Alberta Conservation Association

2021/22 Project Summary Report

Project Name: Pronghorn Movement Enhancement (Fence Trials)

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Project Leader: Paul Jones

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Partnerships

Alberta Environment and Parks
Alberta Fish & Game Association
Bushnell Corporation
Cabela's Canada
Canadian Forces Base Suffield
National Wildlife Federation
Safari Club International – Northern Alberta Chapter
TD Friends of the Environment Foundation
The Nature Conservancy

Key Findings

- We processed over 1.4 million trail camera photos from our fence-crossing trials taken at Canadian Forces Base Suffield in southern Alberta and the Matador Ranch in northeastern Montana. Pronghorn was the most common species captured on camera, followed by mule deer and white-tailed jack rabbits in Alberta. Mule deer was the most detected species, followed by pronghorn and coyote in Montana.
- In Alberta, most events for pronghorn and white-tailed deer occurred after fence modification, while for mule deer most events occurred during the before period. For all three ungulates, most events occurred at fence sites that were modified with clips to lower the top wire.

- Our research has increased awareness of the effects fences and roads have on prairie wildlife through three papers that we have submitted to peer-reviewed journals, and a revised book chapter on pronghorn.

Abstract

The proliferation of fencing that followed cattle ranching since the 1880s poses a serious barrier to ungulate movement. We have documented that pronghorn and deer show a propensity to cross under fences. For deer, this propensity to cross under may be an artifact of the top wire height being too high to allow passage over. Between 2018 and 2020, we evaluated fence modifications proposed for ungulates to make crossing under and over a fence easier to determine if the modifications affect pronghorn and deer fence-crossing behaviours. Our results indicated that modifying the top wire did not hinder the ability of pronghorn to cross under the fence. We also demonstrated that deer, even though we lowered the top wire, still preferred to cross under the bottom wire. Our results from this study will be published in 2022. We have also submitted 3 additional papers for consideration to peer-reviewed journals and a revised book chapter on pronghorn to the editors. We will disseminate our results and conclusions to stakeholders, wildlife managers, and conservation groups.

Introduction

The proliferation of fencing that followed cattle ranching into Alberta poses a serious barrier to pronghorn (*Antilocapra americana)* and deer (*Odocoileus* sp.) movement (Gates et al. 2012, Burkholder et al. 2018). Pronghorn may cross under fencelines in some locations, but it slows down their movement, making them susceptible to predators and in some cases strips hair off their back, causing lacerations and making them vulnerable to infection and frostbite (Jones 2014). Our previous results also documented that mule deer (*O. hemionus*) and, to a lesser degree, white-tailed deer (*O. virginianus*) also show a propensity to cross under the bottom wire of a fence as opposed to jumping over (Burkholder et al. 2018, Jones et al. 2020). However, the propensity for deer to cross under may be an artifact of the top wire being too high to allow easy passage over the fence.

Primary objectives for this work are to 1) test whether lowering the top wire facilitates deer crossing over fences, while not impeding the movement of pronghorn; 2) assess the effects of linear features on the survival of pronghorn; 3) finalize the manuscript examining whether pronghorn are an indicator species for the grasslands; and 4) increase the profile of pronghorn and communicate the conservation challenges they face in Alberta through presentations, publications, and social media.

Methods

We began our fence-modification field trials in July 2018, deploying 30 trail cameras at known pronghorn crossing sites on Canadian Forces Base (CFB) Suffield. The purpose of these trials was to assess how pronghorn and deer react to modifications installed on fences to lower the top wire. Alberta Conservation Association (ACA) also continued a collaboration with the National Wildlife Federation and The Nature Conservancy in Montana by deploying 20 cameras on the Matador Ranch in October 2018. We processed all images captured in Alberta (n = 813,001 photos) and Montana (n = 630,160 photos) between 2018 and 2020. We first grouped photos of a single species into events based on time, where an event consisted of any set of images of at least a single animal captured by a camera and contained any number of photos, lasted any length of time (seconds to hours), involved any number of animals, and ended when there was a minimum of 15 minutes between the last image of a group of photos and the next set of images captured by the same camera. We then classified images into six behaviours: 1) successfully crossed under; 2) successfully crossed over; 3) successfully crossed through; 4) failed attempt to cross; 5) lingering at the site; and 6) paralleling fence. We used a study design that looks at the difference before and after at control sites (known-crossing sites left unchanged) to those with modifications. Modifications consisted of clipping the top wire, with either carabiners [“clips”] or white PVC pipe, to the wire below to lower the overall height of the fence. We used generalized linear models to determine the attributes that resulted in successful fence crossings by pronghorn, mule deer, and white-tailed deer.

Results

Between 2018 and 2020, 22,731 events were detected across both study sites. For CFB Suffield, pronghorn was the most detected species, followed by mule deer, white-tailed deer, white-tailed jackrabbit (*Lepus townsendii)*, coyote (*Canis latrans*), and elk (*Cervus canadensis*) (Figure 1A). Other notable species detected in Alberta were moose (*Alces alces*; n = 3), burrowing owl (*Athene cunicularia*; n = 2), ferruginous hawk (*Buteo regalis*; n = 2), bobcat (*Lynx rufus*; n = 1), and American badger (*Taxidea taxus*; n = 1). For the Matador Ranch, mule deer were the most detected species followed by pronghorn, coyote, white-tailed jackrabbit, white-tailed deer, and elk (Figure 1B). Other notable species detected in Montana were moose (n = 2) and American badger (n = 2).

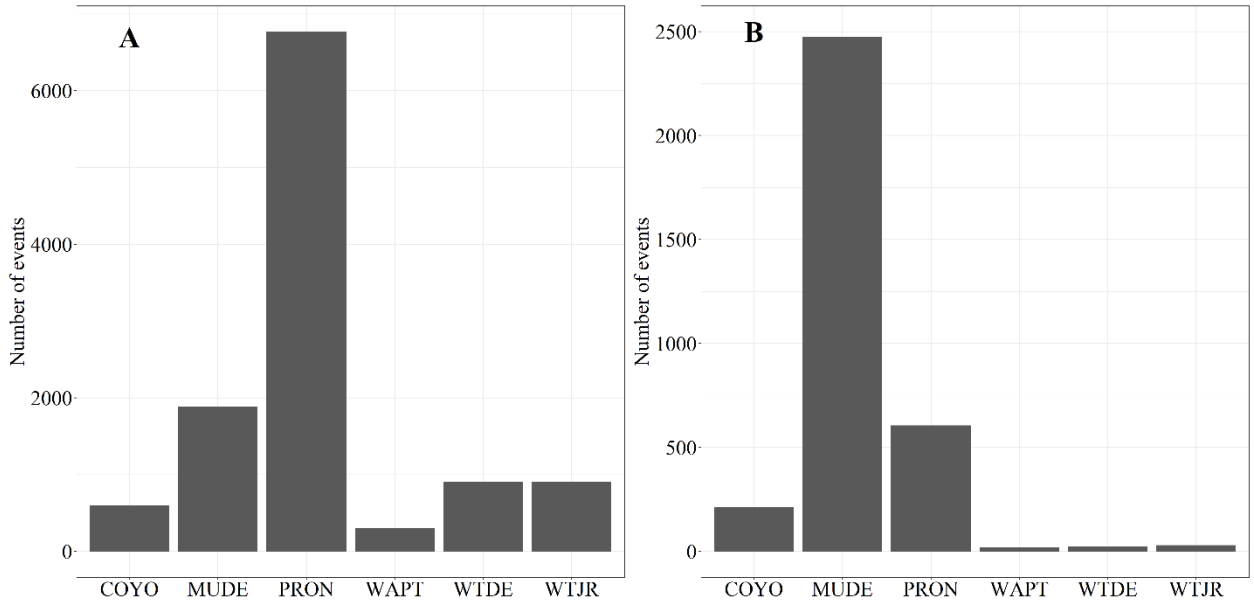

Figure 1. Number of detection events by species captured by remote trail cameras at known-crossing sites on (A) CFB Suffield, Alberta, July 2018 – April 2020, and (B) Matador Ranch, Montana, October 2018 – May 2020. Species codes are COYO = coyote, MUDE = mule deer, PRON = pronghorn, WAPT = elk, WTDE = white-tailed deer, and WTJA = white-tailed jackrabbit.

In Alberta, most events for pronghorn and white-tailed deer occurred after fence modifications (i.e., after period), while for mule deer most events occurred during the before period (Figure 2). For all three ungulates most events occurred at the sites that received the clips (Figure 2). The increased number of events at sites with clips was most notable for white-tailed deer.

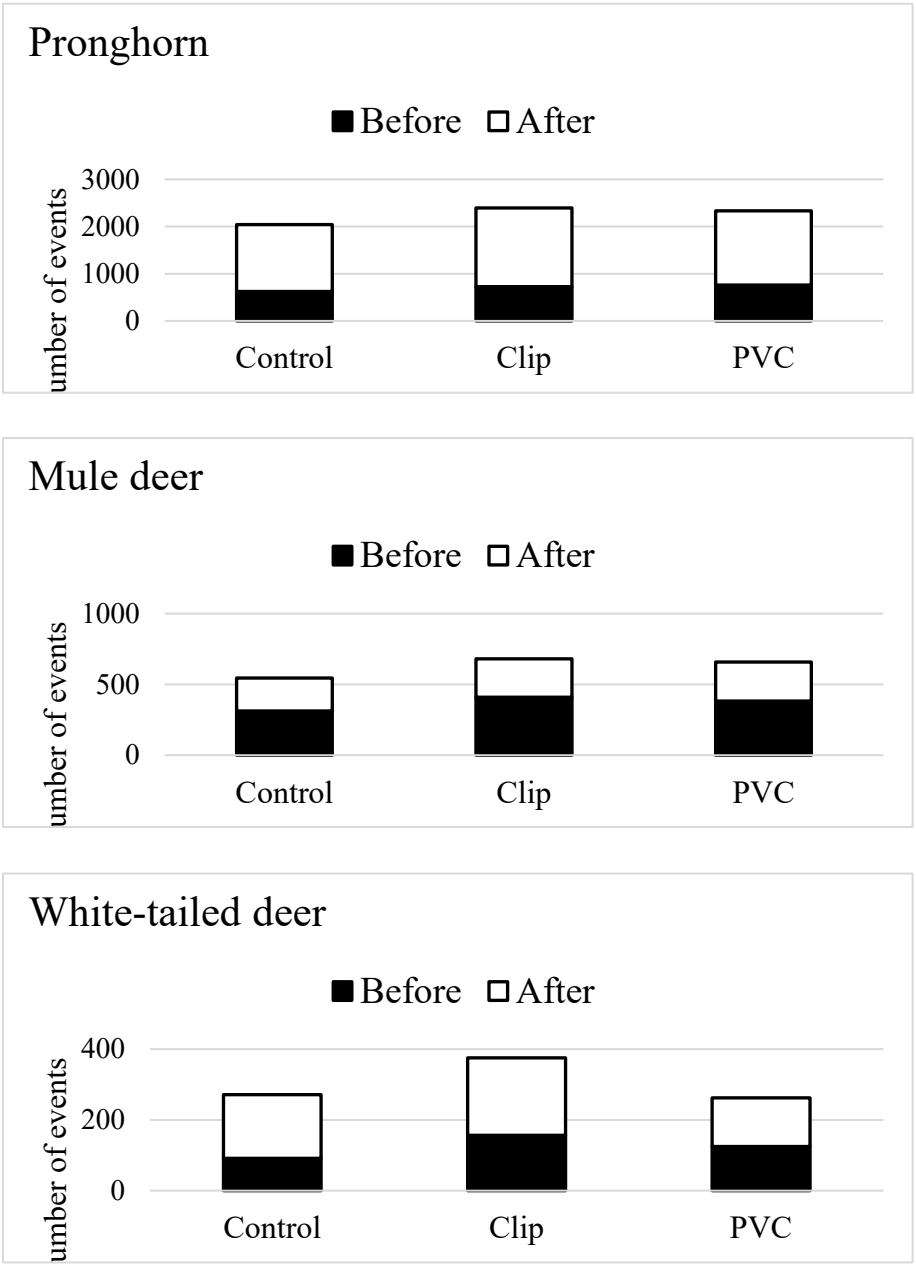

Figure 2. Number of events at three treatment types before (black bar) and after (white bar) fence modification for pronghorn (top), mule deer (middle), and white-tailed deer (bottom), captured by remote trail cameras at known-crossing sites on CFB Suffield, Alberta, July 2018 – April 2020.

We have five peer-reviewed publications on pronghorn underway. We submitted a manuscript to *Frontiers in Conservation Science* with on our results examining the crossing behaviour of pronghorn and deer (MacDonald et al. 2022). We resubmitted a paper for consideration to *Movement Ecology* that examines the selection pattern of pronghorn in relation to fences and roads (Jones et al. 2022a). We submitted a paper for consideration to *Conservation Biology* (Tack et al. 2022) that explores whether pronghorn are an indicator species for the grasslands, and a second paper to *Ecological Applications* (Eacker et al. 2022) that examines the influences of linear features (roads and fences) on the survival of pronghorn in the Northern Sagebrush Steppe. Lastly, after a review by external reviewers and the editors, we revised our chapter on pronghorn for the book *Rangeland Wildlife Ecology & Conservation* (Jones et al. 2022b) and resubmitted back to the editors.

Conclusions

Our work has increased awareness of the effects fences and roads have on prairie wildlife. Our studies are the first scientific evaluation of the effectiveness of proposed fence modifications to increase fence permeability for pronghorn and deer. During this project, we have demonstrated that carabiners and smooth wire on the bottom facilitate passage by pronghorn and deer under the bottom wire. We have also determined that increasing fence visibility by placing sage-grouse reflectors and white PVC pipe on the top wire does not impede the movement of pronghorn or deer. Lastly, we have determined that even when the top wire is lowered using clips of PVC pipe, deer prefer to cross under the bottom wire when not alarmed. We will continue to disseminate information and results to stakeholders, wildlife managers, and conservation groups to support efforts to restore movement patterns that have been relied on for thousands of years by pronghorn and deer.

Communications

Publications

Eacker, D.R., A.F. Jakes, and P.F. Jones. 2022. Spatiotemporal risk factors predict landscape-scale survivorship for a northern ungulate. *Ecological Applications* (submitted March 2022).

Jones, P.F., S.E. Vegter, M.S. Verhage, and A.F. Jakes. 2022a. Effects of linear anthropogenic features on the movement and distribution of an endemic ungulate. *Movement Ecology* (resubmitted March 2022).

Jones, P.F., A.K. Reinking, A.F. Jakes, M.M. Miller, T. Creekmore, and R. Guenzel. 2022b. Chapter 19 Pronghorn. In: McNew, L.B., D.K. Dahlgren, and J.L. Beck (Eds.). *Rangeland Wildlife Ecology and Conservation*. Springer. (resubmitted to editors December 2021).

Tack, J.D., A.F. Jakes, P.F. Jones, M. Hebblewhite, D.E. Naugle, K.E. Doherty, M.K. Sather, B. Martin, and R. Pritchert. 2022. Intact landscapes outcompete focal species as more efficient surrogates in conservation design. *Conservation Biology* (submitted January 2022)

Key Contacts

- Dr. Andrew Jakes – Smithsonian Conservation Biology Institute
- Dr. Carl Schwarz – Simon Fraser University

Literature Cited

Burkholder, E.N., A.F. Jakes, P.F. Jones, M. Hebblewhite, and C.J. Bishop. 2018. To jump or not to jump: Mule deer and white-tailed deer fence crossing decisions. *Wildlife Society Bulletin* 42(3): 420-429.

Gates, C.C., P. Jones, M. Suitor, A. Jakes, M.S. Boyce, K. Kunkel, and K. Wilson. 2012. "The influence of land use and fences on habitat effectiveness, movements and distribution of pronghorn in the grasslands of North America." Pages 277–294. *In:* Somers, M.J., and M. Hayward (Eds.). 2011. *Fencing for Conservation: Restriction of Evolutionary Potential or a Riposte to Threatening Processes?* Springer-US, New York, New York USA.

Jones, P.F. 2014. Scarred for life: the other side of the fence debate. *Human-Wildlife Interactions* 8(1): 150–154.

Jones, P.F., A.F. Jakes, A.M. MacDonald, J.A. Hanlon, D.R. Eacker, B.H. Martin, and M. Hebblewhite. 2020. Evaluating Responses by Sympatric Ungulates to Fence Modifications Across the Northern Great Plains. *Wildlife Society Bulletin* 44(1): 130–141.

Photos

Photo 1. Mass crossing event by a group of pronghorn under the bottom wire. Photo: ACA

Photo 2. White-tailed deer buck jumping over the fence at a modified fence section. Photo: ACA

Photo 3. Bull elk attempting to cross over the top wire at a site modified with a piece of white PVC pipe. Photo: ACA