Alberta Conservation Association

2022/23 Project Summary Report

Project Name: Pronghorn Road Crossing Enhancement (Pronghorn Xing)

Wildlife Program Manager: Doug Manzer

Project Leader: Paul Jones

Primary ACA Staff on Project: Paul Jones, Amanda MacDonald, and Mike Verhage

Partnerships

Alberta Environment and Protected Areas
Alberta Transportation
Miistakis Institute
National Fish and Wildlife Foundation
National Wildlife Federation
Nature Conservancy of Canada
Saskatchewan Government Insurance
Saskatchewan Ministry of Environment and Infrastructure

Key Findings

- We published our results based on the analysis using three sources of data (Pronghorn Xing citizen science data, pronghorn connectivity model, and animal–vehicle collision data) to identify potential road mitigation sites in *Journal for Nature Conservation.*
- We identified 16 potential sites along Highway 1 in Alberta and Saskatchewan where road mitigation could improve pronghorn movement. We are currently examining each site to prioritize which one(s) are feasible for implementation.
- We completed a large-scale assessment of which fences are permeable and which are not for pronghorn across Alberta, Saskatchewan, and Montana using GPS collar data from 2003–2011.

Abstract

Among the diversity of prairie wildlife, the pronghorn is the most specialized and representative large mammal. Within the Northern Sagebrush Steppe of Alberta, Saskatchewan, and Montana, 55% of collared pronghorn made seasonal migrations from summer ranges to winter ranges. Along the migration pathway, pronghorn must navigate their way across primary and secondary highways that are often fenced on both sides, resulting in pinch points where animals pile up. These pinch points along the migration pathway are a formidable challenge for migrating pronghorn.

To address this migration challenge, a citizen science project called Pronghorn Xing was initiated in the spring of 2017. Pronghorn Xing was developed to ground truth seasonal movement pinch points identified by connectivity modelling across highways in the Northern Sagebrush Steppe and increase public engagement in pronghorn science and conservation. Analysis of the pronghorn data collected between November 2017 and June 2020 via the app was completed and potential mitigation sites were presented to stakeholders in a workshop setting. Initially, 16 potential sites were identified along Highway 1 in Alberta and Saskatchewan where road mitigation could improve pronghorn movement. Following a ranking exercise by workshop participants, the number of potential mitigation sites was narrowed down to four sites in Alberta and three sites in Saskatchewan. The prioritized mitigation sites in Alberta and Saskatchewan provide a starting point for assessing the feasibility of implementing a mitigation structure (overpass).

Introduction

Among the diversity of prairie wildlife, the pronghorn (*Antilocapra americana*) is the most specialized and representative large mammal. Within the Northern Sagebrush Steppe of Alberta, Saskatchewan, and Montana, 55% of collared pronghorn made seasonal migrations, including the longest recorded migration for the species at 888 km (Jakes et al. 2018). Along the migration pathway, pronghorn must navigate their way across Highway 1, which includes crossing three fences, four lanes of high-speed traffic, and a set of railroad tracks. These pinch points along the migration pathway are a formidable challenge for migrating pronghorn.

To address this migration challenge, a citizen science project called Pronghorn Xing was initiated in the spring of 2017. The Pronghorn Xing Project is a collaboration among Alberta Conservation Association (ACA), Miistakis Institute, Alberta Environment and Protected Areas (EPA), Alberta Transportation, Saskatchewan Ministry of Environment, Saskatchewan Government Insurance, the National Wildlife Federation, and Nature Conservancy of Canada. Pronghorn Xing is a citizen science program developed to ground truth seasonal movement pinch points identified by connectivity modelling across highways in Alberta, Saskatchewan, and Montana and increase public engagement in pronghorn science and conservation. Information on wildlife sightings collected by the public will enable us to better understand where pronghorn and other wildlife are commonly crossing, involved in collisions, or staging next to the highway in anticipation of making a dash across the road. Data collected via an app will ultimately lead to the development of tools to reduce wildlife-vehicle collisions while ensuring the safe passage of wildlife across highways. The generated information will be shared with government agencies in Alberta, Saskatchewan, and Montana.

Primary objectives in 2022/23 were to 1) finalize data analysis to identify pronghorn crossing pinch points along Highway 1 and publish results in a peer-reviewed journal; 2) assess permeability of fence lines in Alberta, Saskatchewan, and Montana; 3) garner public support and participation; and 4) share our information with our partners, particularly those working to mitigate impediments along key migration routes across highways in Alberta, Saskatchewan, and Montana.

Methods

During the summer of 2017, Miistakis Institute was contracted to develop the Pronghorn Xing smartphone app and corresponding website. The app was developed, and beta tested by ACA staff who drove transects throughout the study area and recorded sightings of real and imaginary wildlife along the road. The app was released to the public (App Store and Google Play) and the project website was made live in September 2017, with data collection running from November 2017 to June 2020. During the summer of 2018, the project was expanded to include Montana and now covers the entire Northern Sagebrush Steppe (Figure 1).

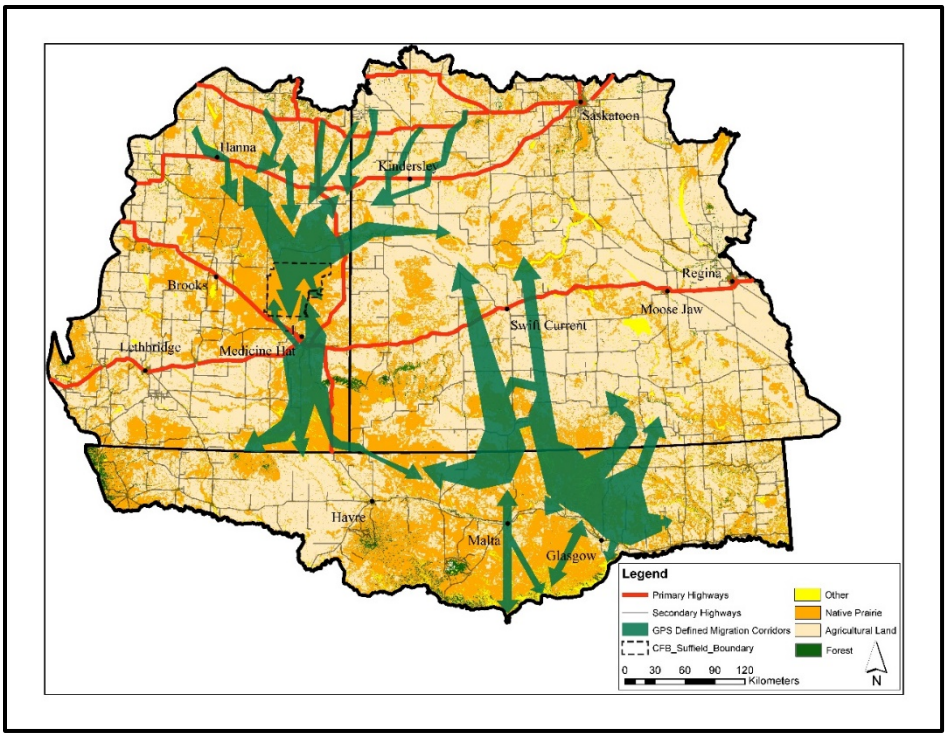

Figure 1. Pronghorn Xing study area in southern Alberta, Saskatchewan, and northern Montana. Green lines depict generalized pronghorn migration routes across the Northern Sagebrush Steppe (Jakes 2015).

Following data collection, we completed the analysis for pronghorn, identified potential mitigation sites, and presented the results to stakeholders in a workshop setting. As part of the workshop, we had participants prioritize the proposed pronghorn mitigation sites based on a set of criteria using an Analytical Hierarchy Process. The prioritization criteria included 1) spatial alignment agreement between the pronghorn connectivity model and pronghorn observations, 2) alignment with clusters based on animal-vehicle collision data, 3) preferable pronghorn habitat surrounding the mitigation site, 4) the ease of implementing road mitigation (underpass or overpass) from an engineering perspective, 5) the number of ungulate species along with pronghorn that would benefit from mitigation, and 6) the density of the human footprint (including fences, roads, oil well sites, houses, and other anthropogenic disturbances) within a 400 m buffer around the mitigation site. Lastly, we used the R package BABa (Xu et al. 2021) to assess fence permeability using pronghorn global position system (GPS) collar data and mapped fence lines to determine if pronghorn can navigate across the landscape and reach potential mitigation sites.

Results

Data analysis of the pronghorn data collected via the Pronghorn Xing app was completed, and potential mitigation sites were presented to stakeholders. We identified 15 potential sites along Highway 1 in Alberta and Saskatchewan where road mitigation could improve pronghorn movement (Figure 2). An additional site was added near Crane Lake based on recommendations from workshop participants (Figure 2). Following the stakeholder workshop, the number of potential mitigation sites was narrowed down to four sites in Alberta and three sites in Saskatchewan (Figure 2). We refined the analysis and then published our results in *Journal for Nature Conservation* (Lee et al. 2023).

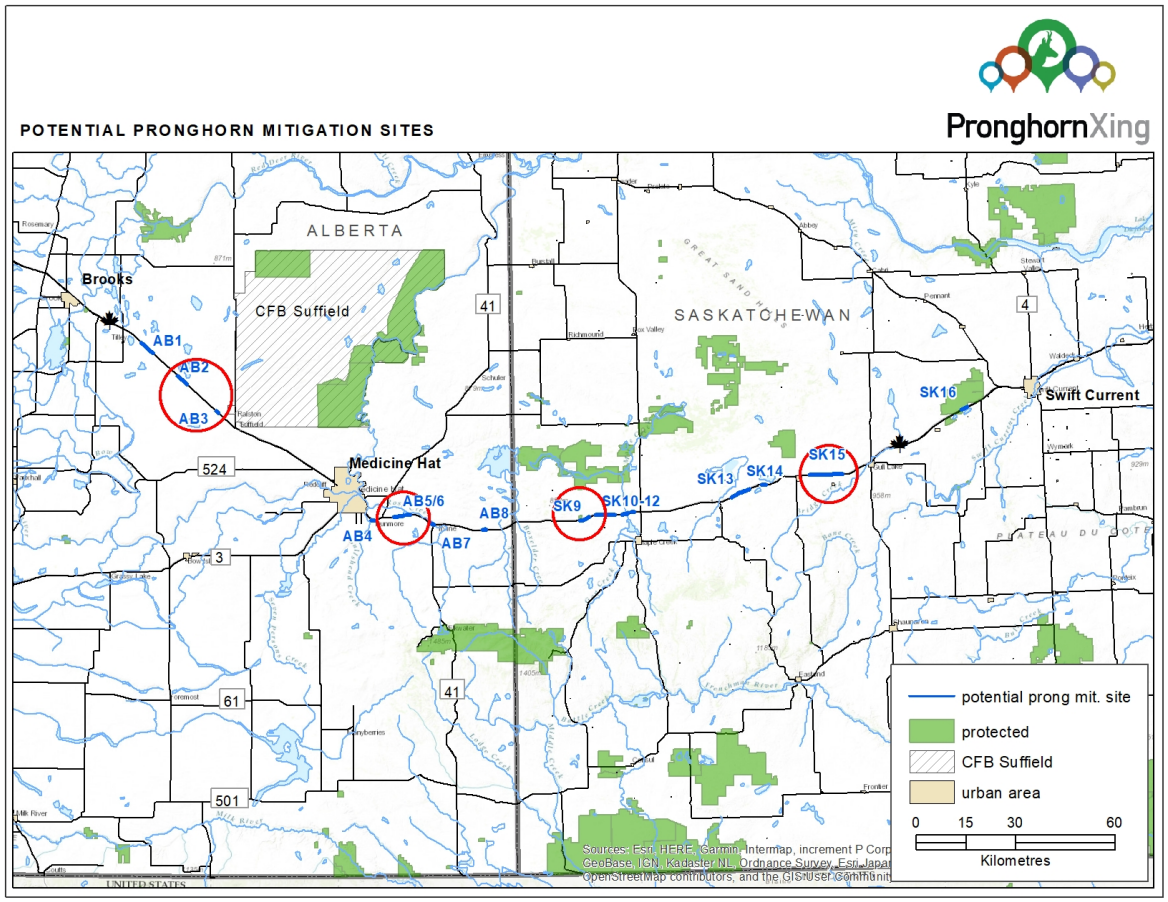

Figure 2. Sixteen potential pronghorn road migration sites (displayed in blue) along Highway 1 in Alberta and Saskatchewan. The red circled area (Alberta AB2-3, AB5-6, SK9-10, and SK15) represent priority potential pronghorn road mitigation sites and were determined based on a ranking exercise completed by project stakeholders. Map

produced by Lee et al. (2021) and reproduced with permission.

Conclusions

Pinch points have been identified along the Canadian highway network where seasonal pronghorn movements are impeded and need to be ground-truthed for the exact crossing location(s). Pronghorn have shown a preference for overpasses and very rarely use underpasses to cross highways (Sawyer et al. 2016, Seidler et al. 2018). The prioritized mitigation sites in Alberta and Saskatchewan provide a starting point for assessing the feasibility of implementing a mitigation structure. Moving forward we will complete an assessment of each site to determine if an overpass is feasible based on engineering requirements, land ownership at the mitigation sites (private versus deeded), and the ability of pronghorn to navigate to the site based on existing infrastructure (i.e., fences). In addition, we will continue to garner public support to foster the business case to provincial and state agencies responsible for implementing strategies to improve movement where fence modifications can be installed to facilitate easier movement by pronghorn and other ungulates.

Communications

Publications

Lee, T.S., P.F. Jones, A.F. Jakes, M. Jensen, K. Sanderson, and D. Duke. 2023. Where to invest in road mitigation? A comparison of multiscale wildlife data to inform roadway prioritization. *Journal for Nature Conservation* 71:126327.

Lee, T.S., S. Sulimov, and K. Sanderson. 2021. *Pronghorn Xing: improving pronghorn migration through road improvements.* Miistakis Institute, Calgary, AB.

Presentations

- Using citizen scientists to connect science and road mitigation. (A. MacDonald) – 29th Biennial Pronghorn Workshop, August 24, 2022 (110 people).

Key Contacts

- Andrew Jakes – Smithsonian's National Zoo and Conservation Biology Institute
- Tracy Lee – Miistakis Institute

Literature Cited

Jakes, A.F. 2015. Factors influencing seasonal migration of pronghorn across the northern sagebrush steppe. Dissertation, University of Calgary, Alberta. Canada.

Jakes, A.F., C.C. Gates, N.J. DeCesare, P.F. Jones, J.F. Goldberg, K. Kunkel, and M. Hebblewhite. 2018. Classifying the migration behaviors of pronghorn on their northern range. *Journal of Wildlife Management* 82(6):1229–1242.

Lee, T.S., S. Sulimov, and K. Sanderson. 2021. *Pronghorn Xing: improving pronghorn migration through road improvements.* Miistakis Institute, Calgary, Alberta, Canada.

Lee, T.S., P.F. Jones, A.F. Jakes, M. Jensen, K. Sanderson, and D. Duke. 2023. Where to invest in road mitigation? A comparison of multiscale wildlife data to inform roadway prioritization. *Journal for Nature Conservation* 71:126327.

Sawyer, H., P.A. Rodgers, and T. Hart. 2016. Pronghorn and mule deer use of underpasses and overpasses along U.S. Highway 191. *Wildlife Society Bulletin* 40(2):211–216.

Seidler, R.G., D.S. Green, and J.P. Beckmann. 2018. Highways, crossing structures and risk: Behaviors of Greater Yellowstone pronghorn elucidate efficacy of road mitigation. *Global Ecology and Conservation* 15:e00416.

Xu, W., N. Dejid, V. Herrmann, H. Sawyer, and A.D. Middleton. 2021. Barrier behaviour analysis (BaBA) reveals extensive effects of fencing on wide-ranging ungulates. *The Journal of Applied Ecology* 58:690–698.

Photos

Photo 1. Pronghorn buck. Photo: Paul Jones

Photo 2. Pronghorn buck near Foremost. Photo: Paul Jones

Photo 3. Pronghorn near Trans-Canada Highway. Photo: Paul Jones