

ANNOTATED BIBLIOGRAPHY OF SELECTED PUBLICATIONS RESULTING FROM RESEARCH ON BLM LAND WITHIN THE RESEARCH RANCH

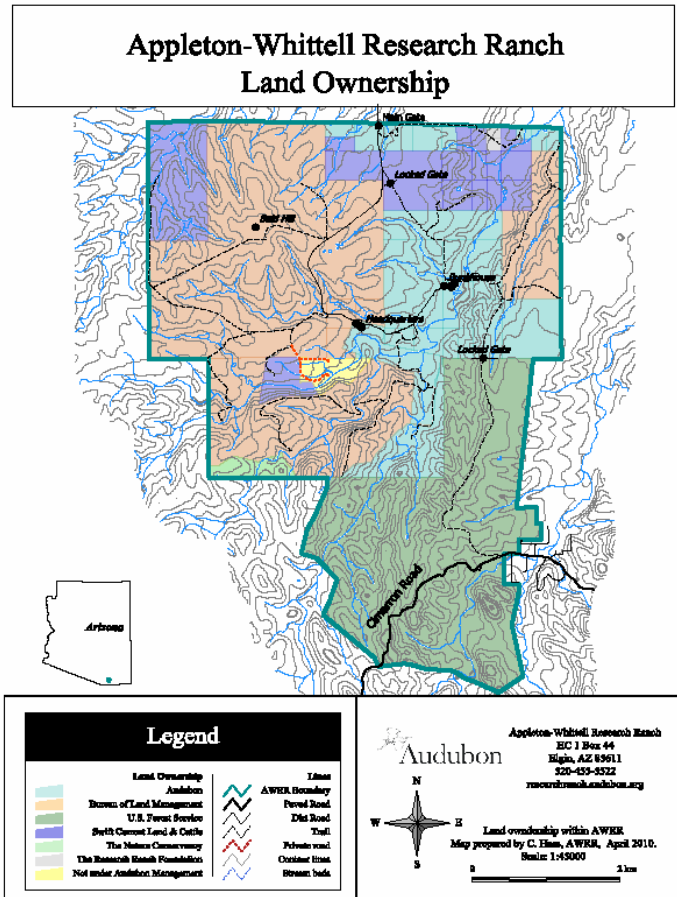
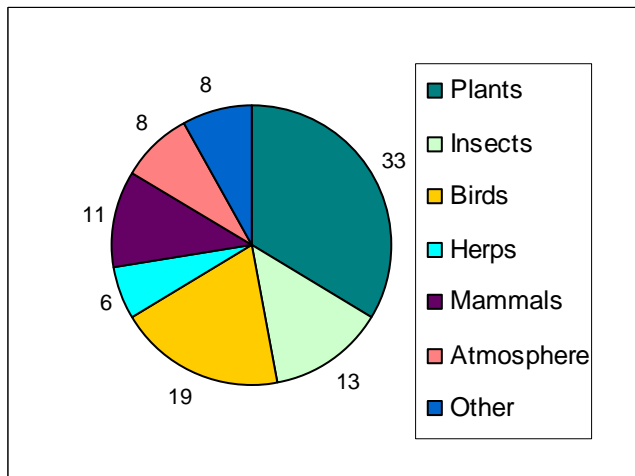
BY PAT KUGLER & LINDA KENNEDY

Twenty-five years ago, on August 8, 1986, the Bureau of Land Management (BLM) and National Audubon Society (NAS) signed a Cooperative Agreement to formalize management of Federally-owned lands administered by BLM within the boundary of the Appleton-Whittell Research Ranch (RR). The management collaboration was further elaborated and strengthened in the Las Cienegas ROD and RMP. The objectives of the Cooperative Agreement are:

- the continuation of on-going research
- the encouragement of future research
- the derivation of mutual benefits from the research
- the protection of the land and its ecological communities from disturbance.

BLM became an active partner in the Research Ranch in part by acquisition of the state trusts land within RR. BLM, thanks to its greater flexibility and authority in resource management, was better able to support long-term research than the state entity. Additional property was added to BLM holdings by direct purchase from Frank Appleton, one of the founders of the Research Ranch, bringing the total acreage of BLM land to 3141 acres.

The relationship between BLM and NAS has enabled dozens of academic, agency and independent scientists to participate in research projects that span a wide range of topics. Below is a briefly annotated list of selected publications (peer reviewed articles, books, theses and dissertations), that we believe have resulted from this collaborative effort between BLM and NAS. We tried to make this list as comprehensive as possible, but it is almost certain that we have missed some important publications. It is also possible that we have included some that did not actually take place on BLM property. GPS and GIS capabilities now enable us to determine exact locations of study sites; the locations of earlier sites are estimated. We included only publications



that are readily available via university libraries, which means there are many agency reports that are not listed that provide excellent information and management guidance. The citations for many of those reports are available on our website: <http://researchranch.audubon.org>.

Subjects of publications included in this bibliography could be categorized in many ways. We chose the easiest to represent– taxa + atmosphere! An equally valid but much more difficult categorization could have been based on processes such as fire, exurbanization, drought, or grazing and the interactions with the various taxa. Feel free to do that categorization on your own!

Publications Arranged by Year:

Allington, G.R.H. and T.J. Valone. 2011. Long-Term Livestock Exclusion in an Arid Grassland Alters Vegetation and Soil. *Rangeland Ecol. Mgt.* 64 (in press).

Exclusion of cattle resulted in lower bulk density and higher water infiltration. Perennial grass cover was higher within the enclosure. Plains lovegrass and Hairy Grama were more common than on the neighboring cattle ranch.

Bock, C.E., Z.F. Jones, L.J. Kennedy, & J.E. Bock. 2011. Response of Rodents to Wildfire and Livestock Grazing in an Arizona Desert Grassland. *Am. Midl. Nat.* 166: 126-138.

Most Cricetidae populations declined post fire and took up to 6 years to recover. Heteromyidae increased after the fire, especially on ungrazed plots.

Krishnan, P., T.P. Meyers, R.L. Scott, L. Kennedy, and M.Heuer. 2011. Energy exchange and evapotranspiration over two temperate semi-arid grasslands in North America. *Agricultural and Forest Meteorology* (n press).

Soil water conditions and vegetation was found to strongly influence energy exchange and evaporation.

Smith, D. 2010. Five New Species of *Acordulecera* Say (Hymenoptera: pergidae) from Arizona and California, the first records of the family from southwestern United States, Washington, D.C., *Proc. Entomol. Soc. Wash.* 112: 410-422.

Five new species of the sawfly family were identified and named, including *Acordulecera whittellj*, which was found on the Research Ranch.

Wheeler, A.G. Jr. 2010. *Teleonemia nigrina* Champion (Hemiptera: Tingidae): New Host-plant Records, Analysis of Host Range, with Notes on Seasonality and Habits. *Proc. of the Entomological Society of Washington* 112:317-325.

Host plants of the lace bug (*Teleonemia nigrina* Champion) are examined and past records are reviewed for accuracy.

Xiao, J., Q. Zhuang, et al. 2010. A Continuous Measure of Gross Primary Production for the Conterminous U.S. Derived from MODIS and AmeriFlux Data Remote Sensing of Environment. Lawrence Berkeley National Laboratory. <http://escholarship.org/uc/item/13187bz>

Expanded GPP & MODIS measurements indicated there was a gross carbon increase of between 6.91 and 7.33 PG C yr⁻¹ for the time frame of February, 2000 to December, 2006, and climate events such as droughts, fires, hurricanes could have an effect on the ecosystem carbon exchange.

Xiao, J. 2010. Estimation of Net Ecosystem Carbon Exchange for the Conterminous United States by Combining MODIS and AmeriFlux Data. Lawrence Berkeley National Laboratory: 61.

Expanding measurements of the net ecosystem carbon exchange to shorter intervals may be helpful in determining levels and carbon exchange estimates.

Loescher, H. W., C. V. Hanson, and T. W. Ocheltree. 2009. The Psychrometric Constant Is Not Constant: A Novel Approach to Enhance the Accuracy and Precision of Latent Energy Fluxes through Automated Water Vapor Calibrations. *Journal of Hydrometeorology* 10:1271-1284.

Examined accuracy of existing hygrometers and calibrations in measuring temperatures.

Wheeler, A. G. 2009. *Teleonemia huachucae* Drake (Hemiptera: Tingidae): New Distribution and Host-Plant Records of a Rarely Collected Lace Bug. *Proc. of the Entomological Society of Washington* 111:762-765.

The range of this species of lace bug has been found to be larger than previously thought. The range is extended to include southern California and southwestern New Mexico.

Wheeler, A. G. Jr., and R. A. Rakitov. 2009. Pinyon Pines as Host Plants of Three Proconine Leafhopper Species (Hemiptera: Cicadellidae: Cicadellinae). *Proc. of Entomological Society of Washington* 111:515-526.

Establishes an association of 3 leafhopper species (Cicadelline tribe Proconini) with pinyon pine host plants.

Bock, C. E., Z. F. Jones, and J. H. Bock. 2008. The Oasis Effect: Response of Birds to Exurban Development in a Southwestern Savanna. *Ecological Applications* 18:1093-1106.

Diversity of birds was studied in grazed and ungrazed areas, low-density exurban areas or both, or neither. In low density ex-urban areas, most birds increased in numbers probably due to food, shade, nest sites, and water that was available at home sites.

DeBano, S. J. 2008. Morphometric Condition as a Measure of Energetic Content and Reproductive Potential in *Dactylotum variegatum*. *Journal of Orthoptera Research* 17(2): 293-300.

Size of grasshoppers in this study are related to food from grazed and ungrazed grasslands, but other factors enter into this, such as water and protein content.

de Steiguer, J. E. 2008. Semi-Arid Rangelands and Carbon Offset Markets: A Look at the Economic Prospects Potentially new economic opportunities for rangeland managers. *Society for Range Management* 30:27-32.

Results support the possibility of carbon storage and carbon credits to offset green-house gas emissions, particularly carbon storage on private grazing lands in the U.S.

Ruth, J. M. 2008. Distribution and Abundance of Breeding Arizona Grasshopper Sparrow (*Ammodramus Savannarum Ammolegus*) in the Southwestern United States: Past, Present, and Future. Pages 113-124 in C. D. Marti, J. Ruth, T. Brush, and D. Krueper, editors. *Birds of US-Mexico Borderlands: Distribution, Ecology, and Conservation*. Cooper Ornithological Society.

Sonoita and San Rafael Valleys, Arizona and Animas Valley, New Mexico, have the highest numbers of singing males Arizona Grasshopper Sparrows, and the largest populations in the U.S.

Yang, F., A.-X. Zhu, et al. 2008. Assessing the representativeness of the AmeriFlux network using MODIS and GOES data. *Journal of Geophysical Research* 113(G04036): 11.

In comparing water and carbon through vegetation and climate throughout the U.S. by using AmeriFlux network, results were less representative at some sites but more representative at the Research Ranch.

Bock, Carl E., R. A. Bailowitz, D.W. Danforth, Z.F. Jones, J.H. Bock. 2007. Butterflies and Exurban Development in Southeastern Arizona. *Landscape and Urban Planning* 80: 34–44.

Domestic grazing had little impact on species richness or abundance and exurban development had minor impacts.

Bock, C. E., J.H.Bock, L.Kennedy, Z.F. Jones. 2007. Spread of Non-native Grasses into Grazed Versus Ungrazed Desert Grasslands. *J. of Arid Environments* 71: 229-235.

Protection from grazing lessened the speed of invasion by exotic grasses, but did not halt the spread of Lehmann or Boer Lovegrass.

Bock, Carl E., Zach F. Jones, Jane H. Bock. 2007. Relationships between Species Richness, Evenness, and Abundance in a Southwestern Savanna. *Ecology* 88(5): 1322-1327.

Species richness, evenness and abundance were compared among flowering plants, grasshoppers, butterflies, lizards, summer/winter birds, and small mammals in grasslands and savannas.

Bock, Carl E., Linda Kennedy, Jane H. Bock, Zach F. Jones. 2007. Effects of Fire Frequency and Intensity on Velvet Mesquite in an Arizona Grassland. *Rangeland Ecology & Management* 60(5): 508-514.

Results suggest that repeated fires could have prevented the historic spread of mesquite into southwestern grasslands and could be used to control mesquite in areas with sufficient fine fuels.

McLaughlin, Steven P., Janice E. Bowers. 2007. Effects of Exotic Grasses on Soil Seed Banks in Southeastern Arizona Grasslands. *Western North American Naturalist* 67(2):206-218.

The seed bank in grasslands dominated by exotic grasses includes very little native seed.

Wilson, P., A. D. Wolfe, W. S. Armbruster, and J. D. Thomson. 2007. Constrained Lability in Floral Evolution: Counting Convergent Origins of Hummingbird Pollination in *Penstemon* and *Keckiella*. *New Phytologist* 176:883-890.

Penstemons have changed greatly in regards to acquiring hummingbird pollination, but haven't made shifts backwards or to other pollination behaviors within their evolutionary group.

Yang, F., K. Ichii, et al. 2007. "Developing a Continental-Scale Measure of Gross Primary Production by Combining MODIS and AmeriFlux Data through Support Vector Machine Approach." *Remote Sensing of Environment*: 14.

A predictive gross primary productivity model was developed, in which the most important factor was enhanced vegetation index.

Bock, Carl E., Zach E. Jones, Jane H. Bock. 2006. Abundance of Cottontails (*Sylvilagus*) in an Exurbanizing Southwestern Savanna. *The Southwestern Naturalist* 51(3):352-357.

Cottontails were more abundant in exurban areas than in undeveloped areas, independent of grazing and were found more frequently on ungrazed than grazed landscapes.

- Bock**, Carl E., Zach F. Jones, Jane H. Bock. 2006. Grasshopper Abundance in an Arizona Rangeland Undergoing Exurban Development. *Rangeland Ecology and Management* 59(6):640-647.
Species richness of grasshoppers was unrelated to grazing or development, but abundance was much higher on exurban transects with livestock than in other areas.
- Bock**, Carl E., Zach R. Jones, Jane H. Bock. 2006. Rodent Communities in an Exurbanizing Southwestern Landscape (U.S.A.). *Society for Conservation Biology*, Vol. 20, No.4: 1242-1250.
Grazing by domestic livestock reduces rodent species richness and mean rank abundance, but exurban development had no clear effects on rodent variety of abundance.
- Debano**, Sandra J. 2006. Effects of Livestock Grazing on Aboveground Insect Communities in Semi-arid Grasslands of Southeastern Arizona. *Biodiversity and Conservation* 15:207-222.
Invertebrates in grasslands outside of the historic range of bison may be sensitive to grazing by domestic livestock.
- Hass**, Christine C., Jerry W. Dragoo. 2006. Rabies in Hooded and Striped Skunks in Arizona. *J. of Wildlife Diseases*, 42(4), 2006: 825-829.
There was no evidence of a large-scale geographic spread of rabies. Few trapped skunks carried the rabies-virus neutralizing antibodies.
- Marsett**, R.C., J. Qi, P. Heilman, S.H. Biedenbender, M.C. Watson, S. Amer, M. Weltz, D. Goodrich, R. Marsett. 2006. Remote Sensing for Grassland Management in the Arid Southwest. *Rangeland Ecology & Management* 59(5): 530-540.
RANGES (Rangeland Analysis Utilizing Geospatial Information Science) provides land managers with a tool to monitor extensive grasslands.
- McLaughlin**, Steven P., Janice E. Bowers. 2006. Plant Species Richness at Different Scales in Native and Exotic Grasslands in Southeastern Arizona. *Western North American Naturalist* 66(2):209-221.
Oak savannas had more than twice the species richness of grasslands dominated by exotic species.
- Thomas**, P.A. 2006. Mortality Over 16 Years of Cacti in a Burnt Desert Grassland. *Plant Ecology* 183: 9-17.
100% of the marked plants of each of four species of small cacti on burnt and unburnt semi-desert grassland in Arizona were dead within 16 years.
- Wheeler**, Jr., A.G. 2006. *Prairiana Orizaba* Ball and Reeves (Hemiptera: Cicadomorpha: Cicadellidae), Colonist of the Introduced African Bunchgrass *Eragrostis curvula* (Poaceae), with Notes on the Use of Little Bluestem, *Schizachyrium Scoparium* (Poaceae) by *P. Kansana* (Ball). *Proceedings of the Entomological Society of Washington*, 108(4):868-877.
Weeping lovegrass was found to be the primary host plant for *Prairiana orizaba*, except at one site in AZ in which *Aristida purpurea*, *Bothriochloa barbinodis* and *Bouteloua curtipendula* were also utilized.
- Wolfe**, A. D., C. P. Randle, S. L. Datwyler, J. J. Morawetz, N. Arguedas, and J. Diaz. 2006. Phylogeny, Taxonomic Affinities, and Biogeography of *Penstemon* (Plantaginaceae) Based on ITS and CPDNA Sequence. *American Journal of Botany* 93:1699-1713.
This review suggests the existing delineation needs to be revised to show evolutionary relationships of species. Some derived from more than one common ancestor. The independent origin of hummingbird floral forms was confirmed in 10 evolutionary groups.
- Audsley**, Blake W., Carl E. Bock, Zach F. Jones, Jane H. Bock, Hobart M. Smith. 2005. Lizard Abundance in an Exurban Southwestern Savanna, and the Possible Importance of Roadrunner Predation. *American Midland Naturalist*. 155:395-401.
Roadrunners, especially in developed areas with livestock, appear to suppress terrestrial lizard populations.
- Bishop**, Kristin Whitney. 2005. Mortality, Reproduction, and Re-sprout of Oaks Following a Wildfire in Southeastern Arizona. M.A. Thesis, Department of Ecology and Evolutionary Biology. U. of Co. 43 pgs.
Quercus emoryi and *Q. arizonica* differ in their response to wildfire; fire and grazing have an interactive effect on mortality and recruitment of these species.
- Bock**, Carl E., Jane H. Bock, Stephen Strom, Photographer. 2005. *Sonoita Plain: Views from a Southwestern Grassland*. University of Arizona Press, Tucson. 121 pgs.
Essays and photographs highlight the complex ecology and aesthetics of the region.
- Chace**, J.F. 2005. Host Use by Sympatric Cowbirds in Southeastern Arizona. *The Wilson Bulletin* 117:375-381.
Both bronzed and brown-headed cowbirds chose hosts by host body size; this seems to fit the "alloxenia" pattern.

- Jones**, Zach F., Carl E. Bock. 2005. The Botteri's Sparrow and Exotic Arizona Grasslands: An Ecological Trap or Habitat Regained? *Condor* 107: 731-741.
Abundance and site fidelity were positively associated with grass height and cover, being greatest in sacaton, intermediate in exotics, and lowest in native upland grasslands.
- Kupfer**, John A., Jay D. Miller. 2005. Wildfire Effects and Post-fire Responses of an Invasive Mesquite Population: The Interactive Importance of Grazing and Non-native Herbaceous Species Invasion. *J. of Biogeography* 32:453-466.
Mesquite on grazed areas showed low levels of fire damage, whereas a majority on ungrazed areas suffered moderate to severe damage. Trees in Boer lovegrass plots exhibited greater levels of damage than trees in native grass plots.
- Ortiz-Barney**, Elena. 2005. Seed Banks in Desert Grasslands and Implications for Management with an Application to Education and Outreach. PhD. Dissertation. Arizona State University. 108 pgs.
Most seed occurs in litter and under shrubs, consequently when prescribed fire raises the temperatures to 100°C or greater the seed bank is severely depleted.
- Pearcy II**, Charles M. 2005. The Impact of Background Resolution on Target Acquisitions Weapons Software (TAWS) Sensor Performance. M.S. in Meteorology Thesis. Naval Postgraduate School, Monterey, CA. 67 pgs.
Evaluation of the sensitivity of the TAWS (Target Acquisitions Weapons Software) detection range calculations to the spatial resolution of scenario backgrounds determined that rural and urban designations are important to the definition of a background database.
- Bristow**, Kirby D., Richard A. Ockenfels. 2004. Pairing Season Habitat Selection by Montezuma Quail in Southeastern Arizona. *J. of Range Management* 57:532-538 pgs.
Quail select areas with higher grass canopy cover and more trees, a minimum of 26% tree canopy and 51-75% grass canopy (20cm ht) cover should be maintained.
- Lombardo**, Keith. 2004. Alteration of Biodiversity and Ecosystem Processes by *eragrostis lehmanniana* Nees and *eragrostis curvula* (Schrad.) Nees var. *conferta* Stapf. following a Wildfire in Southeastern Arizona. M.A. Thesis. Dept. of Geography and Regional Development, U. of AZ. 42 pgs.
Comparison of non-native and native dominated grasslands, pre- and post-fire indicated differences in aboveground biomass, soil structure, species composition and diversity.
- Jones**, Zach. 2003. The Impacts of an Exotic Habitat on the Population Dynamics of a Grassland Specialist, the Botteri's Sparrow (*Aimophila botterii*), in Southeastern Arizona. PhD. Thesis, Department of Environmental, Population, and Organismic Biology. U. of Co. 63 pgs.
Results indicate that the species of grass is not as important to nesting success as the height and cover provided.
- Jones**, Zach E., Carl E. Bock, Jane H. Bock. 2003. Rodent Communities in a Grazed and Ungrazed Arizona Grassland, and a Model of Habitat Relationships Among Rodents in Southwestern Grass/Shrubland. *The American Midland Naturalist* 149:384-394.
The model developed in this study suggests that a mosaic of grass and shrublands will maintain the highest regional diversity of rodents.
- Blumenfeld**, Hana Devorah. 2002. Quantifying Rangeland Health Indicators Using Runoff and Sediment From Rainfall Simulator Experiments. M.S. Thesis with a Major in Watershed Management. School of Renewable Natural Resources, U of AZ, Tucson. 165 pgs.
Runoff and sediment yield have a positive relationship with gap length and negative relationship with amount of cover.
- Miller**, Jay D., Stephen R. Yool. 2002. Modeling Fire in Semi-desert Grassland/oak Woodland: The Spatial Implications. *Ecological Modeling* 153: 229-245.
A comparison between the FARSITE and the Northern Forest Fire Laboratory (NFFL) models helps produce more accurate fire simulations.
- Qi**, Jiago, Robin Marsett, Philip Heilman, Sharon Biedenbender, Susan Moran, David Goodrich. 2002. RANGES Improves Satellite-based Information and Land Cover Assessments in Southwest United States. *Transactions, American Geophysical Union*, Vol. 83 (51) 601, 605-606.
Ground truthing indicates that fractional cover, canopy height, and herbaceous biomass estimates can be obtained with LANDSAT images.
- Woods**, Christopher P. 2002. Ecological Aspects of Torpor Use and Inactivity during Winter by Common Poorwills. PhD dissertation in Biology. University of Regina, Saskatchewan. 194 pgs.
Poorwills can remain inactive for long periods when the ambient temperature is low, and exhibit physiological patterns similar to mammals in hibernation.

- McLaughlin**, Steven P., Erika L. Geiger and Janice E. Bowers. 2001. Flora of the Appleton-Whittell Research Ranch, Northeastern Santa Cruz County, Arizona. *Journal of the Arizona-Nevada Academy of Science* 33(2):113-131.
473 native and 38 exotic vascular plants have been found and identified on the Research Ranch. Floristic affinities are closest with the grasslands of Chihuahua and Coahuila, Mexico.
- Bock**, Carl E. and Jane H. Bock. 2000. *The View from Bald Hill: Thirty Years in an Arizona Grassland*. University of California Press. Berkeley. 197 pgs.
The authors describe the genesis of the Appleton-Whittell Research Ranch and the research conducted to further understanding of the ecology of the semi-desert grasslands.
- Gordon**, Caleb E. 2000. Fire and Cattle Grazing on Wintering Sparrows in Arizona Grasslands. *Journal of Range Management* 53:384-389.
Wintering grassland sparrows benefit from spring burning of their habitat, but effects of grazing by livestock was ambiguous. Severe grazing appears to have a negative effect, but moderate usage may be compatible with maintenance of habitat.
- Gordon**, Caleb E. 2000. Movement Patterns of Wintering Grassland Sparrows in Arizona. *The Auk*: 117(3):748-759.
Cassin's, Grasshopper, and Baird's sparrow abundance was poorly correlated with summer rainfall, but more mobile species such as Savannah and Brewer's sparrows were positively correlated with monsoon precipitation.
- O'Dea**, Mary E. 2000. Arbuscular Mycorrhiza: A Linkage of Plant, Soil and Surface Hydrologic Processes in a Southwest Grassland. PhD Dissertation. U. of AZ, Tucson. 121 pgs.
This study attempted to quantify effects of prescribed fire and monsoon precipitation on plant and fungal communities, soil structure and surface hydrology.
- Stromberg**, Mark R. 2000. Montezuma Quail (*Cyrtonyx montezumae*). in (A. Poole and F. Gill, editors) *The Birds of North America, No. 524, 2000*. The Birds of North America, Inc. Philadelphia, PA.
The former director of the Research Ranch wrote the treatment for this species, including distribution, systematics, migration, habitat, food habits, sounds, behavior, breeding, demography and populations, conservation and management, and appearance.
- Bock**, Carl E. and Jane H. Bock. 1999. Response of Winter Birds to Drought and Short-Duration Grazing in Southeastern Arizona. *Conservation Biology*, Volume 13, No. 5, October 1999: 1117-1123.
Resident and migratory birds were negatively impacted by high density, short-duration rotational grazing coupled with drought.
- Gordon**, Caleb E. 1999. Community Ecology and Management of Wintering Grassland Sparrows in Arizona. PhD. Thesis, Department of Ecology and Evolutionary Biology. U. of AZ., Tucson. 80 pgs.
Granivorous winter grassland sparrows exhibit species variation in movement patterns and moderate cattle grazing may not have a negative impact on the survivorship of *Ammodramus* sparrows.
- Kunz**, Michael. 1999. Mechanisms Contributing to the Alteration in Community Structure by the Exotic *Eragrostis chloromelas* (Boer Lovegrass) in a Desert Grassland. M.A. Thesis. Department of Environmental, Population, and Organismic Biology, U. of CO. Boulder. 52 pgs.
Boer lovegrass alters community structure through seed rain and soils seed bank dominance, direct competition, and capability to spread into native dominated grasslands.
- Miller**, J.D. 1999. Modeling Fire in Semi-desert Grassland/Oak Woodland: The Spatial Implications. M.A. Thesis, Department of Geography and Regional Development, U. of AZ. Tucson. 159 pgs.
Modeling fire behavior as a prediction tool is maximized by incorporation of fuel mapping.
- Smith**, H.M., D. Chiszar, A. Chiszar, D.L. Auth, J. Auth, C. Henke, C.E. Bock, J.H. Bock, J.A. Rybak, R. L. Holland, K. Bonine, G.J. Watkins-Colwell. 1998. Slevin's Bunch Grass Lizard (*Sceloporus slevini*) Decimated on the Sonoita Plain, Arizona. *Herpetological Review* 29(4): 225-226.
Drought after 1997 severely impacted the population density of this species in SE Arizona.
- Bock**, Carl E. and Jane H. Bock. 1997. Shrub Densities in Relation to Fire, Livestock Grazing and Precipitation in an Arizona Desert Grassland. *Southwestern Naturalist* 42 (2): 188-193.
Baccharis pteronoides and *Happlopappus tenuisectus* were both more abundant in ungrazed areas, and *B. pteronoides* populations did not decline after a wildfire, whereas *H. tenuisectus* did.
- DeBano**, S.J. 1997. The Effect of Ecological Disturbance Caused by Livestock Grazing on the Ecology, Morphology, Physiology, and Behavior of the Rainbow Grasshopper, *Dactyloctenium aegyptium*. Ph.D. Thesis, Department of Entomology. U. of KY, Lexington. 211 pgs.

Insect community composition was different between grazed and ungrazed sites, but there were no differences in abundance, richness or diversity. *D. variegatum* densities were lower on grazed sites.

Hubbard, J.A., G.R. McPherson. 1997. Acorn Selection by Mexican Jays: a Test of a Tri-trophic Symbiotic Relationship Hypotheses. *Oecologia* 110: 143-146.

The co-adapted symbiotic oak-jay relationship appears to describe the relationship better than the proposed, tri-trophic oak, jay and weevil model.

Mathies, T., R.M. Andrews. 1996. Extended Egg Retention and its Influence on Embryonic Development and Egg Water Balance: Implications for the Evolution of Viviparity. *Physiological Zoology* 69(5): 1021-1035.

Oviposition does not occur when gas exchange in utero is insufficient for the embryo and increase in duration of egg retention and decrease in shell thickness did not evolve concurrently.

Bock, C.E., J.H. Bock, M.C. Grant, T.R. Seastedt. 1995. Effects of Fire on Abundance of Plains Lovegrass (*Eragrostis intermedia*) in a Semi-arid Grassland in Southeastern Arizona. *J. of Vegetation Science* 6: 325-328.

Episodic fire may contribute to the long term abundance of plains lovegrass, especially in drought.

Hubbard, J.A. 1995. Mechanisms of Lower Treeline Shift: Seed Fate of *Quercus emoryi* Acorns. M.S. Thesis, School of Renewable Natural Resources. U. of AZ, Tucson. 48 pgs.

Seed predation is not a primary constraint on downslope treeline movement, but droughts, low soil moisture or temperature extremes may be.

Mathies, T., R.M. Andrews. 1995. Thermal and Reproductive Biology of High and Low Elevation Populations of the Lizard, *Sceloporus scalaris*: Implications for the Evolution of Viviparity. *Oecologia* 104:101-111.

A reduction of eggshell thickness, reduced clutch size and longer period of egg retention resulted from lower temperatures during gestation at high elevations, which indicates intermediate states in the evolution of viviparity.

Bock, C.E., J.H. Bock. 1994. Effects of Predator Exclusion on Rodent Abundance in an Arizona Semidesert Grassland. *Southwestern Naturalist* 39(2): 208-210.

Exclusion of predators (i.e. bobcats, coyotes, owls, rattlesnakes) led to increased rodent numbers in a semidesert grassland.

Finberg, K.O. 1994. Community Structure Changes in a Grassland after a Wildfire and a Dry Season. M.A. Thesis, Landscape and Architecture. AZ State U., Tempe. 102 pgs.

Fire enhanced the transition from a short-grass to mixed-grass community which included an increase in African midgrasses.

Bock, C.E., J.H. Bock. 1993. Cover of Perennial Grasses in Southeastern Arizona in Relation to Livestock Grazing. *Conservation Biology* 7: 371-377.

Eight native bunchgrass species grew taller and produced more cover on ungrazed grasslands, with sideoats grama, cane beardgrass and plains lovegrass showing the greatest increases. Only two grasses showed an increase on grazed plots, curly mesquite and black grama.

Babb, Geoffrey Dean. 1992. Sprouting Response of *Quercus arizonica* and *Quercus emoryi* Following Fire. M.A. Thesis with a Major in Watershed Management. School of Renewable Natural Resources, U. of AZ. Tucson. 76 pgs.

Sprouting of both species was most likely to occur from smaller stems; top-kill had little effect on number of sprouts produced.

Bock, C.E., J.H. Bock. 1992. Response of Birds to Wildfire in Native Versus Exotic Arizona Grassland. *Southwestern Naturalist* 37: 73-81.

Morning dove, horned lark, vesper sparrow and savannah sparrows were attracted to the burned plots for two years. Grasshopper sparrow, Botteri's sparrow, Cassin's sparrow, and Eastern meadowlarks avoided the burned plots. Burning did not enhance return of native plants into exotic monocultures.

Bock, C.E., J.H. Bock, M.C. Grant. 1992. Effects of Bird Predation on Grasshopper Densities in an Arizona Grassland. *Ecology* 73: 1706-1717.

No impact was noted on vegetative cover or species composition although birds limited grasshopper abundance in grasslands.

Bock, C.E., A.Cruz, Jr., M.C. Grant, C.S. Aid, T.R. Strong. 1992. Field Experimental Evidence for Diffuse Competition among Southwestern Riparian Birds. *American Naturalist* 140: 815-828.

Cavity-nesting species increased when nest-boxes were added to the landscape, but open-nesting bird species decreased in abundance.

- Bock, J.H., C.E. Bock** 1992. Short-term Reductions in Plant Densities following Prescribed Fire in an Ungrazed Semidesert Shrub-grassland. *Southwestern Naturalist* 37: 49-53.
No irreversible changes in grass and herb densities occurred after a June fire, following 15 years without fire or grazing, although variable were reduced for 1-2 years.
- Bock, J.H., C.E. Bock.** 1992. Vegetation Responses to Wildfire in Native vs Exotic Arizona Grassland. *J. Vegetation Science* 3:439-446.
There is no evidence that fire will restore a diverse native flora to grasslands dominated by the South African exotic lovegrasses (*Eragrostis lehmanniana* and *E. curvula*).
- Thomas, P.A., P. Goodson.** 1992. Conservation of Succulents in Desert Grasslands Managed by Fire. *Biological Conservation* 60: 91-100.
The majority of cacti survived a fire, but fewer plants survived intense or repeated fires.
- Valone, Thomas J.** 1992. Information for Patch Assessment: a Field Investigation with Black-chinned Hummingbirds. *Behavioral Ecology* 3(3): 211-222.
Hummingbirds increase foraging efficiency by combining prior information with current patch sampling to more optimally utilize resources.
- Bock, Carl E. and Jane H. Bock.** 1991. Response of Grasshoppers (Orthoptera: Acrididae) to Wildfire in a Southeastern Arizona Grassland. *American Midland Naturalist* 125: 162-167.
Grasshopper densities declined on burned plots one year post fire, but differences did not persist.
- Lima, S.L., T.J. Valone.** 1991. Predators and Avian Community Organization: an Experiment in a Semi-desert Grassland. *Oecologia* 86:105-112.
Cover-dependent escape tactics enable some species to increase concomitantly with cover, while species that are cover-independent decrease as cover increases.
- Ortega, J.C.** 1991. The Annual Cycle of Activity and Weight of Rock Squirrels (*Spermophilus variegatus*) in Southeastern Arizona. *American Midland Naturalist* 126:159-171.
This study established a baseline for phenology of rock squirrels.
- Bock, Carl E., Hobart M. Smith, Jane H. Bock.** 1990. The Effect of Livestock Grazing upon Abundance of the Lizard, *Sceloporus scalaris*, in Southeastern Arizona. *J. of Herpetology*, Vol. 24, No. 4, 445-446 pgs.
Protection from livestock grazing awarded *Sceloporus scalaris* an order of magnitude increase in abundance by increasing the number and size of bunchgrasses.
- Ortega, J.C.** 1990. Home-range Size of Adult Rock Squirrels (*Spermophilus variegatus*) in Southeastern Arizona. *J. Mammalogy* 71:171-176.
Rock squirrels exhibit intra- and intersexual overlap of home ranges, with the largest ranges claimed by adult males during breeding season (May/June).
- Ortega, J.C.** 1990. Reproductive Biology of the Rock Squirrel (*Spermophilus variegatus*) in Southeastern Arizona. *J. Mammalogy* 71:448-457.
Onset of heavy summer rains was associated with the mating period (approx. 9 weeks). Timing ensured a food source for the young via increased production of vegetation.
- Smith, H.M., C.E. Bock.** 1990. Unicolor Hatchling Coloration in a Population of the Lizard *Sceloporus undulatus consobrinus* in Southeastern Arizona. *Bulletin of the Maryland Herpetological Society* 26:14-16.
Newly hatched *Sceloporus undulatus consobrinus* are totally gray-brown in color. This the only subspecies known to have unicolor juveniles.
- Smith, H.M., C.E. Bock, J.H. Bock.** 1990. Notes on Reproduction and Coloration of the Bunch-grass Lizard, *Sceloporus scalaris*, in Southeastern Arizona. *Bulletin of the Maryland Herpetological Society* 26:64-67.
Large hatchlings and late reproduction were noted in the fall of 1989, and no unicolor individuals were seen.
- Stromberg, M.R.** 1990. Habitat, Movements, and Roost Characteristics of Montezuma Quail in Southeastern Arizona. *Condor* 92:229-236.
Quail preferred to use hillsides with intermediate grass cover about 50 ft from oaks during the day. Pairing occurred from April through September. Covey sizes declined from September – April.
- Strong, T.R., C. E. Bock.** 1990. Bird Species Distribution Patterns in Riparian Habitats in Southeastern Arizona. *Condor* 92:866-885.
Cottonwood and sycamore habitats has high total bird density during the breeding season and cottonwood sites had the greatest bird species richness. In winter, plots in open grassland exhibited greater richness and density.

Valone, T.J. 1990. Information and Exploitation: Patch Assessment Strategies in Birds and Mammals. Ph.D. Thesis, Department of Environmental, Population and Organismic Biology. U. of AZ. Tucson. 170 pgs.

Single foragers rely on sampling and prior experience to exploit resource patches. Group foragers also observe the success of other members, which allows groups to evaluate patch quality faster than individual foragers.

Bock, J.H., C.E. Bock. 1989. Factors Limiting Sexual Reproduction in *Plantanus wrightii* in Southeastern Arizona. *Aliso* 12:295-301.

A permanent water table close to the surface is essential to seedling survival. Neither domestic animals nor lack of germinable seeds accounts for the failure of sycamore to reproduce.

Brady, W.W, M.R. Stromberg, E.F. Aldon, C.D. Bonham, S.H. Henry. 1989. Response of a Semidesert Grassland to 16 Years of Rest from Grazing. *J. Range Management* 42:284-288.

There was no significant difference in canopy cover between grazed and ungrazed plots, but cover of midgrasses was significantly greater in ungrazed areas.

Delesalle, V. 1989. Year-to-year Changes in Phenotypic Gender in a Monoecious Cucurbit, *Apodantyhera undulata*. *American J. Botany* 76:30-39.

Plants are considered "male" until sufficient growth has been achieved to start producing cosexual flowers.

Holmes, R.D, K. Jepson-Innes. 1989. A Neighborhood Analysis of Herbivory in *Bouteloua gracilis*. *Ecology* 70: 971-976.

Spatial pattern within a community is a determinant of the risk of herbivory on blue grama.

Jepson-Innes, K., C.E. Bock, 1989. Response of Grasshoppers (Orthoptera: Acrididae) to Livestock Grazing in Southeastern Arizona: Differences Between Seasons and Subfamilies. *Oecologia* 78:430-431.

Ungrazed plots supported almost four times the density of grasshoppers than grazed grassland sites.

Maurer, B.A., E.A. Webb, R.K. Bowers. 1989. Nest Characteristics and Nestling Development of Cassin's and Botteri's Sparrows in Southeastern Arizona. *Condor* 91:736-738.

Although the closely related species breed in similar habitats, Cassin's sparrow nests in shrubs in July and August, whereas Botteri's sparrow nests on the ground in May through August.

Ortega, J.C. 1988. Activity Patterns of Different-aged Coyotes (*Canis latrans*) Pups in Southeastern Arizona. *J. Mammalogy* 69:831-835.

Coyote pups are usually born in May-June and gradually become more active until they start following adults at 8-10 weeks of age. Play is an important activity for the pups at all ages.

Ortega, J.C. 1988. The Behavioral Ecology and Natural History of the Rock Squirrel in Southeastern Arizona. Ph.D. Thesis, Department of Environmental, Population and Organismic Biology. U. of CO, Boulder. 216 pgs.

Rock squirrels were not sexually territorial and preferred den sites were most common in oak savanna and riparian areas. Mating occurred in mid-spring to mid-summer.

O'Shea-Stone, M. 1988. The Seed Bank in a Semidesert Grassland of Southeastern Arizona, and its Relationship to Seed Rain and Vegetation. M.A. Thesis, Department of Environmental, Population, and Organismic Biology. U. of CO, Boulder. 71 pgs.

Density in perennial grass seed banks of semi-desert grassland fell within the reported values of other grasslands.

Delesalle, V.A. 1987. Patterns of Gender Allocation in a Monoecious Cucurbit, *Apodanthera undulata*, and their Reproductive Consequences. Ph.D. Thesis. Department of Ecology and Evolutionary Biology. U. of AZ, Tucson. 123 pgs.

Only larger, older plants are capable of producing female flowers.