

# THE OCTOBER 1998 FLOOD OF THE UPPER GUADALUPE RIVER SYSTEM, CENTRAL TEXAS

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**ABSTRACT**—The October 1998 flood on the upper Guadalupe River system was produced by a 24-hour precipitation amount of 483 mm at one station, over 380 mm at several other stations, and up to 590 mm over five days, precipitation amounts greater than the 100-year storm as prescribed in Weather Bureau Technical Papers 40 (1961) and 49 (1964). This study uses slope-area discharge estimates and published discharge and precipitation data to analyze flow characteristics of the three major branches of the Guadalupe River on the Edwards Plateau. The main channel of the Guadalupe has a single large flood-control structure at Canyon Dam and five flood dams on the tributary Comal River. On the upper San Marcos River there are five detention dams that regulate 80% of its drainage. The Blanco River, which has no structural controls, generated a peak discharge of 2,970 m<sup>3</sup>/s from a 1,067 km<sup>2</sup> basin. Downstream of Canyon Dam, the Guadalupe River generated a peak discharge greater than 3,000 m<sup>3</sup>/s from an area of 223 km<sup>2</sup>. The event exceeded the capacity of both the Comal River and San Marcos flood-control projects and produced spills that inundated areas greater than the 100-year floodplain defined by the Federal Emergency Management Agency.

**Key Words:** Guadalupe River, hydrometeorology, structural flood control, Texas floods

# SULFATE MINERAL PARAGENESIS IN PENNSYLVANIAN ROCKS AND THE OCCURRENCE OF SLAVIKITE IN NEBRASKA

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**ABSTRACT**—The acid weathering of pyrite-bearing Pennsylvanian clastic sedimentary rocks in southeastern Nebraska locally produces the secondary sulfate minerals alunogen, copiapite, epsomite, felsöbányaite/basaluminite, gypsum, halotrichite, jarosite, rozenite, and slavikite. Of these mineral occurrences, four are first-time discoveries in the state or the surrounding region. Slavikite ( $\text{NaMg}_2\text{Fe}_5(\text{SO}_4)_7(\text{OH})_6 \cdot 33\text{H}_2\text{O}$ ), which has been reported only once before in North America and from a handful of sites in Europe and South America, was found in abundance at an outcrop at Brownville, NE. The pH values in 1:1 solutions of deionized water of the studied minerals, excluding epsomite, range from 1.94 to 4.82. Therefore, segregations of secondary minerals in themselves are significant microenvironmental reservoirs of acid that can be mobilized during precipitation events. Because of its role in liberating and concentrating ions such as  $\text{Al}^{3+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Mg}^{2+}$ , and  $\text{SO}_4^{2-}$ , acid rock weathering should be considered in local to regional assessments of surface-water and groundwater chemistry. Observations also suggest that rock weathering by the growth of sulfate salts is a potential factor in local hillslope development, one that has not previously been considered in the study area.

**Key Words:** hydrated sulfate minerals, Nebraska, pyrite oxidation, slavikite

# EVAPOTRANSPIRATION ESTIMATION AND SCALING EFFECTS OVER THE NEBRASKA SANDHILLS

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**ABSTRACT**—Quantifying evapotranspiration (ET) over vast ecosystems such as the Sandhills of Nebraska is crucial in linking the surface, subsurface, and atmospheric processes affecting a region. There are numerous methods of obtaining large-scale ET estimates, but most are constrained by the availability of data. This study investigates implementation of an approach that uses a simple land-cover-based standardized tall ( $ET_{rs}$ ) and short ( $ET_{os}$ ) surface reference crop evapotranspiration and crop coefficient to compute actual ET over various spatial and seasonal scales. Subsequently, computed  $ET_{rs}$  was used to get the preliminary estimate of regional ET over the entire Sandhills at the 30 m scale by using Landsat vegetation data. Therefore, while the final ET values are a close approximation to actual ET, it does not relate to the real water consumption by the vegetation in the Sandhills. The 30 m ET values were aggregated at four different scales (500 m, 1 km, 5 km and 10 km) using three methods of interpolation (nearest neighbor, bilinear interpolation, and cubic convolution) in estimating coarser-scale ET. Although the differences in the estimated ET among these four resolutions and three interpolation methods were generally small in magnitude, aggregation resulted in a mean percentile error of up to 4% when compared with estimated high-resolution 30 m ET over the region. In general, both nearest neighbor and bilinear interpolation methods were found to perform better than the cubic convolution method.

**Key Words:** crop coefficients, evapotranspiration, hydrology, Nebraska Sandhills, scaling

# COMPARISON OF BOTANICAL COMPOSITION, SOIL CARBON CONTENT, AND ROOT DISTRIBUTION OF SUBIRRIGATED MEADOWS IN THE NEBRASKA SANDHILLS

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**ABSTRACT**—Characterizing vegetation composition, carbon/nitrogen (C/N) content of soils, and root-mass distribution is critical to understanding carbon sequestration potential of subirrigated meadows in the Nebraska Sandhills. Five subirrigated meadows dominated by cool-season (C<sub>3</sub>) graminoids and five meadows dominated by warm-season (C<sub>4</sub>) grasses were selected throughout the Nebraska Sandhills. Vegetation, soil carbon and nitrogen, and root-mass density distribution were sampled in each meadow. Meadows dominated by C<sub>3</sub> vegetation had 12% greater ( $P < 0.1$ ) yields than meadows dominated by C<sub>4</sub> vegetation. Total root-mass density was 30% greater ( $P < 0.1$ ) in C<sub>4</sub>-dominated meadows than C<sub>3</sub>-dominated meadows. Total carbon and nitrogen content was 65% and 53% greater ( $P < 0.1$ ), respectively, in the A horizon of C<sub>3</sub>-dominated meadows, but was 43% and 52% greater ( $P < 0.1$ ), respectively, in the C horizon of C<sub>4</sub>-dominated meadows. Although meadows dominated by C<sub>3</sub> vegetation had more carbon in the soil profile, much of the carbon in C<sub>3</sub>-dominated meadows appeared to be recalcitrant C<sub>4</sub> carbon from historic vegetation.

**Key Words:** groundwater, native vegetation, root mass, Sandhills, soil carbon, subirrigated meadow

# EVALUATION OF THE COLLEGE EXPERIENCE AMONG AMERICAN INDIAN UPPERCLASSMEN

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**ABSTRACT**—This article reports partial findings from a five-year study that examined the attitudes, perceptions, and expectations regarding higher education among a sample of American Indian students attending a predominantly non-Indian university. Most notably, this article examines some of the factors associated with two specific personal assessments of the college experience: (1) the impact of college upon their appreciation of Native American heritage and (2) the level of satisfaction with the college experience.

**Key Words:** American Indian cultural traditionalism, American Indian education, American Indian higher educational persistence and attrition, higher education personal evaluation

# ASSESSING THE FREE LAND PROGRAMS FOR REVERSING RURAL DEPOPULATION

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**ABSTRACT**—A number of small towns in the Great Plains have recently started to offer free land and other incentives to entice new residents in the hope of reversing persistent depopulation. Based on in-depth interviews, this study assesses the initial performance of the free land programs in six small towns in central Kansas and analyzes the factors that have affected the migration decisions of the new residents. The initial results of these programs have been impressive. Not only have they attracted multiple new residents and increased enrollments in local schools, but they have also elevated long-time residents' pride in their community and created a positive synergy. The new residents' migration decisions were influenced by a number of push and pull factors. The free land and other incentives are not enough to trigger migration, but they have effectively changed some migrants' destination choice to a small town in central Kansas. Without the free land, most new residents, particularly those from out of state, would not have moved there. Contrary to our expectations, the relative locations of small towns with respect to larger cities do not appear to have affected new residents' destination choice.

**Key Words:** depopulation, free land, Great Plains, Kansas, mini-homesteading, small towns

# POPULATION CHARACTERISTICS AND HEALTH SERVICE USE BY LATINO IMMIGRANTS TO SOUTHWEST MISSOURI

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**ABSTRACT**—The rapid influx and new demographic patterns of Latino immigrants to the United States have precipitated numerous pressing issues, among them health and healthcare disparities. The relatively recent phenomenon of high Latino immigration rates to rural areas is increasingly common in the Midwest and Great Plains states, where they are drawn by the labor market. A rural setting, low socioeconomic status, and high concentrations of minorities have been shown to be closely intertwined, and such regions are often medically underserved. Such describes rural southwest Missouri, where we collected data in four counties on demographics, socioeconomic factors, healthcare perceptions, and use of medical services by Latino immigrants.

The health of a community is reflected by the health of its subpopulations, which are strongly impacted by socioeconomic factors. Results from several interviews and focus groups, and from our surveys of 300 Latino households, showed that low socioeconomic status and poor English proficiency are associated with frequent lack of regular preventive medical and dental care. Most respondents in our sample lack health insurance and commonly use low-cost clinics and health departments. We propose outreach efforts that emphasize preventive health care to better incorporate immigrants and augment their health status, and thus those of their communities at large.

**Key Words:** health disparities, health services, Latino immigrants, preventive health care, rural health, socio-demographics

# WATER RIGHTS AND LAND VALUES IN THE WEST-CENTRAL PLAINS

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**ABSTRACT**—Irrigation is vital to the economic activity of the west-central Great Plains. The crops grown, the distribution of center-pivot irrigation systems, and the basic transportation infrastructure is the same in northwest Kansas, northeast Colorado, and southwest Nebraska. But buyers of agricultural land face a different price for irrigated cropland in each of the states, even when the production characteristics of the land are similar. After accounting for factors like productivity and local property tax differences, we argue that it is the difference in water marketing rights between the three states that explains the price difference. The link between land values and water marketing rights is statistically developed by using Ordinary Least Squared (OLS) regression techniques. After adjusting for differences in property taxes, the analysis reveals that the implicit value of full water-marketing rights in the region is approximately \$1,026 per acre. This valuation is within the range of estimates provided by other comparable studies across the country.

**Key Words:** irrigation, land values, water rights