

CATTLE GRAZING FOR GRASSLAND MANAGEMENT AT CARRIZO PLAIN NATIONAL MONUMENT

One Size Does Not Fit All

The Carrizo Plain – long called the ‘Serengeti’ of California – is one of the last remaining refuges for a number of endangered plant and animal species that were once common throughout the desert-like grassland and scrubland communities of the San Joaquin Valley. The vast, arid landscape found at Carrizo Plain is famous for its displays of spring wildflowers and diverse and abundant wildlife, including San Joaquin kit foxes, giant kangaroo rats, blunt-nosed leopard lizards, and mountain plovers. The Carrizo Plain is also home to herds of re-introduced tule elk and pronghorn antelope, species decimated throughout most of California in the last two centuries.

Starting in 1988, the Bureau of Land Management, The Nature Conservancy, and the California Department of Fish and Game have worked together to protect the Carrizo Plain and its astounding variety of native plant and animal species. Since then, the three organizations – known as the Managing Partners – protected over 250,000 acres and have worked together to manage this ecologically sensitive area. In 2001, the Carrizo Plain was declared a National Monument in recognition of its biological, geological, and historical significance and spectacular scenery.¹

The Managing Partners, in conjunction with the Carrizo Plain Monument Advisory Committee, are developing a Resource Management Plan (RMP), which will guide stewardship of the Carrizo Plain National Monument (CPNM) for the next 10 to 15 years.²



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Among the more complex issues being addressed in the plan is the role of cattle grazing in managing multiple native species and habitats. Although there is a diversity of strong opinions on the use of grazing as a conservation tool, few scientific studies exist to help guide grazing management decisions in this more arid region of California.

In California and elsewhere, grazing is embraced increasingly by land managers and conservation practitioners as one of the more practical tools

available for restoring grassland ecosystems degraded by exotic plant species. At CPNM, ecosystems once typified by sparse shrubs with an understory of native annual forbs (i.e. wildflowers) and bunchgrasses are now dominated by exotic annual grasses with Mediterranean origins. Although often implicated in the original demise of California’s grasslands, grazing is now thought to provide a number of ecological benefits to grassland ecosystems. Indeed, research done in more productive California grasslands (e.g. those found on the coast and in the Central Valley) has shown that cattle grazing can encourage native plant species – especially annual forbs and bunch grasses – by reducing competition with exotic grasses. Grazing by cattle may also mimic disturbances caused by native grazers and browsers, such as tule elk and pronghorn antelope, and may help to create and maintain habitat for native plant and animal species

Although cattle grazing may be a promising tool for managing exotic plants in grasslands, there may be unintended negative consequences, including facilitating the invasion and spread of exotic plants, impacting soil health and water quality, and otherwise degrading native species habitat. This may be especially true for more arid grassland systems, such as Carrizo Plain, that are characterized by extreme annual variation in rainfall. Such ecological variability creates uncertainty about how to best manage the grassland ecosystems at CPNM and what role cattle grazing should play there in the future.

Assessing the Ecological Effects of Grazing at the Carrizo Plain National Monument

To better understand the ecological role of cattle grazing in managing CPNM, the Managing Partners initiated a long-term study in 1997 designed to evaluate the effects of cattle grazing on native plant communities and giant kangaroo rats (GKR), a federal and state-listed endangered species. In the study, a total of 25 pastures were studied (approximately 50,000 acres), with 19 pastures available for grazing and six pastures excluded from grazing. Pastures



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Top and Above: A Legacy of grazing in the Carrizo plain

that were available to cattle were grazed seasonally in the winter and spring months (November to May) when criteria for turning out cattle were met (i.e. sufficient fall plant biomass and new green growth). Each of these pastures was systematically sampled annually, with variables including percent cover of all plant species, the density of GKR precincts (i.e. burrows), and plant biomass.

Results from the Carrizo Plain National Monument Grazing Study

Drawing on previous research across California grassland ecosystems, the Managing Partners evaluated the hypothesis that a winter-spring (November to May) cattle grazing regime would benefit native annual flora by reducing the biomass and cover of exotic annual grasses, such as wild oats (*Avena* spp.) and brome grasses (*Bromus* spp.). The assumption was that native annual species are limited by competition with exotic grasses, and that properly-timed grazing would decrease exotic annual grass cover and biomass and increase native annual grass and forb richness and cover.

As with most cattle-grazing studies conducted in California grasslands, the results from the CPNM study are complex. However, unlike many of the findings from previous studies done elsewhere in the state, the cover and richness of native annual forb species – by far the most diverse group of plants at the CPNM – was significantly lower in grazed areas compared to ungrazed ones. The negative impact of grazing on native annual forbs was greatest in the foothill soil types. In contrast, native bunchgrasses exhibited variable responses to grazing that depended on soil and vegetation community type. Contrary to expectations, the cover of exotic annual grasses was greater in grazed areas relative to ungrazed ones. Thus, two of the primary management objectives for using cattle grazing as a management tool – to enhance native annual plant species and to decrease exotic ones – are not supported by this study.

The study was also designed to monitor the effects of cattle grazing on GKR, a critically important player (i.e. keystone species) in the CPNM ecosystem. GKR is prey for the San Joaquin kit fox, creates burrows that are used by San Joaquin antelope squirrels and blunt-nosed leopard lizards, and through vegetation clipping and seed harvesting creates the short-statured habitat that supports a suite of endangered San Joaquin species. Previous research in nearby grassland ecosystems has suggested that increased levels of plant biomass decrease the suitability of GKR habitat, even though this species removes a substantial amount of biomass through clipping plants. The Managing Partners hypothesized that cattle grazing would have a positive effect on GKR precinct density by removing exotic grass biomass.

The effects of grazing on the density of GKR precincts varied across years, with grazing having a negative effect in four out of six years of the study and no effect in the other two years. Even during the wettest year (1998 El Niño event) and the two years following, when grazing was hypothesized to be the most important for reducing excessive build up of plant biomass, GKR precinct density was significantly lower in grazed areas relative to ungrazed ones. During the course of the grazing study (1997-2002), the density of giant kangaroo rat precincts increased by nearly 50% and the percentage of sampling locations with GKR precincts increased from 21% to 35%, indicating an overall increase in GKR abundance at CPNM during the period.

Implications of Grazing Study for Management

Contrary to recent cattle-grazing studies done elsewhere in California, the results from the CPNM study do not support the general hypothesis that seasonal grazing is beneficial for the native plant communities found in the study area. This result is similar to findings from a small-scale study at the CPNM involving a comparison of vegetation in adjacent grazed and ungrazed pastures³. Our study also failed to support the hypothesis that grazing is important for maintaining GKR habitat.

Like all studies, our work cannot address all of the critical management issues at CPNM. First, the results from the CPNM study cover only a six-year period from 1997-2002. However, during this time, a major rainfall event occurred (1998), and despite dramatic

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increases in plant biomass during this period, no benefits of grazing were detected for the plant community or GKR. It is still possible that larger rainfall events or multiple above-average rainfall years may require vegetation management, such as grazing, to help reduce the build up of excess plant biomass. Another limitation is that this study does not address impacts of cattle grazing on other sensitive species found at CPNM. Some species, such as blunt-nosed leopard lizard and mountain plover, may require additional vegetation management activities, including cattle grazing and prescribed burning, in their core habitats during above-average rainfall events. Thus, caution must be applied when extrapolating results from this study to other taxa. Similarly, the study was conducted only within plant communities found on the valley floor and lower foothills. The effects of grazing in the mountainous regions found in the Caliente and Tumbler Mountains were not assessed. Finally, although the results from the study indicate that grazing has negative effects on native plants and GKR, the ecological reasons underlying these results were not assessed.

Adaptive Management at the Carrizo Plain National Monument

The extreme annual variability in rainfall and arid conditions found in CPNM underscore the need for consistent and efficient monitoring data to develop a flexible and adaptive system of management. The new RMP places a high priority on using a science-based adaptive framework for managing the Monument's sensitive species and habitats, and, in light of results from this study, adjustments are being made to the use (or non-use) of cattle grazing as a management tool in the Monument. The Managing Partners are committed to ongoing research, and new directions include an experiment

CONTINUED ON PAGE 21

NON-SIERRA CLUB ACTIVITIES

The following activities are not sponsored nor administered by the Sierra Club. The Sierra Club has no information about the planning of these activities and makes no representations or warranties about the quality, safety, supervision or management of such activities. They are published only as a reader service because they may be of interest to the readers of this publication.

Friends of the Nevada Wilderness

Friends of Nevada Wilderness organizes volunteer restoration trips to help wild landscapes recover from noxious weeds, illegal vehicle use and other impacts. You can explore scenic Nevada and help keep it wild at the same time! The trips are free, and the beautiful wild areas you get to enjoy are priceless! Contact Pat Bruce, Field Project Coordinator, for more details at 775-324-7667 or e-mail info@nevadawilderness.org. Learn more about Friends at www.nevadawilderness.org.

Mount Grafton Wilderness Restoration

September 12-14, Friday-Sunday

Join Friends of Nevada Wilderness and the Ely BLM for a restoration project erasing OHV tracks. Volunteers will work together to erase irresponsible vehicle tracks penetrating the wilderness boundary and restore the area to its natural character through rock and boulder placement, vertical mulching, and transplanting native plants and other materials. Camp out Friday and Saturday night, project work Saturday followed by dinner provided by Friends of Nevada Wilderness, travel back on Sunday. Contact Pat Bruce, Field Project Coordinator, for more details (775) 324-7667.

Amargosa Conservancy

The Amargosa Conservancy works to protect the land, water, and beauty of the Amargosa River. The Conservancy office is located in Shoshone, CA, south of Death Valley National Park. Space on the hikes is limited, so please call 760-852-4339 to reserve a place. Learn more at www.amargosaconservancy.org

Tonopah & Tidewater Railroad Tour

October 18, Saturday

Tonopah & Tidewater Railroad Tour: Visit points of interest along the historic route of the Tonopah & Tidewater railroad. Meet at the Amargosa Conservancy office at 9:30 am. (Full day; driving with easy walking, 1-2 miles)

Desert Survivors

Desert Survivors is an affiliation of desert lovers committed to experiencing, sharing and protecting desert wilderness. They conduct trips to give others the opportunity to experience the desert as they do, as part of their efforts to protect the wild places they love to explore. Must be a member to participate in trips. Below are three of the trips offered this fall, for a complete listing, go to: <http://www.desert-survivors.org>.

Furnace Creek/Fishlake Valley Carcamp (M)

October 11-13, Saturday-Monday

Furnace Creek is an endangered riparian area on the east side of the White Mountains where off-roaders have damaged the stream and its vegetation, but the BLM has neglected to close it to vehicles. We will hike one day up through the willows (turning yellow?) to appreciate this unique desert canyon. We'll also hike one day in the colorful Esmeralda Badlands nearby, and a third day elsewhere. We'll top off the trip with a dip in Fishlake Valley Hot Springs. Limit 15. Contact Leader: Steve Tabor (510) 769-1706.

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CONTINUED FROM PAGE 17



LARRY SASLOW

Grazing is also done by Giant Kangaroo Rats

designed to evaluate the effects of cattle grazing on giant kangaroo rat populations and how these native and domestic grazers interact to affect the structure and composition of the plant and animal communities of the CPNM. Future monitoring efforts also will evaluate the effects of cattle grazing on the habitats in the mountainous areas of the CPNM. ♦

Caroline Christian is on the faculty at Sonoma State University in the Department of Environmental Studies and Planning and has been involved with management issues and research at Carrizo Plain National Monument since 2004.

Lawrence Saslow is a Wildlife Biologist with the Bureau of Land Management in Bakersfield field office and has been working on management issues at Carrizo Plain and the San Joaquin Valley over the past two decades.

Scott Butterfield is an Ecoregional Ecologist with The Nature Conservancy on the Central Coast and has been the lead Conservancy scientist at the Carrizo Plain National Monument since 2006.

References

¹ For more information about the history of conservation efforts at Carrizo Plain see www.nature.org/wherework/northamerica/states/california/preserves/art6327.html.

² For more information about the current RMP planning process see www.blm.gov.ca.bakersfield/carrizoplain.html.

³ Kimball, S. and P.M. Schiffman. 2003. Differing effects of cattle grazing and native and alien plants. *Conservation Biology* 17: 1681-1693.

Acknowledgements: We thank Robin Cox, Hall Cushman, Johna Hurl, Denis Kearns, Steve Larson, Tom Maloney, Mark Reynolds and Bob Stafford for their helpful comments on this article.