

High Plains Wetlands General Information

864. Aquatic macroinvertebrate diversity of playa wetlands: The role of landscape and island biogeographic characteristics.

Hall, D. L.; Willig, M. R.; Moorhead, D. L.; Sites, R. W.; Fish, E. B.; and Mollhagen, T. R.

Wetlands 24(1): 77-91. (2004)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ macrofauna/ species diversity/ biogeography/ community composition/ ecology/ fauna/ biodiversity/ aquatic organisms/ life history/ regression analysis/ USA, Texas/ USA, Texas, Southern High Plains/ landscape ecology/ island biogeography

Abstract: Wetland habitats continue to be lost at a unsettling rate, especially freshwater emergent wetlands that are isolated geographically. These are the predominant wetlands found in arid and semi-arid environments, where they serve as foci of regional biodiversity. This is especially true of the playa wetlands of the Southern High Plains of Texas, USA. The factors that determine and maintain biotic diversity in these wetlands are understood poorly.

Consequently, this study examined the effect of island biogeographic and landscape features on the diversity of aquatic macroinvertebrates in playa wetlands.

Macroinvertebrates were collected from playas three times during the spring and summer of 1994 and categorized as resident or transient taxa based on life history strategies.

Diversity was estimated using taxonomic richness (richness) and Fisher's log-series alpha (alpha).

Surrounding land-use practices influenced resident richness, whereas playa surface area affected resident and transient richness, as well as resident alpha. However, relationships differed among sampling dates. Regression analyses suggested that transient richness and alpha were influenced more by insular characteristics than by landscape features. The converse was true for resident richness and alpha. Therefore, both insular and landscape characteristics affected the diversity of macroinvertebrates in playa wetlands, but impacts were dependent on life-history strategy and time since inundation (i.e., sampling date). Consequently, conservation and management efforts targeting macroinvertebrates in playa wetlands will need to focus on the wetlands and characteristics of adjacent watershed features.

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865. Behavior of migrant shorebirds in playas of the Southern High Plains, Texas.

Davis, Craig A. and Smith, Loren M.

Condor 100(2): 266-276. (1998)

NAL Call #: QL671.C6; ISSN: 0010-5422

Descriptors: activity budget/ fall/ feeding/ playas/ sleeping/ spring

Abstract: Playas in the Southern High Plains (SHP) are important for migrant shorebirds, but the functional role of playas to migrant shorebirds is not clearly understood. We conducted diurnal time-activity budgets on American Avocets (*Recurvirostra americana*), Long-billed Dowitchers (*Limnodromus scolopaceus*), Least Sandpipers (*Calidris minutilla*), and Western Sandpipers (*C. mauri*) in spring and fall 1993 and 1994 in 69 play as on the SHP of Texas. During both seasons, Least and Western Sandpipers spent

70-80% of their time feeding. Long-billed Dowitchers spent 77% of their time feeding in spring, but spent more time sleeping and less feeding in fall. American Avocets spent 41-50% of their time feeding and 34-40% of their time sleeping during each season. All four species spent minimal time engaged in locomotion, body maintenance, alert, and aggressive behaviors. American Avocets and Long-billed Dowitchers fed most during the midday and late periods and slept most during the early period. Least Sandpipers fed most during the early period, whereas feeding activities of Western Sandpipers remained 70-80% throughout the day. Each of these species use different behavioral strategies in response to such factors as migration distances, energetic needs, differential predation, nocturnal foraging, and diet. Playas appear to serve as important intermediate stopover sites for shorebirds during migration.

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866. Breeding ducks and their habitats in the High Plains of Texas.

Ray, James D.; Sullivan, Brian D.; and Miller, Harvey W.

Southwestern Naturalist 48(2): 241-248. (2003)

NAL Call #: 409.6; ISSN: 0038-4909

Descriptors: roadside survey: applied and field techniques/ central flyway/ breeding areas/ impoundments: habitat/ occupancy rates/ playa lakes: habitat/ ponds: habitat/ species density

Abstract: The High Plains of Texas is one of the southernmost nontraditional breeding areas for many duck species in North America. Because of a paucity of information on breeding ducks there, we conducted roadside surveys of breeding ducks and their habitats during May and June from 1988 through 1992. Breeding pairs of 15 species were observed on 6 types of ponds (natural and man-made wetlands containing surface water). Mallard (*Anas platyrhynchos*) density ranged from 9.1 to 23.1 pairs/100 km², and density for all species combined ranged from 14.8 to 46.7 pairs/100 km² (all years and survey periods included). Occupancy rates were highest on playa lakes and impoundments, though all pond types had occupancy rates exceeding 26% (all surveys and years). Duck pairs per occupied pond were highest on playa lakes (>7 and >4 on May and June surveys, respectively), followed by impoundments (> 5 and > 2) and entrenched draws (>2 and >3). Although the density of breeding pairs in the High Plains of Texas (47 pairs/100 km²) is generally lower than in prominent nesting areas (e.g., >200 in the San Luis Valley, CO; >600 in central Montana; >2,000 in California; >4,000 in the Prairie Pothole Region), information reported here further confirms the use of the Playa Lakes Region by breeding ducks and illustrates its importance as a major habitat area for waterfowl in the Central Flyway.

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867. Composition of seed banks along an elevational gradient in playa wetlands.

Haukos, D. A. and Smith, L. M.

Wetlands 14(4): 301-307. (1994)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ seeds/ vegetation/ water level fluctuations/ soil water/ elevation/ species composition/ aquatic plants/ playas/ seed banks/ gradients/ community composition/ resource management/ water levels/ eolian transport/ vegetation cover/ plant reproductive structures/ USA, Texas/ seed banks/ gradients/ community composition/ eolian transport/ vegetation cover/ resource management/ water levels/ plant reproductive structures/ water level fluctuations/ soil water/ elevation/ playas/ vegetation/ species composition

Abstract: We analyzed the composition of seed banks along an elevational gradient (0-1 m) in playa wetlands of the Southern High Plains of Texas. Differing seed-bank composition along such a gradient may be one mechanism in the determination of vegetation structure in wetlands. We used the seedling-emergence technique under moist-soil and submerged treatments to ascertain the composition of seed banks in 8 playas. There were no differences ($P > 0.05$) in overall or common species seedling densities along the elevational gradient. Fluctuating water levels in a relatively shallow wetland, combined with the short linear distance of the gradient into a flat bottom, results in the uniform distribution of seed in playas. Additionally, wind action during periods when playas are dry may serve to distribute seeds throughout the wetland. Structure of vegetation in playas is determined principally by the varying soil moisture regime, which regulates composition of species germinating when other environmental conditions are suitable. When environmental conditions, including soil-moisture content, are appropriate for germination, each species in the seed bank could potentially be found throughout the wetland. When managing playas for specific plant species through manipulation of soil moisture, we can expect a comparable species response to similar treatments anywhere in the playa.

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868. Ecology and management of migrant shorebirds in the Playa Lakes Region of Texas.

Davis, Craig A. and Smith, Loren M.

Wildlife Monographs(140): 1-45. (1998)

NAL Call #: 410 W64; ISSN: 0084-0173

Descriptors: body size/ diet/ feeding ecology/ habitat selection/ migration/ sex differences/ stopover site

Abstract: During spring and fall migration, shorebirds rely on stopover areas to replenish energy reserves and fulfill nutrient requirements. Most studies of stopover areas have focused on wetlands in the Northern Great Plains; little attention has been given to wetlands in the Southern Great Plains, especially the Playa Lakes Region (PLR). Our objectives were to determine migrant-shorebird species compositions, abundances, migration chronologies, use of habitats, and feeding ecologies in the PLR during spring and fall migration. More than 130 playa wetlands were surveyed for shorebirds in a 34,000-km² area of western Texas. We selected American avocet (*Recurvirostra americana*), long-billed dowitcher (*Limnodromus scolopaceus*), least sandpiper (*Calidris minutilla*), and western sandpiper (*C. mauri*) as a subset of all shorebirds present to examine feeding ecologies; these 4 species

were common species during both migration periods and represent a wide range of body sizes and guilds. We also evaluated the influence of sex on the feeding ecologies of the 4 species. Thirty shorebird species used playa wetlands during spring and fall, 1993-94. The most abundant species during spring were American avocet, long-billed dowitcher, and Wilson's phalarope (*Phalaropus tricolor*), whereas the most abundant species during fall were American avocet, long-billed dowitcher, long-billed curlew (*Numenius americanus*), stilt sandpiper (*Calidris himantopus*), and lesser yellowlegs (*Tringa flavipes*). Migration chronologies of each species were distinct in spring with peak abundances occurring over 2-4 weeks and were protracted in fall with peak abundances occurring over 5-8 weeks. In general, most shorebird species selected playas that contained sparse vegetation (<25% vegetation cover), adequate amounts of mudflat (10-15%) and shallow (<4 cm depth) water (10-20%) habitats, and higher invertebrate populations. Invertebrates were the most important component in the diets of American avocets, long-billed dowitchers, least sandpipers, and western sandpipers, and diets varied little between males and females. In the spring, all 4 species consumed mostly chironomids, whereas in the fall, all 4 consumed a wider variety of invertebrates. important invertebrate foods during the fall included chironomids, hydrophilids, leeches, planorbids, corixids, conchostracans, and hydracarinans. The 4 species also consumed more plant material (predominantly seeds) in the fall than in the spring. Differences in spring and fall diets of the 4 shorebird species were attributed to seasonal differences in invertebrate abundances and diversities; invertebrate abundances and diversities were higher in the fall than in the spring. Shorebird diets were compared with availabilities of foods within and across individual playas. For most foods, overall selection patterns (i.e., selection across playas) were different from selection patterns within individual playas. In general, all 4 species exhibited a wide range of selection patterns for invertebrates as availability of invertebrates changed, suggesting that the 4 species used an opportunistic foraging strategy. Shorebird foraging appeared to decrease invertebrate populations in spring, but not in fall. Management of playas in the PLR should focus on creating and maintaining sparse vegetation cover, and adequate mudflat (at least 10-15%) and shallow water (at least 10-20%) habitats. Because invertebrates are important foods of migrant shorebirds, management also should focus on enhancing invertebrate populations in playas. Gradual drawdowns of playas with deep water and flooding of dry playas should be used to provide available habitat for shorebirds throughout migration. Mowing and shallow disking can be used to create preferred habitat conditions and provide a detrital food base to enhance invertebrate populations. Managers that can manage only a few playas should consider managing playas during periods of maximum shorebird diversity in the PLR. During spring, maximum shorebird diversity occurred in late April and early May, whereas during fall, maximum shorebird diversity occurred in late August.

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869. Factors affecting condition of northern pintails wintering in the Southern High Plains.

Smith, Loren M. and Sheeley, Douglas G.

Journal of Wildlife Management 57(1): 62-71. (1993)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: body weight/ carcass composition/ climate/ diet/ energetic cost/ fat/ gizzard mass/ lipid/ nutrient reserve/ paired male/ population ecology/ protein/ reproduction/ sex difference/ survival/ wetland management
Abstract: Because nutrient reserves affect survival and subsequent reproduction, it is necessary to examine factors affecting nutrient reserves to understand the population ecology of northern pintails (*Anas acuta*). Thus, we examined variation in carcass composition and organ mass of northern pintails wintering on the Southern High Plains (SHP) of Texas(USA) with respect to time (month, year; which varied in wetland availability), age, sex, and pair status. Carcass mass for males, and fat-gizzard mass, and percent fat were higher ($P < 0.05$) in 1985-86 (wet year) than 1985 (normal year) for males and females. This was attributed to precipitation that was 70% above normal in 1985-86, and resulted in increased availability of wetlands. Adult and immature birds did not differ ($P > 0.10$) with the exception of ash mass. Males were heavier ($P < 0.001$), had heavier ($P < 0.001$) organs (gizzard and liver), and had more ($P < 0.001$) protein and ash than females. Females had a higher ($P < 0.001$) percentage of fat than males. Fat and protein decreased from November to December in both years. In the normal year, fat did not vary ($P > 0.05$) from January to March. A decline ($P < 0.05$) in fat in February of the wet year may have been an endogenous response to reduce energetic costs. Changes in gizzard mass over time probably reflected dietary changes during winter. Paired males had greater ($P < 0.01$) lipid levels than unpaired birds in the wet year but not in the normal year. We could not make this comparison for females because there were so few unpaired females. Management in the SHP should focus on improving playa wetlands in winter because pintail body condition can be improved by increased wetland availability, and improved condition has been associated with increased survival and reproduction.

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870. High plains wetlands of southeast Wyoming: Salinity, vegetation, and invertebrate communities.

Lovvorn, James R.; Wollheim, Wilfred M.; and Hart, E. Andrew

In: *Invertebrates in freshwater wetlands of North America: Ecology and management/* Batzer, Darold P.; Rader, Russell B.; and Wissinger, Scott A.

New York: John Wiley & Sons, 1999; pp. 603-633.

Notes: ISBN: 0471292583

NAL Call #: QL365.4.A1158

Descriptors: Invertebrata/ biomass/ food webs/ community structure/ shallow saline lakes/ brackish habitat/ lake/ shallow saline lakes community structure/ biomass and food web/ Wyoming/ south east Wyoming/ Laramie Basin/ biomass and food web in shallow saline lakes

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871. An historical overview of playas and other wetland/riparian areas of "Nuevo Mexico".

Deason, M. G.

New Mexico Journal of Science 38: 189-218. (1998);

ISSN: 0270-3017

Descriptors: wetlands/ USA, New Mexico/ history/ riparian land/ water resources/ playas

Abstract: This journal article briefly examines the history of Nueva Espana (New Spain) since 1541, in the context of playas and other wetland/riparian areas in the Region of Nuevo Mexico (New Mexico). Particular attention is given to their importance and use by indigenous people, early Spanish explorers, and the subsequent settlers of Nuevo Mexico. Furthermore, 1998 marks the 150th anniversary of the original signing of the Treaty of Guadalupe Hidalgo. This event is briefly presented along with several historical periods that influenced the course of water in Nuevo Mexico.

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872. Hydrologic influences on insect emergence production from Central Platte River wetlands.

Whiles, M. R. and Goldowitz, B. S.

Ecological Applications 11(6): 1829-1842. (2001)

NAL Call #: QH540.E23; ISSN: 1051-0761

Descriptors: wetlands/ hydrology/ emergence/ ecological effects/ insects/ species diversity/ aquatic insects/ Insecta/ Diptera/ Chironomidae/ Culicidae/ Ceratopogonidae/ Sciomyzidae/ Muscidae/ USA, Nebraska/ USA, Kansas, Platte R./ insects/ midges/ mosquitoes/ biting midges/ no-see-ums/ punkies/ marsh flies/ face flies/ horn flies/ house flies/ muscid flies/ stable flies

Abstract: The physical template of freshwater ecosystems has a pervasive influence on biological communities and processes. To examine the influence of hydrology on wetland insect communities, we quantified insect emergence from five riparian sloughs in the central Platte River valley. Annual hydroperiods of the wetlands ranged from 94 to 365 d/yr, and frequency and magnitude of drying events were inversely proportional to hydroperiod length. Three emergence traps were placed in each wetland from April through November 1997. Most insects collected in traps were identified to genus, and individual dry mass (DM) also was determined. Abundance of emerging insects (24 124 individuals/m²) and emergence production (5.1 g DM times m⁻² times yr⁻¹) were highest from the site with an intermediate hydroperiod of 296 d. Sites with longer and shorter hydroperiods had lower emergence abundance and production. Emergence production from the perennial site, which contained fish year-round, was only 0.26 g DM times m⁻² times yr⁻¹. Diptera generally dominated emergence trap catches. Chironomidae, Culicidae, and Ceratopogonidae were among the dominant contributors to abundance, whereas Sciomyzidae and Muscidae were important contributors to biomass at most sites. Quadratic equations best described relationships between taxa richness and annual hydroperiod ($r^2 = 0.78$, $P < 0.05$) or number of drying events/yr ($r^2 = 0.81$, $P < 0.05$), reflecting a peak in richness at intermediate levels of both. These relationships followed predictions of the intermediate disturbance hypothesis, but specific mechanisms underlying patterns were difficult to discern. Like emergence production, taxa richness was also highest at intermediate hydroperiods. Hence, insect diversity

(measured as richness) and emergence production were positively correlated ($r_{\text{super}(2)} = 0.85$, $P < 0.05$). Results indicate that the hydrology of central Platte River wetlands exerts a strong influence on insect species richness and emergence production, and that intermittent sites harbor the highest insect diversity and produce more emergent insect biomass. However, trends in seasonal emergence patterns and taxonomic shifts across the hydrologic gradient in this study suggest that a landscape containing a mosaic of hydrologically distinct wetlands will maximize aquatic insect diversity and productivity at larger spatial and temporal scales.

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873. The importance of playa wetlands to biodiversity of the Southern High Plains.

Haukos, David A. and Smith, Loren M.

Landscape and Urban Planning 28(1): 83-98. (Feb. 1994)

NAL Call #: QH75.A1L32; ISSN: 0169-2046.

Notes: Special issue

Descriptors: comprehensive zoology/ farming and agriculture/ threats to playa wetland habitats/ habitat management/ conservation importance and needs/ New Mexico and Texas/ species diversity/ importance of playa wetlands/ semiaquatic habitat/ playa wetlands/ conservation importance in prairie biodiversity/ grassland/ prairie/ biodiversity and conservation importance of playa wetlands/ chemical pollution/ USA/ New Mexico/ southern High Plains/ playa wetlands importance to biodiversity/ conservation implications

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874. Inventory and floristics of Sandhills fens in Cherry County, Nebraska.

Steinauer, G.; Rolfsmeier, S.; and Hardy, J. P.

Transactions of the Nebraska Academy of Sciences (23): 9-21. (1996)

NAL Call #: Q11.N4; ISSN: 0077-6351

Descriptors: wetlands/ ecological distribution/ fens/ plants/ indicators/ flora/ USA, Nebraska/ community composition/ aquatic plants/ indicator species/ USA, Nebraska/ plants/ species composition/ indicator species/ ecological distribution/ fens/ USA, Nebraska

Abstract: The Sandhills of north-central Nebraska and south-central South Dakota are the largest sand-dune area in the Western Hemisphere. In 1991 and 1992, an inventory of Sandhills fens in Cherry County, Nebraska, documented 39 fens ranging in size from 4 to 280 ha. The majority of these sites had been ditched and were used as hay meadows. In 1996, a detailed floristic survey of six fens in Cherry County documented 191 species and one subspecies of vascular plants, including 21 species considered rare in Nebraska. Fifteen Sandhills fen indicator species were identified. The Sandhills populations of the indicator species are disjunct from their primary ranges to the north and east of the Great Plains, suggesting these populations to be glacial relicts.

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875. Macroinvertebrate communities in Central Platte River wetlands: Patterns across a hydrologic gradient.

Whiles, M. R. and Goldowitz, B. S.

Wetlands 25(2): 462-472. (2005)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ biomass/ abundance/ seasonal variations/ community structure/ freshwater environments/ flooding/ macroinvertebrates/ insects/ mollusks/ river basins/ structure/ organic matter/ rivers/ annelids/ crustaceans/ hydrology/ wildlife habitats/ Hydrophilidae/ Ceratopogonidae/ Mollusca/ Chironomidae/ Dytiscidae/ USA, Nebraska, Platte R./ water scavenger beetles/ biting midges/ midges/ predaceous diving beetles

Abstract: Wetlands provide critical wildlife habitat in the central Platte River basin of Nebraska, USA, but little is known about their macroinvertebrate communities or how factors such as hydrology affect them. In 1997, we quantified macroinvertebrate abundance, biomass, and community structure and organic matter resources in four natural wetlands that represented a gradient from ephemeral to permanent flooding. All four wetlands had abundant macroinvertebrate communities when flooded, and we observed unique taxa at all sites. Mean annual macroinvertebrate abundance and biomass increased with hydroperiod length, but taxon richness and diversity were greatest in intermittent sites. Non-insect groups, mostly crustaceans, annelids, and mollusks, were important at all sites, and their taxonomic composition shifted across the hydrologic gradient. Insect communities were dominated by dipterans (mostly Chironomidae and Ceratopogonidae) and Coleopterans (mostly Hydrophilidae and Dytiscidae), and these also varied across the hydrologic gradient. Collector-gatherers, scrapers, and predators were the dominant functional groups in terms of biomass, and biomass was most evenly distributed among these groups in intermittent sites. Macroinvertebrate communities in these riparian wetlands vary across natural hydrologic gradients, and diversity peaks in intermittent sites. Patterns of abundance, biomass, and diversity, along with seasonal patterns, suggest that, at a landscape level, a diversity of wetland habitats with different hydrologic regimes will maximize abundance and diversity of freshwater macroinvertebrate communities in this region.

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876. Nutrients in a playa wetland receiving wastewater.

Pezzolesi, T. P.; Zartman, R. E.; Fish, E. B.; and Hickey, M. G.

Journal of Environmental Quality 27(1): 67-74. (1998)

NAL Call #: QH540.J6; ISSN: 0047-2425

Descriptors: wetlands/ *Typha domingensis*/ wild plants/ wastewater/ nutrients/ Texas

Abstract: We determined nutrient sequestration differences in soil and vegetation within two regions of a playa wetland that receives agricultural runoff and secondarily treated wastewater. Playas are small, topographically closed, ephemeral wetlands that serve as catchments for surface runoff in the Southern High Plains of the USA. The wetland studied received natural runoff and secondarily treated wastewater from the U.S. Department of Energy, Pantex facility near Amarillo, TX. Soil and aboveground biomass N, P, Cu, and Fe and water N and P were evaluated seven times during a 2-yr period in cattail (*Typha domingensis* Pers.) and pink smartweed [*Persicaria pensylvanica* (Raf.) Nieuw.] dominated regions of the playa. Spatial and

temporal variabilities were observed in water, vegetation, and soil-nutrient concentrations. These variabilities were likely due to fluctuation of water depth and quality in the playa. Water was deeper ($P < 0.05$) in the cattail region compared with the smartweed region. Water quality [Total Kjeldahl N (TKN) and total P (TP)] was not effected ($P > 0.05$) by vegetation type. Soil concentrations of TKN, TP, Cu, and Fe were not significantly different ($P > 0.05$) between cattail and smartweed vegetative types. Cattail had significantly greater ($P < 0.05$) levels of TKN, TP, Cu, and Fe than did smartweed. Aboveground biomass was greatest in August. Based on nutrient sequestration this playa wetland functioned quite well as a receptor for added nutrients from runoff and the wastewater treatment facility. This citation is from AGRICOLA.

877. Past and future impacts of wetland regulations on playa ecology in the southern Great Plains.

Haukos, D. A. and Smith, L. M.

Wetlands 23(3): 577-589. (2003)

Descriptors: wetlands/ legislation/ environmental regulations/ conservation/ education/ government regulations/ government policy/ playas/ regulations/ solid wastes/ feedlot runoff/ excavation/ aquifers/ watersheds/ groundwater recharge/ municipal wastewater/ urban planning/ degradation/ surface drainage/ environmental legislation/ environmental protection/ policies/ man-induced effects/ nature conservation/ USA, Southern Great Plains/ USA, Texas/ USA, New Mexico/ USA, Great Plains

Abstract: Playa wetlands provide functions critical to the existence of life on the High Plains portion of the Great Plains, including surface drainage, aquifer recharge, and wildlife habitat. These small, circular, isolated depressional wetlands with closed watersheds have a dynamic, unpredictable hydroperiod, which is essential to the maintenance of biodiversity. Most numerous in the Southern High Plains of northwestern Texas and eastern New Mexico, playas have been impacted by sedimentation, pit excavation, road construction, industrial and municipal wastewater, feedlot runoff, urban development, overgrazing, and deliberate filling. Despite being declared, as a wetland class, jurisdictional 'waters of the United States' since 1977, regulations and laws for conservation of wetland functions have seldom been applied to playas. The January 2001 Supreme Court decision, Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army of Corps of Engineers, likely eliminated federal regulation of impacts covered by the Clean Water Act in all but a few playas. Although still subject to the Federal 'Swampbuster' provision enacted by the 1985 Food Security Act, extended natural dry periods allows for frequent cultivation and other activities in playas without incurring violation, contributing to the continued degradation of playa functions. None of the states with significant numbers of playas have regulations for the conservation of playa functions. Suggestions for the successful future conservation of playas and their associated functions include (1) increased promotion and implementation of existing federal and state conservation programs specifically for playas; (2) proposed state regulations for playa conservation; (3) recognition of agricultural impacts on wetland determinations; (4) creation of Wetland Management Districts to preserve intact, functioning playas; and (5) increased public education on the value of playas.

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878. Playa lakes on the southern High Plains in Texas: Reevaluating infiltration.

Zartman, R. E.; Evans, P. W.; and Ramsey, R. H.

Journal of Soil and Water Conservation 49(3):

299-301. (1994)

NAL Call #: 56.8 J822; *ISSN:* 0022-4561

Descriptors: wetlands/ lakes/ long-term planning/ water management/ infiltration rate/ surface water/ water conservation/ soil types/ playas/ temporary ponds/ fate/ USA, Texas/ temporary ponds/ fate/ infiltration rate/ soil types

Abstract: The fate of water in playa lakes determines the long-term water management strategy for the Southern High Plains of Texas. To determine the fate of water within playa wetlands, initial (1 min) and long-term (>48 h) infiltration rates were determined using double ring infiltrometers at three relative elevations in three Southern High Plains playa lakes. The high elevation treatments were at least 150 mm above the highest intermediate elevation and the low elevation treatments were at least 150 mm below the lowest intermediate elevation. The hydric playa soils [Randall clay (fine, smectitic, thermic Udic Pellusterts)] were vegetated with facultative wetland plants. Particle size analysis, soil pH, and electrical conductivity were also determined at each infiltrometer location. There were no significant differences of infiltration for the three elevational treatments. Initial infiltration rates ranged from 2490 to 10 mm/min while arithmetic means were greater than 100 mm/min. Long-term infiltration rates ranged from 996 to 0.004 mm/min while arithmetic means were approximately 5 mm/min. These rapid initial and measurable long-term infiltration rates demonstrate that infiltration occurs within playas. Furthermore, these high infiltration rates indicate that playa wetlands are important zones in determining the fate of surface water on the Southern High Plains.

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879. Playa lakes: Prairie wetlands of the Southern High Plains, USA.

Bolen E. G.; Smith L. M.; and Schramm H. L.

Bioscience 39(9): 615-623. (1989)

Descriptors: agriculture/ ecology/ irrigation/ hydrology/ flora/ fauna/ grazing/ livestock/ biological diversity/ New Mexico, USA/ Texas, USA

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880. Playas of the Southern High Plains: The macroinvertebrate fauna.

Hall, Dianne L.; Sites, Robert W.; Fish, Ernest B.;

Möllhagen, Tony R.; Moorhead, Daryl L.; and

Willig, Michael R.

In: *Invertebrates in freshwater wetlands of North America:*

Ecology and management/ Batzer, Darold P.; Rader,

Russell B.; and Wissinger, Scott A.

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Descriptors: Macroinvertebrata/ habitat management/ playa lakes overview/ food webs/ community structure/ playa lakes/ emigration/ immigration/ playa lakes fauna overview/ habitat colonization/ playa lakes colonization patterns/ temporary water/ USA/ southern Great Plains/ playa lakes community ecology and conservation

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881. Preserving Nebraska 's wetlands: Now and in the future.

Christensen, M. A.

Nebraska Law Review 63(3): 473-513. (1984);

ISSN: 0047-9209

Descriptors: wetlands/ legal aspects/ water resources development/ Nebraska/ preservation/ sandhills/ groundwater/ flood control/ water quality/ land acquisition/ cost-sharing

Abstract: In an effort to increase public awareness of the importance of Nebraska 's wetlands and to evaluate the means presently available to aid in wetlands preservation, this summary of wetlands and their role in Nebraska is offered. Suggestions for further protective measures are also made. The destruction of Nebraska 's wetlands is described as it relates to the rainwater basin and the sandhills. Consequences of wetlands destruction include a loss of nutrients, groundwater supplies and recycling center for water, and a lessening of the holding power of water from rainfall. Wetland protections afforded under the Clean Water Act are discussed, specifically section 404. Other means of preservation include federal land acquisition, state land acquisition, state cost sharing practices, and water bank programs. (Baker-IVI)

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882. Protein and energy production in playas: Implications for migratory bird management.

Anderson, J. T. and Smith, L. M.

Wetlands 18(3): 437-446. (1998)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ proteins/ energy/ playas/ birds/ biomass/ invertebrates/ habitats/ migration/ waterfowl/ soil management/ migratory species/ environment management/ Invertebrata/ animal feeds/ aquatic birds/ habitat/ nature conservation/ nutrition/ overwintering/ bioenergetics/ animal nutrition/ food availability/ food organisms/ seeds/ sediment properties/ water content/ USA, Texas, High Plains/ USA, Texas, Southern High Plains/ Invertebrata/ USA, Texas/ moist-soil management

Abstract: We examined protein and energy production of potential migratory bird foods produced in moist-soil managed versus unmanaged playa wetlands on the Southern High Plains of Texas (SHP) during fall and winter 1994-95 and 1995-96 to assess potential carrying capacity for wintering migratory birds. Total food (seeds and invertebrates) biomass, crude protein production, and gross energy production were greater in managed playas than unmanaged playas. There was no difference in food biomass or energy production between invertebrates and seeds when managed and unmanaged playas were combined, but protein production from invertebrates was greater than production from seeds. The estimated 160,000 ha of unmanaged playa wetland habitat in the SHP produces about 24.3 million kg of seeds and invertebrates, 9.2 million kg of protein, and 108.6 billion kcal of energy. When these playas have water, there are enough seeds and invertebrates to support 3 million ducks for 3 months. However, water is often limited, making much of this habitat unavailable to waterbirds in most years. Therefore, conservation of existing playas should be supplemented with intensive moist-soil management in some areas as the most economical strategy for providing proper nutrition to migratory birds and other wildlife in playas.

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883. Quaternary evolution of ephemeral playa lakes on the Southern High Plains of Texas, USA: Cyclic variation in lake level recorded in sediments.

Hovorka, S. D.

Journal of Paleolimnology 17(1): 131-146. (1997)

NAL Call #: QE39.5.P3 J68; ISSN: 0921-2728.

Notes: Conference: Modern and Ancient Lake Environments of the Great Plains. Theme Session of the Geological Society of America Meeting, Lincoln, NE (USA), 27-28 Apr 1995

Descriptors: playas/ quaternary/ lake deposits/ water levels/ lake sediments/ water level recorders/ USA, Texas/ lake sediments/ water level recorders/ quaternary/ lake deposits/ water levels

Abstract: Ephemeral playa lakes on the Southern High Plains northeast of Amarillo, Texas, are underlain by more than 10 m of Quaternary lake deposits. Sediments beneath 12 lakes were examined in 76 hollow-stem auger cores and in excavations. Stacked depositional cycles recognized in lake sediments record repeated phases of (1) initial highstand, (2) ephemeral lake, and (3) lake shrinkage and prolonged exposure. Sedimentary and soil structures show that during all phases the lakes were ephemeral, but that the duration and frequency of flooding varied, which caused variation in the relative amounts of accumulation, deflation, and soil formation. The highstand phase is documented by wave-cut benches and lake sediments that extend beyond present lake margins. Mud transported as suspended load was deposited from ponded water. Desiccation resulted in mudcracks and allowed deposition of eolian sand, but exposure episodes were relatively short or infrequent, and vertic soil formation, oxidation of organic material, and deflation of sand were minimal. Decreased frequency and duration of flooding resulting in increased pedogenic modification under conditions similar to those under which modern playa lake sediments accumulate. Eolian silt deposited on dry lake beds and clays deposited in flooded lakes were mixed by vertic soil processes during repeated wetting and drying. Organic material was partly oxidized and partly translocated down roots and cracks, and interbedded upland facies were gleyed. Episodes of lake shrinkage and more frequent exposure are recorded by reddening and formation of calcic horizons within lake muds. Red-brown eolian loam prograded across lake sediments, and calcic soils developed on it. These grassland slope facies record decrease in the size of the playa lakes.

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884. The saline wetland-meadow vegetation and flora of the North Platte River Valley in the Nebraska panhandle.

Rolfmeier, S. B.

Transactions of the Nebraska Academy of Sciences 20: 13-24. (1993)

NAL Call #: Q11.N4; ISSN: 0077-6351

Descriptors: wetlands/ vegetation cover/ community composition/ rare species/ distribution records/ saline water/ aquatic plants/ flora/ salt marshes/ vegetation/ USA, Nebraska, Platte R./ vegetation/ vegetation cover/ community composition/ rare species/ distribution records/ Aster brachyactis/ Haplopappus annuus/ Thelypodium integrifolium/ Althaea officinalis/ Najas marina/ Spergularia marina

Abstract: The saline wetlands associated with the Platte River have received very little attention from botanists since the 1890s, and several plants widespread in these habitats, such as rayless salt-marsh aster (*Aster brachyactis*), annual goldenweed (*Haplopappus annuus*) and thelypody (*Thelypodium integrifolium*) have been considered rare in the State. A floristic inventory of sixteen tracts of saline lowlands near the North Platte River in Garden, Morrill, and Scotts Bluff counties reveals the presence of 231 species of vascular plants (169 native and 62 introduced), including three Eurasian halophytes (*Althaea officinalis*, *Najas marina*, *Spergularia marina*) not previously reported from Nebraska. Saline habitats along the North Platte River have a larger number of halophytic species than similar habitats in eastern Nebraska, though data from eastern salt marshes are insufficient for quantitative comparisons of species richness.

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885. **Shallow subsurface characterization of gas transport in a playa wetland.**

Nicot, J. P. and Bennett, P. C.

Journal of Environmental Engineering 124(11): 1038-1046. (1998)

NAL Call #: 290.9 Am3Ps; ISSN: 0733-9372

Descriptors: wetlands/ soil gases/ advection/ playas/ permeability/ tracers/ gases/ soil gases

Abstract: Controls on vadose-zone gas transport beneath and adjacent to a southern High Plains ephemeral lake (playa) were investigated. Under dry conditions, vertical gas permeability and tortuosity were enhanced by cracks and root tubules in the upper 2.5 m. Below this depth, the horizontal components of both permeability and tortuosity tensors were dominant. Both atmospheric pumping and pneumatic tests were used to determine the gas permeability tensor; whereas gas tracer tests were used to estimate the tortuosity tensor. The field data were elevated in a multilayer numerical model. The results suggest that gas movement can be dominated by both advection and diffusion, with vertical movement dominating in the shallow zone under dry conditions. After a large precipitation event, vertical gas permeability was reduced and large pressure differentials (as high as 1.5 kPa) were produced, creating driving forces for advective gas transport.

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886. **Shorebird breeding biology in wetlands of the Playa Lakes, Texas, USA.**

Conway, Warren C.; Smith, Loren M.; and Ray, James D.

Waterbirds 28(2): 129-138. (2005)

NAL Call #: QL671; ISSN: 1524-4695

Descriptors: hatching success/ clutch size/ nesting/ breeding behavior/ wetlands habitat

Abstract: Wetlands in the Playa Lakes Region of Texas are important habitats for North American wintering waterfowl and migrant shorebirds. However, shorebird breeding biology has been overlooked in characterizing the region's ecological importance. In 1998 and 1999, American Avocet (*Recurvirostra americana*), Black-necked Stilt (*Himantopus mexicanus*), Killdeer (*Charadrius vociferous*), and Snowy Plover (*C. alexandrinus*) breeding ecology were studied in playas, saline lakes, and riparian wetlands in the Playa Lakes Region of Texas. Chronology of nest initiation, clutch sizes, and hatching success for 298 Snowy Plover, 111 American Avocet, 43 Killdeer, and 26 Blacknecked Stilt

clutches were measured. All four species nested in saline lakes, American Avocet and Killdeer also nested in playas, and Snowy Plover nested on riparian wetlands. American Avocet had higher hatching success in 1999 (52%) than 1998 (8%), because of more suitable hydrological conditions and lower predation. Hatching success was higher in 1998 than 1999 for Killdeer (1998, 63%; 1999, 21%) and Snowy Plover (1998, 47%; 1999, 33%) due to failures caused by flooding and hail in 1999. In other regions, clutch predation limits shorebird productivity, but hatching success in the Playa Lakes Region appears to be limited by unpredictable precipitation patterns and wetland hydroperiod. As such, breeding shorebird conservation and management should focus upon maintaining wetland hydrological integrity.

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887. **Soils, surficial geology, and geomicrobiology of saline-sodic wetlands, North Platte River Valley, Nebraska, USA.**

Joeckel, R. M. and Clement, B. J. A.

Catena 61(1): 63-101. (2005)

NAL Call #: GB400.C3; ISSN: 0341-8162

Descriptors: wetlands/ salts/ rivers/ groundwater/ conductivity/ collapse/ sulfates/ ecology/ salinization/ saturated soils/ surface water/ calcite/ drying/ standards/ dewatering/ evaporation/ sediments/ fluvial sediments/ spring water/ hydrogen ion concentration/ mineralogy/ geology/ capillarity/ illite/ USA, Nebraska/ USA, Wyoming, North Platte R.

Abstract: Saline-sodic wetlands along a 200-km stretch of the North Platte River Valley in western Nebraska, USA lie within an important agricultural region, but their processes, salt mineralogy, and geomicrobiology have not previously been investigated. Putative anthropogenic salinization has long been a concern, yet early historical accounts of widespread surface salts in the area have never been applied as comparative standards. Surface salts in the area originate from soil capillarity and surface evaporation. Thenardite (Na_2SO_4) and/or mirabilite ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$) dominate, depending on ambient conditions. Bloedite ($\text{Na}_2\text{Mg}[\text{SO}_4]_2 \cdot 4\text{H}_2\text{O}$), halite (NaCl), burkeite ($\text{Na}_6\text{CO}_3[\text{SO}_4]_2$), and calcite (CaCO_3) are minor constituents. Historical accounts indicate that salts accumulated naturally long before Euramerican settlement, apparently as a result of rock-water interaction in nearby volcanoclastic sediments of the Brule Formation. Ephemeral to permanent water-holding basins in the wetlands contain Na^+ -rich waters that vary widely in electrical conductivity (as high as 159 mS/cm) and in ionic composition, but local spring waters are extremely dilute. Basin floors exhibit a unique type of microrelief, which appears to form by the filling of microlows with water and the dispersal of soil material therein by Na^+ , followed by dewatering and collapse of the soil with drying. Illite dominates basin surface soils, but smectite dominates at depth; high soil pH, available K^+ , and frequent wetting-drying cycles in the wetlands suggest that in-situ illitization may have occurred. Soil crusts and vesicular surface horizons are common as are upward increases in electrical conductivity. The activity of sulfate-reducing microbes forms prominent near-surface horizons of sulfate reduction in saturated soils, which retract or disappear entirely during dry episodes. Saline-sodic wetland soils in

the study area change on daily to seasonal scales. Cycles of surface salt development, microbial activity, and microrelief genesis are all controlled by regular wetting-drying cycles and the interaction of ponded surface waters and shallow groundwaters. Relatively unique aspects of microbial ecology and surface processes make the soils important as "geomicrobial reactors" wherein important parts of hydrological and geochemical cycles occur.
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888. Succession of macroinvertebrates in playas of the Southern High Plains, USA.

Moorhead, D. L.; Hall, D. L.; and Willig, M. R.
Journal of the North American Benthological Society 17(4): 430-442. (1998)

NAL Call #: QL141.F7; ISSN: 0887-3593

Descriptors: wetlands/ trophic structure/ community composition/ species diversity/ temporal variations/ predators/ filter feeders/ detritus feeders/ ecological succession/ colonization/ temporary ponds/ playas/ succession/ macrofauna/ species richness/ trophic levels/ trophic level/ macroinvertebrates/ sampling/ aquatic insects/ Ostracoda/ Branchiopoda/ Notonectidae/ Hydrophilidae/ Invertebrata/ ostracods/ branchiopods/ water scavenger beetles/ freshwater crustaceans/ backswimmers/ USA, Texas

Abstract: Playas are seasonal wetlands that constitute the principal surface-water features of the semiarid, Southern High Plains, USA. They are shallow pools that usually persist for 2-4 mo following inundation by spring rains. The

development of macroinvertebrate assemblages in 10 playas located in West Texas was examined during the summer of 1994. Playas were sampled 3 times at approximately monthly intervals, beginning shortly after initial inundation in early May. All playas were dry within 90 d. Species richness and diversity (Fisher's log-series alpha) increased significantly over time ($p < 0.05$). Thirteen of the 16 species representing at least 1% of collected individuals, showed significant differences in abundances over time ($p < 0.05$). Some taxa increased in abundance (especially insects), whereas others decreased (most crustaceans). Trophic structure of assemblages also changed over time, with a significant reduction in the abundances of detritivores ($p < 0.05$) and filter-feeders ($p < 0.05$) occurring concurrently with an increase in the abundance of predators ($p < 0.05$). The composition of macroinvertebrate assemblages became more similar among playas over time (Ochai's index, $p < 0.05$), and changes in composition within individual playas tended to decrease with time ($p < 0.05$). These results suggest a rapid development of macroinvertebrate assemblages in playas, beginning with early dominance of crustacean detritivores and filter-feeders (e.g., phylloponds and ostracods), followed by later dominance of herbivorous and predaceous insects (e.g., hydrophilids and notonectids). Increases in species richness, diversity, and similarity in assemblage composition among playas over time are consistent with a pattern of progressive colonization by a finite set of species capable of exploiting these ephemeral habitats.

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Effects of Agricultural Conservation Practices on Wetlands

889. Breeding bird response to cattle grazing of a cottonwood bottomland.

Sedgwick, J. A. and Knopf F. L.

Journal of Wildlife Management 51(1): 230-237. (1987)

Abstract: We studied avian habitat relationships and the impact of grazing on breeding densities of selected migratory birds in a plains cottonwood (*Populus sargentii*) bottomland in northeastern Colorado. Five 16-ha plots served as controls and 5 were fenced and fall-grazed October-November 1982-84 following a season of pre-treatment study in the spring of 1982. We focused our analysis on bird species directly dependent on the grass-herb-shrub layer of vegetation for foraging, nesting, or both. The guild included house wren (*Troglodytes aedon*), brown thrasher (*Toxostoma rufum*), American robin (*Turdus migratorius*), common yellowthroat (*Geothlypis trichas*), yellow-breasted chat (*Icteria virens*), and rufous-sided towhee (*Pipilo erythrophthalmus*). Moderate, late-fall grazing had no detectable impact on calculated densities of any of the 6 species, implying that proper seasonal grazing of a cottonwood floodplain is, at least initially (3 years), compatible with migratory bird use of a site for breeding. Habitat associations suggested that common yellowthroats and yellow-breasted chats were most unique and most likely to respond negatively to higher levels of grazing. We suggest that these latter 2 species are appropriate ecological indicators of the quality of ground-shrub vegetation as breeding bird habitats in lowland floodplains of the Great Plains.

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890. Diversity of Salmonella serovars in feedyard and nonfeedyard playas of the Southern High Plains in the summer and winter.

Purdy, C. W.; Straus, D. C.; and Clark, R. N.

American Journal of Veterinary Research 65(1): 40-44. (2004)

NAL Call #: 41.8 Am3A; ISSN: 0002-9645

Descriptors: wetlands/ microbial contamination/ playa soils/ seasonal variation/ serovars/ summer/ water/ water quality/ winter/ Salmonella enterica

Abstract: Objective: To compare Salmonella isolates cultured from feedyard and nonfeedyard (control) playas (ie, temporary shallow lakes) of the Southern High Plains in Texas, USA. Sample Population: Water and muck (sediment) samples were obtained from 7 feedyard playas and 3 nonfeedyard playas in the winter and summer. Procedure: Each water and muck sample was enriched with sulfur-brilliant-green broth and incubated in a shaker at 37 degrees C for 24 h. A sample (100 ml) of the incubated bacterial-enriched broth was then mixed with 100 ml of fresh sulfur-brilliant-green enrichment broth and incubated in a shaker at 37 degrees C for 24 h. After the second incubation, a swab sample was streaked on differential media. Suspect Salmonella isolates were further identified by use of biochemical tests, and Salmonella isolates were confirmed and serovar determinations made. Results: Salmonella isolates were not recovered from the 3 control playas. Seven Salmonella enterica serovars were isolated from 5 of 7 feedyard playas in the summer, and 13 S. enterica serovars were isolated from 7 of 7 feedyard playas

in the winter. In the summer, 296 isolates were cultured, and 47 were *Salmonella* organisms. In the winter, 288 isolates were cultured, and 171 were *Salmonella* organisms. Conclusions and Clinical Relevance: Results indicated that feedyard playas are frequently contaminated with many *Salmonella* serovars. These pathogens should be considered whenever feedyard managers contemplate the use of water from these playas. Water from feedyard playas should not be used to cool cattle in the summer or for dust abatement.

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891. Effects of agricultural cultivation on demographics of Southern High Plains amphibians.

Gray, Matthew J.; Smith, Loren M.; and Brenes, Roberto
Conservation Biology 18(5): 1368-1377. (Oct. 2004)
NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: Amphibial/ farming and agriculture/ agricultural cultivation/ population responses/ community structure/ population density/ agricultural cultivation effects/ semiaquatic habitat/ Texas/ southern high plains/ population responses to agricultural cultivation/ playa wetlands

Abstract: Anthropogenic disturbance of landscapes surrounding wetlands is considered a factor in local and global amphibian declines. Few data exist on the effects of agricultural cultivation of wetland watersheds on amphibians, and results from previous studies are contradictory. Our objective was to test the effects of general anthropogenic land use (cultivation vs. grassland) on the demographics of seven species and three age classes of amphibians in the Southern High Plains of Texas. We partially enclosed 16 playa wetlands (4 per land use per year) with drift fences and pitfall traps and monitored relative daily abundance and diversity from 16 May to 17 October 1999 and 19 April to 18 August 2000. In general, relative abundance (i.e., average daily capture) of New Mexico and plains spadefoots (*Spea multiplicata*, *S. bombifrons*) was greater at cropland than grassland playas; the abundance of other species and diversity of the amphibian assemblage was not affected by land use. Also, abundance generally was greater in 1999 than 2000 for metamorph spadefoots and barred tiger salamanders (*Ambystoma tigrinum mavortium*). Differences in spadefoot abundance between land-use types may have been related to low species-specific vagility, resulting in increased nestedness within disturbed landscapes and reduced abundance of a potential keystone intraguild predator in cropland playas. The yearly difference in amphibian abundance was likely related to annual precipitation, which influenced wetland hydroperiod. Agricultural cultivation surrounding wetlands is associated with the increased abundance of some amphibian species, but other demographic and fitness parameters—such as temporal demographics, body size, and diet diversity—may be negatively affected.

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892. Effects of land use on nongame wetland birds in western South Dakota stock ponds, USA.

May, Shawn M.; Naugle, David E.; and Higgins, Kenneth F.
Waterbirds 25(Special Publication 2): 51-55. (2002)
NAL Call #: QL671; ISSN: 1524-4695

Descriptors: wetlands/ Landsat (tm) imagery data/ national wetlands inventory maps/ cattle grazing/ cropland landscapes/ grasslands/ habitat use/ land use change/ landscape types/ nesting habitat/ prairie landscapes/ stock ponds/ tillage agriculture/ vegetation cover

Abstract: Tillage agriculture is expanding into western prairie landscapes without knowledge of the effects of land use change on habitats used by nongame wetland birds. In 1999-2000, we surveyed 196 stock ponds within grassland (>95% grass) and cropland (>75% tillage) landscapes to evaluate effects of land use on nongame wetland bird densities in western South Dakota. Land use and wetlands were delineated from Landsat TM imagery and National Wetlands Inventory maps. Sixteen nongame wetland bird species used stock ponds in western South Dakota, of which nine species were obligate wetland-nesting species. Although densities of seven nongame obligate wetland bird species were similar between landscape types, abundance of Wilson's Phalarope (*Phalaropus tricolor*) was greater in grassland study areas where cattle grazing limited growth of thick-stemmed emergent vegetation and reduced overall vegetative cover in stock ponds. In contrast, the Red-winged Blackbird (*Agelaius phoeniceus*) and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*) were more abundant in cropland landscapes where stock ponds provide abundant over-water nesting habitat (e.g., cattail). If grasslands continue to be converted to cropland, Wilson's Phalarope numbers will likely decrease as blackbird densities increase in stock ponds dominated by monotypic stands of cattail. To circumvent such changes, we recommend that resource managers conserve large tracts of grassland through aggressive easement programs in landscapes at highest risk of agricultural tillage.

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893. Effects of sedimentation on playa wetland volume.

Luo, Hong-Ren; Smith, L. M.; Allen, B. L.; and Haukos, D. A.

Ecological Applications 7(1): 247-252. (1997)

NAL Call #: QH540.E23; ISSN: 1051-0761

Descriptors: wetlands/ sedimentation/ watersheds/ soil texture/ land use/ agriculture/ vegetation cover/ playas/ sediment texture/ sediment texture/ soil texture/ vegetation cover/ playas/ USA, Texas, Southern High Plains/ USA, Texas, High Plains

Abstract: Over 50% of the wetlands in the conterminous United States have been lost; however, few studies have investigated the more insidious effects of sedimentation on wetland volume. We examined the effects of sedimentation on playa wetland volume in the Southern High Plains (Texas, USA). We compared 20 playas with watersheds dominated by rangeland to 20 playas that had cropland watersheds. Playas were located in fine- and medium-texture soil zones. Playas with cultivated watersheds contained more sediments than those with rangeland watersheds. Playas with cultivated watersheds had lost all of their original volume, on average, whereas playas with rangeland watersheds had lost only about one third of their volume. Of the approximately 30 000 playas in the region, most have cultivated watersheds, and therefore the

hydroperiod of playas has been drastically altered over the last 60 yr, changing the structure and function of these ecosystems. Also, sedimentation in playas in the medium-texture soil zone was greater than in the fine-texture soil zone. Therefore, management efforts should first focus on the coarser soil areas to prevent the greatest sedimentation rates. Permanent vegetative cover (e.g., buffer strips) should be encouraged on playa watersheds to prevent further degradation.

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894. Fate of wetlands associated with the central Nebraska irrigation canal system.

Ekstein, J. D. and Hygnstrom, S. E.

Great Plains Research 6(1): 41-60. (1996)

NAL Call #: QH104.5.G73 G755; ISSN: 1052-5165

Descriptors: wetlands/ irrigation districts/ canals/ aerial photography/ environmental effects/ water table rise/ flooding/ wildlife management/ nature conservation/ environmental impact/ USA, Nebraska/ nature conservation/ environmental impact/ irrigation districts/ water table rise/ wildlife management

Abstract: Changes in wetlands in the vicinity of the Phelps and E65 canals operated by Central Nebraska Public Power and Irrigation District in Southcentral Nebraska were examined using aerial photographs taken on seven occasions from 1938 to 1981. According to previous research, nearly 90% of the original wetlands within the surrounding Rainwater Basin were destroyed or altered by draining and filling between 1900 and 1980. Within a zone extending 10 kilometers on each side of the Phelps and E65 canals, however, we observed an increase in the number and total area of wetlands, which we hypothesize to have been caused by an elevated groundwater table. Of additional importance for wildlife management, there was a notable decrease in wetlands temporarily flooded for 2 months or less, and a notable increase in wetlands seasonally flooded for 3 to 5 months each year. These changes were most conspicuous after 1969.

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895. Grass buffers for playas in agricultural landscapes: A literature synthesis.

Melcher, Cynthia P.; Skagen, Susan K.; Fort Collins Science Center (U.S.); and Geological Survey (U.S.) Reston, Va.: U.S. Geological Survey; Open-file report 2005-1220, 2005.

NAL Call #: QH541.15.B84 M46 2005

<http://www.fort.usgs.gov/products/publications/21485/21485.asp>

Descriptors: buffer zones (ecosystem management)---High Plains (U.S.)/ water quality management---High Plains (U.S.)/ agricultural pollution High Plains (U.S.)/ playas---High Plains (U.S.)/ lake ecology---High Plains (U.S.) This citation is from AGRICOLA.

896. Influence of agricultural landscape structure on a Southern High Plains, USA, amphibian assemblage.

Gray, Matthew J.; Smith, Loren M.; and Leyva, Raquel I.

Landscape Ecology 19(7): 719-729. (2004)

NAL Call #: QH541.15.L35 L36; ISSN: 0921-2973

Descriptors: biogeography: population studies/ freshwater ecology: ecology, environmental sciences/ wildlife management: conservation/ agricultural landscape structure/ amphibian assemblage

Abstract: Landscape structure can influence demographics of spatially structured populations, particularly less vagile organisms such as amphibians. We examined the influence of agricultural landscape structure on community composition and relative abundance of the 4 most common amphibians in the Southern High Plains of central USA. Amphibian populations were monitored using pitfall traps and drift fence at 16 playa wetlands (8 playas/year) in 1999 and 2000. We quantified landscape structure surrounding each playa via estimating 13 spatial metrics that indexed playa isolation and inter-playa landscape complexity. Multivariate ordination and univariate correlations and regressions indicated that landscape structure was associated with community composition and relative abundance for 2 of the 4 amphibians. Spadefoots (*Spea multiplicata*, *S. bombifrons*) generally were positively associated with decreasing inter-playa distance and increasing inter-playa landscape complexity. Great Plains toads (*Bufo cognatus*) and barred tiger salamanders (*Ambystoma tigrinum mavortium*) usually were negatively associated with spadefoots but not influenced by landscape structure. Composition and relative abundance patterns were related to amphibian body size, which can influence species vagility and perception to landscape permeability. Spatial separation of these species in the multivariate ordination also may have been a consequence of differential competitive ability among species. These results suggest agricultural landscape structure may influence abundance and composition of spatially structured amphibian populations. This also is the first applied documentation that inter-patch landscape complexity can affect intra-patch community composition of amphibians as predicted by metapopulation theory. In the Southern High Plains, landscape complexity is positively associated with agricultural cultivation. Agricultural cultivation increases sedimentation, decreases hydroperiod, alters amphibian community dynamics, and negatively impacts postmetamorphic body size of amphibians in playa wetlands. Thus, conservation efforts should focus on preserving or restoring native landscape structure, hydroperiod, and connectivity among playas to maintain native amphibian populations and historic inter-playa movement.

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897. Influence of land use on postmetamorphic body size of playa lake amphibians.

Gray, M. J. and Smith, L. M.

Journal of Wildlife Management 69(2): 515-524. (2005)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: wetlands/ body size/ grasslands/ reproduction/ conspecifics/ rainfall/ drift/ land use/ amphibiotic species/ hydrology/ playas/ habitat improvement/ growth rate/ *Spea multiplicata*/ *Bufo cognatus*/ *Ambystoma tigrinum mavortium*/ USA, Southern High Plains/ Great Plains toad/ barred tiger salamander

Abstract: Agricultural land use may indirectly affect the body size of amphibians by altering the hydroperiods of nearby wetlands and influencing amphibian densities-both factors which can limit the larval and postmetamorphic growth rates of amphibians. We measured postmetamorphic body size for 4 species (*Spea multiplicata*, *S. bombifrons*, *Bufo cognatus*, *Ambystoma tigrinum mavortium*) and 3 age classes (metamorph, subadult, adult) of amphibians captured at playa wetlands

surrounded by one of 2 general land-use types (cultivation, grassland) in the Southern High Plains. Sixteen playas (4 per land-use type in 1999 and 2000) were partially enclosed with drift fence and pitfall traps, and mass and snout-vent length (SVL) were measured from a subsample of captured individuals. Mass and SVL were 10-148% greater for amphibians captured at grassland wetlands than at cropland wetlands for most species and age classes. Mass and SVL also were 3-124% greater in 1999 than in 2000 for most species and age classes. We attribute differences in body size between land-use types to differences in the hydroperiods of the associated wetlands, and potentially to variation in the density of terrestrial conspecifics and aquatic predators. We attribute differences in body size between years to differences in rainfall. Body size is positively related to the probability of survival, reproduction, and evolutionary fitness in amphibians. Thus, if cultivation of landscapes surrounding wetlands negatively influences postmetamorphic body size of amphibians, restoration of native grasslands surrounding playa wetlands may help prevent local amphibian declines.
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898. Microbial pathogen survival study in a High Plains feedyard playa.

Purdy, Charles W.; Straus, David C.; Harp, James A.; and Mock, Richard

Texas Journal of Science 53(3): 247-266. (2001)

Descriptors: feedyard shallow lake/ microbial pathogen survival

Abstract: Sixteen microbes and one enteric protozoal parasite were secured in screw-cap vials (CV) and dialysis tubes (DT) and placed in a feedyard shallow lake (playa) in the West Texas High Plains, USA. They were removed weekly or monthly depending on their susceptibility to the water environment. There were two overlapping studies; one started in September 1996 and was terminated 390 days later. The second study started in May 1997 and was terminated 188 days later. These controlled studies were used to determine the decrease in titers of 10 bacteria (*Pasteurella haemolytica* A1, *Pasteurella multocida* A:3, *Staphylococcus aureus*, *Escherichia coli*, *Enterococcus faecalis*, *Actinomyces pyogenes* *Salmonella enterica* serovar dublin, *Bacillus thuringiensis*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*); two fungi (*Aspergillus fumigatus* and *Aspergillus niger*); four viruses (*Infectious Bovine Rhinotracheitis* (IBR), *Bovine Virus Diarrhea Virus* (BVD), *Bovine Respiratory Syncytial Virus* (BRSV), *Bovine Parvovirus* (BPV) and one protozoal parasite (*Cryptosporidium parvum*), over time. The *Pasteurella* isolates died in both studies within seven to 35 days. *Actinomyces pyogenes* died within 84 days in the 1996 study and survived for 188 days in the 1997 study. The remaining bacterial isolates in 1996 survived for 390 days with low titers, except for *P. aeruginosa*. Both fungal isolates died by 390 days in the 1996 study. All bacteria and fungi survived the 188 day study in 1997, except for the *Pasteurella* isolates. The titers of the viruses decreased rapidly over 42 days, except for BPV in the 1996 study, and all viruses were inactivated by day 42 in the 1997 study. *Cryptosporidium parvum* survived the 1996 winter but lost its ability to infect infant mice during the month of May, 1997. Microbial survival decreased more rapidly in DT samples compared to CV samples.

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899. Occurrence of cotton herbicides and insecticides in playa lakes of the High Plains of west Texas.

Thurman, E. M.; Bastian, K. C.; and Mollhagen, T.
Science of the Total Environment 248(2-3): 189-200. (2000)
NAL Call #: RA565.S365; ISSN: 0048-9697.

Notes: Special issue: Fate and transport of agricultural chemicals in the Mississippi River Basin.

Descriptors: playas/ herbicides/ insecticides/ water pollution/ agricultural pollution/ pollution surveys/ lakes/ water sampling/ pesticides/ agriculture/ drainage/ metabolites/ cotton/ degradation/ fate of pollutants/ water analysis/ phosphates/ USA, Texas

Abstract: During the summer of 1997, water samples were collected and analyzed for pesticides from 32 playa lakes of the High Plains that receive drainage from both cotton and corn agriculture in West Texas. The major cotton herbicides detected in the water samples were diuron, fluometuron, metolachlor, norflurazon, and prometryn. Atrazine and propazine, corn and sorghum herbicides, were also routinely detected in samples from the playa lakes. Furthermore, the metabolites of all the herbicides studied were found in the playa lake samples. In some cases, the concentration of metabolites was equal to or exceeded the concentration of the parent compound. The types of metabolites detected suggested that the parent compounds had been transported to and had undergone degradation in the playa lakes. The types of metabolites and the ratio of metabolites to parent compounds may be useful in indicating the time that the herbicides were transported to the playa lakes. The median concentration of total herbicides was 7.2 mu g/l, with the largest total concentrations exceeding 30 mu g/l. Organophosphate insecticides were detected in only one water sample. Further work will improve the understanding of the fate of these compounds in the playa lake area.

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900. Organochlorine residues in ducks on playa lakes of the Texas panhandle and eastern New Mexico USA.

Flickinger E. L. and Krynskiy A. J.

Journal of Wildlife Diseases 23(1): 165-168. (1987)

NAL Call #: 41.9 W64B; ISSN: 0090-3558

Descriptors: DDT/ heptachlor/ insecticide/ nontarget organism

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901. Sources of recently deposited sediments in playa wetlands.

Luo, H. R.; Smith, L. M.; Haukos, D. A.; and Allen, B. L.
Wetlands 19(1): 176-181. (1999)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ sedimentation/ playas/ watersheds/ clays/ erosion/ deposition/ volumetric analysis/ nutrients (mineral)/ USA, Southwest

Abstract: There are more than 20,000 playa wetlands in the Southern High Plains of Texas and New Mexico. Playas with cropland watersheds have lost most of their basin volume due to sedimentation, and they have lost more volume than playas with rangeland watersheds. To determine the source (wind vs. water transport) of sedimentation in playas and develop management recommendations to lessen sediment impacts, we examined the particle size distribution (PSD) of soils in 8 playas with rangeland and cropland watersheds. The distribution curves of sand in playa sediments plotted

against relative distance coincided with playa elevational profiles, and the PSD of deeper sediments contained more sand, especially at the playa margins. In contrast, more clay had been deposited in the central portion of the playa basin, and clay content decreased with sediment depth. Sand content at playa edges was greater in crop than in range playas. Sediments eroded from the surrounding watershed resulted in deposition of coarser soil particles at the playa margin, whereas finer particles dominated playa centers. Because most sediments in playa wetlands originate from the immediate watershed and are deposited through water erosion, management activities should concentrate on practices that reduce watershed erosion.
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902. Water quality in cattle feedyard playas in winter and summer.

Purdy, C. W.; Straus, D. C.; Parker, D. B.; Williams, B. P.; and Clark, R. N.
American Journal of Veterinary Research 62(9): 1402-1407. (2001)
NAL Call #: 41.8 Am3A; ISSN: 0002-9645
Descriptors: wetlands/ animal health/ coliform count/ endotoxins/ faecal coliforms/ health hazards/ public health/ summer/ water pollution/ water quality/ water resources/ winter
Abstract: To determine the impact of feedyards on endotoxin concentration, faecal coliform count, and other water quality measurements during winter and summer in feedyard playas (shallow lakes), water samples were obtained from seven feedyard playas and three nonfeedyard control playas. Surface water samples were collected from each playa and at various depths from three feedyard playas. Endotoxin concentrations, 22 water quality variables, and faecal coliform counts were determined in samples collected in summer and winter from various combinations of playas. Cattle numbers per feedyard ranged from 40 000-175 000 head/year. Mean endotoxin concentrations were significantly lower in control than in

feedyard playas in winter and summer. Endotoxin concentration appeared to be homogenous at various water depths. Values for 20 of 22 water quality variables were higher in the feedyard than in control playas in winter and summer. Only in winter, mean total faecal coliform concentration in feedyard playas was significantly greater than in control playas. These results indicate that feedyards have a potential impact on water quality in playas, and cattle should not be allowed access to them. Feedyard playa water should not be used under high pressure to settle dust in pens with cattle or to cool cattle, because aerosols containing pathogens and high concentrations of endotoxin are a health hazard for humans and cattle.
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903. Wetland impacts of center pivots in Wheeler Co, NE.

Lewis, G. L.
In: Planning Now for Irrigation and Drainage in the 21st Century: Proceedings of a Conference. (Held 18 Jul 1988-21 Jul 1988 at Lincoln, Neb.) Hay, DeLynn R. (eds.) New York; pp. 235-241; 1988.
NAL Call #: TC823.P52; ISBN: 0872626660
Descriptors: wetlands/ center pivot irrigation/ surface water/ water table/ irrigation/ Nebraska
This citation is from AGRICOLA.

904. Wildlife on ungrazed and grazed bottomlands on the South Platte River, northeastern Colorado: Habitats, land management, adverse effects.

Crouch, G. L.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. (Held 20 Apr 1981-22 Apr 1981 at Coeur D'alene, Idaho.) Peek, James M. and Dalke, P. D. (eds.) Moscow, Idaho: Forest, Wildlife & Range Experiment Station, University of Idaho; pp. 186-197; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Colorado
This citation is from AGRICOLA.

Wetlands as Agricultural Conservation Practices

905. Carrying capacity and diel use of managed playa wetlands by nonbreeding waterbirds.

Anderson, J. T. and Smith, L. M.
Wildlife Society Bulletin 27(2): 281-291. (1999)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: wetlands/ management/ habitat utilization/ carrying capacity/ flooding/ ecosystem management/ migratory species/ playas/ activity patterns/ nighttime/ daytime/ diurnal variations/ aquatic birds/ nature conservation/ USA, Texas, Southern High Plains/ USA, New Mexico, Southern High Plains/ waterfowl/ monitoring/ habitats/ species diversity/ soil management/ seeds/ invertebrates/ Aves/ USA, Texas/ USA, New Mexico/ birds/ winter/ moist-soil management practices
Abstract: Playa wetlands on the Southern High Plains of Texas and New Mexico provide essential wintering habitat for migratory waterbirds. Moist-soil management practices have been implemented in playas, yet no variations on the timing of management have been attempted. In addition, previous evaluation of wetland management has considered only diurnal use by waterfowl and has not

considered invertebrates. We compared waterbird diversity, waterfowl abundance, and waterfowl carrying capacity based on seeds and invertebrates among playas varying in flooding date (September vs. November) and management regimes (moist-soil managed vs. unmanaged) during nocturnal and diurnal periods during the winters of 1994-1995 and 1995-1996. Waterbird species richness and diversity were greater in November flooded, moistsoil managed than in September flooded, managed; September flooded, unmanaged; and November flooded, unmanaged playas. Waterfowl were more abundant in November flooded, moist-soil managed playas than in the other treatments, and counts were 10.5 times higher during nocturnal than diurnal counts. Evaluation of moist-soil management using diurnal counts only showed no waterfowl-use benefit. Carrying capacity, based on seed biomass, was greater in managed than in unmanaged playas. Potential use days, using invertebrate abundance, was higher in playas flooded in September than in November. Moist-soil management of playas is effective in increasing waterbird diversity and waterfowl abundance. If

the main purpose is to evaluate effectiveness of wetland management for waterfowl, then monitoring of nocturnal and diurnal use is essential.

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906. Effects of moist-soil management on playa wetland soils.

Haukos, D. A. and Smith, L. M.

Wetlands 16(2): 1443-149. (June 1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ playas/ soil water/ drawdown/ irrigation/ hydrogen ion concentration/ phosphorus/ limiting nutrients/ germination/ plant populations/ vegetation cover/ nutrient cycles/ nitrogen/ limiting factors/ atmospheric precipitations/ nutrients (mineral)/ soils/ water content/ ecosystem management/ arid environments/ environment management/ water in soils/ ecosystems and energetics/ protective measures and control

Abstract: We evaluated effects of moist-soil management on soils of eight playa wetlands for 2 years. Moist-soil management involves timed drawdown and irrigation of wetlands to promote germination, growth, and seed production of mudflat annuals for use by wintering waterfowl. Moist-soil management reduced soil resistance for germination ($P = 0.02$), raised pH closer to neutrality ($P = 0.002$), but had no effect on soil moisture in the top 4 cm of soil ($P = 0.16$; influence on soil moisture in the root zone is unknown) or on salinity measured as conductivity ($P = 0.51$). Moist-soil management did not affect nitrogen and phosphorus levels in playa soils over 2 seasons ($P = 0.61$). As a percentage of available nutrients, more soil nitrogen was lost during the wetter year compared to the dryer year ($P = 0.02$) -- a trend that was reversed for soil phosphorus ($P = 0.004$). More nitrogen was lost in the wetter year ($P = 0.02$); whereas, more phosphorus was lost in the dryer year ($P = 0.004$). This indicates potential changes in limiting nutrients depending upon local precipitation events. Apparently, nutrient cycling is rapid in playas, producing large amounts of biomass despite having lower soil nutrient pools compared to other inland freshwater wetlands. Moist-soil management is a sustainable and compatible practice for playa wetlands because it enhances naturally occurring events.

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907. Evaluation of farmed playa wetlands as avian habitat using survey data and two rapid assessment techniques.

Rivers, J. W. and Cable, T. T.

Transactions of the Kansas Academy of Science 106(3): 155-165. (2003)

NAL Call #: 500 K13T; ISSN: 0022-8443

Descriptors: wetlands/ playas/ agriculture/ aquatic birds/ biological surveys/ sampling/ habitat/ USA, Kansas
Abstract: Playa wetlands contribute to the biological diversity of the southern Great Plains, yet many are modified by current farming practices. We surveyed 12 farmed playa wetlands from 1998-99 to (1) document seasonal avian use of these habitats and (2) assess the performance of two rapid assessment techniques, the Habitat Assessment Technique and the Wetland Evaluation Technique. Thirty-six bird species were observed on farmed playa wetlands, 42% of which are dependent on wetland habitats. In contrast, only 5 species were observed on upland reference sites in 1999, and none were

dependent on wetlands. Collectively, both rapid assessment techniques rated farmed playa wetlands as poor habitats because of the physical characteristics of study sites. Based on field observations and published work, we conclude that farmed playa wetlands provide habitat for many avian species and the rapid assessment techniques examined are unsuitable for assessing playa wetlands as avian habitat in Kansas.

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908. Hydrologic analysis model for screening wetland restoration sites in the Rainwater Basin, Nebraska.

Clemetson, D. J.

In: *Hydraulics/Hydrology of Arid Lands (H2a)*. (Held 30 Jul 1990-2 Aug 1990 at San Diego, Calif.)

New York: American Society of Civil Engineers; pp. 675-680; 1990.

NAL Call #: TC5.H845 1990; ISBN: 0872627713

Descriptors: wetlands/ hydrologic models/ mathematical models/ model studies/ Nebraska/ rainwater basin/ site selection/ wetland restoration/ agriculture/ aquatic habitats/ capital costs/ economic aspects/ hydrologic budget/ reservoirs/ statistical analysis/ storage volume/ water depth
Abstract: Historically, the Rainwater Basin in south central Nebraska contained approximately 4000 wetlands. Today, over 90% of the wetlands have been lost, primarily due to drainage for agricultural purposes. With an increasing interest in the restoration of wetland habitats, a need has arisen for prioritizing candidate wetland restoration sites, which would ensure expenditure of funds on the best available sites. A hydrologic model has been developed as a tool to assist in screening candidate wetland sites for restoration in the Rainwater Basin. The Wetland Hydrologic Analysis Model (WHAM) was developed to perform daily analysis of the hydrologic budget of individual wetland basins. Inflows to the wetland, which are input data for the WHAM, were derived with the Streamflow Synthesis and Reservoir Regulation model, which was developed by the North Pacific Division of the US Army Corps of Engineers. Statistical analysis was performed on the simulated hydrologic parameters including surface area, water surface elevation, storage volume, and average depth to evaluate the hydrologic effectiveness of the proposed restoration for each site. Priorities for acquisition and restoration can be assigned to the individual wetlands based on the results of these analyses.

(Author's abstract)

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909. Identifying sites for riparian wetland restoration: Application of a model to the Upper Arkansas River Basin.

O'Neill, M. P.; Schmidt, J. C.; Dobrowolski, J. P.; Hawkins, C. P.; and Neale, C. M.

Restoration Ecology 5(Suppl. 4): 85-102. (Dec. 1997)

NAL Call #: QH541.15.R45R515; ISSN: 1061-2971.

Notes: Special issue: Riparian Restoration.

Descriptors: wetlands/ USA, Upper Arkansas R./ rehabilitation/ river basins/ riparian land/ site selection/ priorities/ soil water/ preservation/ reach/ model studies/ geographical information systems/ aerial photography/ energy/ environmental restoration/ models/ riparian environments/ geographic information systems/ vegetation patterns/ USA, Colorado/ rivers/ habitat improvement/ environmental protection/ pollution control/

USA, Arkansas R./ streamflow and runoff/ modeling, mathematics, computer applications/ protective measures and control/ reclamation

Abstract: We present a conceptual model for identifying restoration sites for riparian wetlands and discuss its application to reaches within the Upper Arkansas River basin in Colorado. The model utilizes a Geographic Information System (GIS) to analyze a variety of spatial data useful in characterizing geomorphology, hydrology, and vegetation of riparian wetland sites. The model focuses on three basic properties of riparian wetland sites: relative soil moisture, disturbance regime, and vegetative characteristics. A relative wetness index is used to define nominal soil moisture classes within the watershed. These classes generally coincide with uplands (low), channel margins (moderate), and channels or open water (high). Vegetative conditions are characterized using color infrared aerial photographs. Land cover types are grouped into five major land cover classes: riparian, moist herbaceous, bare ground, upland, and open water. Disturbance regime is characterized by a reach-based index of specific power (ω). Preliminary results indicate that reaches within the Upper Arkansas River basin can be classified as high energy (ω greater than or equal to $8 \text{ W/m super}(2)$) or low energy (ω less than or equal to $3 \text{ W/m super}(2)$), using discharge estimates that reflect the 10-year flood event. Field surveys of channel and floodplain conditions show that high-energy reaches (ω greater than or equal to $8 \text{ W/m super}(2)$) are characterized by sites where the channel occupies a large proportion of the valley bottom. By contrast, low-energy reaches (ω less than or equal to $3 \text{ W/m super}(2)$) are characterized by meandering channels with wide alluvial valleys. Restoration potential is evaluated as a combination of nominal scores from wetness, land cover, and disturbance indices. Application of these methods to field sites within the Upper Arkansas River basin identifies a wide range of riparian wetland sites for preservation or restoration. Potential sites within identified reaches are prioritized using size and proximity criteria.

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910. Little Salt Fork Marsh Preserve: Restoration of an inland saline wetland.

Zlotsky, A. and Yost, J.

Land and Water 42(5): 49-51. (Sept. 1998-Oct. 1998);
ISSN: 0192-9453

Descriptors: wetlands/ salt marshes/ land management/ environmental quality/ environmental restoration/ nature conservation/ research programs/ marshes/ inland water/ USA, Nebraska, Little Salt Fork Marsh/ restoration/ refuges/ sanctuaries/ ecosystem management/ environment management/ land use/ land restoration/ environmental quality standards/ land restoration/ water quality control/ environmental action/ protective measures and control/ water quality

Abstract: The Little Salt Fork Marsh Preserve restoration project initially began in 1995 when The Nature Conservancy purchased a 60-acre tract near Lincoln, Nebraska. The Conservancy was interested in the acquisition and preservation of a large, inland saline wetland complex. About the same time, the Burlington

Northern Railroad Company (BNSF) was in the process of creating the first wetland mitigation bank in the state. Together, the two entities forged an agreement for the restoration, enhancement and expansion of the Little Salt Fork Marsh into a 180-acre nature preserve.

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911. Short-term response of wetland birds to prescribed burning in Rainwater Basin wetlands.

Brennan, E. K.; Smith, L. M.; Haukos, D. A.; and Lagrange, T. G.

Wetlands 25(3): 667-674. (2005)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

Descriptors: wetlands/ burning/ species richness/ abundance/ migration/ recruitment/ basins/ introduced species/ incineration/ birds/ species diversity/ forest fires/ litter/ Aves/ USA, Nebraska/ birds

Abstract: Prescribed burning is often used in wetlands to remove plant litter, decrease woody or invasive species, and increase use by wetland birds. However, little is known about the within-season, short-term response of wetland birds to prescribed burning, especially during spring migration. We surveyed use of 19 burned and 19 unburned (reference) wetlands by migratory birds in the Rainwater Basin region of Nebraska, USA during three spring migrations, 2002-2004. We calculated the change in avian abundance and species richness, as well as generating the Soerenson's similarity index for burned and reference wetlands in the weeks immediately before and after burning. We compared Soerenson's index values and percent change in abundance and species richness between burned and reference wetlands using an analysis of covariance with week and wetland area as covariates to account for migration chronology and differences in the area of experimental units. Following removal of effects due to wetland area and week, burning had no effect on the percent change in avian abundance and species richness. Soerenson's index also did not differ between burned and reference wetlands. Prescribed burning did not improve use of wetlands by migratory birds in the short term. Understanding the immediate and long-term effects of prescribed burning on migratory avian abundance, species richness, and community composition is imperative for management decisions.

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