

The following is the final report for the McKinney Flats Project for 2003. Fieldwork in 2003 included three sessions of lizard and mammal sampling completed in June, July, and August with vegetation sampling completed in November. As in the past lizard and mammal sampling involved the summer intern program with a number of local high school students and college students from around the country participating in the sampling and general plot maintenance. The twenty rainfall gauges established in 2002 continue to be sampled on a monthly basis. A 800 ac prescribed burn was completed on the southeast research block in June in collaboration with the Animas Fire Department, BLM, Grasslands Management, The Nature Conservancy, and New Mexico State Forestry. Though a lack of fine fuels due to drought limited the scope of the fire, we did succeed in treating the experimental plots and enough of the adjoining landscape to prevent the cattle from over-concentrating on the burned areas. A second set of native mammal exclosures was completed post-burn to allow examination of the interaction of fire and native grazers. These 36m² exclosures are important for allowing us to link our results with previous exclosure studies across the Chihuahua desert, and cross-site studies being developed in collaboration with The Nature Conservancy across the intermountain West. The reintroduced prairie dog colonies continue to thrive with an over 30% percent expansion of the colonies over the summer. With the establishment of a fourth colony located in the NE block in the fall of 2002 we are now back to our full experimental design and reproduction is apparent on all sites.

Data analysis continues to examine the interaction of cattle and native grazers through studies of cows and prairie dogs resulting in a paper on grazing effects illustrating that the reintroduction of cattle can lead to increases in diversity. This indicates that even in periods of drought ranching can be compatible with large-scale conservation. Revised and expanded papers on the interaction of prairie dogs and cattle illustrate how ranching and prairie dogs can be compatible in rangelands with positive interactions developing between cattle and native herbivores. Collaborations with Myles Traphagen are beginning to examine how cover and frequency differ in grassland plant communities. This information is especially important in determining the mortality of grasses under

grazing and drought stress. Due to a lack of fine fuels as result of the drought analysis of fire effects is on hold until after we complete a third experimental burn in spring 2004. The southwest pasture was rested following the 2003 growing season and has adequate fine fuels for burning even if we do not have substantial winter rains. As in the past data analysis and results are reported in detail within papers or presentations to maximize the ability to communicate the results to the widest possible audience. Presentations and papers for 2003 are discussed below.

Invited Presentations:

Other the course of the year presentations were given to different groups of conservationists, resource users and managers, and scientists ranging from ranching groups in Nevada to fishery biologists in Maine. A list of the invited presentations from 2003 include:

Society for Range Management, Casper, WY. Role of small mammals in structuring arid grasslands.

Agency Meeting/Malpai Borderlands Group, Douglas, Arizona. Dynamic interactions and science in the borderlands.

Eastern Nevada Landscape Coalition, Ely, Nevada. Fire, Grazing, and Grasslands: Dynamic interactions and the conservation of working landscapes.

Jornada Experimental Range, Las Cruces, New Mexico. Interactions between driving variables in desert grasslands.

The Gunnison Basin as a Model Ecosystem, Rocky Mountain Biological Laboratory, Crested Butte, Co. Hierarchical landscape-level experiments of the interactions of driving processes in Western landscapes.

Meridian Institute Workshop, Assessing the Environmental Outcomes of Community Based Collaboratives. Salt Lake City, Utah. Linking Science and Community-Based Conservation: Conservation and Science's New Frontier.

Consortium of Community-based Collaboratives, Salt Lake City, Utah. Science as support for community-based conservation.

Turning Natural Resources into Assets: Strong Communities, Sustainable Livelihoods, and Restored Environments. Savanna, Georgia. The Two Cowboys Project: Linking pastoralists in Kenya and the United States.

Working Landscape Coalition, Minneapolis, Minnesota. Complexity and collaborative conservation.

Seventh Biennial Conference of Research on the Colorado Plateau. Linking complexity and community: Science and community-based conservation in the borderlands.

Presentation to NAMA (Northwest Atlantic Management Alliance) and collaborators, Waldoboro, Me. Pathologies of resource management – What can rangelands and fisheries learn from each other?

Publications:

Over the course of the year twelve papers or chapters related to the McKinney Flats Project or resource management in the West were completed. Revised and updated papers on the effects of grazing and native herbivores were completed and submitted over the summer and early fall. Two book reviews were used as an opportunity to discuss the wider implications of landscape level conservation. The enthusiastic response to collaboratively developed models of ecosystem function I presented at meetings early in the fall lead me to focus my writing efforts over the past several months on complexity and the collaborative process. These papers go beyond the analysis of data and instead present alternative frameworks for conducting research and resource management based on the Malpai Borderlands experience and the McKinney Flats Project. These papers include a chapter contained in the conference proceedings from the Conference for Community Based Collaboratives, a chapter in the book *Turning Natural Resources into Assets: Strong Communities, Sustainable Livelihoods, and Restored Environments* being prepared by the Sand County Foundation, a book chapter being prepared for a book to be published by the University of Chicago Press, and a paper completed for the journal *Science* that is included with this report. Papers published, completed, or in preparation in 2003 include:

Curtin, C. G. 2003. Culture, ecology, and policy in the old and new West. *Conservation Biology* 4: 1188 – 1189 (Review of Book on Rangelands Policy and Wildlife).

Brown, J. H., C. G. Curtin, and R. W. Braithwaite. 2003. Management of the semi-natural matrix. In *How Landscapes Change: Human Disturbance and Ecosystem Fragmentation in the Americas*.

P. G. A. Bradshaw and P. A. Marquet, Eds. Springer-Verlag, Heidelberg, Germany. Pp. 328 – 342.

Curtin, C. 2003. Prairie dogs, cattle, and conventional wisdom. *The New Ranch at Work: Proceedings of a Conference*. The Quivira Coalition, Santa Fe, New Mexico, USA. Pp. 87 – 92.

Curtin, C. G. 2003. Fire as a landscape restoration and management tool in the Malpai borderlands. 1st. National Fire Congress. Pages 000 – 000 in L. A. Brennan et al. (eds.). *National Congress on Fire Ecology, Prevention, and Management Proceedings*, Tall Timbers Misc. Publication No. 13, Tallahassee, Fl. (In Press).

Curtin, C. G. *Ecological Implication of Prairie Dogs in Chihuahuan Desert Grasslands: Initial Results from Long-term Studies*. *Preservation of Desert Grasslands Conference Proceedings* (In Press).

Curtin, C. G. *Complexity and Community: Linking Conservation and Science in the Borderlands*. In *Proceedings from the Conference for Community Based Collaboratives* (In Press).

Curtin, C. G. *Noah's Reference Manual*. *Prairie Naturalist* (Review of Book on Conservation Planning)(In Press).

Curtin, C. G. and B. Brown. *Complex interactions between cattle and prairie dogs: Implications for the conservation and restoration of desert grasslands*. (In Review – Conservation Biology).

Curtin, C. G. *Landscape-level effects of livestock on the biodiversity of a desert grassland*. (In Review - Ecological Applications).

Curtin, C. G. *Complexity, Community, and the Interaction of Local Knowledge with Science and Conservation* (In Review).

Curtin, C. G. *Linking Complexity, Conservation, and Culture in the Mexico/U.S. Borderlands*. In *Turning Natural Resources into Assets: Strong Communities, Sustainable Livelihoods, and Restored Environments* (In Review).

Curtin, C. G. *Linking Traditional and Non-traditional Paradigms of Science and Resource Management*. In *The Biology of Place Natural History and Understanding Nature*. I. A. Billick and M. V. Price, Eds. University of Chicago Press (In Preparation).

Future Directions:

At present the papers on complexity and conservation linking local knowledge and science are being completed and I am returning my focus to finishing a book with T.H.F. Allen on *Complex Ecological Systems*. When that book is finished I will renew my focus on analysis of McKinney Flats data. The move to 20 rainfall gauges in the research area in 2002 coupled with the effects of drought have highlighted the profound variability of

rainfall at even the scale of acres or hectares with many of the plots showing 15 to 30% variation within a single rainfall event. The interaction of climate and vegetation composition will become a major focus of data analysis and papers of the coming year as six years of McKinney Flats data, coupled with the third large scale vegetation sampling of the Gray Ranch, allow contrasts of the landscape level effects of climate on vegetation growth, diversity, and distribution. This occurs at three scales. Vegetation and rainfall data from the Casabel and McKinney Flats studies examine in detail the response of vegetation to environmental variation at the scale of meters to hectares. Ground data from the experimental studies coupled with that from the 107 Gray Ranch monitoring plots will link experimental and monitoring data at the scale of hectares to kilometers provide the linkage from landscape to regional levels. While analysis of aerial imagery by revisiting the aerial photo analysis completed in collaboration with Jim Brown and Tom Valone in the mid 1990s determines how the last decade of large scale climatic patterns have altered the regional vegetation of the borderlands. These three approaches comprise a coordinated effort over the next several years to tie experimental and monitoring results back to the adaptive management of the land. This linkage is crucial to complete the cycle of information, action, and response necessary for sustaining borderlands ecosystems and creating a truly adaptive management system.