battlefield's Cultural Heritage Center.

The visitor center and all interpretation are new, though the site has retained those old markers that were still in place in 1996.

The National Park Service built the visitor center away from the sacred ground of the site, a model also being followed at Sand Creek Massacre National Historic Site. At the actual massacre site, visitors find a walking trail skirting the landscape that the tribe identifies as sacred. Unless they have read the park's general management plan, visitors will think they have been to the very site of the massacre. Visitors are guided by book or audiocassette so there are no signs to intrude on the natural scene here.

A short drive takes the visitor to the Cultural Heritage Center (Fig. 13), designed to respect both Cheyenne and Anglo connections to this land. Its top floor is oriented toward the Cheyenne directions of northeast, northwest, southeast, and southwest, and houses the main visitor center. The bottom floor is oriented east-west, the direction of European movement. It houses National Park Service and U.S. Forest Service offices and is built into the hillside to evoke the sod and dugout houses of the European American settlers. The colors of the building match the red dirt and tan sandstone of the region.

Visitors enter on a sidewalk that meanders like the Washita River itself, passing an angled wall that reflects the geometry of military maneuvers, while a curved wall on the right represents movements of the Native peoples. Once inside, people enter a gallery with a raftered ceiling that has a churchlike feel. That evokes a western tradition of sacred buildings while emphasizing that the Washita grounds are sacred to the Cheyenne and Arapaho peoples; the rafters also quote the tradition of great lodges throughout the national park system. The gallery floor is



Figure 14. Morning at Washita.

decorated with a black diamond pattern, the symbol for Black Kettle. Many design elements such as windows come in fours, the sacred number of the Cheyenne.

Visitors learn the history of Washita in a film drawing on both oral traditions and western histories. Interviews with historians and modern Cheyenne leaders move the story along, as do actors and reenactments. The content is factually neutral but leaves the visitor with the clear message that this was a “massacre,” not a “battle.” Outside the film, a large mural of the opening moments of the clash tells the same story (Fig. 14).

The visitor center also tells of the events surrounding Washita. One panel states, “Ultimately, the conflict centered on a struggle between a smaller group of people well adapted to living in harmony with the land and a larger group of people seeking to cultivate and mine the land for economic and personal benefit.” This acknowledges the asymmetry of action discussed above. Another panel, “Expansion on the Great Plains,” states that, after the Civil War,

waves of people spilled out into the Great Plains, transforming the landscape as they went. Seeking fresh opportunities in the west, new arrivals procured free land through the Homestead Act of 1862, built a transcontinental railroad by

1869, and linked the coasts together with strands of telegraph wire. As the frontier disappeared, the free-roaming Plains Indians faced their greatest challenge for survival.

The text is sympathetic to the Indians’ plight in the face of this juggernaut. Another panel acknowledges the asymmetry of the conflict: “Americans of European descent provoked the clash by streaming into the domain of native peoples.”

Unlike Jefferson National Expansion Memorial and some other sites discussed here, Washita notes the controversies of the day. Some figures in the United States praised Custer’s actions, while “others believed that Black Kettle’s village had been struck unjustly.” The National Park Service quotes several critics, including Thomas Murphy, then the superintendent of Indian affairs, who believed “that the innocent parties have been made to suffer for the crimes of others.”

The site also continues the story forward in time, discussing some of Washita’s consequences. One panel tells the visitor that

We are still living with the legacies of that conflict—the legacies of western expansion. In the decades since the Washita attack, for example,



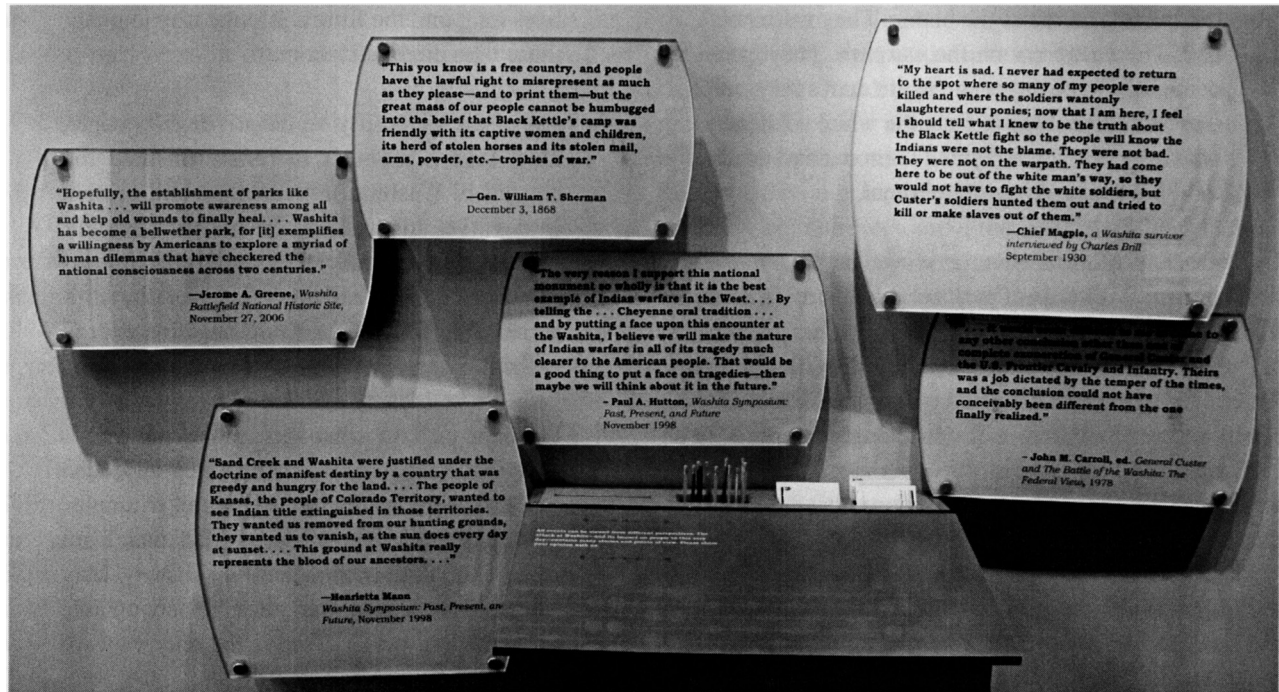


Figure 15. Talking back at Washita.

the resilient Cheyenne and Arapaho people have had to overcome the loss of their land and years of oppression to retain their distinctive cultural identities.

Another panel tells of the modern tribes, unified as the federally recognized Cheyenne and Arapaho Tribes of Oklahoma. It explains that the former reservation, consisting of eight counties in western Oklahoma, is now called a Tribal Service Area, and the tribal government is headed by a governor. Photos of modern American Indians include former Senator Ben Nighthorse Campbell (Northern Cheyenne), the Black Kettle Interagency Fire Crew in action, and veterans “proud of their military service.”

In addition to avoiding the weaknesses we have seen elsewhere, Washita follows a different pedagogy than most park service sites. As visitors leave the exhibits, they confront a half-dozen quotations mounted on the wall (Fig. 15). These present different interpretations of the events, both then and now, Native and European American, government and otherwise. Gen. William T. Sherman defended the military’s actions at Washita, saying that “the great mass of our people cannot be humbugged into the belief that Black Kettle’s camp was friendly with its captive women and children, its herd of

stolen horses and its stolen mail, arms, powder, etc.—trophies of war.” John M. Carroll sided with Sherman in 1978, writing that

it would seem difficult for me to come to any other conclusion other than one of complete exoneration of General Custer and the U.S. Frontier Cavalry and Infantry. Theirs was a job dictated by the temper of the times, and the conclusion could not have conceivably been different from the one finally realized.

In contrast, Native historian Henrietta Mann notes that “[t]he people of Kansas, the people of Colorado Territory, wanted to see Indian title extinguished in those territories. They wanted us removed from our hunting grounds, they wanted us to vanish, as the sun does every day at sunset.” She echoes Washita survivor Chief Magpie, who wrote in 1930 that

My heart is sad. I had never expected to return to the spot where so many of my people were killed and where the soldiers wantonly slaughtered our ponies; now that I am here, I feel that I should tell what I knew to be the truth about the Black Kettle fight so that the people will know

the Indians were not the blame. They were not bad. They were not on the warpath. They had come here to be out of the white man's way, so they would not have to fight the white soldiers, but Custer's soldiers hunted them out and tried to kill or make slaves out of them.

The presence of such diverse views on this museum wall confirm the words of park service historian Jerome A. Greene on that same wall: "Washita has become a bellwether park, for [it] exemplifies a willingness by Americans to explore a myriad of human dilemmas that have checkered the national consciousness across two centuries." By providing multiple perspectives, the park service invites the visitor to think about these events and reach her own opinion about them.

Next to that wall, the park service encourages visitors to talk back—to the park service, to the voices on the wall, and to one another. People can fill out a comment card, and the park posts these comments in a display case. Among those posted in January 2012 (all with original punctuation and grammar, and with state of residence if noted):

For years I was told I was a descendant of Philip Sheridan. Before I learned of the Washita slaughter I was actually proud of that heritage—since learning of the massacre, I am *ashamed*—how I wish it was just a family folklore tale—The impact of the massacre is overwhelming & deeply saddening as I look into the photographed eyes of the helpless women I want to sob. (Oklahoma)

Until the Native people of this land are respected & honored as valuable equals, in Peace and War, we cannot be the America we and our forefathers dreamed. I am Choctaw, Scot, Italian, Creek and an American.

This illustrates just one of the horrors of our history. *If* we credit it to "temper of the times" then we never have to apologize or *remember*. But remember we must and teach each generation *and* every Native History must *never ever* be forgotten. (Minnesota)

Ne-a'eše! Thank you for including Cheyenne language in the museum. I hope this language

lives long into the future. It's one way to honor those who died. (Oklahoma)

All of us, especially white-privileged people, must take a moment to reflect on how the reasons of Washita Battlefield are still present in our lives today. Let's search our souls for modern day misunderstandings, racism, sexism, homophobia, and other forms of discrimination, and let's *change* that negative energy without ourselves. (Utah)

I cannot explain what this makes me feel—only that this is *our* America. It's shrouded in these secret atrocities, and secret triumphs. Our America. I can only be glad that I am lucky enough to be aware of this history. May we learn from it all and each be accountable for achieving peace. That is the only way we can survive.

It still amazes me, that Americans are still uncomfortable with individuals whose beliefs are different from the masses. The question still remains, have we learned anything from history?

These comments, like the others in the display case, are all sympathetic to the Cheyenne. None sided with Custer, though the closest comment came from a visitor from Florida:

Being here has persuaded me on understanding of the conflict that existed during the mid 1800s in this area. It has brought to light what the price of progress can be. It is always a balance—where one gains, another loses. Thank you for the education and presentation of the important land and its history.

Again, that is more sympathetic to Custer and the military than any other comment on display. Unlike the others it recognizes a positive value—progress—while acknowledging its price. Washita has opened up a conversation.

The pedagogy here opens up the site to visitors in a way that a single park service interpretation could not. The National Park Service would never connect Washita to homophobia, to the shame of Sheridan's descendants, or to Americans of Choctaw-Scot-Italian-Creek heritage. In an ever-changing way, Washita's visitors can do that,

and engage in conversations with one another—even if, like me, they were the only visitors in the building.

### CONCLUSIONS: RECONSIDERING PARK INTERPRETATION

Our understanding of National Park Service interpretation today stands in a position not unlike our understanding of park service wildlife management before the 1964 Leopold Report. The public seems to think that all is well, but there are internal and external critics whose concerns have not yet jelled into coherent suggestions for a better approach.

Here I have argued that too many National Park Service sites retain images of western history that reflect concerns of the 1930s and 1950s. Jefferson National Expansion Memorial, Scotts Bluff, Theodore Roosevelt, and most of the forts represent particularly outdated notions of western expansion. Badlands, Big Bend, and Guadalupe Mountains national parks, and many other national park units, are hardly triumphalist. Still, their conceptions of humans and nature, the differences in how they treat Natives and Anglo settlers, the assimilation of non-Anglo Americans to the Anglo experience, and their presentation of the “clash of cultures” raise more subtle difficulties. Even modern interpretation projects at Homestead and Tallgrass Prairie continue some problematic notions. Some park units in the Great Plains have attracted political action resulting in changed interpretive programs, such as Devils Tower, Little Bighorn, and even Mount Rushmore. New units such as Washita Battlefield and Sand Creek Massacre (in progress) better reflect modern historiography.

The National Park Service has historically preferred to present “facts” in a neutral way, using a single, authoritative voice. As teachers know, active learning strategies yield better educational outcomes. The park service helps its visitors be better learners by encouraging them to engage the material intellectually and, when possible, to actively discuss it with one another. Devils Tower provides one example. It interprets the controversies at the site, inviting visitors to think about the issues and make up their own minds. Washita Battlefield lets visitors talk back, leaving comment cards that will be posted for future visitors to read. Guadalupe Mountains could follow these examples by interpreting the different notions of “wilderness” in the park. Visitors could reflect on what wilderness means to each of us, and talk back to future visitors (cf. Stewart 2012).

That pedagogical point suggests some new directions for interpreting westward expansion. First, the National Park Service could open interpretation to a broader range of disciplines, allowing them to give visitors multiple perspectives of events. Military historians such as Robert Utley and Jerome Greene have long dominated park service interpretation of the West. An ethnographer studying Native Americans, an economic historian, or a demographer would likely approach the historic sites of western expansion very differently—less in terms of tactical military movements and more in terms of larger-scale historical processes.

Second, greater consultation with affiliated Native peoples would also broaden the perspectives at each site, as it has for many museums (Kawasaki 1999). Far too often, the park service has treated “consultation” as sending people a copy of the draft environmental impact statement. It is not surprising that many tribes have not responded. However, many parks and tribes are now building ongoing relationships to the benefit of both. Pea Ridge National Military Park (Arkansas) provides a surprising example, where consultation with the Cherokee Nation improved the stories of Cherokee units at the battle and supported greater interpretation of the Trail of Tears that runs through the park (Pahre 2012).

Third, the park service could make an effort to ensure that both sides of any conflict or cultural contact situation receive equal attention. Civil War battlefields give equal attention to the Union and the Confederacy. Unless there is a compelling reason to do otherwise, western military sites should give equal attention to the United States and its opponents. Little Bighorn has come a long way from its days as Custer National Battlefield, but the Seventh Cavalry still dominates the site.

It is less commonly recognized that symmetry should also define the stories at places of contact as well as places of conflict. Fort Davis, Fort Laramie, Fort Larned, Fort Scott, Scotts Bluff, and the several national historic trails across the Plains should give the European American and Native American stories roughly equal weight. The stories of the Butterfield Stage at Pea Ridge or Guadalupe Mountains could provide similar balance about the peoples through whose land the stage traveled. The film at Homestead provides a good example on which to build.

As it opens up the interpretation, the park service should balance stories, and not just balance people. Natives have stories that go beyond their interaction with whites, African Americans in the West are not merely part of the U.S. Army, and Mexican Americans are more



than ranch hands for white farmers. Something as simple as interpreting Mexican wagon traders of the Santa Fe Trail at Fort Larned would add stories of both international trade and ethnic diversity to the site, while also helping visitors see how North America as a whole has shaped U.S. history.

Thinking in terms of more balanced stories will also point toward the internal complexity of each group. Neither European Americans nor American Indians were monolithic groups, nor were any of the groups within them. Apaches were not Comanches, and Mescalero Apaches were not Warm Springs Apaches. Women in Fort Scott experienced the Plains differently than men did, whether those men were soldiers or civilians. The frontier army included black and white, native-born and foreign, who might be German, Irish, or Mexican, among many others nationalities. A Chinese laundryman in a town along the Union Pacific railroad had a different experience than a Mexican washerwoman in Fort Davis. Pea Ridge hints at such complexities in various places, mentioning tensions between German immigrants and native-born Union soldiers, the Cherokee Civil War, and differences of opinion among white Americans on the Trail of Tears. Big Bend has begun to distinguish the Mescalero Apaches and the Comanches more systematically. Homestead has started to distinguish native-born and immigrant homesteaders. Continuing to increase the variety of voices on both sides will help interpretation connect with more visitors.

When the park service does not highlight such internal complexity, or does not give equal weight to both sides of a conflict or contact situation, it may reflect the sources available. The park service generally prefers written sources to oral histories. This preference often has the effect of highlighting the stories of literate European Americans over other peoples. Except at the "archeological parks," the park service does not generally exploit the rich archeological resources of the parks. Scotts Bluff has over 60 archeological sites in a small space, none interpreted, perhaps out of fear of vandalism or plunder. That oversight neglects the long human history of the site in favor of the brief settler history. Many park units protect physical objects such as forts, and interpret durable material culture—again, often privileging European American stories. Adding tipis to the buildings at Fort Laramie, for example, would give a much better sense of what the site looked like historically, since a Native community lived there year-round.

Especially at historic sites, many of these suggestions entail opening up each site's stories beyond the one

purpose of the park. The park service already does this by interpreting ranchers and settlers at non-ranching, non-settler sites. It can do the same with non-European American stories while still serving the establishment legislation of each unit. The general park service mandate to conserve all resources at the sites it manages for present and future generations would provide sufficient justification to tell more stories rather than fewer.

Even on a narrow reading of establishment legislation, the National Park Service could do a better job placing each site in a broader context, connecting it to larger stories about causes and consequences. At battle sites, the park service could tell visitors the causes of the war. At sites that are part of westward expansion, it could explain the causes of that movement, its effects on Native peoples, on U.S. relations with Mexico, and the environmental consequences for the land. At sites that include a designated wilderness area, it could go beyond the Wilderness Act of 1964 in interpretation. What is the meaning of wilderness to modern people, and how does that reflect a criticism of industrial society? How would preindustrial peoples, both indigenous and European, imagine "wilderness" differently? The park service could also explain why wilderness designations are often controversial, and why even some supporters of wild nature have developed a critique of designated wilderness areas.

Some of these suggestions might prove to be controversial among visitors, or within the park service itself. Like many museums, the park service often hesitates to provoke its visitors for fear of alienating them. As Nason (1999:33) notes, "visitors enjoy what best matches their expectations; if museums disagree with and do not seek to fulfill those expectation, then visitors will not be attracted to the exhibitions."

My final suggestion is that the park service embrace those controversies. Teaching all sides of a controversy is good pedagogy, engaging people as active learners and motivating them to understand the site so they can make up their own minds. Devils Tower has successfully presented the controversies surrounding it while maintaining a stance of neutrality. Ulysses S. Grant National Historic Site does likewise, interpreting the national controversies over slavery in terms of dinner disagreements between Grant and his father-in-law. According to Superintendent John C. Scott at Pea Ridge, the changed interpretation at Pea Ridge has received only favorable comments despite being very critical of U.S. policy in the Trail of Tears (Scott pers. comm.). Visitor reactions to Washita on the comment board suggest that the park service worries too much—many visitors appreciate being challenged.

Embracing controversy, and even deconstructing one's own founder, has been successful at the Buffalo Bill Historic Center (Winchester 2009; Pahre 2011b). Certainly the park service could take small steps toward greater controversy, soliciting feedback in many forms rather than fear a backlash that may not occur.

Many of the National Park Service historic sites were established in the 1930s and are therefore approaching their centennials. For most of them, that period will be the most significant for the landscape, certainly much longer than a brief battle. The park service has already occupied many forts longer than the U.S. military did. This too raises interesting questions of interpretation, for we cannot pretend that the park service has not also shaped the landscape and the people who live there. Dealing with this fact raises interesting questions in itself and only makes it more important to think through how these sites present the natural and human histories of their landscapes.

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#### NEW MAP: THE TOP 50 ECOTOURISM SITES IN THE GREAT PLAINS

The Center for Great Plains Studies has announced the publication of an ecotourism map. During spring and summer of 2012, the Center conducted a two-phase survey of 51 naturalists from nine states. The sites receiving the most nominations in the second phase were named as the top 50 sites, which were then separated into three groups. The map will be distributed at visitors centers throughout the Great Plains. For more information, see the ad on page 180 or the web site: [www.unl.edu/plains](http://www.unl.edu/plains).



# EVALUATING THE ROLE OF LATINIDAD AND THE LATINO THREAT IN THE STATE OF MISSOURI

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**ABSTRACT**—Growing Latino populations in midwestern cities of the United States are leading to the creation of contested ethnic spaces and urban landscapes. In this article we examine the historical, demographic, and social contexts associated with a growing sense of *Latinidad* and the countervailing *Latino threat narrative* in Kansas City and St. Louis, the two largest metropolitan areas in Missouri. *Latinidad*, or a notion of belonging based on ethnic identity in Missouri, is being challenged by nativist discourses that frame the growing Latino population as a threat. We highlight the different historical trajectories and geographical characteristics that have created distinct demographic profiles among the emerging Latino populations of Kansas City and St. Louis. These demographic profiles reflect the historical and geographic specificities of each city, but also highlight the ways that the Latino populations in two geographically proximate urban areas in the Midwest can have different trajectories. Finally, we outline three instances of Latino struggles for social and/or political recognition in Missouri, and suggest that the meaning of Latino population growth for both cities will be contested through the conflicting discourses of *Latinidad* and Latino threat.

**Key Words:** demographics, *Latinidad*, Latino threat, Midwest, urban

## INTRODUCTION

Immigration to emerging gateways and nontraditional destinations has become a significant focus for scholars studying immigration trends in the United States (Massey et al. 2003; Gozdziaik and Martin 2005; Okamoto and Ebert 2010). While immigrant populations in these new communities originate from countries around the globe, including Asia, Africa, and Europe, Latinos represent the largest and most geographically diffuse of these new groups (Bean and Stevens 2003). Historically, Latino populations have been concentrated in the U.S.

Southwest as well as large metropolitan areas like New York City and Chicago, but economic and immigration policies adopted by the United States throughout the 20th century have contributed to a diffusion of Latino immigrant populations across the country (Massey et al. 2003; Massey 2008). We examine the characteristics of the Latino population in the midwestern state of Missouri and explore the ways that a growing Latino presence is leading to a burgeoning *Latinidad*, or belonging based on ethnic identification as Latino, at the same time that nativist reactions to the growing Latino population are voiced in terms of the Latino threat narrative.

Latino presence is not a new phenomenon in the Midwest, and Missouri is no exception (Valdes 2000). The pace and scale of Latino population growth in the Midwest, beginning in the 1990s and continuing to the present, however, is qualitatively and quantitatively different from previous decades. In Missouri, Latinos now reside in all parts of the state, and according to the 2000 U.S. Census were present in every county. Latino population growth is rapid compared to other demographic groups in Missouri, but Latinos still comprise only a small portion of the state's population at about 3% of the total (U.S. Census Bureau 2010a). Nonetheless, the demographic growth of an ethnic population in a traditionally homogenous white and African American state is socially significant.

We argue that Latino population growth in Missouri has been accompanied by a growing sense of *Latinidad*, especially in the emerging urban spaces of Missouri's cities. *Latinidad* refers to a sense of belonging that highlights the shared experiences and histories of Latinos from diverse origins. Felix Padilla's (1985) account of a shared Latino experience, or "Latinismo," is often recognized as an early description of *Latinidad*, as he conceptually sought to theorize the political and social interactions between Mexicans and Puerto Ricans in Chicago. More recently, media studies have sought to use the term *Latinidad* in the context of representations of Latino/a ethnicity in popular culture, highlighting the commodification of Latino identity in the cultural marketplace (Davila 2001; Paredez 2002; Rojas 2004). Pan-Latino notions of *Latinidad* also offer a window on the shared experiences of Latinos from diverse origins living in a common neighborhood or social space. "Pan-Latino" refers to the distinct characteristics, politics, and histories of Latinos from different countries of origin, while exploring the relations between these diverse groups that develop as a result of shared interactions and experiences in the United States (Sandoval and Ruiz 2011). Ricourt and Danta's (2003) study of Queens, New York, offers one such example, as the authors conceptualize their pan-Latino project as taking on experiential, categorical, institutional, and ideological elements. Critics of the notion of *Latinidad* argue that the term hides significant differences in class, race, and nation of origin among Latinos and Latino groups (cf. Aparicio 2003). Despite these valid concerns, however, we find *Latinidad* to be a useful way of expressing the shared experiences of Latinos in the United States. We follow a definition outlined by Baez (2007), which interprets *Latinidad* "as a process of identity-making among Latina/os interacting with one

another in everyday, local spaces" (Baez 2007:110). We argue that in Missouri, Latino population growth is lending itself to a flexing of a collective economic and political participation based on a shared sense of community and belonging.

Latino population growth is not without its challenges, however, and the emerging sense of *Latinidad* across Missouri is also contested in numerous ways. Leo Chavez's (2008) notion of the *Latino threat narrative* (henceforth *Latino threat*) provides a useful framework for conceptualizing the fears that we often see accompanying the emerging experiences associated with the Latino population in Missouri. He argues that the notion of Latinos as a threat is an old concept that has attained new currency in the post-9/11 United States, and seeks to posit the long-standing presence of Latinos in the United States as a new threat. This reconfigured and recycled notion of the Latino threat, according to Chavez, is now reshaped as a threat to the national security and social well-being of the United States in which Mexican immigrants in particular are perceived to be engaged in invasion, reconquest, and ethnic separatism in the United States. These themes have often been associated with geographies of traditional Latino immigrant destinations, including the southwestern states, New York City, and even Chicago. Cities like St. Louis, in contrast, have been spaces of opportunity for small Latino populations, in part because of the lack of a well-defined local discourse about Latino immigration (Rynearson 1979).

This investigation is an effort to understand the ways that the burgeoning *Latinidad* and the Latino threat narrative are shaping the experiences of Latinos in the urban Midwest. We begin with a short historical account of Latino presence in Missouri, primarily focusing on factors that shaped the contemporary Latino populations in St. Louis and Kansas City. We then turn to a discussion of the burgeoning *Latinidad* in Missouri with an analysis of Latino population growth from the American Community Survey (ACS). We use that data to compare the Latino population of St. Louis and Kansas City with the demographic characteristics of Latinos across Missouri. In the next section we discuss the ways that the demographic shift underway in Missouri is influencing the emergence of "Latino" places in St. Louis and Kansas City. We conclude by suggesting that despite demographic differences between Kansas City and St. Louis, Latino population growth is contributing to similar struggles for recognition and community spaces. Latino population growth in midwestern cities can be understood in the context of history and demographic change, but it should also account

for the emerging spaces of Latinidad and the discourse of Latino threat if we are to fully theorize the ways that new urban landscapes are evolving.

### BACKGROUND: LATINOS IN URBAN MISSOURI

Despite a long-established Latino presence in Missouri, the historically small size of the population has generally contributed to a lack of significant research. Much of the historical record that does exist focuses on the growth of communities in St. Louis and Kansas City. Missouri's two largest metropolitan areas each have census records indicating Latinos were present dating to the early 1900s, though Latinos were known to have resided in the state prior to this official recognition (Rynearson 1979; Driever 2004). Latino presence in Kansas City and St. Louis throughout the 19th century did generate occasional recognition in media sources and local newspapers. These sources, in conjunction with a few academic publications, offer an outline of the Latino communities in both metropolitan areas. We use these historical accounts to inform our research, which is the examination and interpretation of the contemporary Latino spaces of belonging.

Although Latino growth rates in Missouri have not matched the four-digit increases seen across parts of the South in the past two decades (Gozdziak and Martin 2005; Smith and Furuseth 2006), they nonetheless represent a significant change in terms of the demographic and social structure of Missouri. Latino populations have emerged in the southwestern portion of the state (e.g., Jasper and Green Counties), the southeast part of the Missouri boot heel (e.g., Dunklin County), and the central region of the state (e.g., Cole and Boone Counties) and in smaller numbers throughout other parts of the state. Missouri is an attractive destination due to its economic opportunities, including demand for entry-level labor and lower costs of living. Despite the increasing diffusion of the Latino population across Missouri, however, Kansas City and St. Louis remain the geographic heartbeat of the Latino population.

### Cities in Context: Kansas City and St. Louis

The metropolitan areas of Kansas City and St. Louis, despite being on opposite sides of Missouri, share a number of characteristics that make for useful comparisons. In 2010 the St. Louis metropolitan statistical area had a population of 2.72 million while the Kansas City metropolitan statistical area had approximately 1.84 million

residents. Despite St. Louis's larger metropolitan population, both St. Louis (318,809) and Kansas City (454,876) have a relatively small residential population within the city limits. Each metropolitan area has a significant African American population, comprising 44.1% in St. Louis and 29.9% of city residents in Kansas City. This compares with African Americans comprising only 11.6% of the total statewide population. Kansas City has a larger Latino population due to its location and historical role as a distribution point for Mexican laborers coming to the Midwest. Although the two largest cities in Missouri are separated by only 240 miles, they each have a unique economic and social history that has helped shape the Latino population of each city.

### Kansas City: On the Road to Chicago

Latinos have lived and worked in Kansas City for nearly two centuries, including Mexicans who worked as trail drivers and traders as far back as the early 1830s through the 1850s. In 1884 the Mexican Central Railroad and the Atcheson, Topeka, and Santa Fe Railroad were linked in El Paso, creating a transportation network that played a key role in shaping the Latino population. Sustained Latino population growth began in 1905 when the railroad began to recruit Mexican laborers to work in the area (Driever 2004).

Historian Michael Smith (1989) identifies three separate phases of immigration from Mexico to Kansas City that helped shape the barrios that formed the early Kansas City community between 1900 and 1920. The first group of Mexican migrants, beginning in the early 1900s, were "solos," or single young men, who came for the promise of work but rarely stayed in Kansas City the entire year. This early period saw the establishment of the long-running trend of recruiting Mexican labor from the states of central Mexico, a practice that continues through formal and informal channels across Missouri today. Around 1910, this first group was followed, according to Smith, by a wealthier and more established group of Mexican immigrants who were seeking to escape the upheaval caused by the Mexican Revolution. Finally, a third group of immigrants began to arrive in Kansas City during World War I, meeting the demand for labor created by the war and replacing European immigration, which had virtually ended.

The railroad influenced the emergence of the Latino community in Kansas City in numerous ways during the first decades of the 20th century, with most men working for the railroad at some point during their careers. The



original Mexican *barrios*, or ethnic neighborhoods, were actually boxcar encampments alongside the various railroad lines running through the city. (Kansas City would serve as one of the most important points of distribution for Mexican workers to other midwestern and western states.) Living conditions in these railroad camps were notoriously challenging, and the segregation of Latino residents into ethnic neighborhoods formed the spatial emergence of the Kansas City community. In attempts to address the challenges of life in the Kansas City barrios during this time, Latino residents also established a number of institutions that would provide continuity for the community, including Our Lady of Guadalupe Church and several community newspapers (Smith 1989).

The predominantly Mexican barrios on the Missouri side of Kansas City developed in the area known as the Westside, a community that remains an important place for many Latinos in Kansas City today. Steven Driever (2004) notes that much of the early growth of the Westside barrio can be traced to flooding in the Argentine area of Kansas City during 1951, which led to the resettlement of a significant number of families. The Westside community, however, declined through much of the 1960s and 1970s as a result of the construction of interstate highway 670, which cut through the Westside neighborhood. By the late 1970s the Westside community had fallen from roughly 13,000 residents to just over 7,000, and since that time the predominantly Mexican residents have established a number of efforts to revitalize the area.

Today, the Kansas City metropolitan statistical area (MSA) ranks 27th in the United States. It remains the second-largest railway hub in the United States today. Kansas City is home to the International Freight Gateway, which serves as an inland trade corridor that facilitates international trade, particularly trade associated with the North American Free Trade Agreement, and which led to trade agreements with Mexican port cities of Manzanillo and Lazaro Cardenas (Barnes 2006). Kansas City is also home to a number of major corporate headquarters, such as H&R Block, Garmin International, Sprint, and AMC Entertainment, which serve as the economic backbone for a relatively dynamic economy. The Kansas City metropolitan area ranks below the national average in cost of living and is reported to be one of the most affordable large U.S. cities (Think KC 2012). The median sales price of an existing single-family home in Kansas City is \$139,500, which makes the area more attractive than similar-sized cities that are traditional immigrant destinations.

The Kansas City metropolitan area continues to have a vibrant and, in recent years, rapidly growing Latino

population. Contemporary patterns of settlement among recent immigrant arrivals are much more diffuse than in previous decades, with Latinos establishing a presence throughout the metropolitan area. Nonprofit organizations including the Westside Housing Organization and the Westside Community Action Network exist to meet the needs of community redevelopment and social services (Driever 2004). The older, more established and multigenerational composition of the Latino community in Kansas City provides a useful comparison for the smaller and slower-developing St. Louis population.

### **St. Louis: Connections to the West**

The St. Louis metropolitan area's first official records of Latinos residing in the city also date to near the beginning of the 20th century. The first documented instance of a Mexican immigrant arriving in St. Louis was around 1910, shortly after the opening of the Santa Fe Railroad line that linked St. Louis and the U.S.-Mexico border (Rynearson 1979). Mexican immigration to St. Louis increased, in similar fashion to Kansas City, as a result of the Mexican Revolution. Population growth occurred during the first decades of the century and continued until the onset of the Great Depression in the 1930s. As the depression deepened, Latino residents in many parts of the heartland were treated as scapegoats and in some cases faced de facto forced deportation to central Mexico. The Mexican population is estimated to have decreased by as much as 30% across the Midwest during this period, and it is likely that Latinos residing in St. Louis were under similar pressures (Rynearson 1979).

The 1940s and 1950s, however, brought a demand for labor in the U.S. wartime and post-wartime economy, and once again the region saw an increase in the number of Latino migrants arriving. This slow, steady growth in the Latino population in St. Louis would continue until the late 1980s and early 1990s, when the passage of the North American Free Trade Agreement, the Mexican peso crisis, and a sustained economic boom in the U.S. economy led to increases in Mexican immigration across the heartland.

Currently, the St. Louis metropolitan region is the 18th-largest metropolitan statistical area in the United States and economically offers a mix of Fortune 1000 companies, technology companies, and health/medical industries. Historically anchored by blue-chip corporations like beer-brewing giant Anheuser Busch, chemical giant Monsanto Corporation, Brown Shoe Company, and Ralston Purina (now Ralcorp), the region now also has newer powerhouses like Charter Communications

and mail-order drug distributor Express Scripts. While these large corporations form the backbone of St. Louis's economy, there are other factors that served to draw Latinos to the city. St. Louis was named one of the Forbes "Best Metropolitan Areas" in America in 2005 due to "its business environment, cost of living, healthcare services, and quality of transportation" (St. Louis Regional Chamber and Growth Association 2011:3). Low housing costs are also a factor in St. Louis, as it was named the second-most affordable large metropolitan area in the country by the National Association of Homebuilders in 2005. The median sales price for an existing single family home in St. Louis is \$121,400. A plentiful stock available for rehabilitation within St. Louis city limits, combined with rapid housing construction in the exurban areas of St. Charles, also made the St. Louis metropolitan area attractive to both migrants working in construction as well as Latinos moving from traditional gateways like California or Texas.

Contemporary Latino immigration to St. Louis, particularly from the central states of Mexico, grew at a rapid pace throughout much of the 1990s and early first decade of the 21st century, creating demands for medical, linguistic/translation, and social services. Faith-based organizations have played a key role in providing many basic services, including La Clinica and Acción Social Comunitaria, both of which were launched and supported for more than a decade by the United Methodist Church. Catholic Charities, associated with the St. Louis Archdiocese, have also provided crucial social services, including educational programming for children and mental health resources.

#### **AMBIVALENT WELCOME: BURGEONING LATINIDAD AND THE LATINO THREAT**

Historical differences between the Latino population of St. Louis and Kansas City are also clearly reflected in contemporary demographic trends. We examine these factors in this section through a quantitative "snapshot" of the emerging Latino populations of both cities. We draw on data from the U.S. Census, particularly the 2006–2010 American Community Survey Five-Year Estimates, to provide a sense of the contemporary Latino populations (U.S. Census Bureau 2010b). General demographic data are available for eight metropolitan statistical areas: Columbia MO MSA; Fayetteville-Springdale-Rogers AR-MO MSA; Jefferson City MO MSA; Joplin MO MSA; Kansas City MO-KS MSA; St. Joseph MO-KS MSA; St. Louis MO-IL MSA; and Springfield MO MSA.

We limit our analysis to the two key MSAs: St. Louis and Kansas City. This decision was based on three factors: (1) data availability for the Latino population; (2) size of the Latino population in the MSAs; and (3) reliability of data for the MSAs. We feel it is important to present the numbers for Kansas City and St. Louis in a larger context; therefore, in our analysis we use the figures on the Latino population from the entire state of Missouri as a baseline for comparison. Our analysis compares the statewide statistics with the MSAs for Kansas City and St. Louis. It should be noted that these two areas are not solely contained (i.e., they are not mutually inclusive) within the state of Missouri. Part of the St. Louis MSA extends into Illinois and part of the Kansas City MSA extends into Kansas. We frame our analysis around four themes: (1) population growth, (2) foreign-born status, (3) citizenship status, and (4) bilingual adaptation.

#### **Population Growth**

Contemporary Latino population trends provide some interesting insights into how Latinos are shaping the demographic profile of Missouri. In 2000 there were 118,592 Latinos in the state of Missouri (see Table 1). By 2010 this number had increased to 198,670. Overall, Latinos represented 3% of the state population in 2010. However, the Latino population increased by 68%. This compares to a 5% increase in the state population for the same time period. The increase in the statewide Latino population is coming from two groups: Mexicans (+62,577) and Central Americans (+11,036). At the state level, Mexicans made up 66% of the Latino population in 2000 compared to 71% in 2010.

The Latino population increased in Kansas City by 65%, while the St. Louis Latino population increased by 70% from 2000 to 2010. In absolute terms, the Latino population in Kansas City is more than twice as large as the population in St. Louis. For both cities, Latinos of Mexican descent make up the majority of the Latino population. Central Americans make up the second-largest Latino group in Kansas City, and Puerto Ricans make up the second-largest group in St. Louis. However, although intra-diversity of Latinos has remained stable at the state level, Latino diversity has decreased in both cities.

#### **Foreign-Born Status**

Of the 198,670 Latinos in Missouri in 2010, 68% (134,559 out of 198,670) were native-born and 32% (64,111 out of 198,670) were foreign-born. In Kansas

TABLE 1  
HISPANIC OR LATINO ORIGIN BY SPECIFIC ORIGIN (2000–2010)

	Missouri				Kansas City MO-KS metro area				St. Louis MO-IL metro area			
	2000		2010		2000		2010		2000		2010	
	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)
Not Hispanic or Latino	5,476,619	98	5,723,644	97	1,683,152	95	1,846,015	92	2,563,930	98	2,724,923	98
Hispanic or Latino	118,592	2	198,670	3	92,910	5	153,703	8	39,677	2	67,386	2
<b>Total</b>	<b>5,595,211</b>	<b>100</b>	<b>5,922,314</b>	<b>100</b>	<b>1,776,062</b>	<b>100</b>	<b>1,999,718</b>	<b>100</b>	<b>2,603,607</b>	<b>100</b>	<b>2,792,309</b>	<b>100</b>
Hispanic or Latino												
Mexican	77,887	66	140,464	71	70,966	76	121,946	79	22,324	56	44,050	65
Puerto Rican	6,677	6	11,659	6	2,891	3	4,295	3	3,360	8	5,682	8
Cuban	3,022	3	4,586	2	1,837	2	3,078	2	1,294	3	1,796	3
Central American	5,086	4	16,122	8	2,959	3	11,736	8	1,537	4	3,699	5
South American	3,569	3	8,576	4	2,058	2	4,821	3	1,973	5	5,085	8
Other Hispanic or Latino	22,351	19	17,263	9	12,199	13	7,827	5	9,189	23	7,074	10
<b>Total</b>	<b>118,592</b>	<b>100</b>	<b>198,670</b>	<b>100</b>	<b>92,910</b>	<b>100</b>	<b>153,703</b>	<b>100</b>	<b>39,677</b>	<b>100</b>	<b>67,386</b>	<b>100</b>
<b>Latino diversity*</b>	<b>0.606</b>	<b>N/A</b>	<b>0.586</b>	<b>N/A</b>	<b>0.476</b>	<b>N/A</b>	<b>0.457</b>	<b>N/A</b>	<b>0.702</b>	<b>N/A</b>	<b>0.655</b>	<b>N/A</b>
<b>Percentage increase (%) in population from 2000 to 2010</b>												
	<b>Missouri</b>		<b>Kansas City MO-KS metro area</b>		<b>St. Louis MO-IL metro area</b>							
Not Hispanic or Latino	5		10		6							
Hispanic or Latino	68		65		70							
Mexican	80		72		97							
Puerto Rican	75		49		69							
Cuban	52		68		39							
Central American	217		297		141							
South American	140		134		158							
Other Hispanic or Latino	-23		-36		-23							
<b>Total</b>	<b>68</b>		<b>65</b>		<b>70</b>							

Source: U.S. Census Bureau, 2006–2010 American Community Survey and U.S. Census Bureau, 2000 Census.

\*The Latino score range is from 0 (no diversity) to 1 (complete diversity) based on the Theil Entropy Score for the six Latino subgroups.

City, 62% (94,951 out of 153,703) were native-born and 38% (58,752 out of 153,703) were foreign-born. This compares to St. Louis, where 70% (46,971 out of 67,386) were native-born and 30% (20,415 out of 67,386) were foreign-born. Among Latino males in Missouri under 18 years of age, 89% were native-born compared to 50% who were 18 or older. A similar pattern was found for Latina females under 18 in Missouri, where 91% were native-born compared to 59% who were 18 or older (see Table 2). Among the foreign-born Latinos in Missouri, nearly 9 out of 10 (56,540 out of 64,111 or 88%) were 18 years of age or older. This pattern was consistent for Kansas City and St. Louis, where 88% (51,651 out of 58,752) and 89% (18,072 out of 20,415) of foreign-born Latinos were 18 or older. The pattern for native-born Latinos is strikingly different when compared to foreign-born Latinos. Slightly more than one out of two native-born Latinos (66,899 out of 134,599 or 50%) is 18 years or older at the state level. This compares to

45% (43,034 out of 94,951) and 54% (23,304 out of 46,971) for Kansas City and St. Louis, respectively. When we parsed these numbers by gender and age, we found some interesting results. For example, among Latina females 18 and older in Kansas City, 50% were foreign-born, but only 37% of the 18 and older Latinas were foreign-born in St. Louis. Among Latino males 18 and older in Kansas City, 58% were foreign-born, but only 46% of Latinos who were over the age of 18 in St. Louis were foreign-born. Thus, the profile of Latino foreign-born residents was markedly different for Kansas City and St. Louis, and these differences may explain in part why the Kansas City Latino population has seen a larger absolute increase in Mexicans and Central American immigrant residents. These findings suggest that across Missouri, foreign-born Latinos are overwhelmingly adults. This demographic trend most likely translates into dual-citizenship families, in which the parents are foreign-born and some or all of the children are native-born.

TABLE 2  
AGE BY CITIZENSHIP STATUS FOR THE HISPANIC OR LATINO

	Missouri		Kansas City MO-KS metro area		St. Louis MO-IL metro area	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Males under 18 years						
Native	34,545	89	26,123	86	10,735	89
Foreign-born	4,132	11	4,218	14	1,300	11
Total	38,677	100	30,341	100	12,035	100
Males 18 years and over						
Native	32,499	50	20,872	42	12,482	54
Foreign-born	32,462	50	29,233	58	10,568	46
Total	64,961	100	50,105	100	23,050	100
<b>Total Males</b>	<b>103,638</b>		<b>80,446</b>		<b>35,085</b>	
Females under 18 years						
Native	33,115	91	25,794	90	10,932	91
Foreign-born	3,439	9	2,883	10	1,043	9
Total	36,554	100	28,677	100	11,975	100
Females 18 years and over						
Native	34,400	59	22,162	50	12,822	63
Foreign-born	24,078	41	22,418	50	7,504	37
Total	58,478	100	44,580	100	20,326	100
<b>Total Females</b>	<b>95,032</b>		<b>73,257</b>		<b>32,301</b>	

### Citizenship Status

Of the 64,111 foreign-born Latinos in the state, 77% (49,072 out of 64,111) were not U.S. citizens. Moreover, 87% (42,737 out of 49,032) of the foreign-born Latinos who were not U.S. citizens were 18 years old or older. This trend was even stronger for foreign-born Latinos in the state who were U.S. citizens, where 92% (13,803 out of 15,039) were 18 years old or older. In Kansas City and St. Louis, 82% (48,157 out of 58,732) and 70% (14,273 out of 20,415) of the foreign-born Latinos were not U.S. citizens, respectively. Kansas City and St. Louis had a similar percentage of foreign-born Latinos who were not citizens and were 18 years old or older, 82% (41,590 out of 48,157) and 89% (12,695 out of 14,273), respectively.

At the state level, 23% (15,039 out of 64,111) of the Latino foreign-born residents were U.S. citizens. This compares to 24% and 27% for males and females over 18 years of age, respectively (see Table 3). However, there is a significant difference when comparing Kansas City and St. Louis. For example, 7% of the foreign-born males under 18 were U.S. citizens, but 28% were U.S. citizens in St. Louis. Likewise, 18% of the foreign-born males 18 and older were U.S. citizens in Kansas City, but 28% were U.S. citizens in St. Louis. Similar patterns were observed

for foreign-born Latinas. One out of ten (10%) foreign-born females under 18 in Kansas City were U.S. citizens compared to 27% in St. Louis, and one out of four (25%) foreign-born females 18 years old and older in Kansas City were U.S. citizens compared to 34% for St. Louis.

### Bilingual Adaptation

At the state level, slightly more than one-third (35%) of native-born Latinos speak another language other than English (see Table 4). Only 6% of foreign-born Latinos speak only English. Overall, we found that 43% of the Latinos, at the state level, speak only English. In Kansas City, 41% of the native-born Latinos speak another language compared to 32% in St. Louis. The foreign-born Latino population in St. Louis was twice as likely to speak only English (8%) compared to Latinos in Kansas City (4%). About one out of two (48%) of Latinos in St. Louis speak only English compared to 35% in Kansas City.

The four themes from our statistical analysis show that Latinos represent an important and increasing demographic force in Missouri. A key theme that emerges from these data is that the Latino population in Missouri is actually two different Latino populations. The first population is fairly large, less diverse, and tends to be



TABLE 3  
CITIZENSHIP STATUS OF FOREIGN-BORN HISPANICS OR LATINOS IN MISSOURI

	Missouri		Kansas City MO-KS metro area		St. Louis MO-IL metro area	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Male children (under 18 years):						
Naturalized U.S. citizen	574	14	277	7	362	28
Not a U.S. citizen	3,558	86	3,941	93	938	72
<b>Total</b>	<b>4,132</b>	<b>100</b>	<b>4,218</b>	<b>100</b>	<b>1,300</b>	<b>100</b>
Male adults (18 years and over):						
Naturalized U.S. citizen	7,648	24	5,255	18	2,992	28
Not a U.S. citizen	24,814	76	23,978	82	7,576	72
<b>Total</b>	<b>32,462</b>	<b>100</b>	<b>29,233</b>	<b>100</b>	<b>10,568</b>	<b>100</b>
Female children (under 18 years):						
Naturalized U.S. citizen	662	15	257	10	403	27
Not a U.S. citizen	2,777	85	2,626	90	640	73
<b>Total</b>	<b>3,439</b>	<b>100</b>	<b>2,883</b>	<b>100</b>	<b>1,043</b>	<b>100</b>
Female adults (18 years and over):						
Naturalized U.S. citizen	6,155	27	4,806	25	2,385	34
Not a U.S. citizen	17,923	73	17,612	75	5,119	66
<b>Total</b>	<b>24,078</b>	<b>100</b>	<b>22,418</b>	<b>100</b>	<b>7,504</b>	<b>100</b>

Source: U.S. Census Bureau, 2006–2010 American Community Survey.

TABLE 4  
NATIVITY BY LANGUAGE SPOKEN AT HOME AND ABILITY TO SPEAK ENGLISH  
FOR THE HISPANIC POPULATION FIVE YEARS AND OVER

	Missouri		Kansas City MO-KS metro area		St. Louis MO-IL metro area	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
<b>Total</b>	<b>172,857</b>		<b>133,769</b>		<b>59,483</b>	
Native-born:	109,356		75,292		39,434	
Speak only English	70,884	65	44,503	59	26,745	68
Speak another language	38,472	35	30,789	41	12,689	32
Foreign-born:	63,501		58,477		20,049	
Speak only English	4,048	6	2,287	4	1,692	8
Speak another language	59,453	94	56,190	96	18,357	92
Total population of speak only English	74,932	43	46,790	35	28,437	48
Total population of speak another language	97,925	57	86,979	65	31,046	52

Source: U.S. Census Bureau, 2006–2010, American Community Survey.

more bilingual. The second Latino population has more internal diversity and tends to speak only English. The first is the Latino population located in the Kansas City MSA, while the second is located in the St. Louis MSA.

Our findings presented in Tables 1–4 highlight the burgeoning Latino presence in St. Louis and Kansas City and suggest the *demographic* impetus for the

emerging *Latinidad* in Missouri. On the basis of these figures, we hypothesize that this demographic shift will lead to increasingly visible spaces of *Latinidad* in each city. Kansas City and St. Louis, for example, host annual Hispanic festivals that celebrate the cultures, traditions, and foods from many different Latin American countries. In both cities, the festivals draw thousands of visitors

who enjoy musical performances, dance numbers, and ceremonies that recognize the contributions of Latino leaders to their respective communities. Hispanic festivals represent just one example of Latinidad as identity construction through interactions in everyday activities. In the following sections, we examine three other spaces of Latinidad, including the Hispanic Chamber of Commerce in St. Louis, Hispanic Day in Jefferson City, and the English-language television show *¿Que Pasa, KC?* in Kansas City. In each of these emergent spaces of Latinidad, however, we also see an accompanying backlash against the Latinos claiming new cultural spaces, backlash that is often framed in terms of the discourse of Latino threat. Despite the ethnic and cultural contributions that Latinos are making to the state, many Missourians do not embrace this burgeoning Latinidad, but rather view the new residents as a threat to the state. The creation of these contested spaces is reshaping the urban cultural landscapes of midwestern cities like St. Louis and Kansas City.

#### **Hispanic Chamber of Commerce and Burgeoning Latinidad as Opportunity**

The St. Louis Hispanic Chamber of Commerce's establishment of a business training center for Latino entrepreneurs, made possible by a \$500,000 federal earmark (Bond 2009), offers one example of the oppositional discourses of Latinidad and Latino threat. The earmark was championed by Republican Senator Kit Bond, a long-time conservative presence in Missouri. At the grand opening celebration for the new training center, Bond referenced the Latino population's strong work ethic, which is responsible for the creation of many jobs in the state:

You work the 18-hour days, you put your life savings on the line, and until recently, you have been the economic engine that creates jobs. We need to get that engine going again. . . . The long-term outlook for Hispanic-owned businesses is still very strong.

The Hispanic Chamber of Commerce represents a particularly important example of the burgeoning Latinidad in St. Louis because of the unifying role it plays for the Latino business community. The chamber of commerce has at various times been chaired by individuals of U.S., Mexican, and Puerto Rican descent from a wide range of professional backgrounds. Membership in the chamber is likewise diverse, including a wide range of

businesses from small *tienda*-style shops to large firms that undertake international import-export business. The visibility of the Hispanic Chamber of Commerce in St. Louis has increased with the growth of the Latino population, but also has developed in conjunction with the higher visibility of the Latino business community and greater awareness of the "Latino market."

The procurement of the federal earmark for the Hispanic Chamber of Commerce, furthermore, represents a pivotal event for Hispanic-owned businesses. For the first time, there was public space to train entrepreneurs, to have workshops, or to use the chamber facilities to promote Hispanic-owned businesses and products. The fact that the Hispanic Chamber of Commerce's biggest supporter was a Republican U.S. senator suggests that Latino spaces can be economically profitable. It should also be noted that the chamber's stated mission is "To promote the economic development of Hispanic firms and improve business opportunities for *all* in the St. Louis Region" (Hispanic Chamber of Commerce of Metropolitan St. Louis 2012, emphasis added), a statement that clearly advances both the good of the Latino community in St. Louis *and* in the wider community of St. Louis.

#### **Hispanic Chamber of Commerce and Latino Threat**

Despite the benefits that federal funds provided both Latino businesses and the wider St. Louis community, some in the St. Louis community used the opportunity to advance a discourse that framed the Hispanic Chamber of Commerce and Latinos in general as a threat to the broader community. When the funding of the federal earmark was announced in the local newspaper, the discourse in the public-comment section of the *St. Louis Post Dispatch* immediately transformed from a discussion about the training center to a dialogue about "illegal aliens" getting help from the federal government. The conflation of Latino identity and "illegal aliens" is a discourse that arises regularly when Latino-related news is covered in either Kansas City or St. Louis. It can be found in almost every article related to Latino immigration. Two examples highlight the way that the Latino threat is being constructed in the public discourse. The first example is a response to a letter to the editor that pointed out that there were inconsistencies with immigration policies and labor laws. The writer states:

The Republican corporate Chamber of Commerce will do everything possible to keep il-

legals working in our undocumented national economy. You want to put an end to illegal immigration? Fine every employer \$100,000 for each illegal hired. Instead, Republicans insist that the employer must “knowingly” hire an illegal. Democrats have fought this issue for decades. . . . Republicans want to protect corporate profits even at the expense of our jobs! When Armour Meat Packing Company hired 600 illegals they claimed it was a surprise to learn the Spanish speaking immigrants were here illegally. . . . They got a pass from the Bush [Department of Labor]. (Stritzl 2009:1)

It is also common to find pejorative responses to these pieces, like this one:

I will never understand how people and politicians can feel compassionate for millions of criminals who illegally enter this country and then go on committing crimes on a daily basis (i.e., working by using false or stolen identification, collecting welfare when not entitled or by way of anchor baby), don't pay taxes, drive without licenses or insurance, just to name a few. . . . Illegals who cannot abide by this country's laws deserve nothing but to be charged and sentenced for their crimes and then deported back to where they came from, along with all family members. But millions of illegals get away with a multitude of crimes and still receive all the perks of a legal citizen, with no worry of consequences (Editorial Board 2009:1).

The procurement of funding for the Hispanic Chamber of Commerce and the subsequent tension and public outcry suggests two possibilities. First, people who dislike Latinos will make no effort to distinguish between native-born or foreign-born or between legal or illegal residents. Second, people who oppose change will see any growth of the Latino population and Latino spaces as a threat to their culture and identity.

### **Hispanic Day in Jefferson City and Latinidad**

Hispanic Day in Jefferson City (henceforth Hispanic Day) represents a second instance where the Latino population in Missouri, with particularly strong support from Latino leadership in Kansas City and St. Louis, is

demonstrating an increased sense of *Latinidad*. Hispanic Day is a gathering of Latinos from across Missouri at the state capitol in Jefferson City, and is primarily intended to raise the profile of the Latino population with Missouri legislators. Hispanic Day generally includes a reception with the sitting governor, meetings with state legislative leaders, and an opportunity for members to lobby their own representatives on timely issues that impact the Latino population.

Leaders associated with Hispanic Day are quick to note that the event is nonpartisan and is solely intended to address issues that affect the Latino population of Missouri in broad terms. Participants who have gone to the capitol represent the spectrum of the Latino population, including individuals born in the United States, Mexico, and Central and South America. Attendees are generally middle class and well educated, but they attend as representatives of the Latino population more broadly. Participants are also often divided in terms of political party, with some participants strongly aligned with either the Democrats or Republicans and others who are merely happy to mingle with elected officials and represent the growing power of the Latino population in the state. Hispanic Day is a display of *Latinidad* based on political participation that highlights both the nascent and growing power of the pan-ethnic Latino population in Missouri.

### **Hispanic Day in Jefferson City and Latino Threat**

One of the key efforts of Hispanic Day is to raise awareness of the growing political power of Latinos in Missouri. Part of that effort is intended to serve as a deterrent against bills that would negatively affect the Latino population. In recent years participants attending Hispanic Day have lobbied against a ballot initiative that ultimately made English the official language of Missouri business, as well as a more recent initiative that required all truck-driving licenses to be taken strictly in English (Mannies 2010). The executive director of the Hispanic Chamber of Commerce in 2010, Jorge Riopedre, points out that such laws “send a disquieting message to all immigrant communities . . . ‘Missouri is not welcoming’” (Mannies 2010:3). Each of these initiatives affected immigrants outside the Latino population but were perceived to be developed by legislators intent on using Latino immigration as a political wedge issue.

The influence of Hispanic Day on legislation in Missouri is difficult to gauge, but Latino leaders, including elected officials, suggest that the opportunity may help to take the edge off some of the anti-immigrant (which is

often conflated to mean Latino) rhetoric used by conservative legislators from both the Republican and Democratic parties. The Missouri House Democratic minority leader, Mike Talbot, for example, noted that “You’ve seen some of the rhetoric change . . . some of the language has toned down . . . [which may reflect the realization of some legislators that] Hispanics are the fastest-growing population nationwide” (Mannies 2010:4).

Hispanic Day represents an example where a space of Latinidad has emerged *in reaction to* the Latino threat narrative deployed by some Missouri legislators. A key facet of Hispanic Day is the reality that white and African American legislators are increasingly recognizing that Latinos are not only present in Missouri but are becoming organized and seeking to demonstrate their growing demographic strength.

### ¿Que Pasa, KC? and Latinidad in English

The third example we use to suggest the power of demographic trends and burgeoning Latinidad is from Kansas City. In February 2010, KCTV announced that Sandra Olivas and Iris Hermosillo would host a new TV show that would be targeted to the Kansas City Hispanic community (KCTV5 2010). According to their website, “¿Que Pasa, KC? wants to shine the spotlight on Kansas City’s Hispanic community and bring all cultures together.” ¿Que Pasa, KC? is an English-language television show, and while the cohosts acknowledged that there was a discussion to have a bilingual show, they decided they wanted to bring the community together and felt that they could reach more people by creating an English-only show. Furthermore, the show has been recognized as a success; ¿Que Pasa, KC? was recently given a first-place award for special programs by the Kansas Association of Broadcasters (Que Pasa KC 2010). The success of the show has demonstrated that the creation of a Latino public space on TV can be supported by the growing Latino population in the metro area, and highlights the growing social and political power of Latinos in Missouri (Que Pasa KC 2010). It also affirms that there is a market for the creation of public spaces targeted to the English-speaking Hispanic community. Capitalism is a powerful indicator of success, and the fact that ¿Que Pasa, KC? continues to be well received by the community and to win awards indicates that Latino spaces can be profitable. ¿Que Pasa, KC? is also a reminder that there are many Latinos who were born in the United States who still want to celebrate their Hispanic heritage. This burgeoning Latinidad is a reality in

Missouri, and it will only continue to get stronger as the native-born Latino population grows.

### ¿Que Pasa, KC? and Latino Threat in English

Despite the success of ¿Que Pasa, KC? and its warm reception by its Kansas City audience, we have found significant anecdotal evidence on blogs and in the comments section of web pages of people voicing their opposition to the creation of this social space. For example, a person named “Dave” writes on the local news blog: “They are Illegal Immigrants and should be deported they are law breakers. Secure the border and deport these Criminals. NO AMNESTY!!!!” (Kendall 2010). As new public Latino spaces are created, it is likely that more people who share “Dave’s” perspective of Latinos as an “illegal threat” will continue to frame the Latino demographic growth as “illegal aliens” invading our country and changing our culture. The reality of the situation, however, is that the majority of Latino demographic growth in the United States is driven by natural increase among native-born Latinos who are thereby U.S. citizens. As the growing Latino population creates new spaces, we can expect some Missourians to publically display their dissatisfaction, and this expression is often couched in terms of Latinos as a threat to existing U.S. culture and creed (Huntington 2005). The troubling reaction toward ¿Que Pasa, KC? provides yet another reminder of the continual conflation between Latino population growth and immigration. Immigration growth and natural increase are related to each other in the demographic context, but they must also be viewed as distinct. Many of the anti-Latino critics seem to want to purposefully conflate immigration with Latinos. It is often assumed that the creation of Latino spaces can only be Spanish-language Latino spaces.

### CONCLUSIONS

This research suggests a number of realities for Latinos in Missouri during the coming years. First, the Latino population continues to grow rapidly relative to the general population, but the growth between the two cities is not uniform, despite their geographic proximity. Second, the historical trajectories of St. Louis and Kansas City continue to shape the contemporary characteristics of the population, with Kansas City having a younger population that is more likely to be foreign-born and to be of Mexican descent than the Latino population in St. Louis. Third, despite differences in the demographic profiles of the two cities, the cultural landscape of each is being



contested, and even shaped, through the discourses of Latino presence and membership associated with Latinidad and the countervailing notion of Latino threat.

Ann Rynearson (1979) argued convincingly in her doctoral dissertation that Latinos in St. Louis experienced an attenuated form of ethnicity that was shaped in large part by the location-specific characteristics of St. Louis. The diffusion of the Latino population across the metropolitan area has meant that there were no barrio politics in St. Louis, while slow population growth in the second half of the twentieth century ensured that Latinos maintained low levels of public visibility. Higher levels of education and income among Latino residents also contributed to greater integration across the urban area. The Latino population in Kansas City, in contrast, has long had geographically concentrated neighborhoods that contributed significantly to the shape and profile of the community. The city's location on the railroad lines on the route between the U.S.-Mexico border and Chicago meant that immigration was more of a factor in shaping the population during much of the 20th century. The contemporary Latino demographic profile continues to reflect these realities, as the population tends to be less diverse and more likely to be foreign-born.

Despite these historical differences, we have argued that the demographic transitions in both Kansas City and St. Louis are being interpreted through two competing discourses. The growing Latino presence and increased sense of ownership, whether in the context of programming by the Hispanic Chamber of Commerce in St. Louis, political participation in Jefferson City, or English-language programming for Latinos in Kansas City, all highlight the increasing social and economic power of Latinos in urban landscapes that have often been conceived along a "black-white" dichotomy. The expanding Latino presence, visibility, and power, however, also seems to be inspiring other individuals in Missouri's cities to publicly advance the Latino threat narrative as a rational discourse for conceptualizing the growing presence of Latinos in the urban landscape in Missouri's largest cities.

The narrative of Latino threat, which frames Latinos as a threat to mainstream U.S. culture, language, and social cohesion (Huntington 2005; Chavez 2008), seems to originate from the national media and politics, and seems increasingly less likely to reflect the demographic and geographic specificities of a given city.

Thus, while cities like St. Louis that may have experienced warmer relations due to the lack of a deeply rooted racism against Latinos that was often prevalent

in the Southwest states, we argue that the prevalence of the national discourse media is flattening out the cultural landscape and bringing the discourses shaping Latino urban landscapes into balance.

Historical factors, immigration, and natural increase have all contributed to formation of emerging Latino spaces, but we have argued that these new social geographies may also be interpreted through the competing narratives of Latinidad and Latino threat.

Finally, the emergence of Latino spaces is a reality in urban areas around the Midwest and throughout the heartland. Latinos are changing the social geography of many cities and rural towns across the region. These emerging populations are in turn creating new opportunities for creative renegotiation of the urban landscape. The advocacy group Missouri Immigrant and Refugee Advocates, for example, has undertaken a "Welcoming Initiative" to highlight the contributions that immigrants make within the state. Similar welcoming initiatives have been undertaken in other heartland states, including Nebraska and Tennessee. This type of positive advocacy offers an important counterbalance to the irrational, fear-based claims associated with the Latino threat narrative. In a similar vein, local diversity boards or councils can work to ensure that Latino voices are heard in policy decisions and can facilitate and smooth the path for emerging spaces of Latino engagement. The demographic trends highlighted in this research reinforce the reality that the Latino population will continue to grow as a result of natural increase and immigration. Communities throughout the Midwest will continue to negotiate the tension between emerging spaces of Latinidad and the ever-present whispers of the Latino threat well into the foreseeable future.

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# THE RIGHT CALL: BASEBALL COACHES' ATTEMPTS TO INFLUENCE UMPIRES

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**ABSTRACT**—On-field conversations and confrontations between baseball coaches and umpires have long been a part of the game. An umpire's decision can alter the course of the game, but little has been written about the exchanges between a coach or manager and umpire, especially in relation to theoretical considerations. This study applies management and leadership theories in exploring the strategies baseball coaches use to contest an umpire's decision. By using leadership scholar John E. Barbuto's concept of influence tactics and the various types of social power discussed by sociologists John R. French and Bertram Raven, the study also tests the congruence theory that baseball imitates the workplace. The investigators interviewed six high school and six college baseball coaches in Iowa and Nebraska and found that the strategies used by coaches to dispute calls can be categorized into five tenets: (1) coaches say it's their duty to question umpires and to keep their players from arguing with umpires; (2) coaches expect umpires to use their fellow crew members to help during close calls and to admit their mistakes; (3) coaches say they can help their cause by showing respect for umpires and building positive relationships with them; (4) coaches believe that discretion is important in deciding when they should argue a call; and (5) coaches say their arguments aren't meant to reverse a call but to prevent the umpire from making the same mistake later in the game or in future games. Such strategies are also used in the workplace by managers who want to influence employees or fellow managers, thus reinforcing the congruence theory and demonstrating the similarities between baseball and the workplace. Future research should examine the umpire's perspective during disputed calls and whether the approaches used by high school and college coaches are the same as those used by managers of professional baseball teams.

**Key Words:** baseball, coaches, influence tactics, social power, umpires

## INTRODUCTION

Regardless of the level at which they manage, baseball coaches know that the balance of a game often hangs on an umpire's call. That's why the strategies coaches use to dispute calls with umpires can be as important as the strategies they use when managing the game. The coach-umpire interactions can influence not only the outcome of the game but also the coach's career. College coaches

know their jobs often are weighed by their win-loss records. High school coaches attempting to build a reputation, and perhaps a résumé for moving to a larger school or making the jump to college ball, know that umpires' decisions can dictate the fate of the game, and sometimes their season.

The types of influence tactics coaches use with umpires have garnered little research interest, and there have been no studies of how influence strategies used by

supervisors to manage employees or to interact with peers in the workplace compare to those used by coaches to address umpires. This study will apply those workplace concepts of influence tactics and social power to explore coach-umpire interactions, and to determine which strategies coaches consider the most effective for getting an umpire to make the right call.

In using those workplace concepts, this study will also test a decades-old model, known as the “congruence theory,” that attributes the appeal of baseball to its similarities with the workplace: a five- or six-day work week, accountability, the assignment of specific roles, and communication between manager and employee (Lahr 1972; Gelber 1983; Trujillo and Ekdom 1985). This study will focus on one aspect of that theory—communication between a manager (the coach, in this case) and another authority figure (the umpire)—and in doing so confirm or refute whether that aspect of the theory still applies.

## REVIEW OF THE LITERATURE

In exploring the interchanges between coaches and umpires, it is useful and instructive to examine research on how people in positions of authority interact with others in the same environment when attempting to influence their decisions.

The literature has shown that certain strategies can be successful in the workplace between managers and their peers, and between managers and their subordinates. Since the early 1980s, an increasing amount of research has focused on how managers attempt to influence their peers, subordinates, and in some situations, their superiors (Yukl et al. 1995). In essence, researchers have focused their attention on how one gets his or her way at work. Some of this inquiry has focused on the influence tactics used by managers in the workplace (Kipnis et al. 1980; Hinkin and Schriesheim 1990; Yukl and Falbe 1990). These inquiries led to refinement of nine proactive influence tactics used in understanding managerial effectiveness (Table 1).

Leadership theory typically focuses on how a leader’s behavior affects a follower’s compliance and motivation (Bass 1985). Much of this work has focused—from the followers’ point of view—on the behaviors used by leaders to entice followers to comply (Barbuto 2000). John Barbuto’s work brought together variables—influence tactics, sources of motivation, and bases of social power (among others)—into one framework. We argue that two aspects of this framework—influence tactics and bases of social power—can be used to investigate the approaches

TABLE 1  
NINE INFLUENCE TACTICS USED  
IN UNDERSTANDING MANAGERIAL  
EFFECTIVENESS

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**Rational persuasion.** Agents use logic and facts to persuade targets that the request is consistent with goals and likely to produce the best outcomes.

**Consultation.** Characterized by agents requesting targets’ assistance in planning or troubleshooting an activity or strategy.

**Inspirational appeals.** Agents create enthusiasm for their request by appealing to targets’ values, ideals, or objectives. Agents’ inspiration may increase targets’ confidence to succeed in carrying out the request.

**Personal appeals.** Agents appeal to targets’ feelings of loyalty or friendship when making requests or seeking support. The relationship is the primary tactic of influence in this case.

**Ingratiation.** Agents seek targets’ compliance by offering compliments or acting friendly before making a request.

**Exchange.** Agents seek target compliance in exchange for favors, the promise of reciprocity, or shared rewards.

**Pressure.** Agents use threats, demands, and frequent reminders to influence targets’ compliance of a request.

**Legitimizing.** Agents seek to establish their request as legitimate by claiming they have the requisite authority. Agents may also attempt to equate their request to organizational policies or rules.

**Coalition.** Agents seek the support of third parties to persuade targets to comply with requests. Agents may often leverage the support of others as a method of gaining target compliance.

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Source: Yukl and Falbe 1990.

coaches use to dispute or question calls by umpires and whether the coaches feel their approaches are effective.

Each of these variables—influence tactics and bases of social power—will be explored.



### Influence Tactics

Influence tactics have been described as proactive influence attempts (Mowday 1978). Such tactics can aptly describe what coaches often do to sway umpires. The specific influence strategies were clarified in constructs depicting six primary influence tactics (Kipnis et al. 1980). Subsequent work identified additional influence tactics that were expanded to eight (Yukl et al. 1995) and then nine tactics (Yukl and Falbe 1990): rational persuasion, consultation tactics, inspirational appeals, personal appeals, ingratiating tactics, exchange tactics, pressure tactics, legitimating tactics, and coalition tactics (see Table 1).

### Bases of Social Power

Studies show that acquiring and keeping power is a priority (e.g., McClelland and Burnham 1976). The coach-umpire relationship boils down to a tension between the coach's influence tactics and the umpire's bases of social power. Studies have also explored how power is obtained, how it is used to garner desired results, and how it is perceived by subordinates.

Defining power is the first step. Sociologist Jeffrey Pfeffer (1997) focused on three elements: (1) people have varying degrees of influence over others based on their positions in a hierarchy; (2) power does not discriminate—it is in play among people on all levels of the organizational chart; and (3) the act of exerting influence is conscious and intentional. Pfeffer also distinguished power from authority. "Power is authorized or legitimated authority" (Pfeffer 1997:17). In addition, the exercise of authority is expected, while the use of power may not always be welcome.

Studies have sought not only the definition of power but also ways to measure its impact on other aspects of a supervisor-subordinate relationship. Several of those studies have used a scale first introduced by sociologists John French and Bertram Raven (1959). Those researchers developed a five-category framework for the bases of power: reward, coercive, legitimate, referent, and expert.

Reward power is the ability to offer tangible items, such as a raise or promotion, in exchange for compliance. Perception is paramount with this base of power. Coercive power, conversely, is the ability to punish or withhold rewards when the target fails to comply. Legitimate power is based on the premise that the agent of influence has the right to issue instructions and expect compliance based on position or standing. Expert power comes with

the target's belief that the agent of influence has sufficient experience or expertise to warrant compliance. Referent power is more personal, as the target identifies with the agent of influence and complies.

These bases of social power and influence tactics may be among the girders that support the bridge between baseball and the world of work. That is, these concepts, the results of research in the work environment, may be used to analyze relationships in the confines of baseball and to serve as indicators that the game still mirrors that environment. Historian Steven Gelber (1983) was among those scholars who championed the congruence theory as an explanation for the rise of baseball and its popularity, not only as a game to play but also to watch. Gelber argued that baseball appealed to the masses because of its mimicry of day-to-day challenges, and the responsibility and division of labor in business and industry.

Baseball provided the male business worker with a leisure analog to his job. In the game, he experienced social relationships and psychological demands similar to those he knew at work. Indeed he was working at playing, and by doing so was minimizing distance between those two aspects of his life. (Gelber 1983:7)

Proponents of the congruence theory believe those social relationships and psychological demands, whether as a baseball player or as a baseball spectator, are part of the same landscape that work and baseball share.

### METHODOLOGY

To allow coaches to elaborate on how they try to influence umpires to reverse a call, the researchers took a qualitative approach by asking open-ended questions that would elicit candid responses and rich descriptions. The researchers developed a four-item bank of open-ended questions but used follow-up questions, or probes, when they wanted the coaches to elaborate on a certain point or to clarify their responses. Purposeful sampling was used with college coaches familiar to the investigators. Initial participants were asked to suggest other managers whom they viewed as likely to consider interacting with umpires as part of their duties as managers. All methods and materials used in this study were approved by the Institutional Review Board at the University of Nebraska Medical Center.

Coaches were either called or e-mailed to request their participation in the study. The investigators eventually

interviewed six high school and six college coaches in Iowa and Nebraska. Those coaches had more than 150 years of experience combined. Interviews were recorded and then transcribed. The transcriptions were studied and common themes were coded. John W. Creswell (1998) included eight coding verification procedures for qualitative research. Three of these procedures were enlisted in this study: (1) peer review or debriefing, in which the authors, individually, developed themes from their reviews of the transcripts and then compared results and found congruency; (2) clarifying researcher bias, in that the authors acknowledge they are baseball fans and have been since childhood, which allows the reader to determine whether this has a negative or positive influence on the study; and (3) member checks, which Yvonna Lincoln and Egon Guba (1985) say is the most critical technique for establishing credibility. Two participants were sent a transcript of their interviews and a list of initial themes and codes. Both confirmed the accuracy of their interviews and agreed with the initial themes.

## RESULTS

Coaches downplay the influence they have with umpires. They acknowledge that getting an umpire to change a judgment call is rare. Getting a reversal on a call that involves a quirk with the playing field is more likely. The coaches pick their moments, they said, with hopes that better calls will come. "I don't ever go out if it's not going to be successful," said a coach with 21 years of experience. "I don't mean to change the call. I mean to not let it happen again."

### Themes

Five themes emerged through the interviews with the 12 coaches. The themes were as follows:

1. **"It's my job . . ."** When describing their role, the coaches are insistent on how they and their players are to act with umpires.

2. **". . . So do yours."** This is the bookend to the first theme. The coaches say umpires should act as professionals who are not opposed to seeking their crew members' help and admitting their mistakes.

3. **"Pick your moments."** Coaches agree that they shouldn't constantly hound umpires; instead, they pick their moments when to argue a call.

4. **Relationship with umpires.** The relationships coaches build with umpires are created by showing respect and being accommodating—on and off the field.

5. **Changing the outcome of the game.** Coaches say their attempts to influence a call immediately are seldom fruitful but believe such attempts are more useful in preventing an umpire from making a future mistake on a call.

**"It's my job . . ."** Some coaches have a rule that players are not to confront or question umpires. One coach with 30 years of experience said he wants his players "to worry about playing the game. . . . I don't want them to be concerned about things that are beyond their control. I prefer to have their focus on responsibilities they have within a game, not the responsibilities of the umps. If I feel the umpire is not doing his job, I'll take care of that. I'll be the one who is talking to him."

A coach with 10 years of experience revealed that the reasons for interacting with an umpire are twofold. The first reason, he explained, has nothing to do with umpires or influencing their calls. The reason for the interaction is solely for his players, and remaining credible with them. "The team needs to know that you have their back. I think that's so important that if the call doesn't go your way, if you're not going to help defend them on a call that's not right, I think you lose some validity with your team." Another coach takes the same approach, even if he is satisfied with the umpire's response to his question. If an umpire admits his mistake (both umpire and coach know the call can't be reversed), this coach will continue the conversation anyway. "Hey, I'm going to hang out here for another minute or so, then we'll get going, because I want my guys to know I'm out there defending them."

The second reason is to lay the groundwork for the next questionable call. "So they know you didn't agree with the call. It might sway the decision on the next call," the manager with 10 years' experience said. Umpires are human, one coach explained, and they need to be reminded of that fact. Another coach agreed. He said he knows umpires make mistakes, but he wants the umpires to also realize and remember that point. He makes sure the umpire knows he didn't agree with the call, and that the umpire was in the wrong. His edict to the umpire is "After I leave, [I want you to] just think about it for a second because you blew it." This approach—focusing on an umpire's vulnerability—employs a combination of pressure and legitimating influence tactics. Pressure tactics are characterized by demands and frequent attempts to ensure compliance, while legitimating tactics involve the agent, in this case the coach, claiming to have requisite authority to make the point (Yukl et al. 1995). This same coach explained that umpires at his field have to earn their keep or he doesn't want them

back, and he will take steps to ensure that they aren't asked back.

Several managers revealed that their visits with umpires during games sometimes have nothing to do with his most recent call. The conversation is merely an attempt to break the opposing team's momentum, similar to a time-out in basketball, football, or hockey. "When things are going horseshit, I'll go out and kill their rhythm," one coach said.

Keeping umpires honest means pointing out their bad calls, which often are made when they are out of position. Pointing out mistakes to get a call reversed isn't the point, a collegiate coach said. The point is giving the umpiring crew something to discuss after the game and to plant a seed of doubt: "In the back of their minds when they finish a game, they get together and talk. 'Hey, you know what? When so-and-so came out in the third inning, he might have been right on that call. Even though we didn't reverse it, he might have been right.'"

**"... So do yours."** Most coaches interviewed said all they ask of umpires is to call the game as objectively as possible. It may seem obvious, but coaches say umpires shouldn't care about which team wins. When coaches take umpires to task, a subtle approach, coaches said, is best. Several coaches said they ask what the umpire saw. The approach, they say, avoids putting the umpire on the defensive. This approach smacks of the coach giving the umpire referent power by taking a more subtle approach to begin their conversation about a call (French and Raven 1959). Taking this approach, according to one coach, allows him to gauge the umpire's reaction based on the response. "I'm getting a feel for the guy," the coach explained. "I'm not questioning his manhood. I'm not questioning his strike zone. I just want to know what he saw. And if he feels uncomfortable telling me what he saw, I know he didn't see it." If the umpire responds, the coach explained, he walks away. "If they tell me to go away, now we're talking about something totally different."

The coaches said they will remind an umpire that he is working with a crew. The logical progression for an umpire who missed the action is to ask for help. That's what the coaches often suggest to the umpires. "The biggest thing is if you can convince them to ask for help," a coach said. "Sometimes, an umpire's ego gets in his way, but at least if they got together and discussed, they've done their job."

Another coach echoed the lament: "Why are we paying two guys to umpire if you [the umpire] are not willing to ask to make sure we got this right?" The coach will

remind the umpire, "Hey, you're a crew today. Can we use the crew today?" In such cases coaches are using a combination of coalition and pressure tactics by seeking the support of a third party (the other umpire) and reminding the home-plate umpire of his duty to seek every means for calling a fair game.

Positioning to get the best view of the play is another officiating responsibility that coaches say umpires don't do well at times. On one occasion, as related by a coach, the home-plate umpire called a player out (when the player would have been the winning run) for missing third base on the way to home. Not only was the home-plate umpire not positioned to get the best view of third base (according to the coach), but he was also staring into the outfield during the play in question. The coach recalled that he approached the umpire, "And I said, 'Could I ask you something? Did you see him miss third?' ... and the ump said, 'Yes, I did see him,' and I said, 'You're a lying son-of-a-buck,' and then he threw me out of the game."

Some coaches will give umpires the benefit of the doubt if there are only two umpires officiating the game. Said one coach: "If there are two of them out there, obviously they aren't going to get everything right. They're going to miss plays because there are only two of them, and that's a lot of area to cover."

Several coaches said umpires can end arguments about their job performance during a disputed call. One college coach said when he takes an umpire to task, he tries to be "cordial" to them. "I'll ask them what they saw. The most disarming answer is 'I blew it,' and I just turn around and walk away."

**"Pick your moments."** Coaches said there are times to question an umpire and there are times to remain in the dugout. One coach said he was recently thrown out of a game when he questioned the umpire who called a balk on his pitcher. The coach first asked the umpire if he could ask a question, then asked what his pitcher did. "I didn't say, 'What did he do wrong?' That's where you need to phrase your words a little bit, because if I say, 'What did he do wrong?' you're conceding that he did something wrong."

The story continues. As their discussion heated up, the umpire asked the coach if he wanted to be thrown out of the game. The coach conceded that the decision rested with the umpire but reminded him that he would have to explain the ejection to the coordinator of umpires. This comment suggests that the coach is attempting to establish coercive power over the umpire and to use pressure tactics under the assumption that the umpire will have to

explain the ejection to his boss, and that could be construed as an unpleasant or undesired task.

Too many visits to home plate to argue a call can also put an umpire on the spot and make him look bad, one coach said. "If you're out there all the time, first of all, they're not going to give you the benefit of a doubt because they don't want you out there all the time making them look bad. You pick your spots. It's their judgment that's being questioned, repeatedly, over and over. I think for sure it has an effect." The coach who makes repeated visits to argue a call may be knowingly, or unknowingly, arousing the umpire's coercive power (French and Raven 1959). The umpire may tire of the badgering he is receiving and allow his annoyance with the coach to influence his judgment or, ultimately, he may punish the coach by ejecting him from the ball game.

The authority to eject a coach from a game is the pinnacle of an umpire's coercive power over coaches. One coach pointed out that in his conference, ejection automatically means the coach is suspended for the next game. This coach advised his peers to be aware that the umpire grows tired of the coach who is consistently questioning his calls. For example, it's the first game of a doubleheader. The umpire knows that by ejecting that coach, the coach will be suspended for the subsequent game and the umpire no longer will have to deal with his antics *for the remainder of the day*. The coach explained:

They'll want to toss me. [The umpire may think,] "I'm here the rest of the day and that clown [the coach] isn't." We just gave him (the umpire) an escape clause rather than making him do what you're supposed to do and get the calls right. Gave them an easy out. "You know what, Coach So-and-So, you're out. I'm going to be here the rest of the day and you're not."

That coach just gave the umpire coercive power, and he can mull his failed influence attempt as he waits in the parking lot for the remainder of the day.

**Relationships with Umpires.** Umpires talk with other umpires, just as baseball coaches talk with their peers. A coach with 19 years' experience explained how he knows: "These guys are geared up when they come into here [his home field], and I have a reputation. I'll keep them honest and things like that." A coach with 30 years' experience said coaches want umpires with whom they feel comfortable working. "You want guys out there that you trust, and you know are going to work hard. For me, the biggest

thing is that an umpire is going to work hard for you and they're going to check their egos at home plate." However, because he knows umpires talk, the coach said he expects umpires working his games to know about him before they arrive at the field. "I think umpires probably know what they're getting when they come to work our games. My guess is that I have an idea what we're getting when they come to work our games as well. So it's a two-way street."

The coaches said they do little things to show respect for umpires and to make their jobs easier. One approach is to keep conversations private and near home plate rather than yelling from the dugout. Several coaches said they try to greet umpires when they arrive at the field. They make sure they have water, especially on hot days, and try to bring balls to them before they ask. Finally, as a sign of respect, they try to call umpires by their first names rather than "Blue." Umpires, one coach said, do not like to be called by that moniker. Not only are the coaches giving referent power to umpires by attending to their needs and demonstrating some respect (French and Raven 1959), but their actions may also be viewed as influence tactics through ingratiation (Yukl et al. 1995). The coaches are showing respect due to the position of umpire, not the person filling the role. Finally, the coaches are doing little things to ingratiate themselves to the umpires, partly in order to receive that important call with the game on the line.

One coach takes a different approach to his initial greeting before a game. He said he believes umpires must earn their pay when they are at his field, especially the ones who have yet to earn his respect. The coach's perspective might be a bit of wishful thinking. That is, the coach is expecting the umpire to grant him legitimate power just because the game is being played at his field, and the umpire may be expecting the same of the coach because of his position of authority in the game. Each feeling that he is deserving of being granted legitimate power by the other can create a tension that could carry into the game.

It is worth considering how that tension plays out in the type of influence tactics used by the coach when playing on his home field: "When they [umpires] come in, I won't give them the time of day because I will be as straight as dotting the *i*'s and crossing the *t*'s because I know later on I will be having a heart-to-heart with them during the game." He added: "It's my field. I'm paying. When my athletic director calls me, I jump. Hey, 'when I'm talking to you, you listen. I'm paying you to listen.'" This approach could be viewed as similar to the



use of exchange tactics, seeking support in exchange for favors (being paid, being asked to umpire again), or pressure tactics by using threats (not being asked back) or demands to influence the target's compliance with a request (Yukl et al. 1995).

**Changing the Outcome of the Game.** The baseball coaches who participated in this study generally agree that their attempts to influence umpires have little immediate effect. The value, they explain, can come in a close call later in the game, in a future game, or may not come at all. "I put it in their minds that they're human," said one collegiate coach when describing the value of his visits with umpires during games. "I tell them, 'After I walk away, just think about that for a second—what you just called. It wasn't even close. Just think about it.' I walk away. I just put the seeds in their heads."

One coach admitted he doesn't like coming out to talk with umpires, and he tells them this. Sometimes, he explained, he can't avoid the visits. "You're making me come out and back my team because you continually want to blow calls."

Still, they leave their dugouts to argue calls. Makeup calls do happen, although the coaches concede they shouldn't be part of the game. Better yet, they said, is getting the umpire to call a consistent game.

The coaches notice when umpires make adjustments. One coach recalled talking with the umpires about the opposing pitcher, who wasn't getting set before coming home. "He was balking and they didn't call it. And we talked to the umpires and we got two balk calls in the next two innings. Sometimes they're not noticing it because everything else is going on. Umpires are human." And coaches will point that out.

Coaches must question calls because they might occur again. "If you don't question it, the umpire doesn't have any reason to talk to you about it, and he's not thinking about it." Consider this approach as an attempt by a coach to use a pressure tactic on the umpire, which includes use of reminders to bring about compliance (Yukl et al. 1995).

Some interactions between umpires and coaches are classic and reinforce the notion that influence tactics, especially pressure tactics, do work. The coach with 13 years' experience recalled how an umpire changed his strike zone in a state tournament game. The coach wasn't happy with the home-plate umpire's strike zone and told him so in a demonstrative way. A photographer from the local newspaper snapped a photo of the coach showing what a strike zone should be, and the image subsequently was used in the following day's edition. "I went back and

sat in the dugout. All of a sudden the zone opened up. Struck the guy out. Struck the next guy out. Game over. I'll never forget that."

The opposing coach wasn't happy with the adjusted strike zone and had a legitimate complaint, the winning coach said. Umpires are human, the coach said. "I think all umpires sit back and go until someone questions them. Then doubt comes into their mind."

## DISCUSSION

Are coaches able to influence calls and get umpires to see their points of view? That was the basic question that drove this qualitative study.

While the coaches included in this study claimed they have little immediate influence over the umpires who call their games, they continue to argue calls and ask for explanations. They may not win their argument, they say, but there is always that next close play.

As in baseball, influence attempts are common in the workplace. Managers attempt to influence their superiors, their peers, and their subordinates. Influence attempts are upward, downward, and lateral attempts to get one's way (Yukl et al. 1995).

Whether influence attempts, along with the other workplace tactics to get one's way, translate to the baseball diamond hasn't previously been studied. This study attempted to determine whether baseball coaches use their influence and social bases of power to get umpires to see their points of view.

Coaches used pressure tactics more often than any other influence tactics. The results, however, aren't always positive from the coaches' perspective. There were times when pressure tactics seemed to alter an umpire's calls to the benefit of the coach who is making the complaint. There were other times when a coach's use of pressure tactics got him thrown out of the game. The lesson workplace managers may take away from this study is that using pressure tactics too often does not generate the desired results. Like baseball coaches, workplace managers may want to "pick the moment" when pressure tactics may be most effective. This study intimates that for workplace managers, the "right moment" may be when employees or fellow managers need to be reminded of certain responsibilities or what is expected of them. Similarly, the coaches' use of ingratiating and exchange tactics to build positive relationships with umpires provides evidence that small favors, being responsive to a person's needs, and showing the other person respect can strengthen relationships, including

those between workplace managers and their employees and peers.

The extent to which recognition of social power or lack of it affects the success of influence tactics is a question left unaddressed by this study. Determining whether there is a relationship between social power and influence tactics can enhance the understanding of the dynamics of coach-umpire interactions and can provide coaches with evidence as to which influence tactics are most effective with umpires in game situations. Further exploring that relationship between social power and influence tactics can also result in a better understanding of workplace relationships. In other words, certain influence tactics that employees or managers use when communicating with fellow employees may work better than others when certain bases of social power are in place or are conceded. In demonstrating that the same influence tactics and social power bases that are used in the workplace are used in baseball, this study confirms that the congruence model of baseball, that of the game mimicking the workplace and its ethos, still applies. This may suggest a certain amount of stability in baseball's social meanings in which play copies work. But questions raised by this study apply to both the playing field and the workplace. Do coaches' and managers' self-perceived bases of social power hinder or handicap communication in certain situations? That question leads to another: is there added tension during interactions between coaches and umpires (or managers and their peers in the workplace) who perceive themselves, but not necessarily each other, to be deserving of a specific base of social power (such as legitimate or expert power)?

One group of researchers stated that employing influence attempts and/or flexing social power implies that there are winners and losers in the process (Mumford et al. 2000). For baseball coaches, the winners and losers are obvious.

#### FUTURE RESEARCH

Expanding the number of coaches in a study like this would provide greater depth and insight into strategies used to deal with disputed calls. More research is needed to verify the findings here. Beyond that, a logical extension of this work would be to focus on umpires and determine whether they view attempts by managers to influence their calls as effective, a waste of their time, or merely part of the game. Seeing disputed calls from the umpire's perspective would add balance to this current study and provide insight for both coaches and umpires in how best to navigate those "questionable" calls.

The current study also could serve as a base for examining manager-umpire relationships at the professional level, in the minor and major leagues. Are the influence tactics used by coaches of high school or college teams the same as those used by managers of professional teams? How do managers of professional teams view umpires, and themselves, in terms of social power?

A more general research question that stems from the current study focuses on exchanges of social power between two individuals who see themselves as having the same social power bases. Are interactions and communication between such individuals hamstrung by unfulfilled expectations that one will grant certain social powers to the other? This question applies not only to scenarios on the baseball diamond but also to any workplace where interactions between people at various levels of management occur.

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# DOCUMENTING CHANGE AT UPPER HAMBURG BEND: NEBRASKA'S FIRST SIDE-CHANNEL RESTORATION

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**ABSTRACT**—In 1996 a side channel was excavated on 629 hectares of former agricultural land at Upper Hamburg Bend on the Missouri River in Otoe County, NE. This was the first side channel constructed on the Missouri River in an attempt to restore lost aquatic habitat. The initial design was for an approximately 4,200 m long side channel to be constructed with a 3 m bottom width. Development of the site was to be dependent on flows diverted from the main channel of the river with a final projected top width of 61 m. The side channel was completed in the spring, and shortly thereafter the site was subjected to a series of flood events. The side channel has been subjected to periods of both high and low water since opening. We documented physical changes at the site with the aid of aerial photography, acoustic Doppler current profiler (ADCP) surveys, and topographic surveys. By 2010 the side channel was 4,342 m long with a mean top width of 89.5 m. Channel development has occurred during periods of high and low water. ADCP surveys established that mean depths and velocities have increased since 2001. An increase in the amount of discharge through the side channel since 2001 has resulted in the loss of some of the shallower and lower velocity habitats. Modifications to the site may be necessary to reverse this loss of shallow, slow water habitat that the side channel was designed to provide. Although new off-channel aquatic habitat has been created, channel development has been impacted by the presence of rock control structures throughout the site. Reducing the number of control structures to the minimum necessary to prohibit the side channel from impacting adjacent properties may allow the continued restoration of lost alluvial processes through the ongoing process of bend development and migration.

**Key Words:** alluvial processes, chute, mitigation, pallid sturgeon, restoration, side channel

## INTRODUCTION

Between 1912 and 1980, shallow-water, sandbar, and island habitats were intentionally eliminated as the Missouri River in Nebraska and Iowa was shortened, narrowed, and deepened to create a 2.7 m deep navigation channel. Stabilizing the river for navigation eliminated most of the cut-and-fill alluviation that constantly reformed the aquatic habitats of the Missouri River. These habitat losses have had profound effects on native fish and wildlife populations. Of 59 native fish species found in this portion of the Missouri River whose status could be discerned, 41 species, or 69%, were considered to have decreasing population levels (Galat et al. 2005). In addition, there are three federally listed species on the Missouri River: least terns, listed as federally endangered in 1985; piping plovers, listed as threatened in 1986; and pallid sturgeon, listed as endangered in 1990 (USFWS 2000).

Efforts to restore some portion of these lost aquatic habitats and the processes that formed and maintained them began about the same time that the navigation channel was completed and have increased dramatically in response to the federal listings. Initial efforts through the Missouri River Bank Stabilization and Navigation Project Mitigation Plan focused on restoring lost habitats, both aquatic and terrestrial, thereby restoring a portion of the lost fish and wildlife resources and recreational opportunities that those lost habitats supported (USFWS 1980). More recent efforts in response to the Missouri River Biological Opinion (BiOp) have been directed at restoring habitats to help recover federally listed species, more specifically, emergent sandbars for least terns and piping plovers and shallow-water habitat for pallid sturgeon (<1.5 m deep and <0.6 m s<sup>-1</sup>) (USFWS 2000, 2003).

The Mitigation Plan, enacted in the 1986 Water Resources Development Act (WRDA) (Public Law 99-662) and subsequently expanded in the 1999 WRDA (Public



Law 106-53), authorized the development of fish and wildlife habitat on 27,309 ha of land to be acquired from willing sellers along the Missouri River in Missouri, Kansas, Nebraska, and Iowa. The restoration objective for aquatic habitat was to restore large-river habitats and the associated side channels and backwaters on the floodplain adjacent to the main channel of the Missouri River (Greenhorne and O'Mara, Inc. 1994). Habitat was to be developed by dredging filled-in areas, reopening historic side channels, notching river-training dikes, stabilizing banks, constructing some dikes and levees, pumping river water into wetlands, and planting natural vegetation. Since 2001 these habitat restoration projects have been incorporated into the U.S. Army Corps of Engineers Missouri River BiOp's reasonable and prudent alternative to "implement a habitat restoration program with the goal of restoring habitat quality, quantity, and diversity, so that the benefits of adequate dynamic natural river processes are restored" (USACE and USFWS 2012). A shallow-water habitat goal of 20 to 30 acres per mile was established for the river between Sioux City, IA, and the mouth (USFWS 2003).

The large flood on the Missouri River in 1993 resulted in severe damage to thousands of acres of agricultural land on the floodplain through deep scours and deposition of sand and silt. Because of this damage, the Corps of Engineers was able to acquire what became the Hamburg Bend Mitigation Site (Figs. 1 and 2). After considering available options for this site, a side-channel restoration was determined to be the best option and a pilot channel was constructed during the winter of 1995–96, becoming the first habitat restoration project in Nebraska under the Mitigation Plan. The pilot channel was "intended to assist in restoring the natural chute channel condition by developing into a wide shallow channel that will meander across the point bar to some extent" (Greenhorne and O'Mara, Inc. 1994). By design, the Hamburg Bend restoration project was intended to restore shallow-water habitat through active alluvial processes.

The Hamburg Bend Mitigation Project, designed and built during 1994–96, was one of the first large-scale riverine habitat restoration projects in the world. The project was conceived and completed at a time when the science of ecological restoration was still in its infancy (Palmer et al. 1997). The goals and objectives for the project reflect the state of the science at this time, which Palmer et al. (1997) call the "Field of Dreams" hypothesis, or "build it and they will come." Tens of thousands of hectares of habitat had been lost on the river, and the goal was to restore habitat heterogeneity as defined by historic condi-

tions. Although the designers estimated depth and velocity ranges for the side channel, the only metric included in the project design was a "200 foot wide ultimate chute channel condition" (Greenhorne and O'Mara, Inc. 1994). Biological metrics were probably never even considered, because at the time "the assumed relationship between habitat heterogeneity and biodiversity in a restoration context remains largely untested" (Palmer et al. 1997).

Because of the cost associated with acquiring and developing a site such as Hamburg Bend and because this was the first project of its kind on the Missouri River, the engineers' major concerns were the longevity of the side channel and the possibility of the side channel capturing the main channel of the river. The amount of water and sediment that a side channel carries is critical to its evolution and stability. Designers on the River Rhine asserted that sediment entering the side channel would eventually lead to filling the channel (Barneveld et al. 1994; Schropp 1995) and recommended preventing any sediment from entering side channels (Schropp 1995). Shields and Abt (1989) found that a decreasing sine of angle of approach and increasing discharge in the side channel increased the likelihood of filling in. A side channel's stability is also reliant on the lip height, particle size of the moving bed of the main channel, and the ratio of side-channel slope to main-channel slope (Slingerland and Smith 1998). These issues were addressed by significant rock entrance and exit structures and onsite grade-control structures. Repairs, maintenance, and modifications to the site have been ongoing since its opening, and great measures have been and are being taken to prevent both filling and capture of the main channel.

In the period following the construction of the Hamburg Bend side channel the number of river restoration projects worldwide have increased exponentially (Bernhardt et al. 2005) as have attempts to understand the complex nature of large rivers. There have been recommendations that river restoration efforts should be more holistic, and that to be considered successful, the river's ecological condition must show measurable improvement and the river system must be more self-sustaining and resilient to external perturbations (Palmer and Allan 2006). Recently these ideas were synthesized into the concept of "process-based restoration" (Beechie et al. 2010). Restoration projects that are designed to reestablish the processes or the natural variation that sustained habitat conditions would (1) address multiple ecosystem components concurrently, (2) be more sustainable and resilient, (3) require minimum maintenance, and (4) allow the habitats and biota to adjust to long-term stresses



Figure 1. Area map of the lower Missouri River from Sioux City, IA, to Kansas City, MO, showing location of study site.

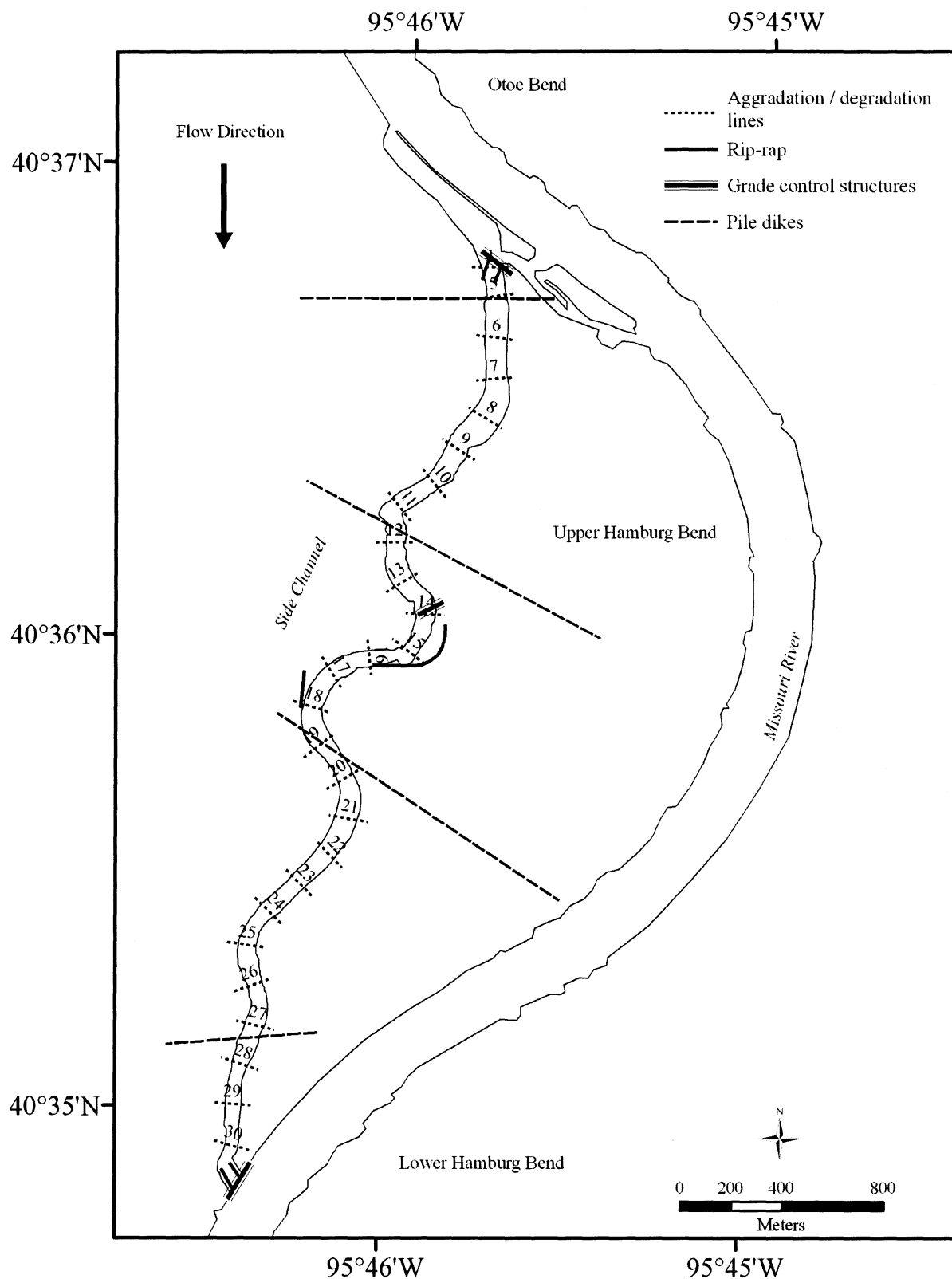


Figure 2. Map of the Upper Hamburg Bend side channel showing bankline locations circa 2001, agg/deg lines, grade control structures, pile dikes, and protective rip-rap.

such as climate change. These concepts of process-based restoration were reiterated by the National Research Council, who reported that degradation of the Missouri River ecosystem “is clear” and would continue “unless some portion of the hydrologic and geomorphic processes that sustained the pre-regulation Missouri River and floodplain ecosystem are restored” (National Research Council 2002).

Our objective was to document and quantify geomorphic change at the Upper Hamburg Bend side channel from 1996 to 2010 and determine if there had been success at restoring a wide, shallow channel that meanders across the point bar to some extent. We addressed this objective using topographic surveys, aerial imagery, and, beginning in 2001, acoustic Doppler current profiler surveys.

### SITE DESCRIPTION

The Upper Hamburg Bend side channel begins on Otoe Bend at river kilometer (rkm) 894.0, Otoe County, NE (distance measured upstream from the confluence with the Mississippi River). It dissects the point bar of Upper Hamburg Bend and rejoins the Missouri River at rkm 888.7, on Lower Hamburg Bend (Fig. 1). Historic maps and photos show the Upper Hamburg Bend area was characterized by extensive off-channel aquatic habitats. After the river was channelized for navigation, the land at the site was reclaimed for agriculture.

The side channel was initially designed as a pilot channel that was 4,267 m long and had a 3 m bottom width, 2:1 side slopes, and a slope of 0.08 m/km (Greenhorne and O'Mara, Inc. 1994). Riprap inlet and outlet structures were built to the final planned width of 61 m to allow for designed inflows and discharges. Due to the configuration of the main channel adjacent to the site, water entering through the upstream inlet is decanted, leaving the coarse bed-material sediment in the main channel. Two grade-control structures (the first being part of the inlet structure) were included in the design to prevent excessive channel degradation and to limit the amount of water withdrawn from the navigation channel. Each grade-control structure was built to the target width of 61 m, with 3:1 side slopes, and armored with riprap. Initial design criteria called for the side channel to capture 8% of the main channel discharge at median August flows, or  $1,047 \text{ m}^3 \text{ s}^{-1}$  (Greenhorne and O'Mara, Inc. 1994). Velocities in the side channel had been projected to be between 0.3 and 0.9  $\text{m s}^{-1}$  and depths were projected to be between 0.6 and 3.0 m (Greenhorne and O'Mara, Inc. 1994).

Approximately  $189,860 \text{ m}^3$  of soil was excavated, and  $12,400 \text{ m}^3$  of riprap was used to armor the inlet, outlet, and grade-control structures (Greenhorne and O'Mara, Inc. 1994). The locations of entrance and exit structures, grade-control structures, and revetment and historic training structures at the site are presented in Figure 2. Most of the riprap was placed in the upper 40% of the site, stabilizing the channel's reach and making it less susceptible to erosion than the lower 60%. The Upper Hamburg point bar also contains a series of historic pile dikes (Fig. 2) that were placed during channelization to direct flow to the new channel and promote sedimentation on the point bar, creating the bend in its present form. After initial construction, modifications at the site have included work to narrow the entrance structure and enhance grade control structures to limit the amount of water entering the side channel and armoring short reaches of bankline with riprap to protect a levee that lies adjacent to the site.

### METHODS

We collected data in three manners for this study: topographic surveys, bathymetric surveys, and data digitized from orthophotographs. Data were collected over a time span that ranged from 1996 to 2010.

#### Topographic Surveys

The Nebraska Game and Parks Commission (NGPC) conducted two topographic surveys at the site in addition to the as-built survey prepared by the U.S. Army Corps of Engineers in 1996 upon completion of the project. Terrestrial portions of the site were surveyed in the summer of 1996 using a total station and in March 2008 using differential GPS (DGPS) survey equipment. Horizontal and vertical control points were established prior to both surveys, and multiple control points were checked before and during all survey trips to ensure horizontal and vertical measurements were accurate to less than 9 cm. The 1996 topographic survey was conducted using a haphazard approach with additional detail given to features such as banklines, ditches, and levees. The 2008 topographic survey was conducted using transects spaced 15.25 m apart and extended 30.50 m perpendicular to the bankline. Where conditions allowed, transects were extended down banks to the water line. Significant topographic features such as ditches, roads, and rock structures were surveyed in greater detail, as were significant features located between transects.



### Orthophotography

We supplemented the as-built and topographic surveys with data digitized from existing orthophotographs from the Farm Service Agency's National Agriculture Imagery Program. Resolution of the orthophotographs ranged from 1 to 3 m. Banklines were digitized from orthophotographs taken in 1999, 2001, 2003, 2006, 2009, and 2010. We used the total nonvegetated channel as the basis for our digitizing to compensate for inconsistent water levels between photographs (Winterbottom 2000; Elliot and Jacobson 2006).

### Bathymetric Surveys

Depth and velocity data in the side channel were collected with an acoustic Doppler current profiler (ADCP) unit. The ADCP surveys will be referred to as "bathymetry" or "bathymetric" to reduce confusion with the topographic surveys. Crews from the U.S. Geological Survey (USGS) Columbia Environmental Research Center in Columbia, MO, collected bathymetry data at the Upper Hamburg Bend side channel and the adjacent main channel in 2001; methods for this survey are documented in detail in Reuter et al. (2008). Mainstem discharge measurements were taken from the USGS streamflow-gauging station on the Missouri River at Nebraska City, NE (06807000), located approximately 10 km upstream from the site. Discharge at the Nebraska City streamflow-gauging station was  $1,047 \text{ m}^3 \text{ s}^{-1}$  on the date of the 2001 survey. The Nebraska Game and Parks Commission conducted the second bathymetric survey on July 2, 2008. Discharge at the Nebraska City streamflow-gauging station on this date was  $1,067 \text{ m}^3 \text{ s}^{-1}$ . Depth and velocity data were collected simultaneously using a 1,200 kHz Rio Grande ADCP (Teledyne RDI, Poway, CA). The ADCP internal compass was calibrated before each survey to within 0.3 degrees of error. All bathymetry data were collected using Bottom Mode 7 and Water Mode 1 or 12, and water velocity data were collected in bins ranging from 0.05 m to 0.25 m depending on conditions. Boat speed was maintained at or below water velocity (usually  $<1.5 \text{ m s}^{-1}$ ). Data were georeferenced using a DGPS and were accurate within 3 cm. Data were logged and checked for quality assurance using WinRiver software (Teledyne RDI, Poway, CA).

Bathymetry data were collected along a series of transects, spaced 40 m apart. When obstructions such as rock structures or large woody debris hindered boat navigation, bathymetry transects were ended as close to the

obstruction as safely possible or conducted immediately upstream or downstream of the obstruction. The water and bottom mode settings required for the survey did not allow us to effectively measure velocities in water less than 0.8 m deep. Bathymetry transects were ended when the ADCP software indicated that velocity measurements were not being taken and therefore no depths or velocities were surveyed in water shallower than 0.8 m. Site conditions in 2001 allowed USGS crews to conduct bathymetric surveys in shallower water than the NGPC crews had surveyed. To ensure that data remained consistent, we eliminated all data points from the 2001 USGS survey that measured depth or velocity, or both, in less than 0.8 m of water. It was our intention in 2008 to duplicate transects from the 2001 survey as closely as possible.

### Analysis

We classified the chute and measured changes in a GIS. Twenty-eight aggradation/degradation lines (agg/deg; Fig. 2), spaced evenly apart and corresponding to a bathymetry transect, were used to measure width and bankline movement based on the digitized banklines from the as-built survey, topographic surveys, and orthophotographs. Not all agg/deg lines were perpendicular to the chute centerline each year because of channel migration. Bankline movement along the agg/deg lines was measured as an absolute value; there was no "negative" bankline movement. Movement of both banks, regardless of direction, was used to sum lateral movement. The agg/deg lines were clipped by the digitized bankline layer to get 28 widths, which were used to calculate a mean width from each as-built survey, topographic survey, or orthophotograph. Mean widths were compared using analysis of variance in SAS 9.2 (SAS Institute Inc. 2008) with an alpha level of  $p = 0.10$ . Length was measured based on the chute centerline, and sinuosity (channel length/valley length) was calculated over the entire chute (reach) from both topographic surveys and all orthophotographs. It was also computed for two subreaches, the upper 40% and the lower 60% from the 1999 and 2010 orthophotographs.

Two indices based on width measurements of both topographic surveys and all orthophotographs were computed along with an index of stability. Normalized bankline movement ( $N$ ) was computed as a percentage of the average width of two topographic surveys or orthophotographs:

$$N = ([\Delta r + \Delta l] / 2) / ([W_i + W_j] / 2) \quad (1)$$

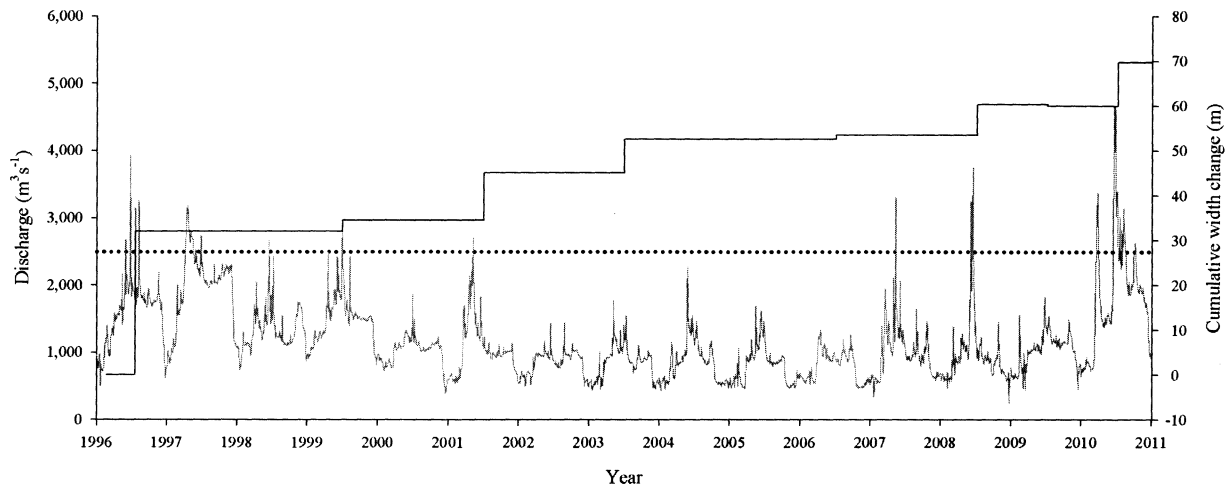


Figure 3. Daily discharge data for the USGS streamflow-gauging station Missouri River at Nebraska City, NE (06807000), from January 1, 1996, to January 1, 2011. The stepped line indicates change in width at the Upper Hamburg side channel and the dotted horizontal line represents flood stage ( $2,491 \text{ m}^3 \text{ s}^{-1}$ ).

where  $\Delta r$  and  $\Delta l$  are the sum of lateral movement (absolute value) for the right and left descending banks at all agg/deg lines in a particular topographic survey or orthophotograph and  $W_i$  and  $W_j$  are the mean width of all agg/deg lines in a particular topographic survey or orthophotograph. The rate of mean width change ( $\Delta W_{mean}$ ) was calculated in meters of movement per year:

$$\Delta W_{mean} = (W_i - W_j) / t_i - t_j \quad (2)$$

where  $W_i$  is the mean width of a particular topographic survey or orthophotograph  $i$ ,  $W_j$  is the mean width of a particular topographic survey or orthophotograph  $j$ ,  $t_i$  is the time of the particular topographic survey or orthophotograph  $i$ , and  $t_j$  is the time of the particular topographic survey or orthophotograph  $j$ .

We computed the lateral stability index (LSI) each year. The LSI compares the total area of the side channel from one topographic survey or orthophotograph that has not changed since the previous topographic survey or orthophotograph (unchanged area) to the total area of the previous topographic survey or orthophotograph.

$$\text{LSI} = \frac{\text{Unchanged total side-channel area}}{\text{Previous total side-channel area}} \quad (3)$$

Values approaching 1 indicate a stable channel, and low values indicate instability.

Each agg/deg line was classified as being in a run (straight), bend, or exit/entrance area based on the original side-channel alignment. These classifications were

then reevaluated based on 2010 morphology and sub-categorized based on the amount and the rate at which development took place.

We compared the 2001 and 2008 bathymetric surveys to see if any changes in mean depth or velocity had occurred. Data were checked for normality and were found to be non-normal. Three transformation types (natural log, log, and square root) failed to normalize the data, and therefore we used a Kruskal-Wallis nonparametric test to compare the distributions. All statistical analyses were conducted with SAS 9.2 (SAS Institute Inc. 2008) with an alpha level of  $p = 0.10$ .

## RESULTS

The pilot channel at Hamburg Bend was extensively reshaped by flooding during the first three months following construction in 1996, resulting in an increase in mean width of 31.7 m (Fig. 3). Since then, most additional widening has occurred during periods of high water. Significant changes in mean width occurred between 1999 and 2001 (10.5 m;  $F = -2.51$ ,  $p = 0.01$ ) and from 2009 to 2010 (9.7 m;  $F = -2.28$ ,  $p = 0.02$ ). There was also some increase in width during the early part of the drought in 2001–2003 (7.6 m;  $F = -1.81$ ,  $p = 0.07$ ). Normalized lateral movement followed a similar pattern, with the greatest values occurring between the as-built and 1996 topographic surveys ( $N = 51\%$ ) and the 2009 and 2010 topographic surveys ( $N = 1.8\%$ ). All other values were low, ranging from 0.1% to 1.0%. Figure 4 gives examples of the amounts of channel movement

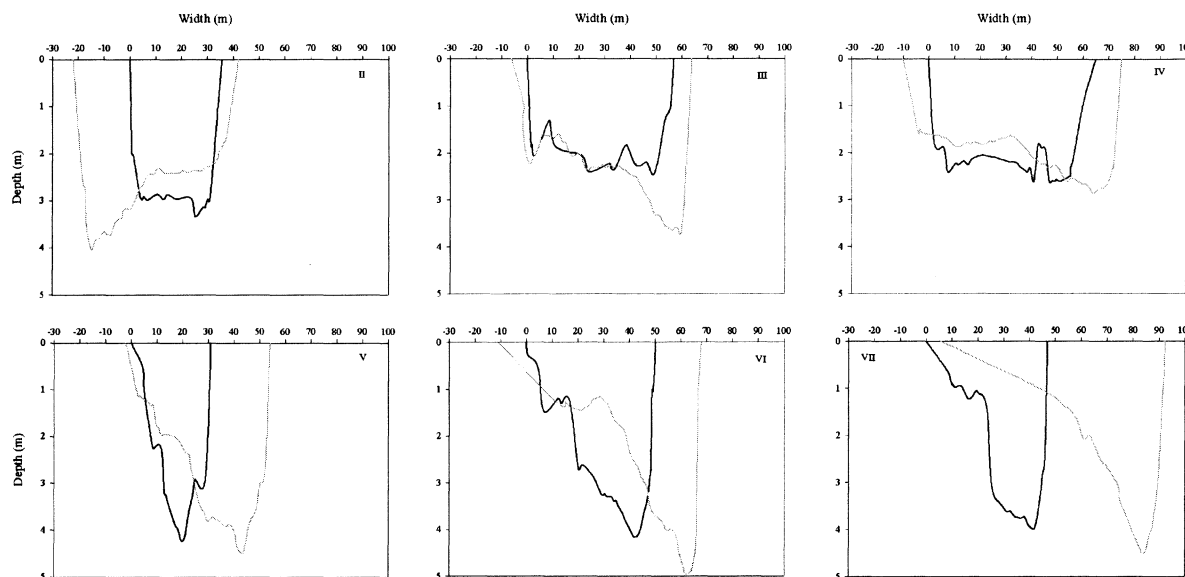


Figure 4. Longitudinal view of aggradation/degradation lines, Types II–VII, at the Upper Hamburg Bend side channel during the 2001 (black) and 2008 (gray) bathymetric surveys (2001 data from Jacobson et al. 2004). On all graphs, zero on the x-axis denotes the right-hand, descending bank during the 2001 survey. Negative numbers on the x-axis signify westward movement.

and reshaping for six of the seven agg/deg line types between 2001 and 2008.

Mean top width of the side channel increased from 16.3 m immediately after construction to 48.1 m in late summer of 1996 and to 89.5 m by the summer of 2010 (Fig. 5). The overall length of the side channel increased by 101 m in the first three years, but only increased an additional 57 m during the next 10 years (Fig. 5). In 2010 the side channel increased in length by an additional 15 m. The surface area of the side channel has expanded from 5.9 to 39.1 ha since construction. Total area has increased between each survey, although the area was nearly identical between 2008 and 2009. In addition to total area, the area common between consecutive surveys, or unchanged area, has increased every year, indicating that the channel alignment has remained stable (Fig. 6). LSI scores, although variable, have increased over time, indicating the side channel is approaching a stable condition.

Individual agg/deg line widths all increased; however, some accretion did take place (Figs. 4 and 7). Change at individual agg/deg lines was not uniform in speed or magnitude, although we did identify six patterns of change for the runs and bends (Table 1). In general, change was more rapid in the upper bends and runs (Types III, IV, and VI) and slower in the lower ones (Types II, V, and VII) (Figs. 7 and 8). By 2010, Type II and III runs and Type V bends exceed the design width by less than 50%, whereas Type IV runs and Type VI and VII runs and run/bends exceed design width by more than 50%.

The amount of water entering the chute increased from approximately 9% ( $97.4 \text{ m}^3 \text{ s}^{-1}$ ) of the main channel flow in 2001 to 14% ( $153.6 \text{ m}^3 \text{ s}^{-1}$ ) in 2008. Both of these measurements were taken at nearly identical main channel flow,  $1,047 \text{ m}^3 \text{ s}^{-1}$  in 2001 and  $1,067 \text{ m}^3 \text{ s}^{-1}$  in 2008, indicating that the increase in discharge within the side channel was not related to an increase in discharge in the main channel. More water entering the side channel resulted in significant changes in depth ( $\chi^2 = 10.03$ ,  $DF = 1$ ,  $p < 0.0015$ ) between the two bathymetric surveys (Fig. 9). During the 2001 bathymetric survey the mean depth in the side channel was 2.6 m and the maximum depth was 8.2 m. Eighteen percent of depths were less than 1.5 m, 33% were greater than 3.0 m, and only 3% were greater than 5.0 m. By 2008 the mean depth in the side channel had increased to 2.9 m and the maximum depth to 13.8 m. Only 14% of depths were less than 1.5 m, and the percentage of depths greater than 3.0 m had increased to 35% and those greater than 5.0 m to 9%.

Velocity at the site was also significantly affected by increased discharge within the side channel ( $\chi^2 = 10.55$ ,  $DF = 1$ ,  $p < 0.0012$ ; Fig. 10). The mean velocity in the side channel during the 2001 bathymetric survey was  $0.82 \text{ m s}^{-1}$  and the maximum was  $2.44 \text{ m s}^{-1}$ . Approximately 20% of velocities were less than or equal to  $0.60 \text{ m s}^{-1}$  and 41% were greater than or equal to  $0.90 \text{ m s}^{-1}$ . The mean velocity of the 2008 side-channel bathymetric survey was  $0.87 \text{ m s}^{-1}$  and the maximum was  $2.31 \text{ m s}^{-1}$ . Approximately 17% of velocities were less than or equal to  $0.60 \text{ m s}^{-1}$  and 45% were greater than or equal to  $0.90 \text{ m s}^{-1}$ .

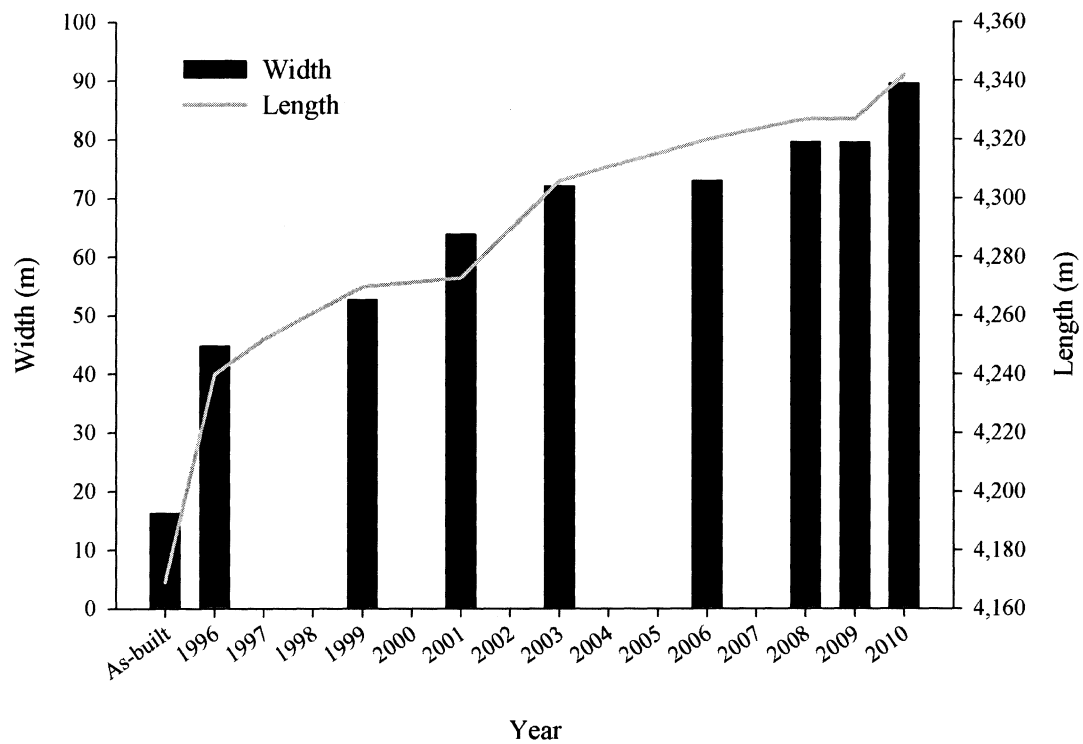


Figure 5. Width and length change at the Upper Hamburg Bend side channel from construction until 2010.

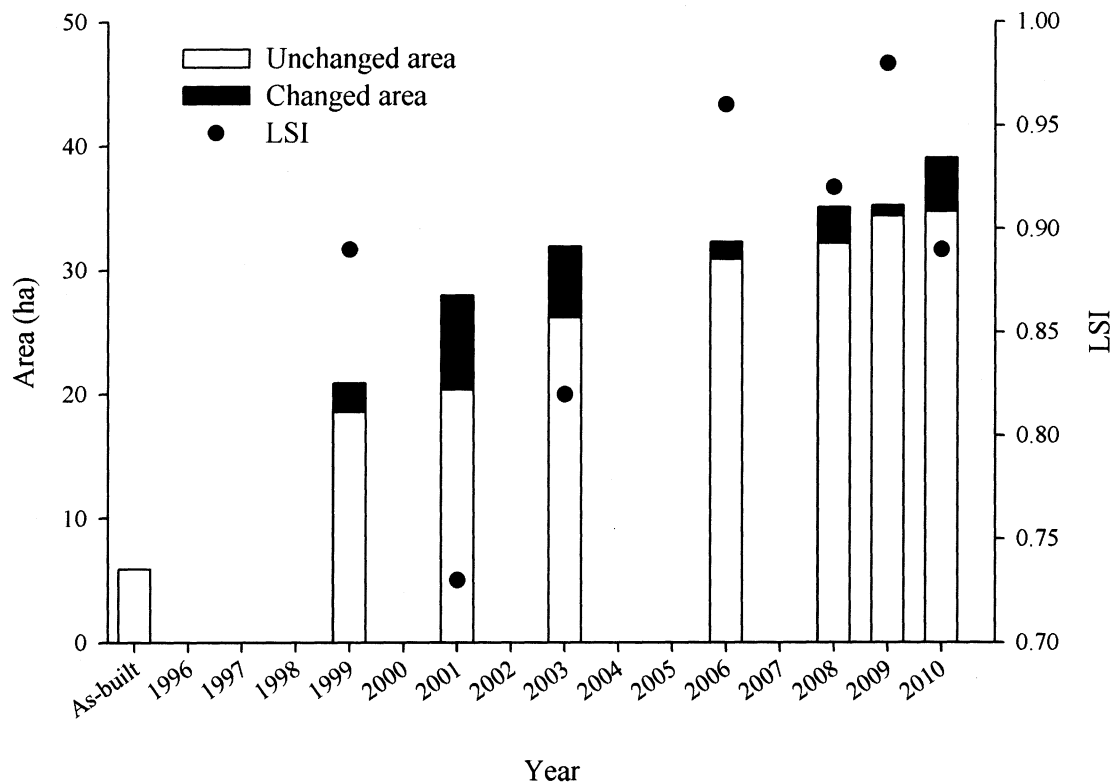


Figure 6. Unchanged area (black), changed area (white), and lateral stability index (LSI) at the Upper Hamburg Bend side channel from construction until 2010.



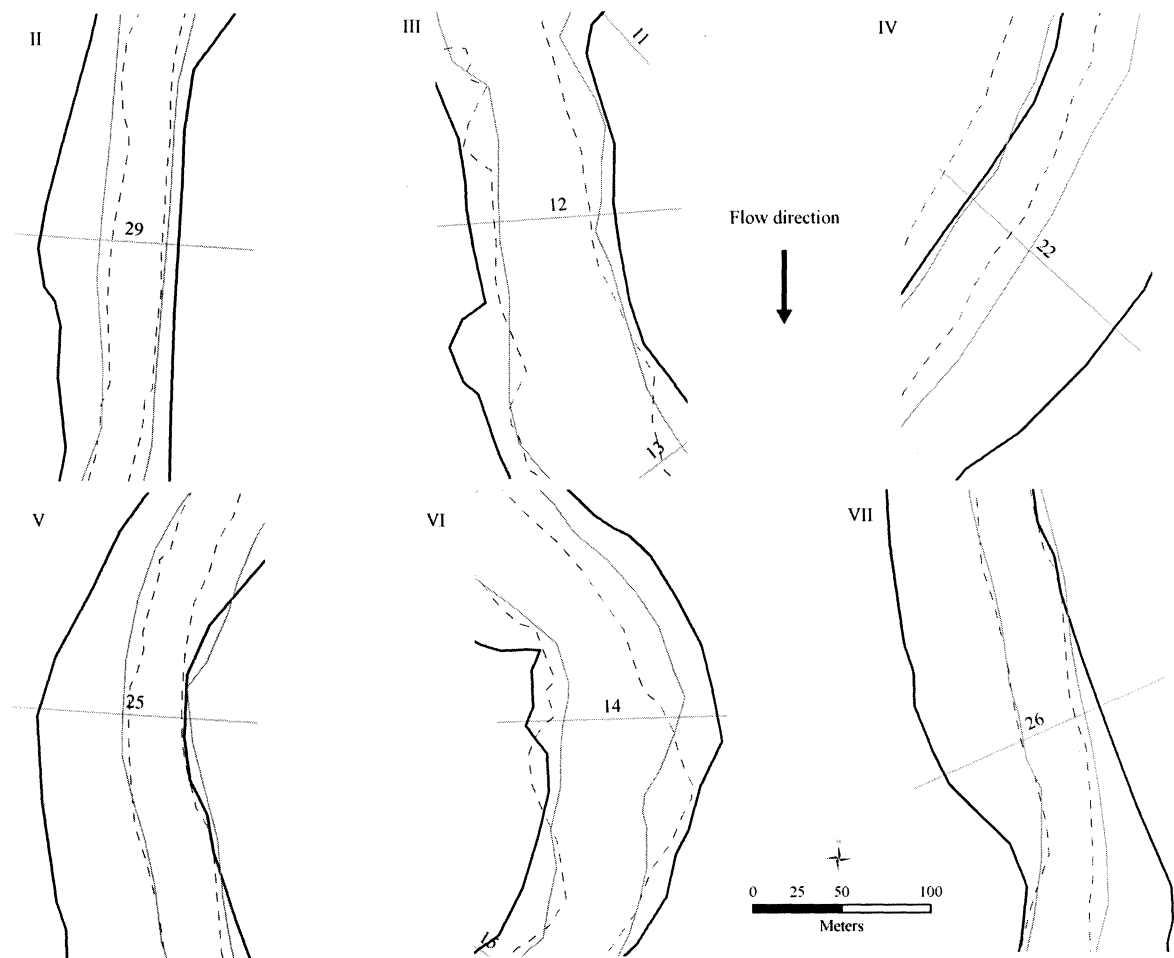


Figure 7. Overhead view of Type II-VII aggradation/degradation lines at the Upper Hamburg Bend side channel in 1996 (gray), 1999 (dashed), and 2010 (black).

TABLE 1  
UPPER HAMBURG BEND SIDE-CHANNEL TRANSECT LINE TYPE, CLASSIFICATION, DESCRIPTION,  
AND NUMBER CORRESPONDING TO EACH TYPE, BASED ON AS-BUILT SURVEY

Type	Classification	Description	Transect number
I	Entrance/exit structure	Entrance and exit structures built to design width and lined with rock	4, 5, 31
II	Run	Runs that developed slowly, generally not approaching design width until 2003	23, 24, 28, 29, 30
III	Run	Runs that developed rapidly, nearly reaching design width in first year	11, 12, 15
IV	Run	Runs that developed rapidly, generally exceeding design width by more than 50%	6, 7, 10, 20, 22
V	Bend	Bends that developed slowly, generally not exceeding design width until 2003	17, 21, 25
VI	Bend	Bends that developed rapidly, nearly reaching design width in first year, generally exceeding design width by more than 80%	8, 9, 14, 18
VII	Run	Runs that changed into bends, generally exceeding design width by more than 75%	13, 16, 19, 26, 27

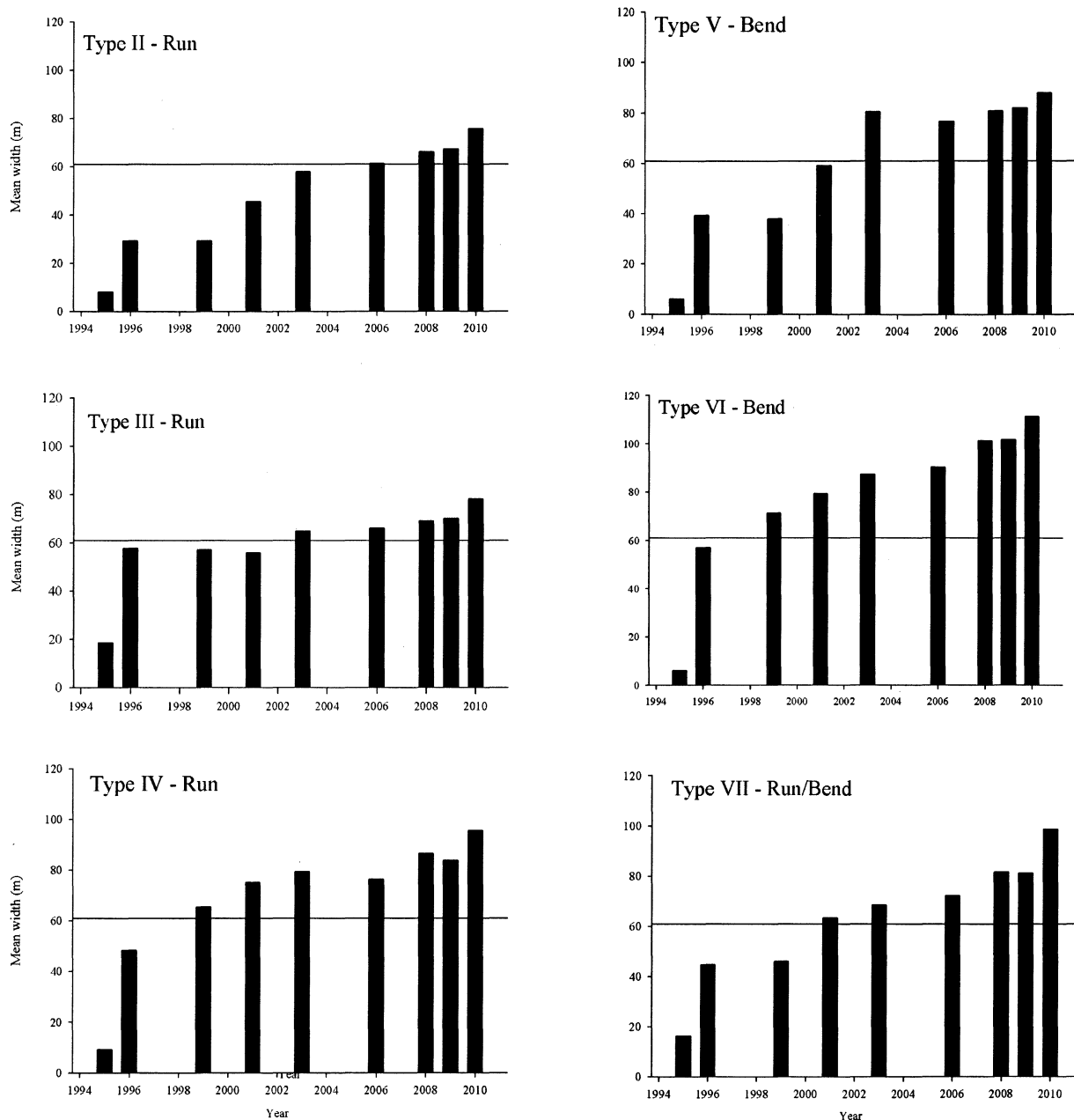


Figure 8. Mean width from 1996 to 2010 and classification of transect types at Upper Hamburg Bend side channel.

The overall sinuosity of the site has not varied much since the 1996 topographic survey; however, the upper and lower reaches have evolved differently. Sinuosity in the upper portion of the side channel decreased from 1.17 to 1.13 between 1999 and 2010, as a result of channel realignment due to rock control structures. The lower portion of the side channel saw an increase in sinuosity

from 1.12 to 1.18 between 1999 and 2010, as the bends started to move laterally and downstream through cut-and-fill alluviation. It was observed that large woody debris has been deposited in the downstream portions of the side channel, especially on eroded outside bends. Large point bars have formed on the insides of these bends. Deep scour holes are associated with the entrance

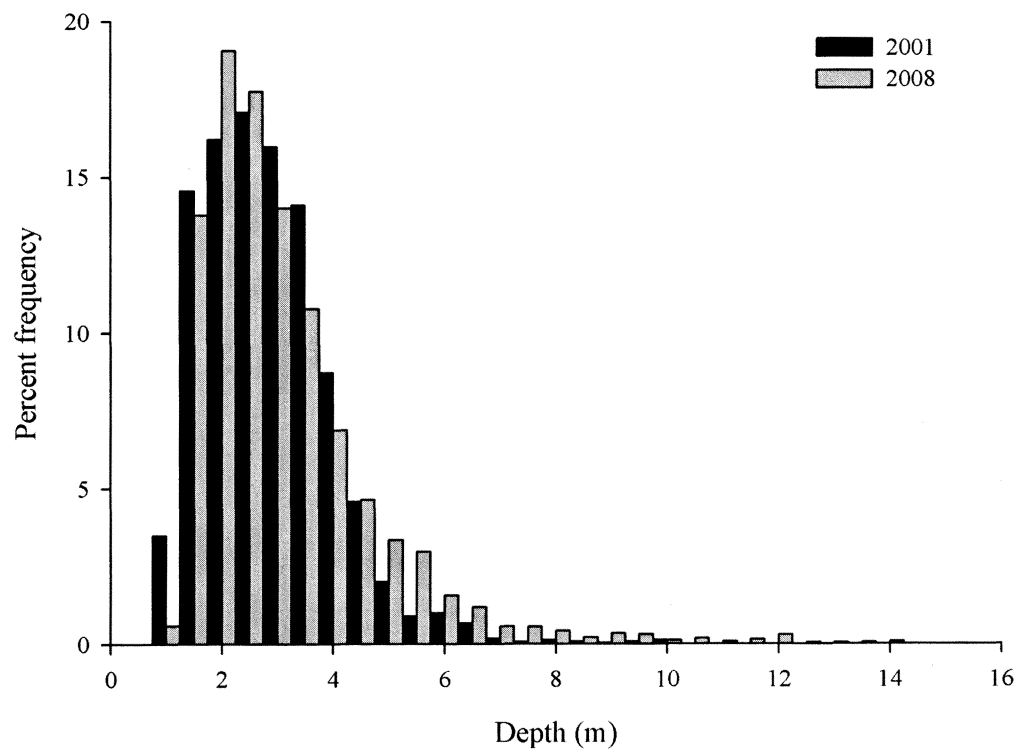


Figure 9. Depth frequency distributions for the August 2001 and July 2008 ADCP surveys of the Upper Hamburg Bend side channel (2001 data from Jacobson et al. 2004).

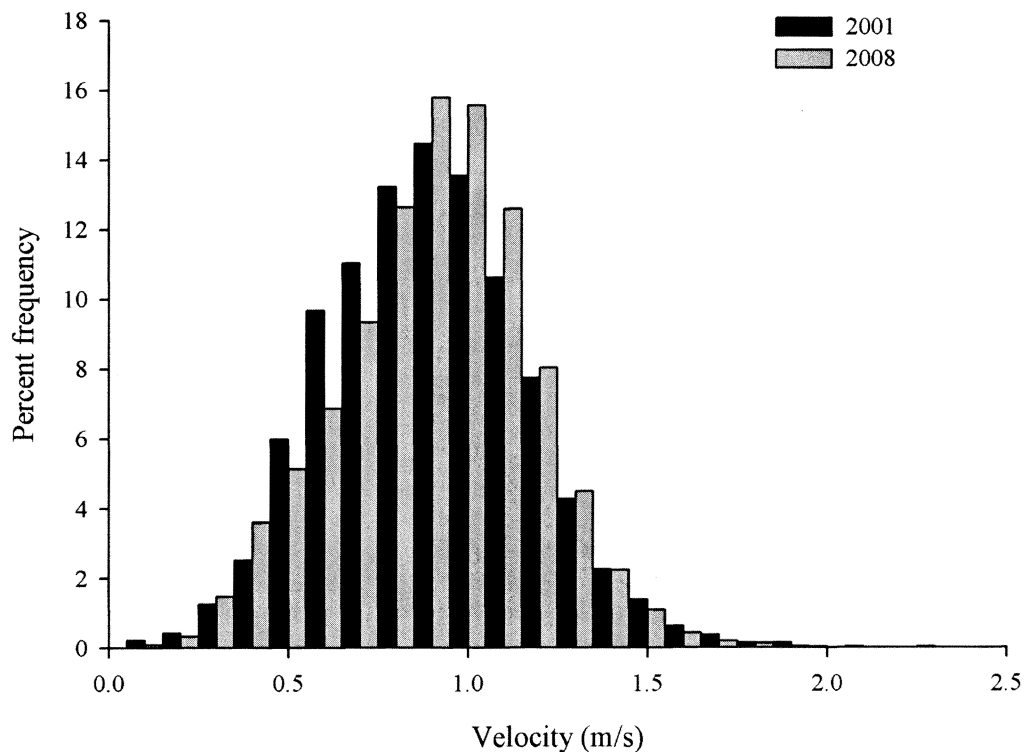


Figure 10. Velocity frequency distributions for the August 2001 and July 2008 ADCP surveys of the Upper Hamburg Bend side channel (2001 data from Jacobson et al. 2004).

and exit structures of the side channel as well as behind the remnants of old pile dikes.

## DISCUSSION

The question of the chute widening by alluvial processes was partially answered on the day the side channel was opened in May 1996, when the second author had to abandon an ongoing topographic survey and retreat from a rapidly eroding bankline near agg/deg line 12. Change at the site began immediately and has continued ever since. Flood flows appear to have been the driving force behind most channel development at the site, the exception being the development that occurred during the drought from 2001 to 2003. Even after the first 10 years, with floods occurring in nearly half of those years, there was substantial change in the side channel as a result of the floods in 2007, 2008, and 2010 (Fig. 3). The large changes in 2010 can be attributed to the flood being of sufficient magnitude that it overtopped several of the rock control structures, resulting in significant channel widening on what was the landward side of these structures.

The mean width of the side channel has steadily increased (Fig. 5), although individual agg/deg lines have been documented to narrow between surveys, due to accretion. The length of the side channel has remained relatively constant, although the length is limited by the size of the site and the control structures. Changes have not been uniform across the site but have been affected by a variety of factors, including channel alignment, the presence of rock control structures, and in some cases the locations of agg/deg lines used in the analysis. Aggradation/degradation lines classified as both runs and bends tended to widen rapidly in the upstream and middle portions of the side channel and more slowly in the downstream portion (Table 1; Fig. 8). Conversely, the greatest lateral movement occurred on the lower 60% of the site, which is characterized by bends, and runs that became bends, with highly erodible outside banks and fewer rock control structures. Most lateral movement occurred during the same time periods of high and low water when the greatest channel widening occurred. Normalized lateral movement was greater than observed by Shields et al. (2000) on the upper Missouri River in Montana (0.6% post-dam to 1.7% pre-dam using centerline measurements).

The lateral stability index, although variable, indicates that overall the site has become more stable over time (Fig. 6). Since 2006, despite floods in 2007, 2008,

and 2010 (Fig. 3), LSI scores have remained high, ranging from 0.89 to 0.98, indicating little channel movement. Related to channel stability, a number of agg/deg lines located in the downstream portion of the side channel that were classified as runs became bends as adjacent bends migrated downstream. This downstream movement of bends was a naturally occurring process on the Missouri River, but it did not occur on the upper and middle reaches of the side channel because of greater control by rock structures.

As of 2010, the site was characterized by a wide, shallow upper section containing in-channel sandbars and a lower section with a meandering thalweg, point bars, and high cutbanks. This resembles the side channel created naturally by the 1993 Missouri River flood at Lisbon Bend near Glasgow, MO. Jacobson et al. (2001) describe the site as having an upper section defined by bars and braiding and a lower section defined by a meandering thalweg and high banks. The channel migration patterns observed at Upper Hamburg Bend were similar to those documented at Lisbon Bend. They also documented a similar pattern of decreasing lateral migration and widening at the Lisbon site over time. Based on these findings it appears that the engineered Upper Hamburg Bend site has followed a natural development process.

Engineers have constructed other side channels at various sites along the Missouri River in Nebraska, Iowa, and Missouri. These sites, constructed after the floods of the late 1990s, have developed much more slowly than Upper Hamburg Bend site, probably due to a lack of floods (Eder and Mestl 2009). The current water-management regime on the Missouri River dictates that releases from the upstream reservoirs seek to balance the multiple authorized uses of the system, including flood control, navigation, power generation, water supply, and recreation. The net result has been to decrease peak flows substantially (Galat and Lipkin 2000), which during most years may not provide sufficient discharge to contribute to side-channel development. Lack of high flows may also substantially slow the rate of channel development to a state of dynamic equilibrium.

Has the side channel at Upper Hamburg Bend increased the diversity of aquatic habitats available in this reach of the Missouri River? The side channel is shallower and slower than the adjacent main channel, but the available depths and velocities have continued to change. Because of the limitations of the boat-mounted survey equipment, neither survey covered water less than 0.8 m deep, which subsequently limits our understanding of the kind and quantity of changes in extremely shallow

habitats. But the amount of area of the site that initially met the requirements for shallow-water habitat as defined by the Missouri River Biological Opinion ( $<1.5$  m deep and velocities  $<0.6$  m s<sup>-1</sup>) decreased between 2001 and 2008. So, although the side channel has continued to widen since 2001, the side channel and its thalweg have become deeper and faster rather than shallower and slower. This is supported by an increase in the discharge of water through the side channel, from 97.4 m<sup>3</sup> s<sup>-1</sup> in 2001 to 153.6 m<sup>3</sup> s<sup>-1</sup> by 2008. Increases in the mean depth and velocity raise questions about the future morphology of the site. While the side channel is unlikely to fill in, it may continue to scour deeper and further reduce the area of shallow, slow water that it was intended to provide. It is important to note that engineers have taken measures to limit the amount of water entering the site in recent years, but water conditions have prevented surveys to assess how depth and velocity have changed due to these updates.

The pilot channel constructed at Upper Hamburg Bend was intended to restore aquatic habitat adjacent to the Missouri River by developing into a wide, shallow channel that would meander across the floodplain and restore access to the site by fish. The side channel has widened beyond design specifications and, instead of providing shallow-water habitat, has continued getting deeper and faster. Over time, depths and velocities in the side channel are becoming similar to those in the main channel of the Missouri River. We recommend modifying the structures to limit the amount of water flowing into the site, and where possible, remove or relax the rock control structures where not absolutely necessary to contain the side channel to the site, thereby allowing for additional lateral movement and downstream bend migration. By allowing bend migration to occur naturally within the side channel at Upper Hamburg Bend, the alluvial processes that defined the historic Missouri River and supported the native biological communities could be partially restored.

#### ACKNOWLEDGMENTS

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# INITIAL CHANGES IN SPECIES COVER FOLLOWING SAVANNA RESTORATION TREATMENTS IN WESTERN IOWA

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**ABSTRACT**—Study areas in the Iowa Loess Hills were used to evaluate short-term responses of understory species to three treatment methods designed to facilitate restoration of *Quercus macrocarpa* savanna. Treatments included burning alone, burning with thinning, and burning with clear-cutting. Plant abundance and diversity were compared before treatment and one year after treatment. Ninety-nine plant species were identified during the study, of which 40 were new following treatment, although most of these were forest associates. Increases in diversity of understory species were observed after treatment, particularly in plots with combined burning and thinning. The forb group was most consistent in response to treatment, increasing in cover an average of 9% in burn-only plots to 33% in burn-clear plots. *Carex* spp. and *Eupatorium rugosum* were the species most consistently responsive to treatments, but responses varied widely among other species. Density of canopy tree species generally did not decline with burning, indicating fire alone is ineffective in short-term removal of established trees. Although short term, our results suggest that a combination of prescribed burning and thinning of canopy trees is most likely to provide environmental conditions suitable for increasing the amount and diversity of herbaceous species comparable to a savanna ecosystem, while also increasing fine-fuel loads that will facilitate future prescribed burning.

**Key Words:** bur oak, Iowa, Loess Hills, *Quercus macrocarpa*, restoration, savanna

## INTRODUCTION

The Loess Hills region of western Iowa and Missouri is a distinctive landform extending north and south along the eastern bluffs of the Missouri River (Fig. 1; Bettis et al. 1986), with a similar formation found on the west bank of the Missouri River in Nebraska. Historically, the landform was dominated by either mixed-grass prairie or *Quercus macrocarpa* (bur oak) savanna (Mutel 1989; Rebertus and Burns 1997), both communities presumably maintained largely by periodic fire of natural or anthropogenic origin (Iffrig 1983; Stambaugh et al. 2006). Forests (canopy cover >50%) were limited either to more mesic southern portions of the Loess Hills or to protected areas along stream courses and sheltered slopes throughout the more northern Loess Hills (Curtis 1959; Roosa et al. 1986).

European settlement in the Loess Hills occurred circa 1843, with subsequent fire suppression allowing

forest expansion from protected areas into surrounding prairie and savanna, and resulting in a decline and fragmentation of these grass-dominated ecosystems (Loomis and McComb 1944; Novacek et al. 1985; Bettis et al. 1986; Roosa et al. 1986; Anderson 1998; Brudvig and Asbjornsen 2005). This change included original *Quercus* savanna succeeding to *Quercus macrocarpa*-dominated forest, but ultimately, likely to be replaced by communities dominated by shade-tolerant species such as *Ostrya virginiana* (hop hornbeam) and *Celtis occidentalis* (hackberry) (Trecek-King 2003). By 1997, less than 1% of historic *Quercus macrocarpa* savanna remained throughout the Midwest (Nuzzo 1986; Rebertus and Burns 1997). Poor regeneration of *Quercus macrocarpa* in the extant Loess Hills forests also suggests future changes in plant community composition away from one dominated by *Quercus macrocarpa* (Russell and Fowler 1999; Abrams 2003; Brudvig and Asbjornsen 2005). Increases in woody cover over past decades are reported to be a significant factor in the decline of



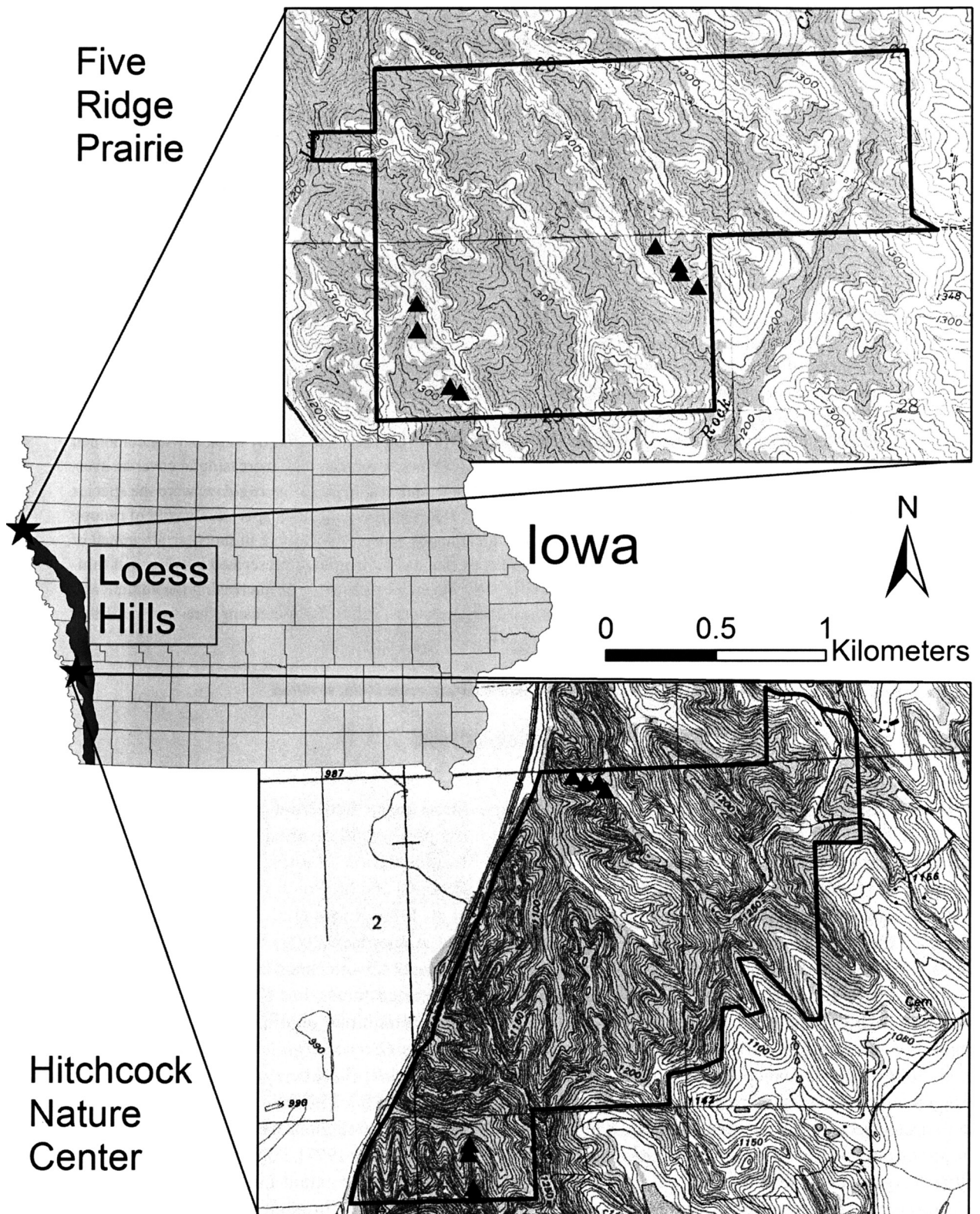


Figure 1. Location of Iowa's Loess Hills landform. The center map depicts Iowa with the Loess Hills outlined (darkened area) and study areas (stars) identified (modified from Novacek 1985). Topography, park boundaries, and the location of study sites within each park are depicted above (Five Ridge Prairie) and below (Hitchcock Nature Center). The scale bar is accurate for the park maps only, and the topographical scale interval in the park maps is in feet.

Loess Hills species. For example, 45 plant and animal species found in the Loess Hills are classified as rare in Iowa, with 21 of these on the Iowa list of threatened or endangered species (Mutel 1989).

From an ecological perspective, restoring and maintaining *Quercus macrocarpa* savanna in the Loess Hills is important to continuing regional biodiversity because savanna provides habitat for a unique species assemblage, as well as for species occurring in adjacent ecosystems (Anderson 1991; Grundel and Pavlovic 2008). To restore historic savanna and associated prairie plant communities, at least two strategies are available. One is to prevent further degradation of existing savanna ecosystems and the other is to reclaim areas lost to tree encroachment (Packard 1993; McCarty 1998; Brudvig and Asbjornsen 2005). The objective of our study was to assess treatment techniques by which to restore savanna, specifically in the Loess Hills of western Iowa. Here, we focus on initial, short-term effects of selective cutting and prescribed burning on the herbaceous community and understory woody-plant component of the current forest ecosystem. We intended to identify restoration techniques that would induce substantive changes in the understory plant community, leading to an increase in herbaceous savanna species, which would also constitute the fine fuels to facilitate future burns. Treatments were also expected to reduce woody-plant cover and create an environment more suitable to the regeneration of *Quercus macrocarpa* and prairie associates.

We focused on fire and mechanical removal of trees as the principal methods for savanna restoration. Fire is a natural process that can be used relatively efficiently in managing large grassland landscapes (e.g., Bragg and Hulbert 1976). It also is important to long-term survival and reproduction of *Quercus macrocarpa*, the dominant tree of the historic Loess Hills savanna (Aikman and Smelser 1938; Olson 1974; Perala 1974; Tinus 1980; Mutel 1989; Brudvig and Asbjornsen 2005). Mechanical tree removal was included in this study because in some systems fire alone has not proven successful in removal of established woody vegetation (White 1983; Packard 1993; McCarty 1998; Brudvig and Asbjornsen 2005). We expected the combination of fire and tree removal would induce greater change in both woody and understory species composition than would burning alone. However, we also expected the extremes in treatment (control and burning with clear-cutting) to result in plots that are structurally very different than that of the desired savanna of presettlement times.

## METHODS

### Study Areas

The study was conducted at two county parks in western Iowa: Five Ridge Prairie (42°40'N, 96°32'W) in Plymouth County in the northern Loess Hills, and Hitchcock Nature Center (41°24'N, 95°51'W) in Pottawattamie County, 140 km south of Five Ridge Prairie, near the center of the Loess Hills landform (Fig. 1). Native vegetation of much of Plymouth County at the time of settlement was short- to mixed-grass prairie on the uplands with *Quercus macrocarpa*-dominated forests and tallgrass prairie in the valleys (Aikman and Smelser 1938; Risser et al. 1981). Pottawattamie County to the south was generally described as tallgrass prairie with *Quercus macrocarpa* savanna on ridge tops and slopes and *Quercus macrocarpa*-*Carya cordiformis* (bitternut hickory) forest in low, protected areas (Aikman and Smelser 1938; Novacek et al. 1985; Rosburg and Glenn-Lewin 1996). Both study areas were historically savanna and thus were considered to have potential for successful restoration. Locations of historic savanna were indicated first by their topographic locations, then by the presence of large, open-grown *Quercus macrocarpa* within a matrix of smaller trees having comparatively pole-like boles. Further evidence is provided by historic accounts and artwork from the region (e.g., see Mutel 1989; Dillon et al. 2006). Conversion of the grasslands and savannas to woodland most likely occurred following European settlement in the region in the mid-1800s.

Soils of ridge tops at both study areas were predominantly Hamburg silt loams (Mesic Typic Udorthents) (Worster and Harvey 1976; Branham 1989). Soils of lower slopes at Hitchcock Nature Center also were Hamburg silt loams while those at Five Ridge Prairie were Castana silt (Mesic Entic Hapludolls). These are calcareous, silty soils of the Mollisol Soil Order that are well to excessively drained, with moderate permeability, and suited to establishment of *Quercus macrocarpa*. Climate of both study areas is continental, with hot summers and cold winters. July temperatures at Five Ridge Prairie and Hitchcock Nature Center average 23.3° and 23.5°C, respectively, while January temperatures average -8.8° and -7.1°C. Average annual precipitation is 67.4 cm at Five Ridge Prairie and 85.2 cm at Hitchcock Nature Center (MRCC 2009).

### Study Sites

At each study area, two separate ridges with west- or southwest-facing slopes were selected as study sites and



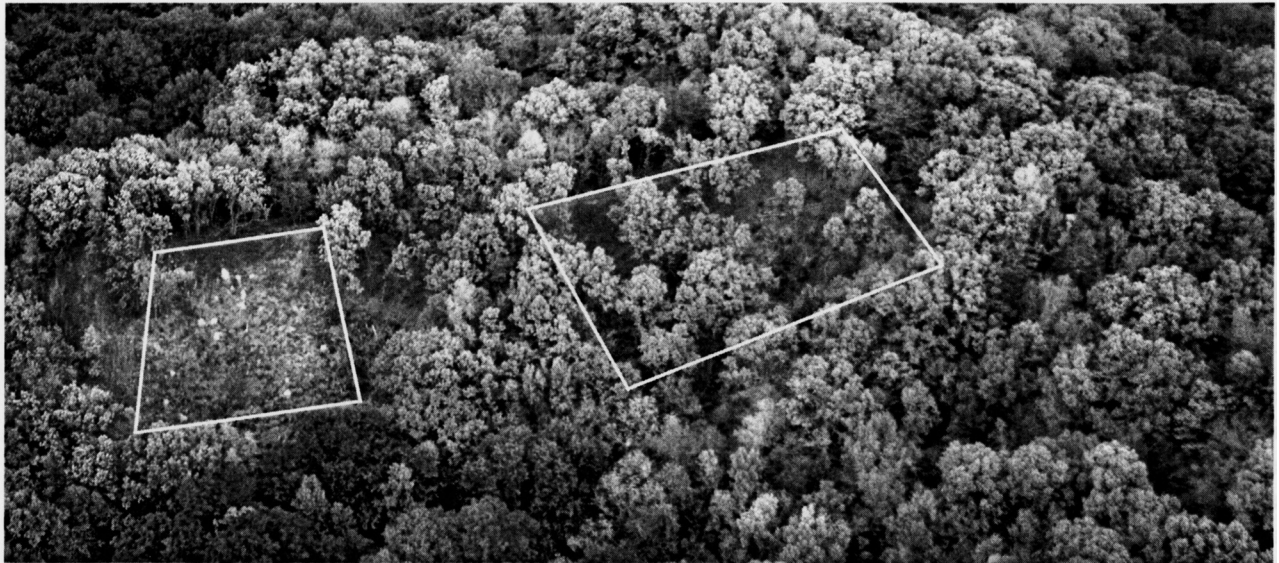


Figure 2. Photograph of the Loess Hills at Hitchcock Nature Center. The right square depicts post-treatment conditions in a burned and thinned plot (burn-thin), and the left square shows post-treatment conditions in a burned and cleared plot (burn-clear). The surrounding forest matrix is representative of what was once savanna but is now closed-canopy forests within this region. A burn-only plot is visible to the right of the burn-thin plot, but it is indistinguishable from the surrounding forest matrix.

designated Study Site 1 and Study Site 2. These four study site locations were selected because evidence suggested they recently supported savanna ecosystems. Evidence at Five Ridge Prairie consisted of small prairie remnants on ridge tops approximately 10–20 m upslope from the study plots. At Hitchcock Nature Center, large, widely scattered bur oak similarly suggested a one-time savanna (e.g., Phillips 2001). Each study site was divided into four treatment plots. All plots selected were characterized by nearly complete overstory canopy closure with each containing at least one mature *Quercus macrocarpa* (Fig. 2) (McKenzie 2006). Treatments were randomly applied to plots within each site. Treatment plot size varied from approximately 0.1 to 0.2 ha because of topographic variability.

Study plot treatments were as follows: control, in which neither burning nor tree removal occurred; burn-only, which involved burning but no tree removal; burn-thin, in which fire was applied and all woody plants over 1 cm diameter at breast height (dbh) except *Quercus macrocarpa* were removed; and burn-clear, in which all woody plants over 1 cm dbh were removed before the plot was burned. These treatments represented a range of intensities of tree removal from no change (control) to total alteration of forest overstory canopy (burn-clear). In some burn-thin plots, removal of some larger *Quercus macrocarpa* was necessary to achieve similar ground-level light intensities among plots (Anderson 1998; Meisel et al. 2002). Reduction in overstory canopy was intended to

result in more xeric, high light surface conditions, that is, conditions under which both prairie species and *Quercus macrocarpa* seedlings preferentially regenerate (Bray 1960; Brudvig and Asbjornsen 2005; Royce et al. 2010).

Each burn treatment included a burned buffer of at least 10 m around each plot to simulate a broader-scale fire. It was necessary to conduct burns during winter to take advantage of greater available fuel from fall leaf-drop. Fire was expected to affect the herbaceous component of understory plants more than that of woody trees and shrubs. In particular, larger-diameter trees were unlikely to be affected by burning in the short term (Peterson and Reich 2001). Any response of smaller-diameter woody plants to initial burns might inform us to some extent about the efficacy of long-term treatment.

### Treatment

Drip torches were used as the ignition source for the prescribed fires that occurred in each location. Average air temperature during the burns was 11.6°C and average relative humidity was 40%. Because backing fires can burn more intensely than heading fires, backing fires were used to encourage greater fuel consumption.

At Hitchcock Nature Center, plots were burned during December 2003. Burning was patchy because of low fuel conditions. Clearing or thinning of plots was completed during January 2004. Downed trees were removed from plots and stems were painted with Tordon RTU (Dow

AgroSciences, Indianapolis, IN) to prevent resprouting. At Five Ridge Prairie, unsuitable weather and fuel conditions prevented burning during the winter of 2003–2004. Thus, plots were burned the next winter (December 2004). Even so, burns at Site 1 were patchy in the burn-thin plot and could not be carried out in the burn-clear plot because of unfavorable weather that continued throughout the winter and spring. While burn-thin and burn-clear plots at Site 1 were not adequately burned, tree removal treatments were applied, and these plots were included in the study. Clearing or thinning of plots at Five Ridge Prairie was completed during February and March 2005, and all cut material was removed. Unlike at Hitchcock Nature Center, however, cut stems at Five Ridge Prairie were not treated with herbicide. Even so, this did not result in a large amount of resprouting as noted in post-treatment sampling.

### Sampling Procedure

Depending on topographic characteristics at the four study sites, treatment plots were separated by up to 300 m, with the corners of each permanently marked with metal poles and GPS coordinates recorded (McKenzie 2006). In the center of each treatment plot we marked a  $10 \times 10$  m macroplot within which we recorded both the percentage of overstory canopy cover and the density of all woody plants with a diameter at breast height of greater than or equal to 1 cm. For the latter measurement we used a concave spherical crown densiometer after full leaf out.

To estimate understory cover, two parallel 21-m-long transects were established and permanently marked within each treatment plot. Along each transect, 10 systematically placed  $1\text{-m}^2$  ( $1 \times 1$  m) microplots ( $n = 20$  microplots per plot) were evaluated for understory species and for cover groups using categories modified from Daubenmire (1959):  $>0\%$ – $1\%$ ,  $1\%$ – $5\%$ ,  $5\%$ – $25\%$ ,  $25\%$ – $50\%$ ,  $50\%$ – $75\%$ ,  $75\%$ – $95\%$ ,  $95\%$ – $99\%$ , and  $>99\%$  (McKenzie 2006). In addition to individual species cover, cover was also recorded for total cover, graminoids, forbs, woody species, litter, and bare soil. We defined understory species as those with individuals either not reaching breast height (1.4 m) or individuals with  $<1$  cm dbh. Plant nomenclature follows the Great Plains Flora Association (1986).

Pre-treatment evaluations of both understory cover and woody species density were conducted during August 2003 at Hitchcock Nature Center and during August and September 2004 at Five Ridge Prairie. Post-treatment evaluations were conducted during July 2004 at Hitch-

cock Nature Center and during August and September 2005 at Five Ridge Prairie. Palmer Drought Severity Index values for the growing season preceding each sampling event were equal to  $0 \pm 1$ , suggesting that none were preceded by either extreme drought or extreme pluvial events.

### Data Analysis

Understory cover data from transects within each treatment plot were averaged for analysis for each year. Statistically significant differences were set at 95% probability ( $p \leq 0.05$ ), but these values can only be taken as trends because of the necessary use of pseudoreplication in these analyses. Pre-treatment and post-treatment understory cover of each species and cover group were compared using the Student's t-test (SAS Institute 1999; Minitab, Inc. 2003). A nonparametric one-way ANOVA was used to detect differences among treatment plots for each species (SAS Institute 1999). Where differences were significant, ANOVA was followed by a Student-Newman-Keuls multiple comparison test to identify differences among plots. Significant differences in Shannon diversity ( $H'$ ) between sites were determined using a Student's t-test (Zar 1999). Although all species identified were included in our initial analyses, those presented in Tables 1–2 include only *Quercus macrocarpa* and species with an average cover of 5% or more in either sampling year for any treatment. For a full species list, see McKenzie (2006). Sample size was insufficient ( $n = 2$ ) for statistical comparison among treatments for either woody plant density or overstory canopy. Thus, comparisons are shown either as the average density (number of stems/ $100\text{ m}^2$ ) or as the percentage of overstory canopy cover.

## RESULTS

### Changes in Diversity and Richness

In total, 99 species were identified during the two years of the study: 76 at Five Ridge Prairie and 71 at Hitchcock Nature Center (McKenzie 2006). Forty species were recorded for the first time in Year 2, of which 16 were ruderal (r-selected) species such as *Erechtites hieracifolia* (fireweed) and *Chenopodium album* (goosefoot) (Great Plains Flora Association 1986). All tree species found in the overstory canopy were also present in the understory. Shannon diversity ( $H'$ ) of understory species increased in all treated plots, although the increase was less at the northern sites (Five Ridge

TABLE 1  
PERCENTAGE OF UNDERSTORY COVER AT FIVE RIDGE PRAIRIE STUDY SITES BY TREATMENTS  
FOR YEAR 1 (PRE-TREATMENT) AND YEAR 2 (POST-TREATMENT)

Cover groups	Year	Site 1					Site 2				
		Control	Burn-only	Burn-thin <sup>#</sup>	Burn-clear <sup>#</sup>	F-value	Control	Burn-only	Burn-thin	Burn-clear	F-value
Total cover	1 <sup>r</sup>	69	67	76	76	0.1919	51	63	50	54	0.2973
	2	74	74	74	85	0.0619	51	54	55	80*	0.0001
Woody species	1 <sup>r</sup>	67 <sup>a</sup>	48 <sup>b</sup>	75 <sup>a</sup>	70 <sup>a</sup>	0.0005	28 <sup>b</sup>	59 <sup>a</sup>	44 <sup>a</sup>	24 <sup>b</sup>	0.0001
	2	71 <sup>a</sup>	24 <sup>c*</sup>	45 <sup>b*</sup>	49 <sup>b*</sup>	0.0001	28 <sup>a</sup>	34 <sup>c*</sup>	30 <sup>b</sup>	16 <sup>b</sup>	0.0411
Graminoid	1 <sup>r</sup>	4 <sup>ab</sup>	6 <sup>ab</sup>	1 <sup>b</sup>	6 <sup>a</sup>	0.0369	14 <sup>ab</sup>	8 <sup>ab</sup>	5 <sup>b</sup>	22 <sup>a</sup>	0.0066
	2	3 <sup>ab</sup>	3 <sup>ab</sup>	2 <sup>b</sup>	16 <sup>a*</sup>	0.0001	25 <sup>ab</sup>	14 <sup>ab</sup>	22 <sup>b*</sup>	58 <sup>a*</sup>	0.0001
Forbs	1	5 <sup>ab</sup>	23 <sup>a</sup>	4 <sup>b</sup>	7 <sup>ab</sup>	0.0001	13	10	3	17	0.0123
	2	4 <sup>b</sup>	42 <sup>a*</sup>	29 <sup>a*</sup>	51 <sup>a*</sup>	0.0001	4 <sup>b</sup>	10 <sup>a</sup>	16 <sup>a*</sup>	36 <sup>a*</sup>	0.0001
Bare soil	1	3	t	2	1	0.3143	3	4	t	9	0.1530
	2	2 <sup>a</sup>	13 <sup>a*</sup>	14 <sup>a*</sup>	2 <sup>b</sup>	0.0017	1 <sup>a</sup>	17 <sup>a*</sup>	7 <sup>a*</sup>	23 <sup>b*</sup>	0.0001
Litter	1	93	95	89	92	0.5987	96	91	97	91	0.2817
	2	92 <sup>a</sup>	82 <sup>ab*</sup>	75 <sup>b*</sup>	88 <sup>a</sup>	0.0094	97 <sup>a</sup>	66 <sup>ab*</sup>	81 <sup>b*</sup>	62 <sup>a*</sup>	0.0001

Woody species	Year	Site 1					Site 2				
		Control	Burn-only	Burn-thin <sup>#</sup>	Burn-clear <sup>#</sup>	F-value	Control	Burn-only	Burn-thin	Burn-clear	F-value
<i>Celtis occidentalis</i>	1 <sup>r</sup>	25 <sup>ab</sup>	19 <sup>b</sup>	64 <sup>a</sup>	57 <sup>a</sup>	0.0001	3 <sup>b</sup>	22 <sup>a</sup>	17 <sup>a</sup>	2 <sup>b</sup>	0.0001
	2	21 <sup>ab</sup>	8 <sup>b</sup>	34 <sup>a*</sup>	24 <sup>ab*</sup>	0.0031	4 <sup>ab</sup>	5 <sup>b*</sup>	9 <sup>a*</sup>	1 <sup>ab</sup>	0.0022
<i>Cornus drummondii</i> †	1 <sup>r</sup>	42 <sup>a</sup>	26 <sup>b</sup>	9 <sup>c</sup>	10 <sup>bc</sup>	0.0001	t <sup>b</sup>	8 <sup>a</sup>	3 <sup>ab</sup>	t <sup>ab</sup>	0.0086
	2	41 <sup>a</sup>	9 <sup>b*</sup>	4 <sup>c</sup>	10 <sup>bc</sup>	0.0001	t <sup>a</sup>	1 <sup>b*</sup>	2 <sup>c</sup>	t <sup>bc</sup>	0.1061
<i>Fraxinus pennsylvanica</i>	1	8 <sup>a</sup>	t <sup>b</sup>	t <sup>b</sup>	3 <sup>b</sup>	0.0026	1 <sup>b</sup>	3 <sup>ab</sup>	4 <sup>ab</sup>	4 <sup>a</sup>	0.2245
	2	5 <sup>a</sup>	t <sup>b</sup>	1 <sup>ab</sup>	1 <sup>b</sup>	0.0254	1 <sup>a</sup>	t <sup>b</sup>	4 <sup>ab</sup>	1 <sup>b*</sup>	0.0165
<i>Ostrya virginiana</i>	1 <sup>r</sup>	•	•	•	•	•	11 <sup>c</sup>	7 <sup>ab</sup>	3 <sup>a</sup>	1 <sup>bc</sup>	0.0763
	2	t	t	t	t	0.8198	7	6	7	t	0.0856
<i>Parthenocissus</i> spp.†	1	1	4	1	5	0.0776	5	2	4	7	0.6591
	2	1	2	2	9	0.0004	3	2	6	1	0.1859
<i>Quercus macrocarpa</i>	1	•	t	3	3	0.5433	•	3	•	•	0.3976
	2	t <sup>b</sup>	0 <sup>b</sup>	3 <sup>b</sup>	8 <sup>a</sup>	0.0405	2 <sup>b*</sup>	3 <sup>b</sup>	t <sup>b*</sup>	t <sup>a</sup>	0.4435
<i>Ribes missouriense</i>	1	1	1	1	•	0.7121	•	•	t	t	0.2472
	2	t	1	t	1	0.6617	t	•	t	t	0.6547
<i>Rubus occidentalis</i>	1	2	1	1	4	0.1847	1	4	1	t	0.0224
	2	2	1	1	9	0.0287	2	3	4	t	0.3501
<i>Symphoricarpos</i> spp.††	1 <sup>r</sup>	2	1	•	2	0.5169	t	•	t	t	0.7615
	2	1	t	t	2	0.2645	t	t	•	t	0.6547

Table 1 continued

Herbaceous species	Year	Site 1				F-value	Site 2				F-value
		Control	Burn-only	Burn-thin <sup>#</sup>	Burn-clear <sup>#</sup>		Control	Burn-only	Burn-thin	Burn-clear	
<i>Carex</i> spp.	1 <sup>†</sup>	2 <sup>ab</sup>	5 <sup>ab</sup>	t <sup>b</sup>	5 <sup>a</sup>	0.0686	8 <sup>ab</sup>	4 <sup>b</sup>	3 <sup>b</sup>	15 <sup>a</sup>	0.0188
	2	3 <sup>ab</sup>	1 <sup>ab</sup>	1 <sup>b</sup>	14 <sup>a*</sup>	0.0001	8 <sup>ab</sup>	8 <sup>ab</sup>	20 <sup>b*</sup>	45 <sup>a*</sup>	0.0001
<i>Chenopodium album</i> group <sup>††</sup>	1 <sup>†</sup>	1 <sup>a</sup>	t <sup>b</sup>	1 <sup>ab</sup>	1 <sup>ab</sup>	0.7130	t <sup>a</sup>	0 <sup>b</sup>	0 <sup>b</sup>	t <sup>ab</sup>	0.0132
	2	1	2	12 <sup>*</sup>	18 <sup>*</sup>	0.0003	0 <sup>*</sup>	1	t	1	0.1988
<i>Chenopodium gigantospermum</i>	1	1	t	t	t	0.2661	•	•	•	•	•
	2	t	•	2	2	0.1782	•	•	•	•	•
<i>Elymus villosus</i>	1	•	•	•	t	0.1058	•	1	t	•	0.3379
	2	•	t	•	2	0.1014	1	1	2	1	0.5774
<i>Erechtites hieracifolia</i> <sup>†</sup>	1	•	•	•	•	•	•	•	•	•	•
	2	•	•	•	4	0.3976	•	•	•	t	0.3976
<i>Eupatorium rugosum</i>	1	2	8	1	3	0.0771	8 <sup>a</sup>	2 <sup>b</sup>	2 <sup>ab</sup>	11 <sup>ab</sup>	0.0123
	2	1	11	6	15 <sup>*</sup>	0.0559	3	1	8 <sup>*</sup>	22	0.0001
<i>Festuca obtusa</i>	1 <sup>†</sup>	t	t	t	•	0.7615	2 <sup>a</sup>	2 <sup>ab</sup>	0 <sup>b</sup>	6 <sup>ab</sup>	0.3167
	2	•	•	•	•	•	13	3	•	13	0.0389
<i>Galium aparine</i>	1 <sup>†</sup>	•	t	t	t	0.6547	1 <sup>b</sup>	t <sup>b</sup>	3 <sup>b</sup>	1 <sup>a</sup>	0.2658
	2	t	t	t	2	0.0297	1	2	7 <sup>*</sup>	9 <sup>*</sup>	0.0029
<i>Hackelia virginiana</i>	1	t	•	t	t	0.5736	•	t	•	t	0.1511
	2	0 <sup>b</sup>	t <sup>b</sup>	7 <sup>a*</sup>	7 <sup>a*</sup>	0.0012	0 <sup>b</sup>	t <sup>b</sup>	3 <sup>a*</sup>	6 <sup>a*</sup>	0.0001
<i>Teucrium canadense</i>	1	0 <sup>b</sup>	8 <sup>a</sup>	0 <sup>b</sup>	t <sup>b</sup>	0.0011	0 <sup>b</sup>	2 <sup>a</sup>	0 <sup>b</sup>	0 <sup>b</sup>	0.0404
	2	0 <sup>b</sup>	13 <sup>a*</sup>	0 <sup>b</sup>	2 <sup>b</sup>	0.0001	0 <sup>b</sup>	2 <sup>a</sup>	t <sup>b</sup>	t <sup>b</sup>	0.0606
<i>Urtica dioica</i>	1 <sup>†</sup>	0 <sup>b</sup>	5 <sup>a</sup>	0 <sup>b</sup>	1 <sup>b</sup>	0.0043	•	1	•	•	0.3976
	2	0 <sup>b</sup>	11 <sup>a</sup>	0 <sup>b</sup>	1 <sup>b</sup>	0.0004	t <sup>b</sup>	1 <sup>a</sup>	0 <sup>b</sup>	t <sup>b</sup>	0.5028

Notes: Species listed include *Q. macrocarpa* and all species with an average canopy of 5% or more in either year for any treatment. F-value is from nonparametric one-way ANOVA among treatment plots at a site. Nomenclature follows the Great Plains Flora Association (1986). Dots (•) are used in place of zero cover values for visual clarity.

# = Part of the burn-thin plot and all of the burn-clear plot were not burned.

† = Significant difference in understory canopy cover between study sites where all treatment plots at a site were combined ( $p \leq 0.05$ ; nonparametric one-way ANOVA).

† = *Parthenocissus* spp. includes at least *Parthenocissus quinquefolia*, and *Symphoricarpos* spp. includes at least *Symphoricarpos orbiculatus*.

\* = Significant difference between Years 1 and 2 for species indicated (Student's t-test).

a, b, c = Different alphabetic superscripts indicate statistically significant differences ( $p \leq 0.05$ ) among treatment plots as determined by the Student-Newman-Keuls multiple comparison test. Values with the same superscript or without alphabetic superscripts among treatments for any year did not differ significantly.

‡ = Species considered to be invasive or non-native (Great Plains Flora Association 1986).

t = trace (<1% cover value).

r = Species considered to be ruderal (Great Plains Flora Association 1986).

TABLE 2  
PERCENTAGE OF UNDERSTORY COVER AT HITCHCOCK NATURE CENTER STUDY SITES  
BY TREATMENTS FOR YEAR 1 (PRE-TREATMENT) AND YEAR 2 (POST-TREATMENT)

Cover groups	Year	Site 1					Site 2				
		Control	Burn-only	Burn-thin	Burn-clear	F-value	Control	Burn-only	Burn-thin	Burn-clear	F-value
Total cover	1	79	88	89	82	0.0461	80 <sup>bc*</sup>	94 <sup>a</sup>	88 <sup>ab</sup>	76 <sup>c</sup>	0.0009
	2	30*	16*	25*	53*	0.0001	43 <sup>b*</sup>	51 <sup>b*</sup>	71 <sup>a*</sup>	80 <sup>a</sup>	0.0001
Woody species	1	3 <sup>b</sup>	2 <sup>b</sup>	3 <sup>a</sup>	14 <sup>a</sup>	0.0044	6 <sup>ab</sup>	5 <sup>ab</sup>	6 <sup>b</sup>	18 <sup>a</sup>	0.0110
	2	18*	15*	6	10	0.0034	12 <sup>b</sup>	21 <sup>ab*</sup>	23 <sup>ab*</sup>	35 <sup>a*</sup>	0.0007
Graminoid	1 <sup>†</sup>	2	t	1	1	0.2838	5 <sup>a</sup>	1 <sup>b</sup>	1 <sup>ab</sup>	4 <sup>a</sup>	0.0324
	2	6 <sup>b</sup>	1 <sup>b</sup>	4 <sup>b*</sup>	15 <sup>a*</sup>	0.0008	15 <sup>a*</sup>	3 <sup>b*</sup>	13 <sup>a*</sup>	48 <sup>a*</sup>	0.0001
Forbs	1 <sup>†</sup>	2 <sup>a</sup>	t <sup>b</sup>	2 <sup>b</sup>	3 <sup>b</sup>	0.4597	4 <sup>ab</sup>	12 <sup>a</sup>	5 <sup>b</sup>	5 <sup>ab</sup>	0.0038
	2	3 <sup>b</sup>	2 <sup>b</sup>	12 <sup>a*</sup>	34 <sup>a*</sup>	0.0001	12 <sup>*</sup>	26	47 <sup>*</sup>	43 <sup>*</sup>	0.0001
Bare soil	1 <sup>†</sup>	20	15	12	11	0.6261	29	19	38	31	0.1803
	2	10	14	22	40*	0.0008	18 <sup>b</sup>	26 <sup>a</sup>	45 <sup>a</sup>	29 <sup>a</sup>	0.0182
Litter	1 <sup>†</sup>	81	82	88	89	0.5940	72	72	62	70	0.5351
	2	81 <sup>a</sup>	76 <sup>a</sup>	59 <sup>ab*</sup>	42 <sup>b*</sup>	0.0001	65 <sup>a</sup>	60 <sup>a</sup>	39 <sup>b*</sup>	59 <sup>a</sup>	0.0202

Woody species	Year	Site 1					Site 2				
		Control	Burn-only	Burn-thin	Burn-clear	F-value	Control	Burn-only	Burn-thin	Burn-clear	F-value
<i>Celtis occidentalis</i>	1	1 <sup>ab</sup>	1 <sup>ab</sup>	2 <sup>b</sup>	2 <sup>a</sup>	0.8069	2 <sup>a</sup>	0 <sup>b</sup>	0 <sup>b</sup>	3 <sup>a</sup>	0.0513
	2	1	1	t	5	0.0009	4 <sup>a</sup>	2 <sup>a*</sup>	3 <sup>b*</sup>	6 <sup>a</sup>	0.2337
<i>Cornus drummondii</i> ‡	1	t	•	•	•	0.1058	t	•	•	1	0.3870
	2	t	•	•	•	0.1058	•	•	•	1	0.3976
<i>Fraxinus pennsylvanica</i>	1	t	•	•	•	0.0614	•	•	•	t	0.3976
	2	t	•	•	t	0.4910	•	1	t	t	0.6039
<i>Ostrya virginiana</i>	1	2	1	2	6	0.4303	1 <sup>c</sup>	4 <sup>ab</sup>	3 <sup>a</sup>	2 <sup>bc</sup>	0.2396
	2	4	3*	1	t	0.0326	1 <sup>bc</sup>	2 <sup>ab</sup>	4 <sup>a</sup>	t <sup>c</sup>	0.0018
<i>Parthenocissus</i> spp.‡	1 <sup>†</sup>	t	1	t	3	0.2549	3 <sup>a</sup>	6 <sup>a</sup>	1 <sup>b</sup>	5 <sup>a</sup>	0.0308
	2	2*	2	1	3	0.4383	11 <sup>a*</sup>	8 <sup>a</sup>	11 <sup>b*</sup>	13 <sup>a*</sup>	0.7687
<i>Quercus macrocarpa</i>	1	•	3	•	•	0.3976	t	•	•	t	0.4596
	2	•	2	•	•	0.3976	•	•	•	•	•
<i>Ribes missouriense</i>	1 <sup>†</sup>	t	•	•	•	0.3976	t	4	•	2	0.0590
	2	t	t	t	•	0.5736	0 <sup>b</sup>	3 <sup>a</sup>	t <sup>b</sup>	5 <sup>a</sup>	0.0189
<i>Rubus occidentalis</i>	1	•	•	•	•	•	•	•	•	•	•
	2	0 <sup>b</sup>	0 <sup>b</sup>	t <sup>b</sup>	1 <sup>a</sup>	0.1195	t	•	t	•	0.2919
<i>Symphoricarpos</i> spp.‡	1	3	t	•	t	0.1534	t <sup>ab</sup>	1 <sup>ab</sup>	0 <sup>b</sup>	2 <sup>a</sup>	0.3784
	2	4 <sup>a</sup>	t <sup>ab</sup>	0 <sup>b</sup>	2 <sup>ab</sup>	0.1001	t <sup>b</sup>	t <sup>b</sup>	t <sup>b</sup>	5 <sup>a</sup>	0.0029



Table 2 continued

Herbaceous species	Site 1						Site 2				
	Year	Control	Burn-only	Burn-thin	Burn-clear	F-value	Control	Burn-only	Burn-thin	Burn-clear	F-value
<i>Carex</i> spp.	1	1	t	1	2	0.1012	2 <sup>a</sup>	t <sup>bc</sup>	1 <sup>ab</sup>	t <sup>c</sup>	0.0044
	2	3 <sup>b</sup>	1 <sup>b</sup>	4 <sup>b*</sup>	10 <sup>a</sup>	0.0221	12 <sup>a*</sup>	1 <sup>b*</sup>	11 <sup>a*</sup>	10 <sup>b*</sup>	0.0368
<i>Chenopodium album</i> group <sup>†</sup>	1	•	•	•	•	•	•	•	•	•	•
	2	0 <sup>c</sup>	t <sup>b*</sup>	1 <sup>ab*</sup>	8 <sup>a*</sup>	0.0001	t <sup>b</sup>	0 <sup>b</sup>	1 <sup>ab</sup>	1 <sup>a*</sup>	0.3181
<i>Chenopodium gigantospermum</i>	1	•	•	•	•	•	•	•	•	•	•
	2	0 <sup>b</sup>	t <sup>b</sup>	t <sup>b</sup>	6 <sup>a*</sup>	0.0023	t	t	•	•	0.2919
<i>Elymus villosus</i>	1 <sup>†</sup>	t	•	t	t	0.3262	1 <sup>b</sup>	t <sup>b</sup>	t <sup>b</sup>	3 <sup>a</sup>	0.0160
	2	1	t	t	4	0.0883	1 <sup>b</sup>	1 <sup>b</sup>	2 <sup>b</sup>	33 <sup>a*</sup>	0.0001
<i>Erechtites hieracifolia</i> <sup>†</sup>	1	•	•	•	•	•	•	•	•	•	•
	2	0 <sup>b</sup>	t <sup>b</sup>	1 <sup>a*</sup>	t <sup>b</sup>	0.0024	0 <sup>c</sup>	t <sup>c</sup>	17 <sup>a*</sup>	7 <sup>b*</sup>	0.0001
<i>Eupatorium rugosum</i>	1 <sup>†</sup>	1	t	t	2	0.3965	2	8	4	3	0.2155
	2	2	t	2	8	0.0068	7 <sup>*</sup>	20	22 <sup>*</sup>	29 <sup>*</sup>	0.0264
<i>Festuca obtusa</i>	1	•	•	•	•	•	•	•	•	•	•
	2	•	•	•	•	•	1 <sup>a</sup>	t <sup>b</sup>	0 <sup>b</sup>	5 <sup>a*</sup>	0.0195
<i>Galium aparine</i>	1	•	•	•	•	•	•	•	•	•	•
	2	•	•	•	t	0.3976	•	•	•	1	0.3976
<i>Hackelia virginiana</i>	1	t	•	•	•	0.2455	t	t	•	t	0.5641
	2	t	t	t	2	0.0375	0 <sup>b</sup>	0 <sup>b</sup>	1 <sup>a</sup>	0 <sup>b</sup>	0.0947
<i>Teucrium canadense</i>	1	•	•	•	•	•	•	•	•	•	•
	2	•	•	•	•	•	•	•	•	t	0.3976
<i>Urtica dioica</i>	1	•	•	•	•	•	•	•	•	•	•
	2	•	•	•	•	•	•	•	•	•	•

Notes: Species listed include *Q. macrocarpa* and all species with an average canopy of 5% or more in either year for any treatment. F-value is from nonparametric one-way ANOVA among treatment plots at a site. Nomenclature follows the Great Plains Flora Association (1986). Dots (•) are used in place of zero cover values for visual clarity.

<sup>a, b, c</sup> = Different alphabetic superscripts indicate statistically significant differences ( $p \leq 0.05$ ) among treatment plots as determined by the Student-Newman-Keuls multiple comparison test. Values with the same superscript or without alphabetic superscripts among treatments for any year did not differ significantly.

\* = significant difference between Years 1 and 2 for species indicated (Student's t-test).

† = significant difference in understory canopy cover between study sites where all treatment plots at a site were combined ( $p \leq 0.05$ ; nonparametric one-way ANOVA).

t = trace (<1% cover value).

‡ = Species considered to be invasive or non-native (Great Plains Flora Association 1986).

<sup>†</sup> = *Parthenocissus* spp. includes at least *Parthenocissus quinquefolia*, and *Symphoricarpos* spp. includes at least *Symphoricarpos orbiculatus*.

r = Species considered to be ruderal (Great Plains Flora Association 1986).

TABLE 3  
SHANNON DIVERSITY (H') AND SPECIES RICHNESS (S) BEFORE AND AFTER TREATMENT

Treatment	Five Ridge Prairie						Hitchcock Nature Center					
	Pre-treatment		Post-treatment		t	p	Pre-treatment		Post-treatment		t	p
	H'	S	H'	S			H'	S	H'	S		
Control	2.489	38	2.480	42	0.104	0.921	2.571	24	2.426	33	2.359	0.056
Burn-only	2.597	39	2.936	47	-4.969	0.003	2.072	18	2.176	28	-1.116	0.307
Burn-thin	1.720	34	2.670	49	-10.81	<0.001	1.816	14	2.493*	42	-8.709	<0.001
Burn-clear	2.310	46	2.866	56	-8.103	<0.001	2.441	24	2.728**	50	-4.127	0.006

t = critical value (Student's t-test,  $p \leq 0.05$ ) (Zar 1999).

\* = Incomplete burn

\*\* = Unburned

Prairie) than at the southern sites (Hitchcock Nature Center) (Table 3). Averaged over both sites, the increase in Shannon diversity was least for the lowest intensity treatment (burn-only) (H' increased 8.7%), intermediate for plots burned and cleared (burn-clear) (H' increased 15.1%), and greatest for burned and thinned plots (burn-thin; H' increased 31.5%). Diversity declined 3.1% in control plots (control). Similar responses were observed for species richness (S), although the effect was more pronounced at the southern study area (Hitchcock) where all treatment plots were successfully burned. In the Hitchcock plots, the number of species increased 27.3% without treatment (control), 35.7% in burn-only plots, 66.7% in burn-thin plots, and 52% in burn-clear plots. The background changes in richness may reflect sampling at different times of year before and after treatment.

#### Changes in Cover and Density in the Understory

**Effects on Species Groups.** Among understory plant groups, forb cover was most consistent in its response to treatments, increasing significantly from an average of 8% before treatment to 41% after treatment in burn-clear plots, from 4% to 26% in burn-thin plots, and from 11% to 20% in burn-only plots, although the latter increase was significant only for Five Ridge Prairie Site 1 (Tables 1–2). Without treatment (control), overall forb cover remained at 6% before and after treatment. Graminoid cover for combined sites increased from 8% to 34% in burn-clear plots, although the increase was significant only in three of four plots. Similarly, increases in graminoid cover in burn-thin plots (from 2% to 10%) were significant in

three of four burn-thin plots, although this increase was substantially less than with burning and clearing (burn-clear). By contrast, changes in understory woody species were variable. For example, at Five Ridge Prairie, woody cover declined from 53% to 33% in all six treated plots, with declines significant in all but the burn-clear plot at Site 2. Meanwhile, at Hitchcock Nature Center, average understory woody species cover increased from 8% to 18% in the six treated plots, with increases significant in four plots (Tables 1–2).

**Effects on Individual Herbaceous Species.** While there were generally consistent trends in species group responses, differences in individual species varied considerably among and within treatments.

**Burn-Clear.** The greatest average post-treatment increase in herbaceous cover among all sites was recorded for *Carex* spp. (sedge) (from 6% to 20%) and *Eupatorium rugosum* (white snakeroot) (from 5% to 19%), with both increases occurring in burn-clear plots at both study areas (Tables 1–2). Increases in *Carex* spp., which likely included *Carex blanda* and *Carex sprengelii*, were significant in all study sites, but in only two of the four sites for *Eupatorium rugosum*. *Festuca obtusa* (nodding fescue) and *Elymus villosus* (hairy wildrye) were important graminoids in the understory whose cover increased in all burn-clear plots in which they occurred (from 2% to 5% and from 1% to 10%, respectively), although increases for each species were significant only in one treatment plot at each study area.

**Burn-Thin.** At both study areas, the second-greatest increase in overall herbaceous cover occurred in burn-thin plots. As with the burn-clear treatment, the greatest

average increases in cover occurred for *Carex* spp. (from 1% to 9%) and *Eupatorium rugosum* (from 2% to 10%) with increases significant in two of the three treated plots (Tables 1–2). *Hackelia virginiana* (stickseed) cover also increased in burn-thin plots (on average from <1% to 3%), although the change was significant at Five Ridge Prairie. *Erechtites hieracifolia* cover increased significantly, from 0% to 9%, in the two Hitchcock Nature Center burn-thin plots but was absent from the Five Ridge Prairie burn-thin plots.

**Burn-Only.** The greatest change in cover for burn-only plots was a significant increase in *Teucrium canadense* (American germander) (8% to 13%) in a single plot (Five Ridge Prairie Site 1). For all other herbaceous species, only slight changes in cover were recorded, with increases in some and decreases in others (Tables 1–2).

**Control.** In the absence of burning and tree-cutting, the greatest average increase in the herbaceous community for all sites was recorded for *Carex* spp. at one Hitchcock Nature Center site (Site 2) where cover increased from 2% to 12% (Tables 1–2). The response of *Eupatorium rugosum*, the species with the second-highest cover, was not consistent between study areas, although it increased significantly, from 2% to 7%, at Hitchcock Nature Center Site 2.

**Effects on Woody Species.** Of the 31 woody understory species recorded, pre-treatment cover of five species averaged greater than 1% for all plots: *Celtis occidentalis* (14%), *Cornus drummondii* (rough-leaved dogwood) (6%), *Ostrya virginiana* (3%), *Parthenocissus* spp. (Virginia creeper) (3%), and *Fraxinus pennsylvanica* (green ash) (2%) (Tables 1–2). As with herbaceous species, the response of individual woody plant species varied between study areas and between and among treatments.

Of the five woody understory species with the highest pre-treatment cover, the most consistent response among treatments was at Hitchcock Nature Center, where *Parthenocissus* spp., a woody vine, increased, often significantly, but irrespective of treatment. Changes in cover of *Parthenocissus* spp. in the northern study area (Five Ridge Prairie), however, lacked any discernible pattern. For *Celtis occidentalis*, the understory tree species with the highest average cover, response to treatment differed between study areas. At Five Ridge Prairie, *Celtis occidentalis* average cover decreased from 30% before treatment to 14% after treatment in combined burned plots ( $n = 6$ ), with the decrease significant only in burn-only and burn-thin treatments (Tables 1–2). In contrast, while substantially lower in cover in the southern site

(Hitchcock Nature Center), the cover of *Celtis occidentalis* increased from 1% to 3% within treatment plots, with increases significant in 2 of the 6 plots. Inconsistent patterns in response to treatment were observed for *Cornus drummondii*, *Ostrya virginiana*, and *Fraxinus pennsylvanica*, although the differences between pre- and post-treatment were generally not significant for these species.

For *Quercus macrocarpa*, the dominant tree of historic savannas in the region, average cover increased from 1% to 2% in the two treatments that involved tree-cutting. Only in Site 2 at Five Ridge Prairie, however, did *Quercus macrocarpa* occur in more plots after burning than before (3 plots vs. 1 plot, respectively) (Tables 1–2).

**Effects on Litter Cover.** Bare soil increased from an average for all treated plots ( $n = 12$ ) of 12% before treatment to 21% after treatment (from 3% to 13% for Five Ridge Prairie and 21% to 29% for Hitchcock Nature Center). Litter cover for the same plots decreased from an average of 85% to 66% after burning (from 93% to 76% for Five Ridge Prairie and from 77% to 56% for Hitchcock Nature Center).

### Changes in Cover and Density in the Overstory

**Effects on Density and Canopy Cover.** As designed, the most intense treatment (burn-clear) removed all woody species  $\geq 1$  cm diameter at breast height. Less intense tree removal (burn-thin) resulted in an average reduction from 15 to 3 individuals per 100 m<sup>2</sup> (9 to 3 at Five Ridge Prairie and 22 to 2 at Hitchcock Nature Center) (Table 4). Based on combined treatment plots, average overstory canopy cover declined from 94% to 69% for burn-thin treatments and from 95% to 15% for burn-clear treatments (Table 5). The 15% canopy cover recorded in the burn-clear plots was a function of the wide view of the densiometer reflecting the canopy of large trees uphill from the plot. The control and burn-only plots at Hitchcock Nature Center showed no change in overstory canopy cover, but at Five Ridge Prairie, small declines from 94% to 87% cover were observed for burn-only and from 94% to 90% cover for control. These differences are within the margin of error for spherical densiometers.

Stand basal area also changed predictably in response to treatment. Average control-plot basal area remained the same from before (31.5 m<sup>2</sup> ha<sup>-1</sup>) to after (31.4 m<sup>2</sup> ha<sup>-1</sup>) treatment. Burn-only plots increased slightly in average basal area from 55.4 m<sup>2</sup> ha<sup>-1</sup> to 58.4 m<sup>2</sup> ha<sup>-1</sup>. Burn-thin plots were reduced in average basal area from 34.8 m<sup>2</sup> ha<sup>-1</sup> before treatment to 21.0 m<sup>2</sup> ha<sup>-1</sup> after treatment.

TABLE 4  
DENSITY (NUMBER OF INDIVIDUALS PER 100 M<sup>2</sup>) OF OVERSTORY SPECIES  $\geq 1$  CM DBH  
BY SPECIES, STUDY SITE, AND STUDY AREA

Species	Year	Five Ridge Prairie								Hitchcock Nature Center							
		Site 1				Site 2				Site 1				Site 2			
		Control	Burn- only	Burn- thin*	Burn- clear*	Control	Burn- only	Burn- thin	Burn- clear	Control	Burn- only	Burn- thin	Burn- clear	Control	Burn- only	Burn- thin	Burn- clear
<i>Celtis occidentalis</i>	1	•	•	1	1	•	•	•	•	4	1	•	6	•	•	•	•
	2	•	3	•	•	•	•	•	•	4	1	•	•	•	•	•	•
<i>Cornus drummondii</i>	1	10	1	4	4	•	2	•	1	•	•	•	•	•	•	•	•
	2	21	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•
<i>Fraxinus pennsylvanica</i>	1	1	•	•	•	•	•	•	•	1	2	•	1	•	2	2	•
	2	1	•	•	•	•	•	•	•	•	2	•	•	•	3	•	•
<i>Gleditsia triacanthos</i>	1	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•
	2	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•
<i>Juniperus virginiana</i>	1	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•
	2	•	•	•	•	•	•	•	•	•	v	•	•	•	•	•	•
<i>Ostrya virginiana</i>	1	•	•	•	•	9	•	8	5	15	21	24	15	24	18	11	13
	2	•	•	•	•	8	•	•	•	12	18	•	•	25	18	•	•
<i>Quercus macrocarpa</i>	1	2	3	2	3	1	7	3	1	2	2	4	2	5	1	1	•
	2	2	3	2	•	1	7	4	•	2	2	3	•	5	1	•	•
<i>Quercus rubra</i>	1	•	•	•	•	•	•	•	•	•	•	•	2	•	•	•	•
	2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<i>Ulmus americana</i>	1	•	•	•	•	•	•	•	•	•	•	•	•	1	•	1	•
	2	•	•	•	•	•	•	•	•	3	•	•	•	•	•	•	•
Total	1	14	4	7	8	10	9	11	7	24	26	28	27	30	22	15	13
	2	24	6	2	•	9	8	4	•	22	23	3	•	30	23	•	•

Notes: Year 1 = pre-treatment; Year 2 = post-treatment. Dots (•) are used in place of zeros for visual clarity.

\* = Part of the burn-thin plot and the entire burn-clear plot were not burned.

Burn-clear plots had an average of 27.9 m<sup>2</sup> ha<sup>-1</sup> basal area before treatment, and an absence of woody species stems above 1.37 m following treatment.

## CONCLUSIONS

In general, across treatments we observed a substantial increase in diversity with burning and tree removal.

This result, at least initially, appears to be consistent with other studies on savanna restoration in the Midwest (e.g., Apfelbaum and Haney 1987). The greatest diversity in our treatments ( $H' = 1.77$  to 2.58) resulted from burning and thinning, which might be considered an intermediate level of disturbance between burning only and clear-cutting with burning. With burning only, the amount of light reaching the understory was likely

TABLE 5  
PERCENTAGE OF OVERSTORY CANOPY COVER BY YEAR FOR EACH STUDY SITE,  
STUDY AREA, AND TREATMENT PLOT

Study area	Treatment	Five Ridge Prairie			Hitchcock Nature Center	
		2003	2004	2005	2003	2004
1	Burn-only	90	93	80	89	95
2	Burn-only	89	95	94	87	94
1	Burn-clear	92	95	1	96	14
2	Burn-clear	93	97	18	91	26
1	Burn-thin	90	96	44	91	72
2	Burn-thin	94	97	86	93	75
1	Control	88	91	85	93	95
2	Control	94	96	95	95	97

to have been insufficient to allow germination or growth of shade-intolerant species that could respond to the greater light levels in treatments involving tree removal (Peterson et al. 2007). With clear-cutting, full sunlight (except for shading from the forest edge) could reach more of the ground for longer periods of time than in thinned forest-canopy plots. As a result, species better adapted to respond to full sunlight may have increased their canopy cover in the second year of sampling, thereby reducing the sunlight needed by species requiring high light conditions. The intermediate level of disturbance, burning and canopy thinning, created a patchwork of light levels in the treatment units, from full sunlight to full shade. As a result, a greater range of species could potentially occupy the space (i.e., those suited to either grasslands or woodlands [Leach and Givnish 1999]). This idea is also consistent with Grime's (1973) discussion of the role that intermediate levels of disturbance play in structuring plant community diversity. For example, forest species such as *Osmorhiza longistylis* (anise root) were present in burn-thin plots but not in burn-clear plots, and sun-requiring species such as *Solanum ptycanthum* (black nightshade) were present in burn-thin plots but not in burn-only plots.

#### Understory Cover by Plant Groups

With but one exception (graminoids at Five Ridge Prairie Site 1, burn-thin plot), average cover of graminoids and forbs increased significantly in plots with tree-thinning or clearing. Forbs were most responsive to this treatment. Increases in cover of herbaceous groups

associated with treatment intensity, particularly the greater response of forbs, appears to be a consequence of increasing light levels in the forest. Similarly, observed increases in bare soil and concurrent decreases in litter cover in burned plots may have encouraged establishment of prairie species. Herbaceous species contributing most to increased understory cover were sedges and woodland forbs, which increased in abundance when light levels increased. This may represent an early stage in the recovery of savannas after decades of fire suppression and forest succession (Peterson et al. 2007). After several years of treatment, later stages may involve colonization of plants commonly thought of as prairie species, such as *Andropogon scoparius* (little bluestem) and *Bouteloua* (grama grass) species. Importantly, increases in these groups, particularly graminoids, increased fine-fuel loads, resulting in conditions more suitable to future higher-intensity burning than presently is possible in these stands. The ability to carry fire is necessary, both in the restoration of *Quercus* savanna and in maintaining natural dynamics of the ecosystem.

Changes in understory woody species in response to treatment were more variable but consistent with results reported in other studies (e.g., Nuzzo et al. 1996). The increase in woody plant cover at Hitchcock Nature Center and decrease at Five Ridge Prairie may reflect less rainfall (approximately 18 cm per year), a shorter growing season, or other differences in the north compared to the south, as suggested by Trecek-King (2003). Other explanations for these differences, such as biotic interactions or abiotic stresses and treatment conditions, cannot be excluded. Despite the short post-treatment sampling period



evaluated in this study, possible longer-term effects are indicated. For example, the slight reduction in overstory *Ostrya virginiana* density with fire treatment alone at the southern site (Hitchcock Nature Center) may represent a significant effect because *Ostrya virginiana* is a forest understory tree. This result suggests that fire alone may affect thin-barked woody plants, which are common in forest environments. Another effect suggested in this study is that manual woody plant removal may be necessary to increase herbaceous cover, and hence fine-fuel loading, in order to support fires sufficiently intense so as to reduce woody plant cover in the understory. Whether fuel loading from sedges and forest herbs is sufficient to kill mature trees in the Loess Hills is not known, but studies from other midwestern savanna restoration efforts suggests that such effects may occur if treatments are repeated frequently (Chapman and Brewer 2008). Similarly, burning at different times of year, such as summer or fall, could also differently affect the results.

### Understory Cover by Species

**Herbaceous Species.** As treatment intensity increased, subsequent herbaceous cover increased in several species (Tables 1–2). In particular, native and nonnative herbaceous species associated with prairies or open habitats either occurred for the first time or were greater in number where canopy cover was reduced (e.g., *Verbena stricta* [hoary verbenal]), whether resulting from burning or tree removal (see complete table in McKenzie 2006). These increases included graminoids (e.g., *Festuca obtusa* and *Elymus villosus*).

Among all species, the greatest significant increase in cover was in *Carex* spp. and *Eupatorium rugosum* in burned and cleared plots and in burned and thinned plots, respectively. Several *Carex* species are common in native prairie habitat, so the increase of this genus may be consistent with an increase in prairie species with treatment intensity, but many *Carex* species are also present in regional woodlands. However, while ubiquitous in regional woodlands, *Eupatorium rugosum* is rare in native prairies, although it was probably a component of historical savanna ecosystems and is known to increase following fire (Nuzzo et al. 1996). In plots that were burned and clear-cut, *Erechtites hieracifolia*, *Hackelia virginiana*, and *Galium aparine* (stickweed bedstraw) increased significantly, while *Festuca obtusa* and *Elymus villosus*, common forest understory graminoids, increased, albeit not significantly. These changes indicate the importance of opening the canopy during the savanna restoration process.

Rapid increase in cover of some graminoids and forbs suggests a robust soil seed bank or more likely, the abundance of wind-dispersed seeds. However, the absence of some of the most common prairie species (e.g., *Andropogon scoparius* and *Bouteloua* species) after treatment suggests that natural restoration of the understory herbaceous components of savanna in the study region will likely be a lengthy process.

**Woody Species (<1 cm dbh).** Most understory woody species declined with treatment, although declines were not in proportion to treatment intensity, and most woody species were still present in the understory after treatment. One possible example of woody plant reduction was the significant decline in *Cornus drummondii*, a woody shrub considered to be a successional species but one commonly found in formerly open areas, even long after canopy closure (McClain and Anderson, 1990). The susceptibility of this species to burning has been variously reported (e.g., Heisler et al. 2004). Had our sites contained a greater fine-fuel load and burned more intensely, there likely would have been a more uniform reduction of *Cornus drummondii* following fire across all sites (Haney et al. 2008). Our results suggest at least a short-term reduction of this species, but long-term studies show *Cornus drummondii* to increase with burning due to resprouting (e.g., Briggs et al. 2005).

Beyond *Cornus drummondii*, trends in other woody plant species were less clear, and they persisted in the understory after treatment. The greatest changes in cover across treatments and sites occurred with *Celtis occidentalis*, although changes were not consistent in direction and amount among treatments and study areas. However, taken together with the observed infrequent occurrence of *Quercus macrocarpa* regeneration, the persistence of *Celtis occidentalis* in our study, irrespective of treatment, suggests that at least in the southern Loess Hills (where all plots were completely burned) it has the potential ultimately to dominate these woodlands as it has elsewhere (Bellah and Hulbert 1974; Abrams 1986; Phillips 2001).

The persistence of woody plants in the understory, despite declines in cover, is consistent with results from studies by Brudvig and Asbjornsen (2005) and Ansley and Castellano (2006) who suggest that in the short term, fire alone cannot effectively reduce woody species in previous savanna areas that subsequently experienced several decades of fire suppression. In our study neither *Ostrya virginiana* nor *Parthenocissus* spp. showed discernible trends in response to treatments. *Quercus macrocarpa*, a dominant species in the historical savanna, showed little response to treatment. The short time frame of this study

was probably not sufficient to detect germination and development of this species, but other studies report fire as an essential part of *Quercus macrocarpa* regeneration success (e.g., Peterson and Reich 2001).

### Overstory Woody Species (dbh $\geq 1$ cm)

Manual removal of trees in the burn-clear and burn-thin treatments greatly reduced the density of tree species with a diameter at breast height  $\geq 1$  cm. These effects appeared to be exclusively the result of manual tree removal. We saw only slight declines in density (from 21 to 18 individuals/100 m<sup>2</sup>) of *Ostrya virginiana* at the southern study area (Hitchcock Nature Center), although this may reflect sampling error rather than an actual decline in cover. This result, however, is consistent with results reported by Brown (1960) even though the duration of our study was too short term to definitely identify a pattern of decline. Daubenmire (1936) also observed that after long fire-free intervals, fire decreased *Ostrya virginiana* populations in the Minnesota "Big Woods." However, top-killed *Ostrya virginiana* trees have been observed to resprout (Swan 1970), suggesting the need for repeated burning if complete removal of resprouting species is a management objective. In the burn-thin plots we removed all species except *Quercus macrocarpa*, and in the burn-clear plots, we removed all woody species. It is important to note that different tree species can affect aspects of community structure and function in different ways, and the removal of one species may have more substantial and immediate effects on the community as compared to the removal of another species (Ellison et al. 2005).

Our results suggest that in the short term, a combination of burning and tree-cutting has the potential to increase the cover and diversity of herbaceous species in former Loess Hills savanna communities, although many of these may be either ruderal or woodland species. An increase in graminoids is particularly important because it reflects an increase in the amount of fine fuel, which can increase fire intensity and the concomitant mortality of woody plants (Fuhlendorf and Smeins 1997). Removal of more tree canopy can result in greater amounts of fine fuel in the understory, and species diversity may be greatest when some trees remain, probably due to variable light levels, allowing a mixture of shade-tolerant and shade-intolerant species to coexist. A single burn, however, does not appear to effectively reduce tree canopy, even though fire has been shown to be important for maintaining established savanna (e.g., White 1983; Peterson and Reich 2001). A single burn,

however, does appear to increase fine-fuel loads for future burns. Overall, our results suggest that restoration of savanna understory species in the Loess Hills can be initiated with tree-cutting and fire. Restoration of an oak savanna with prairie plants in the understory, however, will most likely require repeated treatments to control undesirable woody plants, and to provide conditions for a sufficient period of time for prairie or savanna species to become established.

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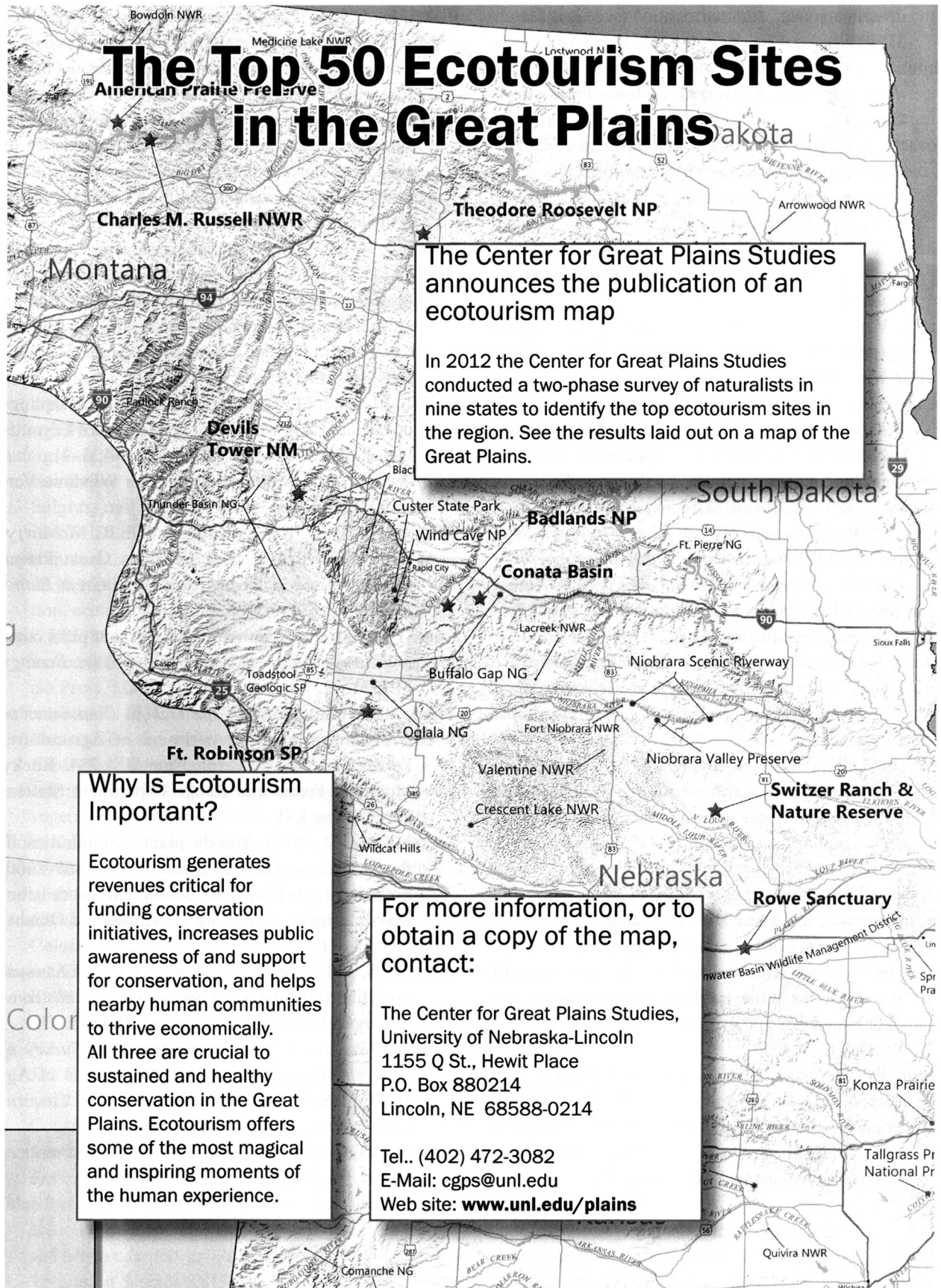
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# MONITORING STANDING HERBAGE OF THE SANDS AND CHOPPY SANDS ECOLOGICAL VEGETATION TYPES IN THE NEBRASKA SANDHILLS

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**ABSTRACT**—A modified Robel pole with white and gray alternating bands (2.54 cm) was used to measure vegetation on sands and choppy sands ecological types in the Sandhills of Nebraska. Objectives were to determine the relationship between visual obstruction readings (VOR) and clipped standing herbage, develop guidelines for monitoring standing herbage, and provide sample size estimates. Visual obstruction measurements of standing herbage were linear, and regression coefficients were significant ( $P < 0.001$ ) for 125 transects ( $R^2 = 0.60$ ,  $SE = 496$  kg/ha). Clipped standing herbage ranged from 293 to 4389 kg/ha with a mean of 1,559 kg/ha. A minimum of four transects (20 stations/transect with four readings/station) is required for monitoring key areas or small areas up to 259 ha in size. Cluster analyses (ISODATA) applied to VOR and standing herbage resulted in four resource categories: short, short intermediate, intermediate, and tall. Band 3 corresponded to approximately 40% utilization of herbage. The protocol and guidelines developed provide managers with a tool that is cost effective, accurate, and reliable for management and monitoring standing herbage.

**Key Words:** grassland structure, livestock, management, Robel pole, wildlife

## INTRODUCTION

Standing herbage or standing crop and vegetation structure are important variables for managing multiple uses such as livestock grazing, wildlife habitat, plant and animal diversity, and protection from soil erosion (Bement 1969; Hooper and Heady 1970; Heady and Child 1994; Reece et al. 2001). Standing herbage has been conventionally estimated by clipping, drying, and weighing the vegetation from plots or transects. This procedure is limited in practice because of time, cost, and sample size constraints (Benkobi et al. 2000). A modified Robel pole with 2.54 cm bands as specified by Benkobi et al. (2000) provides greater precision and accuracy for the same effort. Monitoring vegetation for an ecological vegetation type with the Robel pole can be accomplished at the local or landscape level.

Monitoring rangelands often involves indirect methods of assessing forage utilization or estimates of standing herbage. Ocular methods are widely used for monitoring, but they suffer from inaccuracies and observer biases (Schultz et al. 1961; Kershaw 1973; Irving et al. 1985; Block et al. 1987). The Robel pole marked for

visual obstruction readings overcomes the drawbacks of indirect methods based on subjective observations.

Several studies involving the Robel pole, direct clipping of vegetation, estimating standing herbage, and relating these to wildlife habitat have been performed in the Sandhills of Nebraska (Frolik and Keim 1933; Gilbert et al. 1979; Potvin and Harrison 1984; Stubbendieck and Reece 1992; Volesky et al. 1999; Reece et al. 2001; Volesky et al. 2005; Volesky et al. 2007). An overall review of the ecology of plants and animals, soils, livestock grazing, climate, geology, hydrology, and streams and lakes in the Sandhills is presented by Bleed and Flowerday (1990). Stubbendieck et al. (1989) provide an additional review of the literature. However, no research has been conducted with the Robel pole to monitor standing herbage or to establish guidelines based on VOR and standing herbage on the sands and choppy sands ecological type.

The objectives of this study were (1) to quantify the relationship between standing herbage and visual obstruction readings, (2) to develop sample size estimates for the number of transects required to achieve adequate precision for monitoring, and (3) to develop guidelines for monitoring and management.

## STUDY AREA

This study was conducted on the Samuel R. McKelvie National Forest located southwest of Valentine and on the Bessey Ranger District at Halsey (Nebraska National Forest), a combined area of approximately 82,463 ha (203,770 acres). The Sandhills in Nebraska include sand dune hills to sandy basins and valleys. This study focused on vegetation in the sands and choppy sands ecological types (USDA-NRCS 2000, 2001). Dominant plants include sand bluestem (*Andropogon hallii* Hack.), little bluestem (*Schizachyrium scoparium* [Michx.] Nash), prairie sandreed (*Calamovilfa longifolia* [Hook.] Scribn.), needle-and-thread grass (*Stipa comata* Trin. & Rupr.), hairy grama (*Bouteloua hirsuta* Lag.), blue grama (*Bouteloua gracilis* [H.B.K.] Lag.), and sedge (*Carex* spp.). Common forbs are green sagewort (*Artemisia* spp.), lemon scurfspea (*Psoralea lanceolata* [Pursh] Rydb.), and western ragweed (*Ambrosia psilostachya* DC.). Plant nomenclature follows the Great Plains Flora Association (1986). Elevations range from 1,219 to 1,310 m above sea level. Average annual precipitation at Halsey (87-year average) is 541 mm, most of it occurring as rain from April through August (High Plains Regional Climate Center 2011). Average maximum temperature is 16.9°C and average minimum temperature is 1.4°C. The frost-free period is 150 days.

## METHODS

Visual obstruction readings (VOR) and clipped vegetation data were collected in the fall of 1997 after a killing frost. All procedures and methods follow Benkobi et al. (2000). The modified Robel pole has alternating white and gray bands (2.54 cm bands) with the bottom band labeled 1. VOR were recorded at a distance of 4 m, from the four cardinal directions, with the reader's eye at a height of 1 m. The lowest visible band was the recorded VOR. If the first band, placed at the soil surface, was visible, the reading was 0; however, if the first band was totally obscured, the reading was 1. Transects were 200 m long with Robel pole stations spaced 10 m apart. At stations 50, 100, 150, and 200 m along the transect, vegetation was clipped to ground level. All clipped vegetation was oven-dried at 60°C for 48 hours and weighed to the nearest 0.1 g. Weights were expressed as kilograms/hectare.

A stratified sampling design based on vegetation height (short, intermediate, and tall) was used to collect transect data (Cochran 1977; Thompson et al. 1998; Levy and Lemeshow 1999). A total of 125 transects were located randomly within the three strata and on sands and

choppy sands ecological vegetation types (USDA-NRCS 2000, 2001). Sampling vegetation was conducted in the fall after frost over a broad range of pasture conditions from no grazing through heavy grazing. Data were used over this broad range of sampling to define guidelines for resource management.

All data for VOR and clipped standing herbage were averaged by transect for statistical analyses. Linear regression (SPSS 2003) was used to quantify the relationship between VOR and standing herbage, and ISODATA was used for cluster analyses (Ball and Hall 1967; del Morel 1975) to establish resource groupings and management guidelines. All VOR and standing herbage (kg/ha) were standardized (individual data subtracted from the sample mean/standard deviation) to give equal weight for cluster analyses. Probability plots were examined for normality of residuals. Significance is at  $P = 0.05$  unless actual  $P$ -values are presented. The number of transects required for monitoring standing herbage, one section (259 ha) at a precision of 20% of the mean at 80% confidence, was based on the grouping variance within the resource categories.

## RESULTS

VOR values ranged from 0.5 to 7.1 bands with an overall mean of 2.5. Oven-dried, clipped herbage had a mean of 1,559 kg/ha and ranged from 293 to 4,389 kg/ha. The relationship between standing herbage and VOR was linear, with a correlation of determination of  $R^2 = 0.60$  (Fig. 1). Both slope and intercept of the regression model were significant ( $P < 0.001$ ). Examination of normal probability plots showed residuals were normally distributed. The slope was 349.5 kg/ha per band with an intercept of 669.0 kg/ha.

Cluster analyses resulted in four distinct categories (Table 1): short (0.5–1.7 bands), short intermediate (1.8–3.5 bands), tall intermediate (3.6–5.4 bands), and tall (5.5–7.0+ bands). Standing herbage (kg/ha) by categories included short (844–1,263), short intermediate (1,298–1,892), tall intermediate (1,927–2,556), and tall (2,591–3,116). These categories represent heavy, moderate, light, and no grazing. Herbivory at 40% utilization based on the mean of the tall category (2,836 kg/ha) is 1,702 kg/ha residual herbage remaining on the rangeland. This equates to approximately band 3. The number of transects needed to estimate standing herbage based on the variance from the four groupings at a precision of 20% of the mean with 80% confidence was four transects per section (259 ha).

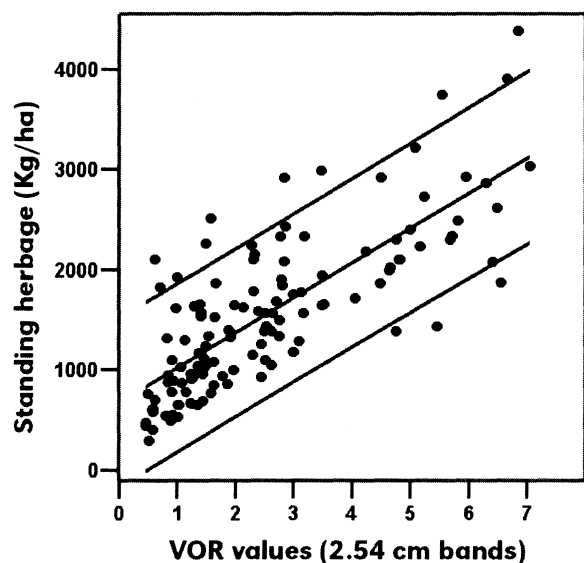


Figure 1. Relationship between VOR values (pole bands) and standing herbage. Prediction intervals are 90% for individual transects. SE is the standard error of the estimate. Standing herbage (kg/ha) =  $660.0 + 669.0 \times \text{bands}$ .  $R^2 = 0.60$ .  $SE = 496$ .

TABLE 1  
CATEGORIES OF STANDING HERBAGE IN  
SANDS AND CHOPPY SANDS ECOLOGICAL  
TYPES DEFINED BY CLUSTER ANALYSIS

Category		Minimum	Mean	Maximum
Short ( <i>n</i> = 47) <sup>a</sup>	Band:	0.5	1.1	1.7
	Kg/ha: <sup>b</sup>	844	1,053	1,263
Short intermediate ( <i>n</i> = 48)	Band:	1.8	2.3	3.5
	Kg/ha:	1,298	1,473	1,892
Tall intermediate ( <i>n</i> = 22)	Band:	3.6	4.8	5.4
	Kg/ha:	1,927	2,347	2,556
Tall ( <i>n</i> = 8)	Band:	5.5	6.2	7.0+
	Kg/ha:	2,591	2,836	3,116

Note: Bands (2.54 cm) represent visual obstruction readings (VOR).

<sup>a</sup>Number of transects.

<sup>b</sup>Standing herbage (kg/ha) is based on VOR band-weight equation.

## DISCUSSION

Comparisons of several Robel studies show differences among various vegetation types in the Sandhills or in other sandy areas. In the current study, standing herbage per VOR centimeter, 275.2 kg/ha, was 12.1% lower

than on sandy soils (Benkobi et al. 2000). Our standing herbage study per VOR centimeter was 44% lower than reported by Vermeire and Gillen (2000) in a tallgrass prairie in Oklahoma with similar vegetation. Clearly, the weight per centimeter is less in the current study on sands and choppy sands.

USDA-NRCS (2000, 2001) reported maximum standing herbage of 3,026 kg/ha for choppy sands soils and 3,250 kg/ha for sands soils. Standing herbage for the tall category in our study is in close agreement with USDA-NRCS standing herbage values. Therefore, it seems reasonable to use the mean of the tall category as a measure of the potential of the sands and choppy sands vegetation for development of resource guidelines.

Grazing a pasture to band 3 (leaving 1,702 kg/ha standing herbage) is commensurate to 40% utilization, a common guideline for range use, and is the recommended guideline for maintaining residual vegetation. At this level of use, it should be possible to maintain or even improve the vegetation (Hooper and Heady 1970; Holechek et al. 1989; Heady and Child 1994). I do not advocate changing the guideline yearly to adjust bands to 40% utilization of the current year's standing herbage. With VOR-based monitoring, a fixed amount of residual standing herbage is maintained through wet and dry years. Maintaining the proper amount of residual vegetation results in cooler soil for a longer period during the growing season, and increased plant growth and production. It also greatly reduces wind speed at the soil surface, reducing wind erosion and soil evaporation (Beetle et al. 1961; Lal 1994; Molinar et al. 2001). The guideline may be altered based on the results of trend monitoring.

Monitoring standing herbage for livestock use on rangelands is generally based on utilization measurements (NAS-NRC 1962; Holechek et al. 1989; Heady and Child 1994). The fixed amount of forage utilization by livestock is estimated from the current year's peak standing herbage. The peak standing herbage varies from year to year, so the residual amount remaining is highly variable between and among years, assuming 50% utilization. During wet years, more residual herbage is left. In dry years there is less. Several consecutive years in which minimal residual herbage remains will negatively impact the subsequent year's growth (Stubbendieck and Reese 1992). Monitoring with VOR, a fixed amount of residual standing herbage (band 3) is maintained regardless of yearly variation in peak standing herbage. In dry years, the impact on resources will be minimal or avoided, and in wet years, additional time or numbers of livestock may be allocated.

Four resource categories were defined from clusters analyses (Table 1) for management of livestock and wildlife. These categories correspond to none, light, moderate, and heavy grazing and may be useful with the various grazing management systems presented by Stubbendieck and Reece (1992). Wildlife habitat requirements for residual standing herbage will vary by animal species. Sharp-tailed grouse is a key species whose nesting habitat it is prudent to manage at approximately VOR band 4 (>3.4 inches) (Prose et al. 2002). Sharp-tailed grouse select nesting sites up to approximately band 5 (4.7 inches) in the Sandhills (Reece et al. 2001). Maintaining a range of residual standing herbage wherein 10%–15% of the vegetation is in the short and tall categories and the remainder in the intermediate categories is recommended to maintain diversity (Mueller-Dombois and Ellenberg 1974; Rumble and Gobille 1998; Fritcher et al. 2004; Benkobi et al. 2007).

Future sampling with an unknown variance will require four transects to be within 20% of the mean with 80% confidence for estimating standing herbage. This has long been the standard for management of federal lands (USDA Forest Service 1996). Monitoring with four transects applies for a section of land (259 ha) or key areas. When the objective is to manage for a specific VOR, a one-sided t-test using the variance of the four transects is appropriate (Steel and Torrie 1980; Uresk and Juntti 2008; Uresk et al. 2010). Monitoring with four transects (Robel pole bands = 1.27 cm) in the Bighorn National Forest showed differences from an established band at 0.64 cm (0.25 inches) 95% of the time (Uresk and Juntti 2008, Tongue District, Bighorn National Forest, Sheridan, WY, 2011). When considering a higher level of precision with the current study, a sample size estimated to be within 10% of the mean with 95% confidence for monitoring standing herbage would be 23 transects to monitor 259 ha. At this level, science-based resource management and monitoring for residual standing herbage would essentially be cost prohibitive. Benkobi et al. (2000) explains the methodology for landscape monitoring. Uresk (2012) found that validation data collected in July for a fall cool-season grass model on the Fort Pierre National Grassland could be used to monitor from near-peak standing herbage to fall.

As with any field technique, monitoring with the Robel has several constraints. Monitoring requires staying within the ecological vegetation types described for sands and choppy sands. Sampling outside these types will produce spurious results when estimating standing herbage. The model was developed with standing herbage and has constraints when the vegetation is subjected to heavy

rains, winds, and heavy snow after melts. The vegetation may bend over, resulting in errors for estimating standing herbage.

## CONCLUSIONS

Monitoring rangeland resources for standing herbage and visual obstruction readings on sands and choppy sands with the Robel pole is simple and precise. I developed four resource management guidelines corresponding to the intensity of grazing. Managing for a mosaic of short, short intermediate, tall intermediate, and tall vegetation structures provides diversity in residual vegetation required for key wildlife species. A guideline of three bands of standing herbage for removal of livestock (1,702 kg/ha) should maintain or improve the range resource. The calibrated Robel pole is a tool that provides data and information for resource managers to determine compliance of management plans for vegetation conditions and to implement guidelines.

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# REVIEW OF CONSPECIFIC ATTRACTION AND AREA SENSITIVITY OF GRASSLAND BIRDS

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**ABSTRACT**—Many species of grassland birds are area sensitive, which may exacerbate the ecological effects of the extensive loss and fragmentation of grasslands that has taken place across the northern Great Plains. However, the reasons for this area sensitivity are unclear, as vegetation structure, matrix composition, and restriction of movements among patches do not seem to provide viable explanations for species native to grasslands. Conspecific attraction, whereby species are behaviorally stimulated to select habitat or establish territories near individuals of the same species, may help explain this area sensitivity. We review and discuss theoretical and empirical research on avian conspecific attraction and area sensitivity of grassland birds. While the body of literature on these subjects is growing, there have been few experimental tests of conspecific attraction in grassland bird species and none that investigate its role in grassland-bird area sensitivity. We suggest that research into the role that conspecific attraction may play in grassland-bird habitat selection could provide new insights into the mechanisms behind area sensitivity in grassland birds and yield new management tools for their conservation.

**Key Words:** area sensitivity, behavioral ecology, conspecific attraction, grassland birds, landscape ecology

## INTRODUCTION

The grassland ecosystems of North America's Great Plains have undergone dramatic reduction and fragmentation since European settlement (Samson and Knopf 1994; Samson et al. 2004). Avian habitat suitability may be influenced by the size and configuration of the habitat patch, its spatial distribution in the landscape (Brennan and Kuvlesky 2005), and the landscape matrix surrounding the patch (Donald and Evans 2006). Hence, the extensive declines of grassland bird populations that have occurred over the last few decades (Herkert 1995; Peterjohn and Sauer 1999) have largely been attributed to habitat loss and the interrelated issues of habitat fragmentation and degradation (Peterjohn and Sauer 1999; Johnson and Igl

2001). Some mechanisms triggered by habitat fragmentation in forest songbirds are understood relatively well; for example, small forest fragments are often associated with decreased reproduction due to increased nest parasitism and increased predation nearer to edges (Tewksbury et al. 2006). However, the proximate mechanisms responsible for the effects of fragmentation on grassland birds remain largely unknown and do not appear to be the same as those that affect forest species. Many grassland bird species exhibit area sensitivity, even where there are no significant structural differences between smaller and larger patches discernable to human researchers, but few empirical studies have been able to conclusively explain the ecological factors and mechanisms behind this trend (Ribic et al. 2009).

Behavioral phenomena may help explain why many grassland bird species seem to avoid small patches that are composed of structurally adequate habitat at local and landscape scales (Ahlering and Faaborg 2006, Ribic et al. 2009). Social information from conspecifics (individuals of the same species) may provide important indicators of habitat quality, especially for individuals that are dispersing from the nest and prospecting for future territory locations (Ahlering and Faaborg 2006; Ahlering et al. 2010). Small, unoccupied patches may remain unoccupied if the presence of conspecifics influences the settlement response of dispersing and prospecting individuals; that is, the presence of conspecifics might be needed to encourage colonization (Stamps 1988; Smith and Peacock 1990; Ahlering and Faaborg 2006; Bourque and Desrochers 2006; Fletcher 2009).

Conspecific attraction has been shown to explain area sensitivity exhibited by least flycatchers (*Empidonax minimus*) in a fragmented forest landscape (Fletcher 2009) and has been shown to contribute significantly to the settlement patterns of two grassland bird species, Baird's sparrow (*Ammodramus bairdii*; Ahlering et al. 2006) and bobolink (*Dolichonyx oryzivorus*; Nocera et al. 2006). However, conspecific attraction has not yet been studied in the majority of grassland bird species that occur in the Great Plains, nor has it been studied in relationship to area sensitivity for any grassland bird species.

Understanding how local, patch, and landscape-scale habitat characteristics interact with behavioral mechanisms of habitat selection in grassland bird species may be critical for preventing further declines in grassland bird populations. This understanding may be even more important given the reduced extent, ecological alterations, and high degree of fragmentation of grassland habitats in the Great Plains. Below, we review theoretical and empirical research on avian conspecific attraction and area sensitivity, and highlight how this intersection of landscape ecology and behavioral ecology could inform management strategies for grassland bird conservation.

## DISCUSSION

### Area Sensitivity of Grassland Birds

Grassland bird populations have declined more precipitously than any other group of birds in North America, as evidenced by North American Breeding Bird Survey (BBS) data and anecdotal accounts preceding the initiation of the breeding bird survey in the mid-

1960s (Herkert 1995; Peterjohn and Sauer 1999; Herkert et al. 2003). This is commonly attributed to loss of native grassland, disruption of natural disturbance regimes, habitat fragmentation, and degradation of remaining native habitat due to the encroachment of woody and exotic vegetation (Peterjohn and Sauer 1999; Johnson and Igl 2001).

Area sensitivity, which refers to a pattern wherein the probability of occurrence and/or density of a species is higher in larger habitat patches (Robbins et al. 1989), may exacerbate the effects of habitat loss and fragmentation and therefore be an important factor contributing to declines in grassland bird populations (Johnson and Igl 2001). Because the extent of grassland ecosystems has been drastically reduced and many remaining patches are small and highly fragmented (Samson and Knopf 1994; Samson et al. 2004), species that avoid small patches have even less habitat available (Koper et al. 2009).

Of the obligate grassland passerine bird species that are consistently reported to occur in lower densities in smaller patches (see review in Ribic et al. 2009), all have undergone population declines between 1966 and 2009, according to data from the breeding bird survey (Sauer et al. 2011). These declining, area-sensitive species include Baird's sparrow, chestnut-collared longspur (*Calcarius ornatus*), dickcissel (*Spiza americana*), eastern meadowlark (*Sturnella magna*), Henslow's sparrow (*Ammodramus henslowii*), horned lark (*Eremophila alpestris*), Sprague's pipit (*Anthus spragueii*), and vesper sparrow (*Poocetes gramineus*). Reported area sensitivity varies in other declining grassland songbirds, such as bobolink, grasshopper sparrow (*Ammodramus savannarum*), Savannah sparrow (*Passerculus sandwichensis*), and western meadowlark (*Sturnella neglecta*) (Ribic et al. 2009; Sauer et al. 2011). To the best of our knowledge, area sensitivity of two of the most precipitously declining grassland bird species, lark bunting (*Calamospiza melanocorys*) and McCown's longspur (*Rhynchophanes mccownii*), has not been studied. Documenting avian area sensitivity and understanding the mechanisms behind it is, therefore, important for understanding the effects of habitat loss and fragmentation on grassland bird populations (Vickery and Herkert 2001; Ribic et al. 2009).

There may be multiple, complex, and interrelated reasons for area sensitivity in songbirds (Ribic et al. 2009). For example, edge effects and the surrounding matrix may reduce the reproductive success, survivorship, and therefore density of certain bird species in fragmented landscapes, particularly in smaller patches (Herkert et al. 2003; Ribic et al. 2009). However,

mechanisms that seem to be obvious explanations for area sensitivity in forest songbirds, such as less cover in clearcuts or agricultural fields surrounding forests, and therefore higher mortality rates in the matrix, seem unlikely to explain area sensitivity in grassland songbirds. For example, nesting success in mixed-grass prairies is actually higher closer to habitat edges (Davis et al. 2006; Koper and Schmiegelow 2006). Large patches, especially those with high sinuosity, may have more overall edge than do small patches; however, small patches still tend to have more edge relative to interior area than large patches, all else being equal. Moreover, horned lark and lark bunting nesting success in short-grass prairies is higher in smaller patches (Skagen et al. 2005). Therefore, if grassland birds select habitat to maximize their productivity, and if nesting success is higher closer to habitat edges and smaller patches, then this should attract birds to smaller patches. However, the opposite pattern is usually observed (e.g., Davis 2004; Herkert 1994; Mozel 2010; Winter and Faaborg 1999).

Effects of patch size, habitat edge, and landscape matrix on grassland birds vary among species. Some grassland songbird species, such as sedge wren (*Cistothorus platensis*), may be more likely to occur in small grassland patches that have a less treed edge and/or a surrounding landscape with higher amounts of grassland cover (Bakker et al. 2002). However, other species (e.g., dickcissel) do not seem to avoid treed edges and are less likely to occur in small patches regardless of the amount of grassland cover in the landscape (Bakker et al. 2002). Further, many landcover types in agro-ecological systems in the Great Plains, such as pastureland and idle hayland seeded with exotic perennials, are utilized as surrogates for native grasslands by grassland birds (Davis et al. 1999; Warren and Anderson 2005).

Although the mechanism(s) precipitating grassland-bird area sensitivity likely vary among species, it seems that local vegetation structure and composition, patch configuration, and landcover composition of the surrounding matrix do not fully explain the area sensitivity exhibited by many grassland bird species (e.g., Herkert 1994; Helzer and Jelinski 1999; Winter and Faaborg 1999; Davis 2004; Winter et al. 2006; Ribic et al. 2009; Mozel 2010). Traditional ecological explanations for resource selection seem to offer only partial insight into why grassland songbirds avoid small grassland patches. Instead, we suggest that area sensitivity in some, or even many, species of grassland birds might be explained by their behavioral ecology and dependence on social information provided by cues from conspecifics.

## Conspecific Attraction

Conspecific attraction describes the phenomenon whereby an individual of a territorial species is behaviorally stimulated to establish its territory adjacent to territories occupied by individuals of the same species, resulting in species aggregations (Stamps 1988; Ahlering and Faaborg 2006). Although conspecific attraction has been documented in territorial species from a wide variety of vertebrate taxa (Stamps 1988; Smith and Peacock 1990), it has not been studied in most species and guilds, and it is not well known how widespread the phenomenon of conspecific attraction actually is throughout the animal kingdom (Stamps 1988; Bourque and Desrochers 2006). Conspecific attraction may serve as a mechanism for indirect but effective assessment of habitat quality: it may be more efficient to obtain information about the quality of habitat indirectly via the transmission of information among individuals than through direct habitat sampling by individuals, as the latter can be costly and time-consuming (Stamps 1988).

Territorial species may benefit from aggregation in ways similar to colonial species; the territory aggregations of territorial species are simply at lower densities than those of colonial species (Stamps 1988). Increased reproductive opportunities and success, enhanced predator detection and defense, increased defense against intruders, and opportunity to indirectly assess habitat quality have been proposed as potential adaptive advantages of territory aggregation and conspecific attraction (Stamps 1988; Ahlering and Faaborg 2006; Ahlering et al. 2010).

A number of studies have demonstrated that grassland songbird territory aggregations cannot be explained by patterns of resource distribution alone. For example, Nocera et al. (2009) found that the territories of Savannah sparrows were clustered, but that the clusters were discordant with resource abundance and distribution. Etterson (2003) found that individual loggerhead shrikes (*Lanius ludovicianus*) that were inexperienced breeders tended to nest nearer to already established nests of experienced breeders than was predicted by the distribution of suitable nest trees. In instances where spatial autocorrelation of the landscape composition and habitat structure within patches do not explain territory aggregations, conspecific attraction may be operating (Bourque and Desrochers 2006) and may be an important factor influencing territory selection (Ahlering and Faaborg 2006). Indeed, several studies have experimentally demonstrated that conspecific attraction may play an important role in

avian territory selection (e.g., Alatalo et al. 1982; Ward and Schlossberg 2004a; Betts et al. 2008; Fletcher 2009), including among grassland songbirds (e.g., Ahlering et al. 2006; Nocera et al. 2006).

Location cues, such as postbreeding song, have been experimentally demonstrated to cause strong settlement responses in birds, irrespective of habitat quality, as indicated by high recruitment in experimental treatment plots where playing audio recordings of conspecific song provided false cues in structurally suboptimal habitat (e.g., Nocera et al. 2006; Betts et al. 2008). In some species, conspecific song in the postbreeding season has been found to be a reliable indicator of breeding success, which suggests that direct evidence of breeding success may not be necessary for conveying useful habitat quality information (Betts et al. 2008).

### **Conspecific Attraction and Metapopulation Theory**

Patch colonization and extinction rates are a function of patch size, configuration, distance, and connectivity to other patches (MacArthur and Wilson 1967; Ray et al. 1991). However, species-specific behavioral mechanisms, such as conspecific attraction, may also have strong influence on metapopulation dynamics (Smith and Peacock 1990; Ray et al. 1991; Lima and Zollner 1996; Campomizzi et al. 2008; Nocera et al. 2009; Ribic et al. 2009). If the absence of conspecifics dissuades dispersing individuals from colonizing a patch, then vacant patches that are otherwise suitable might be bypassed (Ray et al. 1991). Conversely, dispersing individuals may preferentially select occupied patches simply because of the detected presence of conspecifics (Ray et al. 1991). As such, occupied patches may receive disproportionately higher numbers of dispersers and empty patches may have disproportionately lower colonization than expected (Ray et al. 1991).

This behavioral component of metapopulation dynamics may help explain area sensitivity of migrant grassland songbirds: migrants returning to their breeding range in the northern Great Plains might be more likely to encounter and settle in larger patches, elicit settlement responses from additional conspecifics, and thus concentrate populations in the relatively few remaining large grassland patches. Furthermore, natal philopatry and breeding-site fidelity is generally low among migratory songbirds (Weatherhead and Forbes 1994), especially among grassland species (e.g., Balent and Norment 2003; Jones et al. 2007). Thus, if behaviorally driven preferen-

tial selection of large grassland patches occurs, it likely happens via annual attraction of dispersing individuals to conspecifics encountered in large patches rather than by perennial returns of the same individuals to their former breeding sites. Vacancy of small patches may be perpetuated from year to year if individuals prospecting for future territories utilize postbreeding conspecific location cues to indirectly assess habitat quality (*sensu* Nocera et al. 2006); currently vacant patches will be assumed to contain lower-quality habitat than currently occupied patches, and thus settlement in vacant patches will be lower in future breeding seasons.

Therefore, conspecific attraction may help to explain avian area sensitivity (Bourque and Desrochers 2006; Fletcher 2006, 2009; Ribic et al. 2009). In one of the few experimental tests of this hypothesis, Fletcher (2009) found that the area sensitivity of least flycatchers in a fragmented forest landscape in Montana vanished in response to experimental playback of conspecific song. Conspecific attraction may be a particularly important explanation for area sensitivity among grassland songbirds, as mechanisms that might explain area sensitivity in forest species, such as hostile matrix and edge effects, do not seem appropriate for grassland birds (see "Area Sensitivity of Grassland Birds," above). The combination of significant fragmentation of grasslands and behaviorally driven area sensitivity may be one of the factors precipitating population declines in North America's grassland birds.

### **Implications of Conspecific Attraction for Conserving Grassland Birds**

If populations are founded and immigration is encouraged through conspecific attraction, vacant patches may remain vacant even if they consist of suitable habitat, and smaller populations are more likely to decline. Moreover, species that become concentrated in a few large grassland patches via behaviorally driven settlement patterns might be at higher risk of total extinction than species that disperse randomly (Ray et al. 1991). This poses a challenge to conservationists and wildlife managers attempting to maximize habitat utilization by declining species, as simply increasing the area of available habitat may not always attract colonizers (Ahlering and Faaborg 2006; Laiolo and Tella 2008). However, if artificial conspecific cues can entice individuals to settle in vacant habitat, it may offer opportunities for conservation and species recovery (Ward and Schlossberg 2004a). This technique may prove particularly useful for management of grassland birds,



given that the majority of remaining grassland patches are very small (e.g., in northern tallgrass prairie; Koper et al. 2010) and because edge avoidance greatly decreases selection of small habitat fragments by some grassland bird species, such as Sprague's pipit (Koper et al. 2009).

Experimental studies have shown that playback of conspecific song is sufficient to elicit strong settlement responses in several forest songbird species (e.g., Ward and Schlossberg 2004a; Betts et al. 2008; Fletcher 2009). Betts et al. (2008) found that conspecific song in the postbreeding season was a reliable indicator of breeding success in black-throated blue warblers (*Dendroica caerulescens*), suggesting that more complex forms of social information may not be necessary to convey useful information about habitat quality. In certain forest bird species, the use of decoys in combination with playback does not elicit a stronger settlement response than that of playback alone (Ward and Schlossberg 2004a; Betts et al. 2008).

Playback and decoys have also elicited settlement responses from the two species of grassland birds that have been experimentally tested: Baird's sparrow (Ahlering et al. 2006) and bobolink (Nocera et al. 2006). Visual location cues may be more important for species that inhabit open environments, such as grasslands, than they are for forest species (Ward and Schlossberg 2004b). Ahlering et al. (2006) did not accompany their Baird's sparrow song playback with decoys, but Nocera et al. (2006) tested the effect of playback and decoys on bobolink and found that the artificial acoustic and visual location cues in combination elicited strong settlement response. This suggests that in grassland systems, playbacks should perhaps be accompanied by decoys when artificial conspecific cues are intended to attract grassland songbirds to suitable grassland patches or restored prairies. The necessity for both visual and acoustic cues for this purpose will need to be experimentally evaluated.

Given the degree of grassland habitat fragmentation in North America and the (theoretically) strong possibility that the area sensitivity exhibited by many grassland bird species is behaviorally driven, artificial cues may present a particularly useful tool for maximizing habitat occupancy by grassland birds and preventing further declines in their populations. There are growing numbers of experimental studies investigating bird responses to artificial conspecific location cues (Ahlering et al. 2010). However, with the exception of using playback and decoys to facilitate the relocation of threatened prairie grouse lek sites (e.g., Eng et al. 1979), to the best of our knowledge there are no instances where playback

or decoys have been applied as a management tool for increasing avian occupancy of grassland habitat patches. Moreover, manipulative testing of the role of conspecific attraction in grassland bird area sensitivity has not been pursued.

Managers may be hesitant to apply behavioral manipulations for bird management because conspecific attraction has only been studied in a handful of avian species; the extent to which it occurs in other bird species is not known, and where it is known to operate, it is still poorly understood (Bourque and Desrochers 2006). However, there may also be good theoretical reason for managers to approach the use of artificial conspecific location cues with caution: using them to elicit a settlement response in vacant patches may create population-sink habitat if those patches are of poor quality due to some factor that is not apparent to human managers (Ward and Schlossberg 2004a; Ahlering and Faaborg 2006). For example, artificial conspecific cues have been used to coerce individuals, especially younger ones, to adopt territories in very poor habitat quality (Nocera et al. 2006; Betts et al. 2008). Nocera et al. (2006) found that bobolinks respond strongly to playback and decoys deployed in the postbreeding season, irrespective of habitat quality, as indicated by high recruitment in suboptimal habitat in experimental treatment plots in the breeding season following treatment. However, perpetuating settlement traditions were not initiated in suboptimal habitat, indicating that avian settlement traditions likely will not develop or persist if adequate resources are not present. Ward and Schlossberg (2004a) found that populations of forest songbird species founded through attraction to artificial conspecific cues were far more likely to persist if nesting success was high. This would suggest that artificial settlement cues might result in short-term suboptimal settlement decisions, but are unlikely to create a persistent population sink.

These precautions may be especially pertinent to experimental or management-oriented manipulation of grassland birds, given already significant declines in their populations. However, these risks must be balanced with the risks of ignoring avian avoidance of small patches. In the mixed-grass prairies of southern Alberta, only 3.4% of the grassland patches contain habitat that is far enough away from edge that it would support a population of Sprague's pipits at 50% or higher of its normal density in the absence of edge avoidance (Koper et al. 2009). Anthropogenic habitat fragmentation combined with behavioral avoidance of edges means that virtually all remaining grassland patches are unsuitable for this species. Conservation of Sprague's pipit and other area-sensitive

species might be strongly dependent on anthropogenic encouragement to use the small amount of grassland habitat that remains on the landscape.

The degree to which conspecific attraction occurs, and explains grassland bird area sensitivity, likely varies among species. Thus, differing responses to fragmentation among species may vary with their responses to conspecific social cues (Bourque and Desrochers 2006). Due to behaviorally influenced area sensitivity, the same level of fragmentation may represent a much greater loss of habitat for species that exhibit conspecific attraction than for species that do not, and such species may be much slower to recolonize a patch following a local extinction (Stamps 1988; Bourque and Desrochers 2006). Species that aggregate via conspecific attraction may have larger area requirements than individual/pair territory sizes because larger patches permit aggregation of multiple pairs (Stamps 1988; Bourque and Desrochers 2006).

#### Next Steps for Future Research

Investigation of the relationship between conspecific attraction and area sensitivity and its potential management implications for grassland birds must be done on a species-by-species basis and in a manner that avoids creating population sinks. We recommend that future research should address the following:

Mensurative studies of area sensitivity should be conducted for species that have not yet been assessed, especially those that are declining rapidly (e.g., lark bunting and chestnut-collared longspur). Patch characteristics, landscape composition, local habitat structure, and local resource availability should be assessed as alternative hypotheses to conspecific attraction to explain area sensitivity. Multiscaled analyses of habitat covariates and investigations of predation and brood-parasitism rates may be required for thorough assessment. Thus, the first step is to identify species that exhibit area sensitivity that is not fully accounted for by distribution of habitat and resources.

For such species, conspecific attraction should be assessed within large patches using mensurative studies of territory aggregations relative to resource distribution (e.g., Nocera et al. 2009) and manipulative experiments employing artificial cues (e.g., Ahlering et al. 2006). Demographic and behavioral studies of area-sensitive species that exhibit conspecific attraction should then be carried out to assess whether they require larger local populations, and therefore larger patches, to realize the adaptive advantages of territory aggregations (e.g.,

genetic benefits or safety in numbers). Manipulative tests of whether artificial cues can elicit settlement responses from a grassland songbird species in small patches of vacant habitat should proceed if there is evidence that the species is area sensitive, that it exhibits conspecific attraction in large patches, and that small patches are able to provide it with productive habitat.

#### CONCLUSION

Recognizing the potential influence of behavioral mechanisms on grassland-bird resource selection may be important for understanding their settlement patterns and population trends. Although area sensitivity in grassland birds is relatively well documented, experimental tests of conspecific attraction have only been conducted for two grassland songbird species. Whether conspecific attraction influences settlement patterns remains unknown for most grassland bird species, and our knowledge of how it may relate to area sensitivity is entirely lacking.

Further investigations into area sensitivity, conspecific attraction, and artificial conspecific location cues may yield new tools for actively combating the effects of habitat loss and fragmentation on declining grassland bird populations, so long as empirical evidence and continued monitoring indicate that treated patches are not population sinks. Colonization, self-perpetuating settlement, and productivity initiated by artificial cues in previously unoccupied patches would provide evidence of a fascinating behavioral-ecological phenomenon and a practical tool for conservation of declining species.

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## NEW DISTRIBUTIONAL RECORDS OF GREAT PLAINS PSEUDOSCORPIONS (ARACHNIDA: PSEUDOSCORPIONES)

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**ABSTRACT**—Pseudoscorpions are tiny, oval, brown, flattened arachnids that possess large “pinchers” in front of the body for capturing smaller prey. They generally live in forested habitats in soil litter or beneath loose bark. It has been presumed that pseudoscorpions are scarce in the Great Plains, except for along rivers, due to harsh climatic conditions. However, new records of pseudoscorpions from the Great Plains were derived from identification of specimens obtained from university and college collections, and from specimens collected by the first author. Records provided new revelations about distributions of not only the more commonly known pseudoscorpion species but also species previously not believed to be adaptable to grassland habitats. For example, *Dactylochelifer silvestris* Hoff, a western species, appears to be common throughout the Great Plains, with new state records from Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Texas and Wyoming. In addition, *Parachernes nubilis* (Hoff) previously was not known from Kansas, Nebraska, or Texas, and *Parachernes virginicus* Hoff, *Apocheiridium stannardi* Hoff, *Hysterochelifer proprius* Hoff, and *Chthonius tetrachelatus* (Preyssler) are newly recorded for Nebraska. Records of *Microbisium parvulum* from Rapp (1978) in Nebraska were bolstered by five more in the state.

**Key Words:** pseudoscorpion, false scorpion, arthropod records, Great Plains, grasslands, ecology, yucca, sagebrush

### INTRODUCTION

The Great Plains is a vast grassland region generally lying west of the Missouri River and east of the Rocky Mountains in the United States and Canada (Wishart 2004). It extends from southern Canada to the Rio Grande along the Mexican border in Texas and is transected by rivers and streams mainly flowing eastward from the Rockies (Fig. 1). Altitude increases east to west from less than 150 m (500 ft) above sea level to more than 1,524 m (5,000 ft). Topography is quite diverse, having alluvial and upland plains, hills, canyons, escarpments, buttes, badlands, and intrusions of much higher mountains.

Formerly this region consisted of immense expanses of tallgrass, mixed-grass, and shortgrass prairies. It now can be described as a complex patchwork of prairies, pastures, rangeland, agricultural cropland, and mostly small rural communities interconnected with transportation routes.

Pseudoscorpions, also referred to as “false scorpions,” are tiny, brown, flattened arthropods that possess large grasping pincers in front, called palps, for seizing and feeding upon smaller prey (Fig. 2). Unlike a scorpion, they have no tail, but like their spider cousins, they produce silk to line their chambers for protection during dormancy or to encase their eggs. Most species are associated with woodland microhabitats such as soil surface litter,



Figure 1. Simplified map of the Great Plains, showing boundaries.

loose bark of trees, rotted logs, rock crevices, beneath stones, and bird and rodent nests. They prefer moist, organic habitats in which other small invertebrates thrive. In their feeding habits, pseudoscorpions are limited to smaller prey, such as tiny insect larvae, springtails, mites, ants, booklice, small worms, and other soft-bodied micro-invertebrates. They are limited in their ability to disperse, but many pseudoscorpions hitchhike great distances by grasping onto beetles, flies, and moths (Weygoldt 1969; Muchmore 1990; Beccaloni 2009).

Biologists do not know much about pseudoscorpions in the Great Plains. Pseudoscorpions frequently have been associated with deciduous forest regions (Nelson 1975). Hoff and Bolsterli (1956) reported several species from deciduous forests along the major streams that transect the Great Plains but did not expect that there would be any in grasslands, due to inhospitable climatic conditions. Hoff (1959) also made reference to the eastern two-fifths of Colorado, which lies in the Great Plains, as an area "occupied by a grassland community, but where

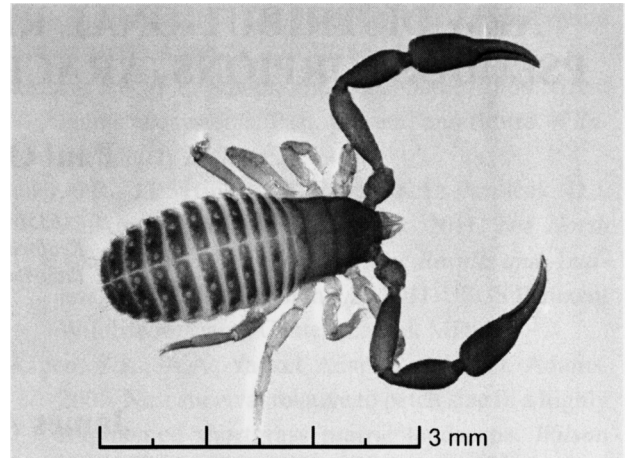


Figure 2. Pseudoscorpion (*Dactylochelifer silvestris*), adult male.

pseudoscorpions have not become adapted to grassland conditions, with the exception that species are often found in woody debris and litter of trees along watercourses and near lakes and springs, as well as in the debris of nests of birds and rodents." However, Rapp (1978) in a preliminary study collected *Microbisium parvulum* Hoff from nine of 28 sites in tallgrass and mixed-grass prairies in Nebraska. He postulated that moisture and depth of litter were important factors that limit pseudoscorpions in grasslands or pastures, noting also that overgrazed native pastures in particular are almost devoid of arthropods living in soil and litter, including pseudoscorpions. In conclusion, this earlier literature cited suggests that pseudoscorpions are less abundant in the prairies presumably because of limited microhabitats (litter) and harsh climatic conditions, primarily due to the drying action of the wind and the sun. We report results of our studies to test this idea and to better understand distributions of pseudoscorpion species in the Great Plains.

## MATERIALS AND METHODS

Many new records of pseudoscorpions from the Great Plains were derived from our study of specimens obtained by request from university and college collections, with corresponding abbreviations, as follows: Chadron State College (CSCC), Colorado State University (CSUC), University of Kansas Snow Entomological Museum (SEM), University of Minnesota (UMSP), University of Nebraska State Museum (UNSM), University of New Mexico Museum of Southwestern Biology (UNM), North Dakota State University (NDSU), Oklahoma State University (OSEC), South Dakota State



University (SDSU), and West Texas State University (WTSU).

These pseudoscorpions largely came from student collections in field biology courses or as incidental specimens collected during field research projects involving evaluation of other arthropods in soil and litter in specific types of prairie grassland, such as the tallgrass or shortgrass prairie biomes. These specimens were mainly obtained either by extraction from grass or associated soil using a metal funnel and light apparatus called a Berlese funnel or by collection from pitfall traps inserted in the ground.

The remainder of the new records came from pseudoscorpions collected by the senior author at 21 sites while traveling several times across parts of the Great Plains from 1999 to 2009. Sites selected for investigation were those thought to offer protective microhabitats favoring pseudoscorpions and other tiny invertebrates on which they feed. This included litter from bases of yucca plants and sagebrush (Fig. 3), dense tussocks of bunchgrasses, tree bark and organic debris below trees, leaf litter, and objects on the ground. Leaf detritus and rotting yuccas were pulled apart and sifted through a 4.0 mm mesh screen over a white enameled pan. Tree bark was pulled from dead trees or stumps and gently struck against the inside edge of the pan to dislodge arthropods clinging to the bark, and the surfaces of trunks or stumps were carefully examined for specimens. Material collected from bunchgrasses was taken directly from the soil-plant interface by pulling up grass tussocks and sampling associated organic debris. When a tussock was pried from the soil, the roots were pulled apart and these and the rest of the plant were sifted by mesh screen over an enameled pan. Pseudoscorpions were removed from the fine residue and placed in vials containing 70% ethyl alcohol.

Taxonomic keys used for identifications were from publications by Hoff (1949; 1956a, 1956b), Muchmore and Alteri (1973), Nelson (1975), Benedict and Malcolm (1979), and Buddle (2010).

Most of the material collected by the first author in this study will be deposited in the University of Nebraska State Museum except material marked "PCC", which the senior author has retained.

## RESULTS

Following is a list of 52 records. Each record includes state, county, location, and collector, if known. Fifteen new state records, as indicated with an asterisk (\*), were determined as a result of this study.



Figure 3. Sagebrush (*Artemisia tridentata*), habitat for pseudoscorpions.

### CHTHONIIDAE:

*Chthonius tetrachelatus* (Preyssler)

#### \*Nebraska

— Dawes Co., Brigg's Pond, Berlese funnel, twigs and leaves, 17-IX-04, H.R. Lawson. (UNSM)

### CHERNETIDAE:

*Microbisium parvulum* Hoff

#### Kansas

— Geary Co., Konza Prairie Research Natural Area, grass litter sample, tallgrass prairie, 16-II-1996, J. Blair. (PCC)  
— Kiowa Co., 13 mi. S. of Greensburg, leaf litter, 11-I-2004, G. Salsbury. (UNSM)

#### Nebraska

— Harlan Co., Harlan County Lake, S. of Alma, under cottonwood log, 4-X-2004, P. Cooney. (UNSM)  
— Lancaster Co., Nine-Mile Prairie, W. of Lincoln, vacuum, tallgrass prairie, *Andropogon gerardii*, 1-X-2007, S. Schaeffer. (UNSM)  
— Saunders Co., UNL ARDC, S. of Mead, soil plug, *Panicum virgatum*, 20-IX-2007, S. Schaeffer. (UNSM)  
— Sheridan Co., Metcalf Wildlife Area, litter sample near water, 25-V-2005, H.R. Lawson. (CSCC)  
— Sioux Co., Gilbert-Baker Fishing Pond, litter, Berlese funnel, 18-V-2005, 25-V-2005, H.R. Lawson. (CSCC)

## North Dakota

— Grand Forks Co., Inkster, extracted from moss, 26-IX-1959, D. Kuske. (NDSU)

## South Dakota

— Edmonds Co., Bowdle vicinity, Lat. 45.47764, Long. 99.519436, grass, 3-VII-2001, C. Noble. (SDSUC)

*Parachernes nubilus* (Hoff)

## Colorado

— Washington Co., Prewitt Reservoir, extracted from bunchgrass, shortgrass prairie, 16-V-1999, P. Cooney. (PCC)

## \*Kansas

— Kearny Co., Santa Fe Ruts Trailside Area, E. of Lakin, extracted from rotting yuccas, 24-VII-2009, P. Cooney. (SEM)

## \*Nebraska

— Dawes Co., Fort Robinson, Icehouse Pond, litter sample, 14-VII-2005, H.R. Lawson. (UNSM)

## New Mexico

— Union Co., Kiowa National Grassland, S. of Clayton, County Rd. CC, extracted from dead yuccas, 22-VII-2009, P. Cooney. (UNM)  
 — Union Co., Kiowa National Grassland, S. of Oliver Rd., extracted from grass clump, 23-VII-2009, P. Cooney. (UNM)  
 — Union Co., Route 406, N. of Goodin Draw, sifted from *Artemisia* litter, 23-VII-2009, P. Cooney. (UNM)

## \*Texas

— Randall Co., under log, 20-III-1997, D. Sissom. (WTSU)

## Wyoming

— Goshen Co., 9 mi. SW of Lingle, mixed-grass prairie, pitfall trap, T24N R64W, 104°29'W, 42°01'N, 24-VI-2002, collector unknown. (PCC)

*Parachernes virginicus* Hoff

## \*Nebraska

— Deuel Co., I-80 Chappell rest area, under dead bark on cottonwood, 16-VII-2009, P. Cooney. (UNSM)

## CHEIRIDIIDAE:

*Apocheiridium stannardi* Hoff

## \*Nebraska

— Deuel Co., Chappell I-80 rest area, under willow bark, 16-VII-2009, P. Cooney. (UNSM)

## CHELIFERIDAE:

*Dactylochelifer silvestris* Hoff

## Colorado

— Sedgwick Co., Julesburg, under railroad ties, shortgrass prairie, 25-V-1999, P. Cooney. [det: R. Fagerlund] (PCC)  
 — Weld Co., IBP-Pawnee Site, 15-XII-1972, J. Leetham. (CSUC)

## \*Kansas

— Norton Co., Route 383 rest area, extracted from grass tussocks, 17-IX-2003, P. Cooney. (UNSM)  
 — Wallace Co., Weskan, extracted from grass-weed litter, 17-IX-2003, P. Cooney. (UNSM)

## \*Montana

— Carter Co., Boyes, Route 212 picnic area, extracted from grass clump, 7-X-2004, P. Cooney. (UNSM)  
 — Carter Co., as above, but from *Reithrodontomys* nest under *Artemisia*, P. Cooney. (UNSM)  
 — Dawson Co., I-94 rest area, extracted from grass litter, 7-X-2004, P. Cooney. (UNSM)  
 — Yellowstone Co., Laurel, under boards in yard, ??-IX-2005, A. Grandpre. (PCC)

## \*Nebraska

— Cherry Co., 1 mi. N. of Niobrara River, Route 81, extracted from dead *Yucca glauca*, 6-X-2004, P. Cooney. (UNSM)

— Cherry Co., Ponderosa stand near Niobrara River, CDC mosquito trap, 13-IX-2004, H.R. Lawson, Mugo and Schwarting. (CSCC)

— Harlan Co., Harlan Co. Lake, S. of Alma, under cottonwood logs, 4-X-2004, P. Cooney. (UNSM)

— Frontier Co., Red Willow Reservoir, extracted from dead *Yucca glauca*, 5-X-2004, P. Cooney. (UNSM)

— Frontier Co., as above, but from *Andropogon scoparius* clump, P. Cooney. (UNSM)

#### \*North Dakota

— South Unit, Theodore Roosevelt National Park, extracted from sod, 24-VI-1965, G. Thompson. (NDSU)

#### \*Oklahoma

— Garfield Co., Carrier, KB trap, 3-VII-1995 LT. (OSEC)

— Ottawa Co., Afton, KB trap, 6-VII-1995, LT. (OSEC)

#### \*South Dakota

— Charles Mix Co., Snake Creek Lakeside Usage Area, extracted from dead *Yucca glauca*, 9-X-2004, P. Cooney. (SDSU)

\*Texas (The following Texas material borrowed from WTSU collection.)

— Donley Co., 6 mi. W. of Clarendon, under boards, 20-IX-1994, M. Curry.

— Hutchinson Co., Lake Meredith National Recreation Area, no other data.

— Hutchinson Co., Lake Meredith National Recreation Area, Spring Canyon, NE end of lake, 20-IX-1994, D. Sissom and B. Johnson.

— Kleberg Co., Kingsville (junction of US 77 and TX 242), 10-IX-2000, Capes-Hendrixson.

— Lipscomb Co., 5 mi. E, 1 mi. N. of Follett, 4-X-2000, J. Babitake.

— Potter Co., Lake Meredith National Recreation Area, McBride Canyon, 20-IX-1994, DS/WP.

— Potter Co., as above, except 29-VII/8-VIII and 19-X/26-X-1995, T. Rothblatt.

— Potter Co., Lake Meredith National Recreation Area, Mullinaw Canyon, under log, 9-X-1994, DS/WP.

— Potter Co., Lake Meredith National Recreation Area, Chicken Creek, under log, 28-X-1994, DS/WP.

— Potter Co., N. of Amarillo on US 287 at Canadian River bridge, 27-IX-2000, A. Miller.

— Randall Co., Ceta Canyon, FM 1721, 2.5 mi. N. of junction FM 285, 7-X-2000, anonymous.

#### \*Wyoming

— Converse Co., about 2 mi. W. of Fort Fetterman, *Artemisia* litter, 21-VII-2009, P. Cooney. (UNSM)

— Converse Co., 1 mi. N. of Glenrock, *Artemisia* litter, 21-VII-2009, P. Cooney. (UNSM)

#### *Hysterochelifer proprius* Hoff

#### \*Nebraska

— Hooker Co., Mullen, camping area, phoretic on *Alaus occulatus*, 13-VII-2004, R. Wall. (UNSM)

#### *Parachelifer longipalpus* Hoff

#### Nebraska

— Lancaster Co., Lincoln, extracted from bark of rotten logs, 18-IX-2000, F. Baxendale. (UNSM)

## DISCUSSION

Information obtained from identifications of specimens in this study indicates clearly that some common species of pseudoscorpions have the ability to adapt to a wider variety of habitats than previously known. For example, Hoff's (1961) Colorado records for *D. silvestris* are from collections taken in forested habitats under logs and rocks, under pieces of bark lying on the ground, debris and litter at base of a yellow pine, in aspen litter, and mixed cottonwood and box elder litter at elevations from 1,676 m (5,500 ft) to 2,804 m (9,200 ft). Hoff's (1963) survey of the Black Hills for pseudoscorpions did not detect *D. silvestris*, and records were chiefly from wooded areas, suggesting a closer affinity with the Rocky Mountains than the Great Plains. However, in this study, *D. silvestris* was found at various exposed grassland locations such as in grass clumps, beneath sagebrush litter, in dead yucca, and at elevations lower than those reported by Hoff. And proximity of collection locations to the Black Hills, as indicated in Figure 4, suggests that this species would be

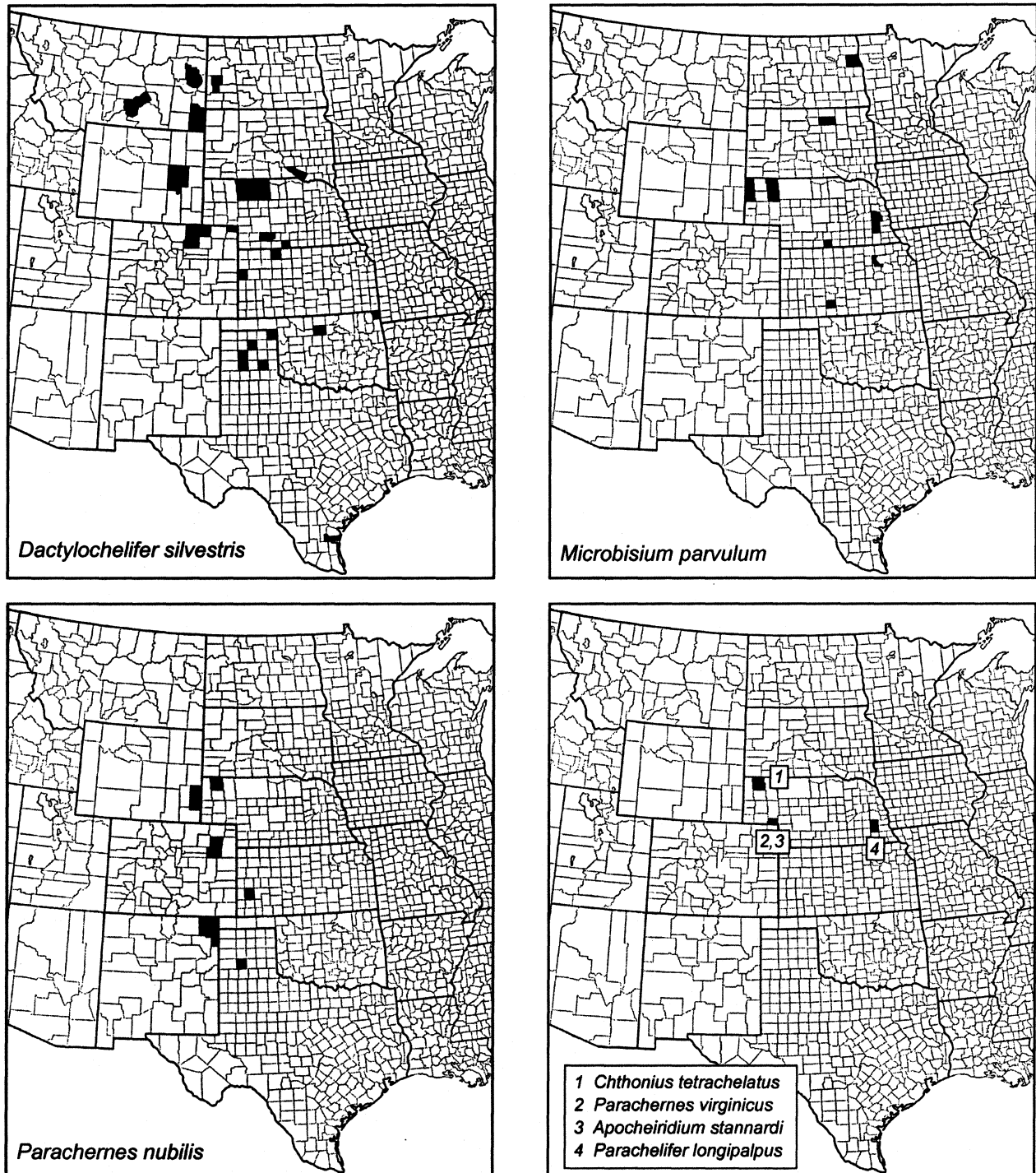


Figure 4. Locations of pseudoscorpion species identified in this study. Shaded counties represent new records.

found there as well. In summary, therefore, *D. silvestris* not only is known to be adapted to mountainous and grassland conditions, but it also has a greater distribution than previously realized.

Specimens from South Dakota and most, if not all, of the Nebraska and Kansas specimens were collected at elevations below 914 m (3,000 ft), and the Oklahoma specimens were collected from sites below 610 m (2,000 ft).

Eight pseudoscorpion species were identified and are listed in this study. Other species may also be found in the Great Plains. Based on records, *Dactylochelifer silvestris* is a species that appears to be common throughout the Great Plains, with new state records from Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Texas and Wyoming. In addition, *Parachernes nubilus* was not previously known from Kansas, Nebraska, or Texas, and *Parachernes virginicus*, *Apocheiridium stannardi*, *Hysterochelifer proprius*, and *Chthonius tetrachelatus* are newly recorded for Nebraska. Records of *Microbisium parvulum* from Rapp (1978) in Nebraska were bolstered by five more from the state. Additional surveys are needed to determine more thoroughly the distributions of pseudoscorpions adapted to Great Plains microenvironments.

#### ACKNOWLEDGMENTS

We thank two anonymous reviewers for their helpful comments. This study would have been impossible without the generous help of others. The authors are grateful to the following individuals and institutions for permitting them to examine pseudoscorpions from their collections: Dr. Randy Lawson, Department of Biology, Chadron State College in Nebraska; Dr. Boris Kondratieff, curator, C. P. Gillette Museum of Arthropod Diversity, Colorado State University; Dr. Gerald Fauske, Department of Entomology, North Dakota State University; Dr. Don Arnold, curator, K. C. Emerson Museum, Oklahoma State University; Dr. Paul Johnson, South Dakota State University; Dr. W. David Sissom, West Texas State University; Mr. Glenn Salsbury of Greensburg, KS. Dr. Jan Peters of Florida A&M University, Dr. Boris Kondratieff of Colorado State University, and Dr. Richard Packauskas of Hays State University in Kansas provided suggestions to improve this article. Last and by no means least, the first author thanks his father, Edgar, for accompanying him and encouraging his interest in pseudoscorpions and the world of nature. The first author wishes to dedicate this work to Dr. Richard J. Snider of Michigan State University for years of help and encouragement.

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## REVIEW ESSAY

**Atlas of the Great Plains.** By Stephen J. Lavin, Fred M. Shelley, and J. Clark Archer. Foreword by David J. Wishart. Introduction by John C. Hudson. Lincoln: University of Nebraska Press, 2011. xvi + 335 pp. Maps, illustrations, bibliography. \$39.95 cloth.

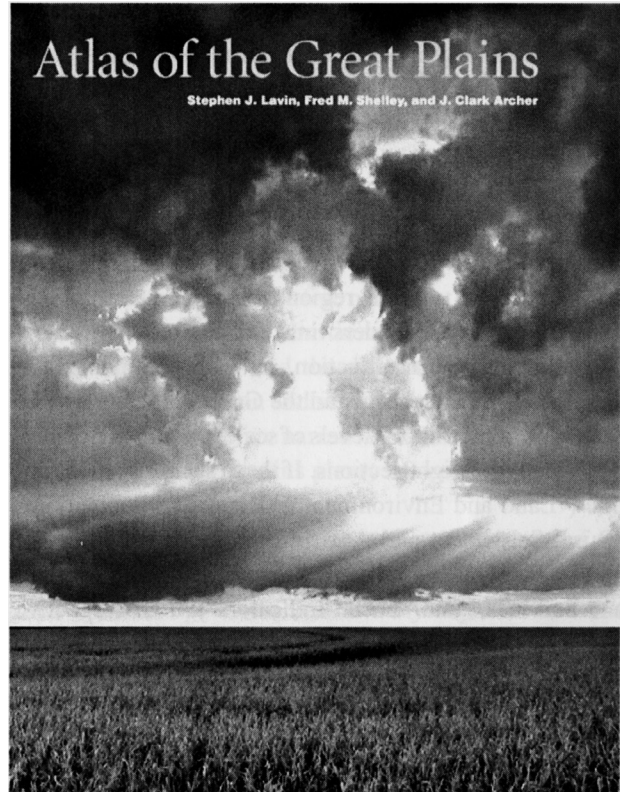
### AN ATLAS TO BE READ FROM COVER TO COVER

In New York earlier this year I found myself embroiled in a vigorous dinner-party debate over the supposedly declining prospects of printed books, journals, and newspapers. The majority view was that “electronic media” would consign such “products” to the dustbin of history; and as to maps and atlases, surely these would likewise disappear. Certainly the current National Geographic *Atlas of the World* would be the Society’s last. Why would anyone need an unwieldy atlas when you can bring up any map on any topic at any scale on your computer screen?

This magnificent, magisterial, sumptuous volume would have silenced even the most ardent advocate of the demise of yet another intellectual symbol of Western civilization. It is an atlas, but it is far more than an assemblage of maps. It is a book, but the narrative is far more than an effective guide to the cartography. It is also unique, even daring in its conception.

Atlases tend to cover familiar geographic ground: the world, or a continent, occasionally a region (such as Western Europe), often a country (many countries still publish “national” atlases), sometimes a subunit such as a province or a state. In the United States, several state atlases form excellent examples of the last: veritable coffee-table, multicolor, glossy promotion pieces for the states they represent.

But comparatively few atlases focus on a geographic concept. This is a risky proposition: gone is the safety of an insular continent, an assembly of contiguous countries, or the political boundary of a state or province. The regional concept of a Great Plains evokes countless interpretations. Give a hundred informed North Americans each an outline map of the continent and ask them all to draw their conception of the Great Plains region, and you will get one hundred different interpretations. Most would probably be aware that the Great Plains region extends from Texas into Canada. All would know that some states lie entirely within the Great Plains and that others are bisected by the region’s boundary, no matter where it is perceived to lie. That, however, is where the



Cover of the *Atlas of the Great Plains*, University of Nebraska Press, 2011.

consensus ends. In his introduction, John C. Hudson presents a map showing fifty published versions of the Great Plains boundary (2). Take the outer limits, and the Great Plains extends from Mexico to the Northwest Territories and from eastern Oregon to western Wisconsin. Thus the Great Plains Reference Map, the framework for the entire enterprise, is of special interest (18). Who would know that Fort Worth lies within the Great Plains, but Dallas lies outside? Or that Cheyenne is in, but Laramie is out?

Conceptual regions, being mental constructs, tend to have smooth, sweeping outlines, as is the case with every one of Hudson’s fifty, and with the map of the Great Plains region originally drawn by the doyen of American Great Plains geographers, David J. Wishart



(12). But the regional boundary on the Reference Map is jagged, reflecting one of the challenges the atlas makers confronted: the problem of data. The atlas is replete with thematic maps, and county data were crucial in constructing these. So the regional boundary's angular appearance reflects an inescapable quantitative imperative as image is translated into reality. As such, it delimits a region that includes the southern half of Saskatchewan and adjacent corners of Alberta and Manitoba, the eastern sectors of Montana, Wyoming, Colorado, and New Mexico, all of North and South Dakota, Nebraska, and Kansas, and most of western Oklahoma and Texas. It is a vast region but, as the jacket blurb asserts, it is "a region that has been understudied and overlooked."

The magnificent *Atlas of the Great Plains* will do much to change this. If you think of an atlas as a place to look something up, think again. This is an atlas to be read from cover to cover. It constitutes a comprehensive prospectus of a vibrant region geographic diversity of which will surprise readers time and again.

Following the introduction, in which boundary and data issues are addressed and the Great Plains Reference Map is presented at two levels of scale, the atlas is topically divided into eight sections. If these sections seem routine ("Land and Environment," "History," "Population," "Rural Settlement and Agriculture," "Urban Settlement and Economy," "Politics and Government," "Recreation and Services," and "Social Indicators"), their respective components are anything but. More than 300 maps, aptly described in Wishart's foreword as "not only significant analytically but also works of art" (xiii), depict items such as tornado tracks, the diffusion of horses among Native American tribes, population ancestries, the diffusion of irrigation, the Wal-Mart invasion, political-party allegiance, symphony orchestras (paired with rodeos!), and crime rates. Many of these topics presented difficult cartographic challenges: how to show FM radio stations and their range? Or hospital accessibility? Or water loss (and gain) in aquifers?

Importantly, although more than 300 map pages are listed in the table of contents, this atlas contains about double that number of individual maps. For example, under the rubric of "Population," the table of contents lists 24 maps, but many of these consist of sets of two or even four, showing historical or other comparative details. In fact, the "Population" rubric contains 61 discrete maps in addition to several diagrams. The *Atlas of the Great Plains* is a veritable mine of information, and there is more to it even than the front matter promises.

In some especially inventive maps, for example one showing daily newspaper circulation (239), the Great Plains region is set in its wider spatial context. Regional newspapers published in the Great Plains are also read beyond its borders, and some newspapers published outside the region have significant readership within. These maps display the region's entire external periphery, not only in complete coverage of the states and provinces within the Great Plains, but also of neighboring states from Minnesota to Louisiana. By reflecting the region's influences beyond its borders as well as external forces radiating inward, such maps yield valuable insights.

Readers will detect some variation in the effectiveness of the coverage under the eight major rubrics. Dramatic scenery may not, by some definitions, be one of the attributes of the Great Plains, but the series of maps and instructive text describing the region's physiography are superb, notably those of elevation, topography, drainage, ecology, and aquifers. The map of ecological provinces (31) is one of those set in wider regional context, showing nearly 30 ecologies of which a dozen have a presence within the Great Plains border. The troubling fate of the High Plains Aquifer is dramatically depicted on a map that will give all readers pause (32). If the section on climate lacks the Köppen regionalization that can be so effective in conveying prevailing regimes and misses an opportunity to depict air-mass synoptics in this infamous funnel between tundra and tropics, it is nevertheless enhanced by vivid displays of two of the Great Plains region's major environmental challenges: tornadoes and hailstorms (43).

Lucid and efficient narrative and splendid maps make Great Plains history come alive in unexpected ways. So much has happened in this vast expanse—*Atlas* coverage ends before the end of the nineteenth century—that this is of necessity a selective presentation, but there is a wealth of information. Maps of the diffusion of horses among Native American peoples (50), the fragments of reservation (52), the tragic decline and adulteration of the American Bison (55 and 56), the drama of exploration (60–64), and the advent of military forts and trading posts, railroads, and the beginnings of modern settlement are chronicled on maps one does not find in the usual atlas. The "Population" rubric follows logically, and in these nearly fifty pages authors and cartographers excel. Guided by engaging text, readers will trace two centuries of changes in regional population density, changing patterns of ethnicity, demographics,

and European ancestries (the last on 120 and 121) that will hold some surprises for many.

In this era of modernization and globalization, it can be difficult to render “Rural Settlement and Agriculture” as a fascinating topic, and in truth this is not the atlas’s most arresting section. While comprehensive on the large issues (wheat cultivation, as the authors say, for many people is synonymous with the Great Plains) and presenting some revealing cartography on the historic expansion of farmland and the spread of irrigation, there is little here about soil types and the particular difficulties Great Plains environments present to farmers. I was surprised to find a section on “miscellaneous crops” without any reference to my favorite: the wine grape. Every state in the Great Plains has a wine industry, and the Texas wine industry in particular has achieved national recognition. This would have been a good way to enliven these pages.

“Urban Settlement and Economy,” the next section, is a treasure trove of information, starting with three memorable illustrations (two of them maps) and eight pages of productive text. A map of metropolitan and micropolitan areas reveals the inaccuracy of a Great Plains conceptualized as a vast, sparsely populated rural area (158), but the regional border superimposed on a “North America at Night” satellite image confirms that the region’s major metropolitan areas are located on its fringes (159). And the map showing businesses and institutions using “Great Plains” in their names displays an interesting geographic asymmetry. This section naturally focuses on industry and employment, and pie charts dated a half-century apart reveal a quite momentous economic transformation. Also featured under this rubric are income variations, retail giants, and energy production, all depicted on more than 40 (rather than 22 listed) maps. Again the atlas delivers far more than its table of contents promises.

The final three sections of the *Atlas of the Great Plains* constitute in many ways the volume’s apogee. Another stereotype of this region is that its politics are overwhelmingly conservative and dominantly Republican, but 16 maps of U.S. presidential elections in the Great Plains states (1860–2008) and 14 maps of national legislative elections in the United States and Canada (1870–2000) indicate otherwise.

No atlas of the Great Plains region would be complete without some reference to football, but the first four maps under the rubric of “Recreation and Services” address symphony orchestras, rodeos, historic landmarks of national import, and powwows. Football, baseball, and basketball get their cartographic due, but only after women’s

NCAA sports teams are mapped (250). This section ends with three fascinating maps showing the Great Plains birthplaces of selected artists, performers, and writers. Prepare, again, to be surprised.

Yet the section that will undoubtedly provoke more discussion than any other is titled “Social Indicators,” with a range of mapped topics as broad as it is contentious. Great Plains states do not rank high on the ladder of public school teacher salaries, a circumstance with serious social consequences (277). Canadian sectors of the Great Plains region display far higher rates of robbery and vehicle theft than the “lower” Great Plains. Prisoner incarceration rates in the Canadian sector are much lower than in the U.S. sector. (Is there a lesson here?) Violent crime rates in the U.S. Great Plains are much higher in the south than in the north. The three maps and an accompanying chart on capital punishment and its spatial manifestations will provoke much debate. So, undoubtedly, will the five maps that follow the series on religious adherence: abortions, infant mortality, births to teenage mothers, and the distribution of poverty for the general population and separately for those under age 18. Especially effective narrative explains what the maps display, but there remains plenty of scope for discussion and alternative assessment.

And that is just one of the many dimensions of this spectacular achievement. This is an atlas that educates and informs, but it also is admirably objective and does not conceal flaws past or present, from the fates of Native American peoples to issues of abortion and capital punishment. Even as the *Atlas of the Great Plains* erases faulty and dated stereotypes about this region, it also focuses on real and current problems and their spatial manifestations.

Preparing for this review I began by scanning the volume and stopping to read several especially interesting maps, finding myself riveted and, it seemed, on a journey of discovery. It has often been said about books, but perhaps never about an atlas, “I could not put it down once I had opened it.” Nor has any atlas ever enhanced my knowledge of any region as greatly as this one has. There can be no doubt about it: no region, certainly in North America and perhaps in the world, is as well served as is the Great Plains region by this monumental work. Its nearly 30-page bibliography is an invaluable resource all by itself. Still, any atlas is an exercise in emphasis, and opinions may differ as to the balance of content in the *Atlas of the Great Plains*: gender contrasts (for example in the employment section) would have added significantly

to the mix and could have strengthened the population section. Given the length and detail of the narrative section, consideration might have been given to the inclusion of an index.

But these are minor caveats. This matchless work should serve as a textbook for college and university courses on the Great Plains region not only in institutions within the Great Plains, but, one hopes, elsewhere in North America as well. It will undoubtedly serve as a template for other projects of this kind elsewhere on the continent. The acknowledgments section forms a reminder of the numerous contributors and talents required to ensure the success of a massive publishing project of this kind, and I congratulate the University of Nebraska

Press not only on its superb production, but specifically on its choice of the glossy, opaque paper without which the maps (often on back-to-back pages) could not have looked the way they do.

I only wish I'd had a copy of this volume that argumentative evening in New York.

**HARM J. DE BLIJ**

John A. Hannah Professor of Geography  
Michigan State University

*Professor de Blij is the author of more than 30 books, including the recently revised Why Geography Matters: More than Ever (Oxford University Press, 2012).*

## BOOK REVIEWS

**Spanish Mustangs in the Great American West: Return of the Horse.** By John S. Hockensmith. Georgetown, KY: Fine Art Editions Gallery and Press, 2009. 271 pp. Photographs, maps, illustrations, bibliography, index. \$49.95 cloth.

A combination of myth and reality, the American West evokes images that feature the mustang as a central player. By using oral histories, books, and images, Hockensmith provides meaningful insight into how the mustang weaves together history and culture. He acknowledges his book is not a regurgitation of historical facts. Rather, it seeks to capture the essence of how one animal evokes cultural values over time.

Hockensmith begins with the prehistory of the horse and highlights the impact it had on taming the West, changing Native American cultures, and its decline in line with advances in technology. The mustang provides an indicator of how the Great Plains have changed over time. Even today, many imagine the Great Plains as an untouched expanse providing escape from urban realities. The mustang plays a vital role in this imagery, documented here through pictures, stories, and poetry.

The imagery ties past to present. Although reliance on the horse diminished over time, the majesty of the mustang against the backdrop of panoramic images lives in our imaginations and cultural celebrations. In a time of economic austerity, Hockensmith's book reminds us that beauty cannot always be quantified. Mustangs provide a tangible entity echoing American values of freedom and independence; they support our belief in "wide-open spaces."

A clear definition of a Spanish mustang is not plainly provided. On several occasions Hockensmith states there is "pure Spanish blood." However, Andalusians have a separate stud book from Sorraias and are held to different statuses over time. Since much of the mixing of Spanish breeds occurred in the Plains without human oversight, it is difficult to determine how much is based on fact or myth. This is not to say that some mustangs have no Spanish markers, but the mixing of Spanish breeds suggests that the bloodlines are not "pure." Why is this significant?

Over the centuries, the mustang has been manipulated based on human cultural values. The mustang is recognized for its beauty and its ability. That recognition changes, however, depending on how humans determine its worth. An initial focus on endurance, agility, and refined beauty of the Spanish horse first introduced to North America gives way to a "type" of horse defined by bloodlines and phenotype. This transition accompanies the declining reliance on horses for work, war, and transportation.

*Spanish Mustangs* can also be read as a cautionary tale. Throughout, there is an implied superiority of the Spanish mustang in comparison to the *Others*, the disparate feral horses that currently roam the Great Plains. Hockensmith comesling

pictures and stories of both types of mustang whose ultimate survival will be determined by the actions of their human counterparts.

KAREN DALKE

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**Birds of Southwestern Nebraska: An Annotated Check-List of Species in the North and South Platte River Valleys and at Lake McConaughy.** By Mary Bomberger Brown, Stephen J. Dinsmore, and Charles R. Brown. Lincoln: Institute of Agriculture and Natural Resources, University of Nebraska–Lincoln, 2012. ii + 152 pp. Maps, photographs, illustrations, references, appendix. \$19.95 paper.

Opening with a map of the region under study, *Birds of Southwestern Nebraska* proceeds, in its introduction, to a summary of the presettlement landscape and a description of the large-scale habitat changes occurring since then, along with avian responses to those changes. While crediting previous avian studies in southwestern Nebraska, often not readily available to the public, the authors note this area initially received little attention from ornithologists, who tended to focus on other biologically unique parts of the state, such as the Sandhills, forests, and Pine Ridge.

The body of the book consists of a list of species reported in southwestern Nebraska, in taxonomic order, with comments on seasonal occurrence (year-round resident, migrant, breeder, winter visitor, etc.), an indication of numbers reported, species status (threatened, endangered, special conservation concern, etc.), and population changes. It is illustrated with photographs of 135 of the 363 species recorded. Photographic quality ranges from adequate for purposes of identification to quite good, with occasional problems of focus or color reproduction.

The individual species accounts contain useful discussions of range changes due to continued global warming over millennia (and increasing at present) and which within the past several decades have added white-faced ibis, Mississippi kite, snowy plover, black-necked stilt, blue-gray gnatcatcher, and great-tailed grackle, all formerly of more southerly distribution, to the area's breeding avifauna. Also discussed are the hybridization zones of orioles (Baltimore and Bullock's), towhees (eastern and spotted), grosbeaks (rose-breasted and black-headed), and buntings (indigo and lazuli), all of which have been the subject of intense study nationally. In addition, comment is made on several subspecies and recognizable races currently under scrutiny by researchers and taxonomists. These discussions within the species accounts are useful to neophytes as well as advanced birders, encouraging an appreciation of the area's and its birds' significance in a continental context.

Overall, the book will be useful to both beginning bird-watchers and more advanced students who wish to learn more about a region also of great interest to historians, biologists, geologists, and the general public. It is a valuable document listing the current avifauna of a biologically significant area undergoing rapid landscape-level changes in agricultural practices, human settlement patterns, recreational use, hydrologic fluctuations, as well as reintroduction of fire into the landscape to control encroachment of woody vegetation. All of these changes seem to be accelerating during a period of rapid global warming, recurring droughts, and other weather extremes.

WAYNE J. MOLLHOFF

Nebraska Breeding Bird Atlas Project  
Ashland, Nebraska

**The Midwestern Native Garden: Native Alternatives to Nonnative Flowers and Plants, An Illustrated Guide.** By Charlotte Adelman and Bernard L. Schwartz. Athens: Ohio University Press, 2011. xv + 268 pp. Illustrations, bibliography, index. \$26.95 paper.

Native plants are important for maintaining biodiversity and supporting birds, mammals, and insects in a particular region. The interaction of plants with other organisms is what makes up food webs, and a shift in one will result in change in the other, change that is often detrimental to both. Invasive plant species, which include many nonnative types, can alter ecosystems with lasting effects on hydrology, nutrient cycling, and habitat. Similar to other regions, the Central Plains is increasingly threatened by the establishment of invasive plant species. The reintroduction of native plant species not only in large natural areas, but also in smaller settings such as home gardens, small pastures, and urban centers, will be critical in combating the advancement of invasive plant species.

In *The Midwestern Native Garden*, Adelman and Schwartz set forth a simple and timely strategy for reducing invasive plant species: plant natives, thereby helping to restore critical ecosystem function in a range of settings. The book is ideal for plant enthusiasts, home gardeners, and anyone who manages landscapes in rural and urban areas of the Central Plains and neighboring regions. The authors have put together a list of nonnative and potentially invasive plants currently available at retail outlets and unknowingly used for display in private and public settings. For each nonnative plant, at least three to four native alternatives are suggested, along with written and pictorial information on plant characteristics and beneficial insects. Other key features that make the book especially useful are its notes, glossary, and bibliography sections, as well as a detailed index.

Adelman and Schwartz present information on plants along with less extensive material on other organisms in an easy-to-read manner appropriate for a beginning gardener or the college-level instructor. The book's main sections follow the

seasons, beginning with spring and ending with winter, thereby providing a broad framework in which to classify each nonnative plant species and potential native alternative. While focused on nonnative plants in gardens and urban landscapes, its list of alternatives spans a wider geographic range and should have broad appeal among individuals managing everything from school grounds and parks to rangelands and riparian areas, the latter two common in the Central Plains.

Readers will appreciate the lengthy introductions to each section, interspersed as they are with quotes from historical figures and early pioneers viewing the landscape for the very first time. In emphasizing the importance of using native plants, *The Midwestern Native Garden* will engage gardeners, landscape professionals, and land managers alike.

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**Agricultural History: History of the Prairie West Series, Volume 3.** Edited by Gregory P. Marchildon. Regina, SK: Canadian Plains Research Center Press, 2011. xvi + 410 pp. Maps, notes, photographs, illustrations, tables, index. C\$59.95 cloth.

This is the third book of the History of the Prairie West Series published by the Canadian Plains Research Center in Regina, Saskatchewan. The series, edited by Gregory P. Marchildon, consists of articles previously published in *Prairie Forum*, a journal devoted to the northern Great Plains, primarily the region encompassing the provinces of Alberta, Saskatchewan, and Manitoba. The book is organized into four sections: the first contains broad articles that survey prairie history; the other three focus on farming, ranching, and marketing, respectively.

D. Wayne Moodie and Barry Kaye's contribution describes First Nations maize-beans-squash agriculture in what now constitutes Manitoba before Euro-Canadian settlement in the area, reminding us that not all Aborigines of this period relied exclusively on hunting and gathering. Sheilagh S. Jameson's piece, first published in 1976, provides a lively account of western Canadian ranching up to 1910, emphasizing, as would much of the subsequent literature on the subject, ranching society's British and Canadian—as opposed to American—origins. Bruce Dawson's 2003 article offers a useful historiographical analysis of First Nations agriculture under the federal government's control. While noting different scholarly views, the article brings out the general consensus that Native agriculture failed largely owing to substandard farm land, climate problems, and, especially, federal policy.

Analyzing the costs of establishing a farm in Saskatchewan in the early settlement era, Lyle Dick concludes that costs, while not uniform, were relatively low, implying "a degree of economic democracy in the prairie settlement experience." Warren Elofson's analysis of mixed and dryland farming in



southwestern Alberta before World War I introduces his thesis, highlighted in his later works on Canadian ranching, that Canadian agricultural practices, like those south of the border, were greatly shaped by environmental and frontier conditions. Articles by Tony Ward and R. Bruce Shepard deal with technological advancements and their inexorable impact on farming and rural life: increased acreages and production, downward pressure on farm product prices, and, eventually, rural depopulation.

The first of Simon Evans's two contributions considers a little-known chapter in pre-World War One Canadian ranching: the place of American cattlemen. His second piece ably explains the demise of the open range in the Canadian West. David Hall's article—essential for any student of the early Canadian prairie economy or the early prairie farm movement—details early legislation affecting the grain industry and prairie producers, while in two articles Robert Irwin acutely analyzes Canadian farmers' efforts to improve the marketing of their products, culminating with the Wheat Board, a subject of current debate among Canadian farmers.

There are other useful articles in this generally strong collection, but two issues raise some unease. First, I question whether, in this age of databases and online scholarly articles, there is a need for a book of this type, a collection of previously published journal articles from a single periodical. Second, none of the articles deal with Great Plains rural women, even though there are *Prairie Forum* articles on this subject that could have been included. Be that as it may, *Agricultural History* sheds light on many central elements of the northern Great Plains experience in an era when ranchers and farmers ruled the region.

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**Implementing the Endangered Species Act on the Platte Basin Water Commons.** By David M. Freeman. Foreword by Robert Ward. Boulder: University Press of Colorado, 2010. xxiv + 483 pp. Illustrations, tables, maps, appendices, photographs, references, index. \$45.00 cloth.

*"There is something new under the Platte River Basin sun. It is habitat restoration produced by a richer civic life and better self-governance of an important water commons" (428).*

David M. Freeman has written a landmark treatise on a landmark event—the development of the Platte River Habitat Recovery Program. The program's goal is to integrate provisions of the Endangered Species Act and the habitat needs of four imperiled species (interior least tern, piping plover, whooping crane, and pallid sturgeon) into river basin-wide water management policy. The process was formally initiated

in 1997 with the signing of a cooperative agreement between the states of Colorado, Nebraska, and Wyoming and the U.S. Department of the Interior, but discussions had been under way since the 1970s. The process was completed in 2006 when the program agreement was signed by the governors of the three states and the U.S. secretary of the interior and is now nearly halfway through the first 13-year implementation increment. In addition to the signatories to the agreement, critical participants in program negotiations included state and federal agencies (e.g., U.S. Fish and Wildlife Service, Federal Energy Regulatory Commission, Bureau of Reclamation, U.S. Forest Service, Nebraska Department of Natural Resources, and Nebraska's Natural Resources Districts), environmental groups (e.g., Platte River Whooping Crane Maintenance Trust, National Audubon Society, National Wildlife Federation), irrigation organizations (e.g., Central Nebraska Public Power and Irrigation District), electric power generating companies (e.g., Nebraska Public Power District), and municipal water providers (e.g., Denver Board of Water Commissioners).

Presenting all of these constituencies' concerns without bias, Freeman focuses not on individual participants and personalities, but on policy, conceptual issues, and the efficacy of applying this cooperative approach to conservation. This is the book's strength. Freeman attended nearly all of the negotiating sessions over the ten-year process, developing working relationships with individuals from the participating agencies and organizations, and the work resulting from his efforts maintains a high standard of scholarship throughout. The appendices, maps, and figures will be a rich resource for students of the program for years to come. Beyond the book's value as a discussion of the program's development, it is a case study in itself of how a case study should be undertaken.

Freeman clearly recognizes that water management is the great issue of our time (and of our future). We must find broad-scale cooperative solutions if we hope to manage our resources responsibly. By presenting such a detailed chronology and providing insight into the intrinsic and extrinsic factors that influenced the Platte Basin negotiations, he provides us with a model of how to proceed with negotiations for other river basins.

My only concern raised by the book is a lack of attention to detail in the individual species accounts in chapter 2, "Change on the River," where a few errors appear in the scientific names and in the natural history descriptions. Small issues, to be sure, in a work that will certainly become an indispensable resource for academics, policy makers, environmentalists, and others engaged in broad-scale water management. I hope Freeman is continuing to observe the implementation of the program and will provide an evaluation of its progress at the end of the first 13-year increment. It would be another landmark accomplishment.

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**Wet Prairie: People, Land, and Water in Agricultural Manitoba.** By Shannon Stunden Bower. Foreword by Graeme Wynn. Vancouver: UBC Press, 2011. xxiii + 238 pp. Maps, tables, photographs, illustrations, appendices, notes, bibliography, index. \$94.00 cloth, \$37.95 paper.

Is a “wet prairie” an oxymoron? Many scholars of the Great Plains might think so, given the region’s location across the “aridity line,” for its periodic droughts and for memories and images of horrible dust storms. But as environmental historian Shannon Stunden Bower explains, the “wet prairie” describes most of southeastern Manitoba—the province’s most agricultural area. Yet the wet prairie is not a swamp, nor is it exactly wetlands—landforms that cannot be farmed. Thus, the wet prairie of agricultural Manitoba is unique for the larger Great Plains region and the entire North American West and, as Stunden Bower notes, “a distinctive landscape, with distinctive challenges.”

The prairie landscape of this region is wet, not so much because it gets more rainfall than areas of the Great Plains farther west, but primarily because there is such poor drainage in the remarkably flat terrain. Add to that the region’s being situated in a bowl due to an escarpment that divides the province from north to south, and you get an environment that prevents easy drainage and makes for frequent standing water and flooding (especially after heavy-snow winters or high-rain springs). The questions that Stunden Bower deals with here, then, include how humans managed to deal with this peculiar wet landscape, how liberal federal and provincial governments (based on the ideals of private property) created pro-drainage policies, how conservationists (especially Ducks Unlimited—with an excellent treatment of that organization in the book) worked to save the wet prairie, what transnational connections existed about the history and politics of wet prairies in the United States, and what agricultural and environmental implications resulted.

What makes the agricultural question all the more interesting is that, as Stunden Bower explains, this is not typical farming history relating to crops, markets, technology, and economics. Instead, it deals with how farmers, and government support for them, have dealt with the drainage issues. A bit more, perhaps, could have been added on types of crops that farmers chose to grow in this wet environment and the kinds of technology used for planting and harvesting. And perhaps a discussion of First Nations understandings of this environment, and more on the Métis who farmed in the area, would have added to the richness of this analysis.

More than anything, then, *Wet Prairie* is excellent environmental history that evaluates the human/nature relationship. Stunden Bower writes, “In grappling with the environment of their province, Manitobans confronted not only the environmental conditions, but also the political and social arrangements that bore on their lives.” Though no easy task, she succeeds in showing these relationships in what is an important contribution

to the geographical, environmental, political, and cultural history of the Prairie Provinces and to the Great Plains as a whole.

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**Clovis Lithic Technology: Investigation of a Stratified Workshop at the Gault Site, Texas.** By Michael R. Waters, Charlotte D. Pevny, David L. Carlson, et al. Foreword by Michael B. Collins. College Station: Texas A&M University Press, 2011. xxii + 226 pp. Illustration, maps, photographs, tables, references, index. \$45.00 cloth.

This volume is a valuable contribution to the growing knowledge of Early Paleoindian behavior in the Southern Plains. It offers a thorough description of excavations and analyses conducted on collections from the Excavation Area 8 of the Gault Site in central Texas. The book is organized into ten chapters detailing the site setting, formation processes, Clovis tool manufacture patterns, microwear analyses, faunal analyses, and interpretations of the site’s organization and purpose.

Chapter 1 provides a brief description of the site’s setting, a history of research conducted at the site, and a summary table of all Clovis-period artifacts found there. The excavation techniques detailed vouch for the high-quality data presented in tables throughout the book, tables that in themselves represent a significant contribution to the archaeological literature.

Detailed information on the site formation processes, chronology, and stratigraphy is provided in chapter 2, which establishes the limited soil disturbance within the excavated loci. A large-scale refit study undertaken where refits were looked for not only within levels but also between levels suggests that the Clovis levels are contained within a distinct geologic unit. While water-level changes have affected the preservation of perishable artifacts, dip and strike measurements taken from *in situ* artifacts suggest that this has not significantly affected the orientation of the lithic artifacts. These studies assure that later interpretations of site activities are based on reliable data.

Chapters 3 through 6 discuss the organization of Clovis lithic technology, including morphology and reduction strategies evidenced at the Gault Site. Blades, bifaces, endscrapers, and edge-modified tools are all discussed in detail. The Gault Site offers the opportunity to examine nearly the entire reduction trajectory for each of these tool types, providing unequalled information about Clovis lithic reduction sequences as well as tool stone use in the Great Plains.

Chapter 7 conveys the results of several microwear studies of blades, bifaces, endscrapers, and edge-modified flakes. I was particularly pleased with the breadth of this study, which provides highly valuable information about site activities based upon more than morphological characteristics. Microwear analysis is often underutilized, and its inclusion here is refreshing.

Detailed results of a vertebrate faunal analysis, offering tantalizing hints at the potential diet breadth of Paleoindians in the Plains, are the focus of chapter 8. While large mammals were present, many small and medium-sized mammals as well as birds and reptiles are also identified. These data suggest that at least at Gault, and potentially other Clovis-period sites, a wide variety of animal species were exploited.

Chapter 9 investigates the spatial organization evident at the site. The inclusion of multiple maps and figures illustrating the distribution of the materials is particularly helpful. These, paired with quantitative techniques to identify drop-toss zones and potential spatial ranges of activity areas, give added weight to later interpretations of site activities.

In their concluding chapter, the authors provide their final interpretations of the main activities of Area 8 at the Gault Site, suggesting that—at least in the Great Plains—Clovis people used a wide variety of plant and animal resources and had much more intricate landscape knowledge than previously believed.

*Clovis Lithic Technology* is a valuable contribution to researchers interested in the archaeology of the Great Plains, Paleoindian research, lithic analysis, and New World colonization research.

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**Land of the Tejas: Native American Identity and Interaction in Texas, A.D. 1300 to 1700.** By John Wesley Arnn III. Foreword by Tom D. Dillehay. Austin: University of Texas Press, 2012. xiii + 300 pp. Illustrations, maps, photographs, bibliography, index. \$55.00 cloth.

This tremendously enjoyable, thought-provoking book should be read by anyone interested in the history of the state of Texas, the archaeology of the Plains, and the past social and cultural interactions among peoples living within this region during this time period. Arnn provides a concise framework for his theme in his introduction: "This book presents a model of late prehistoric and early historic Texas that was also extremely dynamic and diverse and suggests that as early as A.D. 1300 aboriginal peoples living in this region may have also recognized a broader sociocultural identity."

Throughout the book, Arnn refers to the East Texas Caddo or "Caddoan." And rightly so, for he need look no further than to Caddo archaeology to find a similar (and successful) holistic approach to archaeology that has been developed over the past 50 years. Although archaeologists have used the term "Caddoan" loosely to try to define a material culture, the fact remains that it is a linguistic term for a common language stock of the Wichitas, Arikaras, Pawnees, and Caddos. Wallace Chafe has suggested that sometime around 3,000 years ago these groups may have spoken a "common" language. "Tejas" was not sim-

ply a "Caddoan" word, therefore, but derives from the Hasinai Caddo language in the form of "Teysha," meaning "friend."

Arnn does an exceptional job of providing his readers with the background of archaeological thought pertaining to sociocultural identity and what he refers to as the "Classic Toyah Culture Area." He goes so far as to say, "if history and prehistory must be divided: 'Tejas I' for the prehistoric and 'Tejas II' for the Historic Period." Arnn may not have thought about the consequences of using these terms, however, since there is already a strong push for state and federal recognition of a specific group of people (not an "alliance" or "coalition") identifying themselves as "Tejas Indians" led by Chief Blackjack Pruett (see <http://www.tejasindians.info/>).

Arnn's discussion of Perdiz points is intriguing. Yet I wonder why he never attempts a study of bilateral symmetry or asymmetry in the stem-barb notches of these points when this seems to be such an important aspect of defining this regional identity.

Overall, Arnn does a fine job explaining the intricacies of the archaeology of Central Texas, the Southern Plains, and the "Classic Toyah Culture Area."

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**On the Edge of Purgatory: An Archaeology of Place in Hispanic Colorado.** By Bonnie J. Clark. Lincoln: University of Nebraska Press, 2011. xxvi + 148 pp. Maps, photographs, illustrations, tables, references, index. \$45.00 cloth.

Bonnie Clark's book is a welcome addition to the small body of published literature regarding Great Plains historical archaeology. It concerns two habitation sites located on the Piñon Canyon Maneuver site, a modern military base in the canyon lands of the Purgatory River (which the Spanish named *El Río de Las Ánimas Perdidas en Purgatorio*) in southeastern Colorado. The river is the lifeblood of this region, with a deep record of occupation by both prehistoric and historic populations. Clark searches for Hispanic Colorado, which she identifies as both a people and a place. But unlike other historical archaeology studies, this one has few written records to rely upon for building a story of the peoples of the past. The goal of Clark's work is to place these two sites into a broader social fabric of Hispanic place.

Chapter 1 sets the historical stage for Clark's narrative. This area of Colorado has long been considered *desplorado*, a territory outside of the Spanish core of New Mexico, but nevertheless maintaining a Hispanic identity (under both Spanish and Mexican influence). Clark identifies several of the major events and processes that affected this region, including the development of New Mexican settlements, Mexican independence from Spain in 1821, the development of the

Santa Fe Trail as a major Mexican/American trade route, the development of land grants, and the Mexican-American War of 1846–48. As of the 1870s, 90% of the region still had ties to New Mexico.

The focus of chapter 2 is the archaeology of the two historic sites recorded and tested by Clark and her crew, including La Placita, a cluster of six habitation structures surrounded by additional livestock features. First settled in the late 1880s, the site appears abandoned by 1898. It is contrasted with the Wild Plum site, located only two miles away. Wild Plum also dates to approximately the 1890s, and appears to contain two to three occupations, including a household, as well as later ranching and mining activities. How the residents of these sites made a living, including by ranching and gardening, is the subject of chapter 3, in which Clark details several of the artifact classes recovered during her work, discussing the use of ceramics and other common household items, some of which appear in period Montgomery Ward catalogs.

Chapter 4 considers the uses of plazas in the New World, with laws governing Spanish settlement dating back to the 16th-century Law of the Indies. Clark argues that La Placita was conceived, built, and used as a plaza; her argument is supported by the architecture itself as well as associated features and artifacts. Dealing with landscapes and the meaning of place in chapter 5, she identifies slight differences in Hispanic and Anglo use of place, in particular in concepts of land use. For example, Clark contrasts whether lands were modified into new, artificial forms or were altered in a lower-intensity method, simply taking advantage of local ecological conditions. In her concluding chapter, she discusses how archaeologists should begin to view such places as La Placita not as discrete “sites,” but instead as parts of a larger “place,” urging researchers to broaden their scope of inquiry to that of the landscape scale.

Archaeologists and historians will find *On the Edge of Purgatory* useful on several levels. First, it helps in diversifying the archaeology of Colorado by broadening the range of economic adaptations as well as ethnic populations discussed in the archaeological literature. Second, it is a valuable introduction to landscape archaeology and the concept of place. So often archaeologists become trapped in the concept of an archaeological site as an analytical unit, rarely attempting to integrate sites into broader spatial (and conceptual) units. Clark is to be commended for bringing greater diversity to the theoretical and topical literature of historic Colorado.

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**Native Acts: Law, Recognition, and Cultural Authenticity.** By Joanne Barker. Durham, NC: Duke University Press, 2011. ix + 284 pp. References, bibliography, index. \$23.95 paper.

*Native Acts* is organized in three parts. In the first (“Recognition”), Barker (correctly) argues that the United States government exercised its plenary power to coerce Native peoples to recognize themselves as “Indian tribes.” In part 2 (“Membership”), she discusses tribal membership policies as a legal frame through which Native peoples—now organized into semisovereign states called “tribes”—define themselves in relation to the U.S. government. In part 3 (“Tradition”), Barker examines how “tribal traditions” can turn on racist, sexist, and homophobic policies that themselves become cultural acts of identity formation.

Federal Indian Law—the body of federal law that governs the relationship between the U.S. government and a recognized tribe—is ossified with just the sort of doctrines and inherited traditions that Barker thoughtfully calls into question. She frames the paradox well. Historically, tribes secured federal recognition if and when they defined themselves in terms that furthered colonialist, social Darwinist ideologies. The legal-policy process worked like this: (1) the United States recognized tribes as semisovereign nations; (2) the United States then authorized each recognized (official) tribe to define (and manage) its own membership roll; (3) this consequently created incentives for those individuals and groups most privileged by the membership rules to define (invent) “tradition.” There it is, the “rational,” modernist side of the paradox: identity formation via Social Darwinism, blood quantum, and historicized claims to the ownership of tradition. But how did modernist justifications for tribal recognition morph into a tribal version of “100% Americanism,” that 1920s Ku Klux Klan code phrase for white supremacy? (The first part of the 20th century is when tribal reorganization took place.) Why do “traditions” give rise to policies (like those discussed by Barker) that are predicated on racist, sexist, and homophobic beliefs?

An excellent question.

Much of the formal legal process that defines who can (or cannot) be an enrolled member of a particular tribe turns on the concept of blood descent, or “blood quantum.” But the blood quantum test leads to absurdities, as Barker discusses, in addition to being a variant of the racist one-drop rule, a property-based rule that once rationalized enslavement by birth. (Under the one-drop rule, an enslaved woman’s child was born enslaved.) Barker analyzes tribal membership ideologies throughout her book, with an in-depth analysis of *Martinez v. Santa Clara*, the case that split the legal community between those who argued that “self-determination” must come before gender equality (why?), and those who argued that gender equality was every tribal woman’s right as a United States citizen (shouldn’t it be?).

*Native Acts* is an important and thoughtful challenge to the political position that “tradition” is an acceptable rationale

for excluding those whom the politically powerful deem “non-traditional.” Women, LGBT persons, and persons of mixed ancestry are critically important to the development of fair tribal policies, and yet, as *Native Acts* cogently argues, they are increasingly blocked from participating in tribal affairs due to “traditions” that are (unfortunately) reminiscent of hate-based ideologies. Also relevant for readers of *Great Plains Research* is that *Native Acts* opens the way for further research on how 100% Americanism, that 1920s code for white supremacy, found its way into sovereign tribal processes, tribal policies, and tribal communities.

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**Unsettling the Settler Within: Indian Residential Schools, Truth Telling, and Reconciliation in Canada.** By Paulette Regan. Vancouver: UBC Press, 2010. xii + 299 pp. Notes, bibliography, index. C\$85.00 cloth, C\$34.95 paper.

The Canadian settler state has enacted egregious practices of assimilation, dispossession, and genocide against First Nations, Inuit, and Métis peoples throughout its history. Running contrary to these practices are the prevailing narratives found in Canadian historical texts and settler national myths. In *Unsettling the Settler*, Paulette Regan addresses this contradiction by analyzing the “peacemaker” myth, which she suggests is deployed by the state to construct a history of settler innocence. In light of this, any acknowledgment of historical injustices committed by Canada, such as Indian Residential School policies, is iteratively couched in the promise of *reconciliation*.

Regan describes state-driven reconciliation initiatives (such as Alternative Dispute Resolution) as tantamount to “re-gifting,” where reparations processes resemble “a new variation of the peacemaker myth that promised to bring neutral justice to Indians in order to save or heal them” and thereby reify the paternalistic relationship established by the Indian Act. While Regan remains suspicious of the state’s deployment of reconciliation discourses, she sees potential for redress movements to enact “a liberatory form of non-violent resistance.” Building on this logic, *Unsettling* advocates for a “settler call for action,” which entails an individual (and collective) psychic decolonization that will serve as a necessary step towards achieving justice and material restitution for Indigenous peoples.

In her introduction, Regan mobilizes Roger Epp’s concept of the “settler problem” to outline a “decolonizing pedagogical strategy that is designed to teach Canadians about their history as a way to unsettle and transform how they view the past.” The text explores how witnessing and testimony can initiate a crucial and informative dialogue between Indigenous peoples and settler-Canadians. Pedagogical strategies are central to the mandate of Truth and Reconciliation of Canada (a process

negotiated through the Indian Residential Schools Settlement Agreement in 2006) as a means to end a prolonged period of collective and institutional denial surrounding residential schooling. Regan aptly positions the role of pedagogy as a way to precipitate change in the *content* and *practice* of Canadian history. Therefore, decolonization requires not only the sharing of testimony and the active listening of witnesses, but the embrace and implementation of Indigenous epistemologies and methodologies in Canadian institutions.

Regan’s project seeks to unite “works that run on parallel tracks that rarely intersect” as she juxtaposes the work of scholar-practitioners in the field of treaty claims and negotiations, “historians of Indigenous-settler relations,” and educators who address the “commemoration of a difficult past.” Her ability to fuse literatures from the burgeoning field of settler studies and anticolonial scholarship is impressive, and her extensive literature review reveals a compelling argument that widens the scope of Indigenous-settler reconciliation. Regan is careful to place the violation of treaties and the dispossession of Indigenous peoples from their ancestral lands at the center of the process, thereby resisting the state’s tendency to reduce colonialism to residential schooling in order to foreclose on the past.

Regan’s unique methodological approach combines decolonial and feminist methods with critical pedagogy, drawing notably on the work of Paulo Freire. She also employs autoethnography to demonstrate personal feelings of “unsettlement” relating to her participation in reconciliation events, namely the Apology Feast in Hazelton held on Gitksan territory (chapter 7). While she frames autoethnography as a methodology that resists the researcher’s quest for “objective” truth, there is some danger that her personal narrative will be conflated with the category of “settler” writ large. Regan describes a white, English-Canadian settler response to colonial history that may not be representative of the heterogeneity of Canada’s citizenry. For this reason, I believe Regan’s audience could benefit from reading the Aboriginal Healing Foundation’s *Cultivating Canada: Reconciliation through the Lens of Diversity* (2011) alongside *Unsettling*. The AHF volume incorporates a generous collection of responses to Indigenous-settler reconciliation from diverse settler communities.

Seeking to navigate the complex terrain of reconciliation in Canada, Regan’s text is an important contribution to settler studies in Canada. *Unsettling* encourages settlers to revisit the problematic appropriation of terms such as *warrior* and *peacemaker* that have been grossly misrepresented in settler myths as a way to reframe Indigenous approaches to reconciliation. In doing so, Regan demonstrates how attitudinal shifts may engender new material realities.

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**White Man's Water: The Politics of Sobriety in a Native American Community.** By Erica Prussing. Tucson: University of Arizona Press, 2011. viii + 272 pp. Map, photographs, notes, references, index. \$49.95 cloth.

Epidemiological evidence consistently emphasizes the challenges American Indian tribes of the Great Plains confront through excess alcohol consumption. Until Erica Prussing's recent book, however, we have lacked a detailed analysis of the social and cultural context in which these challenges unfold. With a focus on women's experiences across two generations, *White Man's Water* provides us with a careful description of the social and cultural world of contemporary Northern Cheyennes, coupled with an understanding of how individual experiences within the milieu vary, especially as a function of history.

The first generation of women Prussing describes saw alcohol introduced in their youth; the second often grew up with heavily drinking parents. As a consequence, women of the older generation recall a world relatively unaffected by alcohol, while younger women have no such memories. This has important implications for the moral worlds these women inhabit and also shapes their imagination of possible solutions to current problems involving alcohol: women from the older generation emphasize the need to return to the traditions of the alcohol-free world of their childhoods, while younger women find inspiration in 12-step approaches emphasizing personal growth and healing, which would seem to suggest an important role for 12-step programs, at least in the lives of younger women.

It is curious, then, that Prussing's final chapters on culturally appropriate services turn, instead, to a critique of the 12-step approaches used in the tribal treatment center. While she makes many important points in these chapters, the critique of the 12 steps seems somewhat out of place, given the discourse of the younger generation of women. If the point is to move beyond a static definition of culture as tradition, then we would most certainly want to allow for the ways in which even the 12 steps can be culturally appropriate treatment, and there is presumably much to be learned from the ways in which tribal communities make the 12 steps work for them. Nevertheless, as the experiences of the older generation of women make clear, the 12 steps are not likely to work for everyone. In addition, moves toward increasing requirements for evidence-based practice in substance abuse treatment nationally will only exacerbate the bureaucratic problems Prussing describes that discourage local innovation. One hopes the emphasis here on the need to attend to local structures of meaning and variation within local communities can provide an important corrective in what might otherwise become a rush toward standardization.

*White Man's Water* is a truly significant book: the first book-length ethnographic account of drinking in a Plains tribe, the first representation of American Indian drinking to focus on women's experiences, a careful analysis of subjectivity in culture, and a critical statement on the ongoing need for health

care improvements in tribal nations. It deserves to be widely read by audiences sharing any of these interests.

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**Trailblazers: The Lives and Times of Michael Ewanchuk and Muriel (Smith) Ewanchuk.** By John Lehr and David McDowell. Winnipeg, MB: Carpathia Publishers, 2011. vi + 226 pp. Photographs, notes, maps, tables, appendices, index. C\$28.50 paper.

Belonging to the genre of local history, *Trailblazers* explores the lives of two Canadians in the province of Manitoba spanning the 20th century. They were, as the introduction states, ordinary people, just like us. There is much here to interest the casual reader and the serious historian alike. Readers of *Great Plains Research* may need to be reminded that while the geographic designation "Great Plains" extends into the western Canadian provinces, the term is purely American. Canadians use the generic term "prairie."

Michael Ewanchuk was a teacher, a principal, and finally a school inspector for 23 years; Muriel was a teacher whose professional career effectively ended in 1941 when she married, since married female teachers were not hireable in that era. In their introduction and conclusion, John Lehr and David McDowell effectively place the story of Michael and Muriel within the cultural and social milieu of their times. Issues of environment, colonialism, racism, and feminism are integrated into the narrative without ever being heavy-handed or overly academic.

The book broaches some tantalizing social questions, but often fails to resolve them. For example, when were females (like Muriel) allowed to continue teaching after marriage? How much of a problem was Michael's non-Anglo-Saxon-Protestant heritage? Why does the fact that women first won the right to vote in Manitoba in 1916 not figure into Muriel's story? These and other questions are hinted at, but left unanswered.

The back cover calls Michael the "quintessential" Ukrainian immigrant, yet he was not an immigrant at all, but born in Manitoba and therefore a British subject. The book further argues that a major theme is "migration," but both Muriel and Michael remained relatively close to their rural Manitoba roots.

What is not explained is that Winnipeg, where Michael and Muriel spent the last half of their lives, was one of the largest up-and-coming cities at the turn of the 20th century, poised to be a leading urban center. But technology was to pass Winnipeg by; air travel replaced the railroad; and the Panama Canal opened up a sea route around North America instead of the slower and more expensive land routes. Winnipeg (and Manitoba) became a curious anomaly, quickly dropping from Canada's third-largest city to eighth. Yet it boasted some unique



achievements as one of the cosmopolitan capitals of the world (namesake of the original Winnie the Pooh; birthplace of William Stephenson, the “man called intrepid,” who became the model for James Bond; a city visited by Mark Twain and Arthur Conan Doyle).

The book has its minor flaws. While there are detailed maps of the land of Michael’s ancestors in western Ukraine and Muriel’s ancestors in Nova Scotia, the map of Manitoba at the end of the book (which should have appeared in the opening pages) fails to identify the pivotal towns of Gimli and Killarney.

*Trainblazers* does not pretend to be a scholarly history, but a recollection of a time and a place. If portions appear problematic, it is because the book is essentially a localized and celebratory story. But given its aims, those faults can be overlooked. There are thousands of such life stories. This book deals engagingly with two of them.

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**Every Twelve Seconds: Industrialized Slaughter and the Politics of Sight.** By Timothy Pachirat. New Haven, CT: Yale University Press, 2011. xii + 302 pp. Illustrations, appendices, notes, index. \$30.00 cloth.

*“You have just dined, and however scrupulously  
the slaughterhouse is concealed in the graceful distance  
of miles, there is complicity.”*

—Ralph Waldo Emerson

In June 2004, political scientist Timothy Pachirat went to work on the killfloor of an unnamed beef slaughterhouse in Omaha, Nebraska. He started out as a “liver hanger” in the cooler. There carcasses hang before being sent to the fabrication floor where “hundreds of handheld knives and saws reinvent chilled half-carcasses as steaks, rounds, and roasts that are then boxed and shipped to distributors and retailers around the world.” For four days he worked in the chutes, driving cattle to the knocking box to be stunned, as required by the Humane Slaughter Act, before being turned into meat. Then for three months he was in QC (quality control), which afforded him access to the entire killfloor. In December, when asked by a USDA inspector to blow the whistle on food safety violations, he explained that he was actually an undercover ethnographer. The next day Pachirat quit his job, but stayed in Omaha for another 18 months “conducting, on a much less grueling schedule, participant-observation research and interviews with community and union organizers, slaughterhouse workers, USDA inspectors, cattle ranchers, and small-slaughterhouse operators.” Sadly, this later research does not appear in his account.

Pachirat frames modern meatpacking plants as “zones of confinement,” which hide the bloody business of industrialized

slaughter from the outside world. He justifies his clandestine methods with an overview of Iowa’s 2011 “ag-gag” law that makes it a felony to gain unauthorized access to—or disseminate documents on—agricultural or food processing operations and practices. But Pachirat wants us to *see* “industrialized slaughter . . . to provoke reflection on how distance and concealment operate as mechanisms of power in modern society.” To this end he offers a rich description of the killfloor, which he organizes around a series of detailed maps, including locations and descriptions of each of its 121 jobs. The remainder of the book chronicles his experiences at the plant, beginning with his persistent efforts to land a job.

Pachirat is intent on conveying the sights, sounds, smells of the killfloor: “Shrouded and ghostly in the fog, the yellow hat beckons me into the vast chambers of the cooler. Row after row of headless, hoofless, hideless cattle, split in half and suspended by their hind hocks, fill the room.” He wants us to experience—to feel—work in such a place, and he vividly describes the layout of the killfloor, what his jobs involved, and what it was like—emotionally and physically—to do them day after day after day. And he succeeds. But in his enthusiasm for “thick description,” he can succumb to monotonous detail, much as workers succumb to the monotony of the line, devoting three pages to his first break, for example. He details the cruelties of his fellow workers as they drive bellowing steers from the chutes to the knocking box and recounts numerous hygiene and food safety violations. But of the injuries and illnesses suffered by his fellow workers, we hear little.

“By removing the methodological distance that typically separates researchers from the social worlds they study and undertaking direct participant-observation research within the slaughterhouse, I sought . . . to provide insight into what it means, from the perspective of the participants, to carry out the work of industrialized killing.” If this was his intent, he failed. We are treated in great depth to what it felt like for Timothy Pachirat to become a poorly paid and mistreated meatpacking worker. His coworkers, on the other hand, are one-dimensional walk-on players in this tale. The mustachioed Mexicans who work the chutes are heartless and cruel—to the animals and to the reticent Pachirat, who balks at using the electronic cattle prod. Other coworkers, managers, and USDA inspectors appear briefly to further the plot and to attest to their feelings about their jobs or their sadness for the animals.

*Every Twelve Minutes* is an autoethnography of one ethnographer’s clandestine research in one beef plant. It is, without a doubt, well written, moving, and disturbing on several levels—not the least of which are the ethical dilemmas of undercover research. But Pachirat makes no effort to place his experiences within the context of the larger industry. Nor do we learn very much about his fellow workers, who have little choice but to take dead-end, dangerous, distasteful jobs to support themselves and their families. He could have told their story, he should have—he owed them that. And us. To paraphrase the

ethnographer Gary Allan Fine, Pachirat writes too well and shares too little.

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**Keep True: A Life in Politics.** By Howard Pawley. Foreword by Paul Moist. Winnipeg: University of Manitoba Press, 2011. ix + 278 pp. Photographs, notes, index. C\$27.95 paper.

Howard Pawley served as premier of Manitoba from 1981 to 1988, a period that stands to this day as one of the most controversial and turbulent in the province's modern history. *Keep True: A Life in Politics* traces Pawley's life and political career from his birth in Brampton, Ontario, to the defeat of his government in 1988 at the hands of one of his own caucus members. Educated as a teacher and lawyer, Pawley became active in the Cooperative Commonwealth Federation (which later became the New Democratic Party) as a young man before turning his sights on a political career. In a campaign fought largely from a hospital bed (the result of a car accident in which he was injured), Pawley was elected in the provincial election of 1969 that brought Ed Schreyer and the NDP to power in Manitoba.

During his time as a cabinet minister in the Schreyer administration, Pawley oversaw what would be the first of many contentious issues that would mark his years in office, including the introduction of public auto insurance (commonly referred to as Autopac) in Manitoba. This would be followed by battles concerning French-language rights in the province, changes to Manitoba's labor, marriage, and human rights legislation, and, on the national stage, the proposed free trade agreement between Canada and the United States.

Particularly compelling is Pawley's recounting of the negotiations surrounding the Meech Lake Constitutional Accord. His firsthand account of these proceedings, which represent a key event in Canada's modern political history, captures much of the high drama that is constitutional politics in the country. In March 1988, less than a year after the Meech Lake Accord was negotiated by the provinces and the federal government, Pawley would go down in defeat on a vote of no confidence over the provincial budget. After an unsuccessful bid for a House of Commons seat, he commenced an academic career at the University of Windsor in Ontario where he taught courses in politics and law until his retirement in 2000.

Written in a straightforward yet engaging style, *Keep True* speaks to Pawley's attempts to remain true to his principles in the face of the challenges and compromises necessitated by a life spent in politics. While a few of his statements come across as somewhat self-serving or intentionally naive (for example, his government's ill-fated decision to impose hefty increases in Autopac rates are blamed on bureaucrats and an "icy winter that produced more crashes"; in another instance, he maintains it was their inability to understand the intricacies of the

province's taxation system that explains the public's negative reaction to increases in personal income taxes introduced during his premiership), Pawley nonetheless presents a fascinating look inside the life of a provincial premier in Canada. This book will be of interest to anyone intrigued by Canadian politics and the interplay—sometimes hostile, sometimes cooperative—between the provinces and the federal government.

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**Turning Points: A Memoir.** By George A. "Bud" Sinner and Bob Jansen. Foreword by Clay S. Jenkinson. Washburn, ND: Dakota Institute Press of the Lewis & Clark Fort Mandan Foundation, 2011. xix + 359 pp. Photographs, appendix, notes, index. \$29.95 cloth, \$18.95 paper.

*Turning Points* focuses on the political career of George Sinner from the 1960s to his two terms as a Democratic governor of North Dakota from 1984 to 1992. His legacy, however, is felt beyond North Dakota and was influential on the national scene as well. Many of the governor's reflections on his early life provide insight into the seminal events that influenced him as an adult. Sinner's reflections on his experience after politics focus on his family and on what his life has taught him.

The character that emerges from the memoir exemplifies virtues often associated with the Great Plains: frugal living, family-centeredness, honesty, integrity, faith, practicality, cooperation, and service. Sinner's integrity as governor was much admired, even among those who disagreed with his policies. He aimed at seeing the good in people, even his opponents. His political backbone was not particularly partisan but practical, allowing for an approach to governing that served him well in dealing with difficult issues during a pessimistic period in North Dakota's history: taxes and deep budget cuts resulting from a severe recession, outmigration of young people, water shortages, and farm foreclosures. Although a devout Catholic, he was undogmatic and more than once found himself admonished by the Church for less than orthodox positions, particularly on abortion.

Though his policies and appointments did not always win the endorsement of more partisan Democrats, the governor stood his ground on what he believed to be good for North Dakotans. He resisted letting the power of his position distort his purpose of service and refused to take advantage of several perks and privileges that come with being governor. He understood that truth and integrity mattered to his constituents and demonstrated being a man of the people throughout his political career. In a Republican-dominated state, Sinner won a second term with nearly 60% of the vote. His policies and reorganizations, particularly in the Economic Development Commission, helped turn the state's economy around and laid the groundwork

on which succeeding governors have built. Today, with the state's robust economy, North Dakotans are more optimistic about the future than they have been in the last 40 years.

*Turning Points* is a collection of stories and events from the Heartland, some humorous, others tragic, some life changing, all of them shedding light on the life and character of "Bud" Sinner.

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**State of Change: Colorado Politics in the Twenty-First Century.** Edited by Courtenay W. Daum, Robert J. Duffy, and John A. Straayer. Boulder: University Press of Colorado, 2011. viii + 259 pp. Tables, maps, graphs, notes, references, index. \$26.95 paper.

This edited volume compiles an impressive set of contributions covering the complexity, causes, and implications of the transformation of Colorado politics and policy over the last few decades. Several chapters illustrate how demographics, institutions, and public policy altered the makeup of what was once considered a fairly solid red state into one with a more purple hue. Combined with chapters examining recent constraints on legislative authority and Colorado's fiscal policy, the volume represents an exceptional look into the changing nature of Colorado politics and serves as both a historical narrative and solid political analysis that should be compulsory reading for anyone interested in politics in the state and region.

The initial set of contributions focuses on the recent "purple-ing" of Colorado's electorate, detailing how demographic shifts, term limits, intraparty divisions, and national trends all played a part in the shift away from a more consistently red state. The second set explores the effects of the state's political institutions, from the direct initiative to less visible rules regarding the legislative process, on politics and policymaking in Colorado. The final chapters explore constraints placed on Colorado after a succession of policy adoptions that limit the options of lawmakers to construct fiscal policy. In the end, the reader is left with a solid understanding of both the politics underlying Colorado's transformation as well as the implications of this change.

On the whole, these contributions to the understanding of Colorado politics are solid and well worth reading. Particularly appealing is each chapter's consistent presentation of a historical framework and solid descriptive data on its respective topic, such as Daniel A. Smith's presentation of the development and use of direct democracy (chapter 4), followed by a reasoned analysis of the implications for politics in the state. There is something for readers interested in the political development of Colorado (albeit in most instances covering no more than a few decades) and for those interested in more analytic approaches

to understanding the causes and implications of the historic trajectory.

An emerging theme of the book, which presents itself primarily in the chapters devoted to legislative institutions and fiscal policy, is that Colorado is now something other than a representative democracy. With direct democracy and legislative initiatives limiting the role of the state legislature, several chapters conclude that Colorado is more of a hybrid democracy, with one contributor going so far as to suggest that the state's legislature "no longer qualifies as a representative government." While limits to legislative authority, polarization, and a lack of institutional memory are reasonable descriptions of Colorado's recent legislative politics, the presentation sometimes errs on the side of nostalgia. But this is a minor quibble. *State of Change* is a significant contribution that will appeal to anyone interested in the politics of one of the Great Plains's most politically visible states.

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**Together We Can: Pathways to Collective Leadership in Agriculture at Texas A&M.** By Edward A. Hiler and Steven L. Bosserman. College Station: Texas A&M University Press, 2011. xii + 105 pp. Illustrations, notes, index. \$25.00 cloth.

Leadership is about people and their interdependence in groups, organizations, and communities. More specifically, it is about understanding and working with the individual and collective psychology of people and groups. The rhetoric of leadership is much more than what leaders say; it is fundamentally what leaders *do*, and what their behavior signals regarding institutional values, goals, and commitments.

In colleges of agriculture, land-grant universities, and higher education more generally, the need for people-centered, collective leadership is dire. Leadership is not a mechanical enterprise that treats people as inputs into some organizational production function depicted in shifting organizational charts. It embraces change, not the status quo, and recognizes that change is grounded in the thinking of individuals and groups; leadership involves connecting with people's hearts and minds in a process of cocreating vision, process, action, and community. This necessitates treating people with respect and valuing their expertise, experience, and wisdom in a process of mutual learning over time. Leadership is a dynamic, evolutionary process of finding the nexus between conflict and cooperation within groups, organizations, and communities, as well as with external collaborators and interests, all in service to larger social and institutional goals.

Edward Hiler's leadership journey through a series of major administrative positions at Texas A&M is a story of collective leadership, as told by Hiler himself, and framed by organizational and leadership strategist Steve Bosserman. This brief,

highly readable, and provocative book illustrates the philosophical and operational essences of collective leadership. The shifting demographic, economic, ecological, and sociopolitical realities of Texas and the Great Plains called for optimizing the contributions of Texas A&M and other institutions of higher education in addressing critical issues. Hiler, ever the visionary, saw the power of an inclusive, egalitarian, shared leadership style that allowed diverse constituencies to take ownership of both issues and proposed solutions. The import of Hiler's work, however, ranges far beyond the Great Plains; it applies to strengthening organizational development and leadership in land-grant universities and higher education nationally.

Hiler and Bosserman artfully weave together several essential themes in organizational development and collective leadership that emphasize the critical importance of collaboration and collective engagement, rather than competition, as the vehicle for individual and institutional growth, development, and effectiveness. To this end, formal and informal conversations have an equally important role. Hiler sought to create spaces in which informal exchanges could flourish: opening his home, for example, to colleagues and students in an effort to develop sensitivity to and respect for both professional and personal goals and motivations. In both formal and informal contexts, Hiler prioritized opportunities for open dialogues in which participants could forward ideas and raise concerns as individuals rather than as institutional affiliates as a means of fostering innovation. He also developed transparent and extensive channels and networks of commu-

nication that allowed internal and external partners to share, discuss, and access available ideas and information. By forging individual relationships centered on integrity, trust, and a willingness to share power and influence, Hiler modeled a form of leadership that came to characterize the institutional culture.

Hiler's personal narrative is interspersed with Bosserman's metaframes detailing organizational development and collective leadership philosophy and principles. This structure contributes immeasurably to conveying the powerful messages stemming from Hiler's experience. In a writing style reflecting many of the qualities of his fruitful collective leadership approach, he highlights and honors the critical roles of wisdom of his institutional colleagues and fellow citizens in shaping his understanding of the processes and values of partnering at all levels. And Bosserman deftly distills critical collective leadership philosophy and principles from Hiler's work.

*Together We Can* provides valuable insight for current and aspiring leaders and professionals in land-grant universities, higher education in general, and the nonprofit sector more broadly.

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## NEWS AND NOTES

### NEW MAP: THE TOP 50 ECOTOURISM SITES IN THE GREAT PLAINS

The Center for Great Plains Studies has announced the publication of an ecotourism map. During spring and summer of 2012, the Center conducted a two-phase survey of 51 naturalists from nine states. The sites receiving the most nominations in the second phase were named as the top 50 sites. The map will be distributed at visitors centers throughout the Great Plains. For more information, see the ad on page 180 or the web site: [www.unl.edu/plains](http://www.unl.edu/plains).

### CONFERENCES

November 4–7, 2012

**The Annual Meeting of the Geological Society of America** will be in Charlotte, NC. The theme is “Geosciences: Investing in the Future.” Web site: [www.geosociety.org/meetings/](http://www.geosociety.org/meetings/).

November 11–14, 2012

**The 60th Annual Meeting of the Entomological Society of America** will be held in Knoxville, TN. This year’s theme is “A Global Society for a Global Science.” Covering all aspects of the science, the section and member symposia will provide insight into many of the world’s most vexing problems that affect you and the global community, and will help you with your research. Web site: [www.entsoc.org/entomology2012](http://www.entsoc.org/entomology2012).

November 14–18, 2012

**The 111th Annual Meeting of the American Anthropological Association** will be held in San Francisco, CA. The theme is “Borders and Crossings.” San Francisco offers the perfect venue for thinking about border crossings across time, space, embodied differences, language and culture. If we have learned anything in the last decade with the increasing globalization of social movements, the election of the first black US president, and the legalization of gay marriage in five states, it is that borders—taboos, injunctions, stigmas and resource flows—are not fixed, but open to renegotiation. It is in that spirit that we dedicate this meeting to recognizing our discipline’s borders and those borders’ permeability to relevant transgressions. Web site: [www.aaanet.org/meetings/](http://www.aaanet.org/meetings/).

December 28, 2012 through January 20, 2013

**The Geological Society of America (GSA)** kicks off the celebration of its 125th anniversary with an expedition to Antarctica, “Travels in Geology — Antarctica and the Scotia Arc: Tectonics, Climate and Life.” Web site: <http://www.geosociety.org/125/>.

February 3–7, 2013

**The 66th Annual Meeting of the Society for Range Management** will be held in Oklahoma City, OK. The theme is “Native America – Native Rangelands.” Web site: [www.rangelands.org/events/](http://www.rangelands.org/events/).

March 7–9, 2013

**The 56th Annual Missouri Valley History Conference** will be at Embassy Suites Downtown/Old Market, Omaha, NE. The theme is “Life Must Be Lived as Play: Competition, Sport & Leisure in Human History.” Contact Dr. Jeanne Reames, MVHC Program Chair by e-mail: [mvhc.coordinator@gmail.com](mailto:mvhc.coordinator@gmail.com); web site is [www.unomaha.edu/mvhc/index.php](http://www.unomaha.edu/mvhc/index.php).

April 3–4, 2013

**The 2013 National Conference on Rural Education Research** will be in Omaha, NE, at the Embassy Suites Omaha/Downtown/Old Market. The theme is “Promoting Academic Success of Rural Students.” The National Center for Research on Rural Education (R<sup>2</sup>Ed) will assemble researchers, educational practitioners and policymakers from across the country to discuss the factors influencing rural K-12 students’ academic achievement.

The conference will foster dialogue about the inter-related impacts of teaching, parental involvement and school environment on rural students’ performance. Participating practitioners and administrators will explore methods for incorporating researchers’ recent findings into schools and educational policy.

Nebraska Commissioner of Education Roger Breed will provide the conference’s keynote address. The conference will feature several moderated panel presentations, each of which will include representatives from the research, practitioner and policy communities. Small-group roundtable discussions will follow the presentations, giving attendees the opportunity to engage in dialogue while providing and receiving real-time reaction through a conference-specific Twitter feed.

For more information, see this web site: <http://r2ed.unl.edu/2013/eblast/savethedate.html>.

April 5–6, 2013

**The Center for Great Plains Studies, University of Nebraska–Lincoln, presents its 39th Interdisciplinary Symposium in collaboration with the University of Nebraska at Kearney.** “School Consolidation in the Great Plains: Efficiencies, Change, and Community Identity” will be held at the University of Nebraska at Kearney and the Younes Conference Center in Kearney, Nebraska.

Most rural communities throughout the Great Plains have been losing population for nearly a century. One especially difficult, unhappy, and contentious consequence of this decline is loss of local schools through school consolidation.

Starting in the middle of the twentieth century, consolidation of school districts drastically reshaped American schools. In urban and suburban areas, consolidation was largely completed by 1980, but it continues to be a critical and controversial issue in the Great Plains today. The symposium will address such questions as: What are the causes and consequences of consolidation? What are its effects on students? What are its wider effects on rural communities and the rural quality of life? Is it possible to respond to population shifts in ways that better recognize the value of local schools in the life of a rural community? Are there alternatives?

The conference is open to the public. There is a registration fee. Contact the Center by e-mail: [cgps@unl.edu](mailto:cgps@unl.edu); web site: [www.unl.edu/plains](http://www.unl.edu/plains).

April 5–6, 2013

**The 145th Annual Meeting of the Kansas Academy of Science** will be held at Johnson County Community College. Web site: [www.kansasacademyscience.org/](http://www.kansasacademyscience.org/).

April 9–13, 2013

**The 2013 Annual Meeting of the Association of American Geographers** will be held in Los Angeles. Web site: [www.aag.org/cs/annual\\_conference](http://www.aag.org/cs/annual_conference). For emerging themes, see this web site: [www.aag.org/cs/news\\_detail?pressrelease.id=1270](http://www.aag.org/cs/news_detail?pressrelease.id=1270).

April 19, 2013

**The Annual Meeting of the Nebraska Academy of Sciences and the Nebraska Junior Academy of Sciences State Science Meeting** will be held at Nebraska Wesleyan University in Lincoln, Nebraska. Web site: [www.neacadsci.org](http://www.neacadsci.org).

#### IN MEMORIUM: CLARE (BUD) MCKANNA, JR.

In March 2012, Clare (Bud) McKanna, Jr. passed away in his home in San Diego, CA. A preeminent scholar of the American West, Bud taught classes in U.S., California, Native American, and Latin American history at San Diego State University and local community colleges in a career that spanned 40 years.

Bud came to the University of Nebraska–Lincoln in 1990, where he started his PhD program in history under Professor John Wunder. As a graduate student, Bud served as editorial assistant under Editor Paul Kay as they worked to inaugurate the *Great Plains Research* journal. In 1992, Paul Kay left for a position at the University of Waterloo, and Bud stepped in as editor. In 1994, Bud left for his home and a teaching job at San Diego State University.

In 1997, Bud published his first book, *Homicide, Race, and Justice in the American West, 1880-1920* (University of Arizona Press). Four more books followed, including *Race and Homicide in Nineteenth-Century California* (University of Nevada Press, 2002), *The Trial of “Indian Joe”: Race and Justice in the Nineteenth-Century West* (University of Nebraska Press, 2003), *White Justice in Arizona: Apache Murder Trials in the Nineteenth Century* (Texas Tech University Press, 2005), and *Court-Martial of Apache Kid: The Renegade of Renegades* (Texas Tech University Press, 2009).

At the time of his death, Bud McKanna and Richard W. Crawford were completing a book on San Diego’s historic Stingaree district. A recent tour of that district that Bud organized for friends drew upon his expertise in homicide and his passion for local history. He called his tour “A Walk on the Wild Side: Booze, Bawds, and Murder in the Stingaree.”

For more information on Bud’s life, see the story written by his colleague, Clare Colquitt, on the San Diego State University web site: [http://newscenter.sdsu.edu/sdsu\\_newscenter/news.aspx?s=73541](http://newscenter.sdsu.edu/sdsu_newscenter/news.aspx?s=73541).



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