University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Great Plains Wildlife Damage Control Workshop Proceedings | Wildlife Damage Management, Internet Center for

4-10-1995

PLASTIC VISUAL BARRIERS WERE INEFFECTIVE AT REDUCING RECOLONIZATION RATES OF PRAIRIE DOGS

Scott E. Hygnstrom
University of Nebraska - Lincoln

Follow this and additional works at: http://digitalcommons.unl.edu/gpwdcwp

Part of the Environmental Health and Protection Commons

Hygnstrom, Scott E., "PLASTIC VISUAL BARRIERS WERE INEFFECTIVE AT REDUCING RECOLONIZATION RATES OF PRAIRIE DOGS" (1995). *Great Plains Wildlife Damage Control Workshop Proceedings.* Paper 437.
http://digitalcommons.unl.edu/gpwdcwp/437

This Article is brought to you for free and open access by the Wildlife Damage Management, Internet Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Great Plains Wildlife Damage Control Workshop Proceedings by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

PLASTIC VISUAL BARRIERS WERE INEFFECTIVE AT REDUCING RECOLONIZATION RATES OF PRAIRIE DOGS

SCOTT E. HYGNSTROM, Department of Forestry, Fisheries and Wildlife, University of Nebraska, Lincoln, NE 68583-0819

Abstract: Two plastic visual barriers were ineffective in controlling expansion of 7 active black-tailed prairie dog (*Cynomys ludovicianus*) colonies and recolonization of 7 toxicant-treated sections of colonies. Barriers constructed with Sno-Strap, a 15.2-cm wide band of high-tensile polyethylene plastic, were destroyed by wind action within 3 weeks. Barriers constructed with Tensar® snowfence cost $2.10/m and retained their structural integrity for 3 years with occasional maintenance. Recommendations are provided to increase effectiveness of visual barriers.

Pages 74-76 *in* R.E. Masters and J.G. Huggins, eds. Twelfth Great Plains Wildl. Damage Control Workshop Proc., Published by Noble Foundation, Ardmore, Okla.

Key words: barrier, black-tailed prairie dog, *Cynomys ludovicianus*, exclusion, Nebraska, recolonization, toxicant.

Prairie dogs (*Cynomys ludovicianus*) are fuel for controversy throughout much of the Great Plains. They are viewed as both a keystone species for ecosystem management (Whicker and Detling 1988, Miller et al. 1994) and a direct and significant competitor of the livestock industry (Merriam 1902, Kelso 1939, Hansen and Gold 1977). It is estimated that prairie dogs occupied between 40 (Marsh 1984) and 100 million ha (Anderson et al. 1986) of prairie in North America in the early 1900's. Agricultural tillage, real estate development, and prairie dog poisoning resulted in the substantial decline of prairie dog populations (Fagerstone 1982, Marsh 1984). Some speculate that prairie dog populations have been reduced by 98% in some areas and eliminated in others (Coppock et al. 1983, Miller et al. 1994). Yet where prairie dogs still exist, they are perceived to compete with cattle for forage and therefore reduce profitability.

The most common methods used to legally control prairie dogs include toxic baits treated with zinc phosphide, and fumigation with aluminum phosphide and gas cartridges (Hygnstrom and Virchow 1994). When properly applied, these lethal control methods have resulted in population reductions of about 75% and 95%, respectively (Hygnstrom and McDonald 1989, Hygnstrom 1994). Complete eradication is difficult to attain and remaining prairie dogs are able to repopulate treated areas over time. If immigration occurs from nearby colonies (or untreated portions of the same colony), prairie dogs can recolonize treated areas in as little as 2 to 4 years (Cox and Hygnstrom 1991). Additional management techniques are needed to reduce recolonization of prairie dog towns that have been treated with toxicants, especially when adjacent landowners choose to forgo prairie dog control.

In 1989, Franklin and Garrett promoted use of visual barriers to contain or manage directional expansion of prairie dog colonies. They reduced colony expansion with 3 parallel rows of 1-m burlap and 3 parallel windrows of ponderosa pine (*Pinus ponderosa*). They also recommended pursuing the use of visual barriers that were more cost-effective, durable, and easier to construct. The concept of visual barriers is attractive because barriers may capitalize on the innate requirement of prairie dogs to have an unobstructed view of the area they occupy. Visual barriers are a nonlethal control technique that if effective would reduce rates of recolonization and pesticide use. The objectives of this study were to determine the efficacy and cost-effectiveness of a polyethylene plastic visual barrier for reducing recolonization rates of prairie dogs.

We thank N.S. Foster, J.R. Hygnstrom, P.M. McDonald, and K.C. VerCauteren for assisting with field work. Materials and assistance were provided by Bell Laboratories, Inc.; Evert Fumigation; Evert Pest Management; Great Lakes Chemical Co.; Signode Industries, Inc.; Tensar Polytechnologies, Inc.; and the U.S. Dep. of Agric., Animal and Plant Health Inspection Service, Animal Damage Control. Several University of Nebraska (UN) Cooperative Extension personnel assisted with locating suitable prairie dog colonies. Fourteen landowners in Central Nebraska provided access to their land for the study. This project was funded by the UN Integrated Pest Management Program.

STUDY AREA AND METHODS

The study areas consisted of 14 prairie dog colonies in Central Nebraska. Colonies ranged in size from 1 to 8 ha. Because this research was part of a demonstration project, about half of the colonies were selected for their size and proximity to well-traveled roads. The remaining were selected for their size and proximity to the demonstration colonies. Soils varied from loamy sands to silty loams. The predominant vegetation in the prairie dog colonies was blue grama (*Bouteloua gracilis*).

During fall 1988, half of each colony was treated with 1 of 3 formulations of zinc phosphide-treated oats (75% reduction in burrow activity, Hygnstrom and McDonald 1989), followed by applications of 1 of 5 burrow fumigants to remaining active burrows (95 to 98% reduction in burrow activity, Hygnstrom 1994). As of December 1988, we assumed that there were no prairie dogs remaining on treated halves of each colony. The untreated halves of each colony were left undisturbed. Several searches and surveys of the study areas revealed

no evidence of black-footed ferrets (*Mustela nigripes*). I am confident that no ferrets were present in the study area or impacted by the research activities. This project was approved by the UN Institutional Animal Care and Use Committee and all approved protocol were followed.

Seven of the colonies (those located near roads) were selected to serve as treatment areas. We installed polyethylene plastic visual barriers in the treatment colonies along the line that separated the occupied versus the toxicant-treated halves of each colony. The first 2 barriers installed were constructed with Sno-Strap (Signode® Industries Inc., Glenview, Illinois), a 0.05-cm-thick band of high-tensile polyethylene plastic, 15.2-cm wide, black in color, and ultraviolet-protected. The material is normally used for constructing snowfences or livestock fences. The barriers consisted of 3 bands of Sno-Strap suspended 10, 35, and 60 cm above the ground on steel posts spaced at 10-m intervals. Barriers were constructed according to manufacturer recommendations.

After 2 weeks, the Sno-Strap was found to be broken or badly damaged by wind action in several places. The fences were repaired, but again found damaged 1 week later. I removed the Sno-Strap from both sites and continued with the construction of 7 visual barriers with SB Tensar® snowfence (Tensar® Polytechnologies, Inc., Morrow, Georgia). The SB Tensar® is a 2.5-cm x 10-cm polyethylene mesh that is black in color and ultraviolet-protected. The Tensar® barriers consisted of 67-cm wide x 30-m rolls suspended on steel posts spaced at 10-m intervals. Barriers were constructed according to manufacturer recommendations. The SB Tensar®, which is 60% porous, is normally used for snowfences and human barriers around construction sites. I recorded all material and labor costs associated with construction of the visual barriers.

The remaining 7 colonies (those located near the treatment colonies) were selected to serve as control areas. No visual barriers were constructed on these sites and prairie dogs were allowed to move about undisturbed.

I collected population data on the treatment and control colonies during August-October of 1989-1991. Two 0.4-ha sample areas were established in each of the toxicant-treated halves, 1 adjacent to the center of the barrier or the line dividing the 2 halves and 1, 50 m away and perpendicular to the center of the barrier or dividing line. Two 0.4-ha sample areas were similarly located in each of the untreated halves. Once each year we counted the number of active and inactive burrows in the sample areas. Activity was determined by plugging each burrow with soil and counting unplugged burrows 24 hr later. Mean recolonization rates (active burrows per year) were calculated by dividing the sum of the annual increment of active burrows in each treatment and control area by the number of years. Our null hypothesis was that colonies with and without visual barriers had similar recolonization rates of prairie dogs. We used a *t*-test on pooled data to test the null hypothesis. The data were approximately normally distributed.

RESULTS AND DISCUSSION

Wind caused harmonic motions in the Sno-Strap, resulting in friction and wear at the points of attachment to the steel posts. After 3 weeks all Sno-Strap bands were severely damaged and had to be removed. I would not recommend Sno-Strap for developing visual barriers on the windy plains unless another proven method of attachment is employed. The manufacturer of Sno-Strap, Signode® Industries Inc., was later purchased by another company which no longer manufactures or markets Sno-Strap.

Tensar® visual barriers required some maintenance to keep them upright and in working order, but they remained functional during the 3-year study period. Foster (1990) observed prairie dogs in 2 of the study areas with Tensar® barriers and reported that visual barriers had little effect on the behavior and location of home ranges of prairie dogs adjacent to the barrier. Active burrow counts from sample sites adjacent to the barriers also indicate that the barriers did not exclude prairie dogs from toxicant-treated areas (Fig. 1). In 1990, mean active burrow counts were similar for study areas with (7.0) and without (7.6) barriers. Growth trends changed in 1 town from 1990 to 1991, but mean active burrow counts were still similar for study areas with (9.6) and without (9.0) barriers. Similar relationships are found in active burrow counts made 50 m away from the barriers (Fig. 2). Mean annual recolonization rates for study areas with and without visual barriers were similar in areas adjacent to the barriers ($t_{df=12}$ = 0.143, $P > 0.1$) and in areas 50 m from the barriers ($t_{df=12}$ = 0.838, $P > 0.1$). Several factors indicate that the Tensar® visual barriers were ineffective in reducing recolonization rates

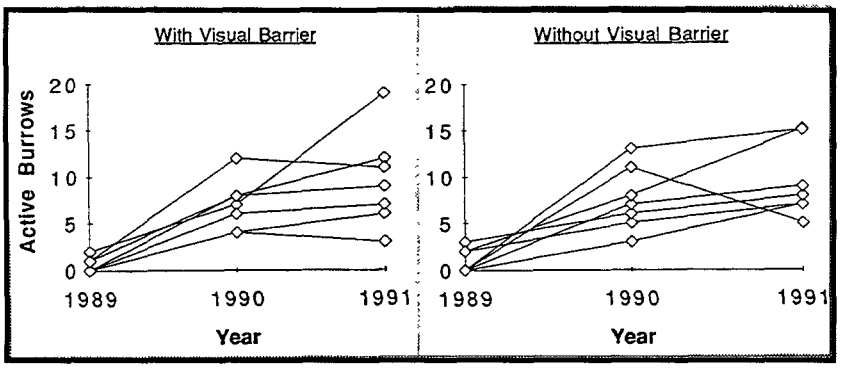

Fig. 1. Number of active burrows in 14, 0.4-ha sample sites located in toxicant-treated halves of prairie dog colonies with and without Tensar® visual barriers (sites were located adjacent to the center of the barrier or line dividing the 2 halves).

of prairie dogs. These results are not consistent with those presented by Franklin and Garrett (1989), who observed a 61% reduction in prairie dog activity during a 2-month period in an area with 3 parallel burlap fences. Some variables that may have influenced the results of my study, such as colony age, size, population immigration and emigration, were not measured because of limitations in staff time and monetary resources.

Several improvements could be made to increase the efficacy of visual barriers. Snowfence materials with lower porosity or even solid materials such as irrigation ditch liners could be used to increase the visual occlusion provided by the barrier. The barriers could be secured in trenches to prevent movements of prairie dogs under the barriers, and thus increasing their capacity as physical barriers. Also, psychological barriers consisting of closely-spaced electric wires or electronetting could be tested. All of the above would likely cause significant increases in material and labor cost.

Material costs for the 7 visual barriers ranged from \$1.74/m to \$1.98/m ($\bar{x}$ = \$1.80/m). The overall rate of barrier construction was 25.6 m/hr. At \$7.50/hr, the cost for labor is \$0.30/m. Therefore, the total construction cost of the Tensar® visual barrier was about \$2.10/m. This cost is similar to the total cost for building a contemporary high-tensile electric fence. Costs for visual barriers could be reduced if barriers were attached to existing fencelines. Fences are usually present on property lines in situations where adjacent landowners have different opinions regarding prairie dog management.

LITERATURE CITED

Anderson, E., S.C. Forest, T.W. Clark, and L. Richardson. 1986. Palio-biology, biogeography, and systematics of the black-footed ferret, *Mustela nigripes* (Audubon and Bachman), 1851. Great Basin Nat. 8:11-62.

Coppock, D.L., J.K. Detling, J.E. Ellis, and D.S. Dyer. 1983. Plant-herbivore interactions in a North American mixed grass prairie I. Effects of black-tailed prairie dogs on intraseasonal aboveground plant biomass and nutrient dynamics, and plant species diversity. Oecologia 56:1-9.

Cox, M.K., and S.E. Hygnstrom. 1991. Prairie Dog Control: A computer model for prairie dog management on rangelands. Proc. Great Plains Wildl. Damage Control Workshop 10:68-69.

Fagerstone, K. A. 1982. Review of prairie dog diet and its variability among animals and colonies. Proc. Great Plains Wildl. Damage Control Workshop 5:178-184.

Foster, N.S. 1990. A report on black-tailed prairie dogs in Nebraska—their biology, behavior, ecology, management, and response to a visual barrier fence. M.S. Thesis, Univ. Nebraska, Lincoln. 69pp.

Franklin, W.L. and M.G. Garrett. 1989. Nonlethal control of prairie dog expansion with visual barriers. Wildl. Soc. Bull. 17:426-430.

Hansen, R. M., and I.K. Gold. 1977. Black-tailed prairie dogs, desert cottontails, and cattle trophic relations on shortgrass range. J. Range. Manage. 30:210-214.

Hygnstrom, S.E. 1994. Efficacy of five burrow fumigants for managing black-tailed prairie dogs. Vertebr. Pest Conf. 16:80-82.

Hyngstrom, S.E., and P.M. McDonald. 1989. Efficacy of three formulations of zinc phosphide for black-tailed prairie dog control. Proc. Great Plains Wildl. Damage Control Workshop 9:181.

Hyngstrom, S.E., and D.R. Virchow. 1994. Prairie dogs. Pages B85-B96 *in* S.E. Hygnstrom, R.M. Timm, and G.E. Larson eds. Prevention and Control of Wildlife Damage. Univ. Nebraska Coop. Ext. Serv. Lincoln

Kelso, L.H. 1939. Food habits of prairie dogs. U.S. Dep. Agric. Circ. 529. 15pp.

Marsh, R.E. 1984. Ground squirrels, prairie dogs, and marmots as pests on rangeland. Pages 195-208 *in* Proc. Conf. Organiz. Practice Vertebr. Pest Control. Plant Protect. Div. Fernherst, England.

Merriam, C.H. 1902. The prairie dog of the Great Plains. U.S. Dep. Agric. Yearbook. 1901:257-270.

Miller, B., G. Ceballos, and R. Reading. 1994. The prairie dog and biodiversity. Conserv. Biol. 8:677-681.

Whicker, A.D., and J.K. Detling. 1988. Ecological consequences of prairie dog disturbances. Bioscience 38:778-785.

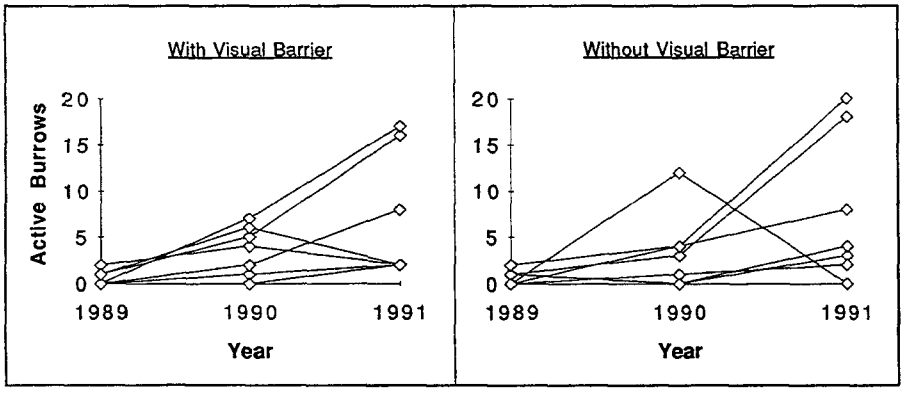

Fig. 2. Number of active burrows in 14, 0.4-ha sample sites located in toxicant-treated halves of prairie dog colonies with and without Tensar® visual barriers (sites were located 50 m away from and perpendicular to the center of the barrier or line dividing the 2 halves).