

ABUNDANCE AND DISTRIBUTION OF LESSER SNOW AND ROSS'S GEESE IN THE RAINWATER BASIN AND CENTRAL PLATTE RIVER VALLEY OF NEBRASKA

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ABSTRACT—The number of lesser snow geese (*Chen caerulescens*) and Ross's geese (*C. rossii*), hereinafter called “light geese,” staging during spring in the Rainwater Basin and Central Platte River Valley of south-central Nebraska has dramatically increased since the late 1980s. However, there has been no documentation of the abundance or distribution of light geese across the Rainwater Basin and Central Platte River Valley and the relationship of distribution to conservation-order activities. We used aerial transect surveys and distance sampling methodology to estimate abundance and distribution of light geese in the Rainwater Basin and Central Platte River Valley in the spring of 2001, 2002, and 2003. In 2001 at peak migration, we estimated approximately 7.3 million light geese in the Rainwater Basin and Central Platte River Valley. In 2002 and 2003 there were approximately 1.2 million and 1.6 million light geese at peak migration, respectively. Distribution did not appear to change in relation to light goose conservation-order activities. However, there was an increased use of the Central Platte River Valley during 2002 and 2003 due to dry conditions. The Rainwater Basin and Central Platte River Valley have become a major spring staging area for light geese. Abundance and distribution appear to be related to water conditions and migration chronology.

Key Words: *Chen caerulescens*, *Chen rossii*, lesser snow geese, Ross's geese, Rainwater Basin, Platte River, migration

Great Plains Research 19.2: 147-55

PREDICTING LESSER SCAUP WETLAND USE DURING SPRING MIGRATION IN EASTERN SOUTH DAKOTA

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ABSTRACT—The relative influence of physical, chemical, and biotic wetland characteristics on wetland use by spring migrating lesser scaup (*Aythya affinis* [Eyton]; hereafter “scaup”) is not well understood. We compared characteristics of used and unused wetlands in eastern South Dakota. Used wetlands were larger (>2 ha; $P = 0.05$), with higher amphipod densities (>500 individuals m^{-2} ; $P = 0.01$) and higher chlorophyll-a concentrations (>0.2; $P < 0.05$). These wetlands had lower ionic conductivity (1.8 mS; $P = 0.02$), lower nitrates (1.0 ppm; $P = 0.01$), lower submerged aquatic vegetation density ($P < 0.01$), and lower fine sediment proportions ($\leq 150 \mu m$ grain size; $P < 0.01$). Wetland use was best described by amphipod and submerged aquatic vegetation densities. The predictive model explained 50.4% of the variation in scaup use in a reserve dataset. Thresholds of tolerance by amphipods in relation to wetland habitats in the upper Midwest should be investigated further as indicators of a broader range of water and habitat quality characteristics for scaup.

Key Words: amphipods, Prairie Pothole Region, submerged aquatic vegetation, water quality

Great Plains Research 19.2: 157-67

A TAXONOMIC STUDY OF POPULATIONS OF TIGER BEETLES IN THE *CICINDELA LONGILABRIS* COMPLEX FROM THE BLACK HILLS OF SOUTH DAKOTA

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ABSTRACT—Three phenotypes within the *Cicindela longilabris* complex are present in the vicinity of the Black Hills in South Dakota: Laurent’s boreal long-lipped tiger beetle, *Cicindela longilabris laurentii*; the prairie long-lipped tiger beetle, *Cicindela nebraskana*; and a third phenotype that shares characteristics of both species. By comparing morphological and ecological characteristics between these three phenotypes, I was able to separate *C. longilabris* and *C. nebraskana* using ventral and proepisternal color, presence or absence of a middle band on the elytra, elytral luster, labral width:length ratio, and hind tarsal length. Somewhat less useful characters were labral color and total length. The third phenotype was often not assignable to either species and probably represents hybrid populations, showing gene flow (introgression and recombination) between *C. longilabris* and *C. nebraskana*, as individuals were often found in overlapping prairie/boreal habitats at intermediate altitudes.

Key Words: Cicindelidae, hybridization, taxonomy

Great Plains Research 19.2: 169-77

THE GRASSHOPPERS *ARPHIA XANTHOPTERA* AND *DICHRMORPHA VIRIDIS* PREFER INTRODUCED SMOOTH BROME OVER OTHER GRASSES

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ABSTRACT—A study of feeding preference was conducted on two tallgrass prairie grasshopper species, the autumn yellow-winged grasshopper *Arphia xanthoptera* (Burmeister) and the short-winged green grasshopper *Dichromorpha viridis* (Scudder), to determine if they would feed upon introduced grass species. Both grasshoppers were offered two non-native cool-season grasses, smooth brome (*Bromus inermis* Leyss) and Kentucky bluegrass (*Poa pratensis* L.), and two native warm-season grasses, big bluestem (*Adropogon gerardii* Vitman) and sideoats grama (*Bouteloua curtipendula* Michx.). Live biomass of the plants was weighed before and after feeding to quantify the amount of each plant species consumed by the grasshoppers. Statistical analysis showed that *D. viridis* strongly preferred smooth brome ($P \leq 0.05$) over other species offered. *A. xanthoptera* also consumed more smooth brome than the other grass species offered. These results suggest that both grasshopper species accept non-native grasses and perhaps prefer them to tallgrass prairie species. Because the tallgrass prairie ecosystem of the Great Plains has been dramatically impacted by human activity, documentation of the response of native insects to incursion by exotic plants is important to preservation efforts. Moreover, if grasshoppers feed on invasive sod-forming species such as smooth brome and Kentucky bluegrass, they may become an important ally in maintaining native plant diversity in remnant grassland ecosystems.

Key Words: feeding preference, grasshopper, non-native grass, smooth brome, tallgrass prairie

Great Plains Research 19.2: 179-86

ANALYSIS OF AQUIFER DEPLETION CRITERIA WITH IMPLICATIONS FOR GROUNDWATER MANAGEMENT

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ABSTRACT—Groundwater is critical to many aspects of life on the Great Plains. Overdevelopment of this resource can have serious social, economic, and environmental consequences. Aquifer depletion criteria are used in many areas of the Great Plains to implement management responses and limit groundwater development. This study addresses groundwater-level triggers and depletion limits—criteria commonly used in Nebraska—within the context of interconnected ground- and surface-water systems. Generic models are used to calculate transient water budgets in three hypothetical systems given depletion limits of 5%, 10%, 15%, and 25%. In each simulation, the source of water to the wells changes from aquifer depletion to surface-water depletion, but at rates varying from 1 day to several hundred years. Separate simulations test the effectiveness of groundwater-level triggers at achieving a desired depletion limit. Results suggest that universal application of generic depletion criteria may lead to unintended consequences such as excessive surface-water depletion, excessive aquifer depletion, or conversely, unnecessary constraints on pumping. A holistic process framework for groundwater management is presented to promote the use of aquifer depletion criteria in conjunction with an adaptive management strategy. Such strategies can help ensure the future sustainability of water resources in Nebraska and elsewhere in the Great Plains.

Key Words: groundwater, water, pumping, sustainability, model, management

Great Plains Research 19.2: 187-200

REDEFINING THE DUST BOWL REGION VIA POPULAR PERCEPTION AND GEOTECHNOLOGY

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ABSTRACT—The Dust Bowl is a historical vernacular region that has been delimited by a diverse group of academics, literary authors, and popular cultural voices. However, the general public's perception of the Dust Bowl region has not been mapped and analyzed. This research queried residents of 93 Great Plains counties in order to ascertain their perceptions and knowledge of the vernacular Dust Bowl region. Analysis of the responses via the application of geographic information system mapping reveals striking differences between respondents of varying age and place of residence. Findings suggest that spatial understanding of the Dust Bowl phenomena is eroding among young people in the Great Plains. Diminished knowledge of human-environment dynamics should raise concerns in light of the recurrent nature of drought in the region.

Key Words: drought, Dust Bowl, environmental perception, GIS, vernacular region

Great Plains Research 19.2: 201-14

TOURIST ATTITUDES TOWARD ELK MANAGEMENT IN THE PINE RIDGE REGION OF NORTHWESTERN NEBRASKA

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ABSTRACT—We interviewed 200 tourists at Fort Robinson State Park and Chadron State Park in the Pine Ridge region of northwestern Nebraska during July and August of 1997 to determine attitudes toward elk (*Cervus elaphus*) and elk management in Nebraska. Fifty-nine percent of the respondents were aware that elk occupied the Pine Ridge, 95% favored free-ranging elk, and 55% favored hunting as a means of managing the population. Nebraska residents were more aware of elk and elk hunting in the Pine Ridge than were nonresidents. Also, more residents had observed elk and were willing to drive longer distances to view elk in the Pine Ridge. Respondents in older age groups (55–64) were more knowledgeable about elk. More urban tourists were in favor of elk than those from rural communities, but attitudes toward elk hunting were similar between urban and rural residents. Seventy-six percent of respondents wanted an increase in the population of elk. Men were more aware of elk populations than women and more supportive of hunting as the best method to manage the population. We found no differences between gender for maintaining free-ranging elk, knowledge of hunting seasons, or willingness to drive, pay, or spend time to view elk. Our results revealed that tourists had positive attitudes toward free-ranging elk and management practices in Nebraska. Elk herds should be managed to provide maximum opportunity for both consumptive and nonconsumptive uses while minimizing negative impacts to property owners and the ecosystem.

Key Words: *Cervus elaphus*, elk, human dimensions, Nebraska, public knowledge, tourist attitudes

Great Plains Research 19.2: 215-23

LONG-TERM AGRICULTURAL LAND-USE TRENDS IN NEBRASKA, 1866–2007

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ABSTRACT—Although landscape changes from anthropogenic causes occur at much faster rates than those from natural processes (e.g., geological, vegetation succession), human perception of such changes is often subjective, inaccurate, or nonexistent. Given the large-scale land-use changes that have occurred throughout the Great Plains, the potential impacts of land-use changes on ecological systems, and the insight gained from knowledge of land-use trends (e.g., to compare to wildlife population trends), we synthesized information related to land-use trends in Nebraska during 1866–2007. We discussed and interpreted known and potential causes of short- and long-term land-use trends based on agricultural and weather data; farm policies and programs; and local, state, and global events. During the study period, mean farm size steadily increased, whereas number of farms rapidly increased until about 1900, remained stable until about 1930, then rapidly decreased. Total area of cropland in Nebraska increased until the 1930s, but then showed long-term stability with large short-term fluctuations. Crop diversity was highest during 1955–1965, then slowly decreased; corn was always a dominant crop, but sorghum and oats were increasingly replaced by soybeans after the 1960s. Land-use changes were affected by farm policies and programs attempting to stabilize commodity supply and demand, reduce erosion, and reduce impacts to wildlife and ecological systems; direct and indirect effects of war (e.g., food demand, pesticides, fertilizers); technological advances (e.g., mechanization); and human population growth and redistribution. Although these causes of change will continue to affect Nebraska’s landscape, as well as that of other Great Plains states, new large-scale trends such as increasing energy demands (e.g., biofuels) may contribute to an already highly modified landscape.

Key Words: agriculture, biofuels, Conservation Reserve Program, farm policy, farm programs, land use, Nebraska, wildlife

Great Plains Research 19.2: 225-37