Testing Wildlife-Friendly Modifications to Manage Wildlife and Livestock Movements

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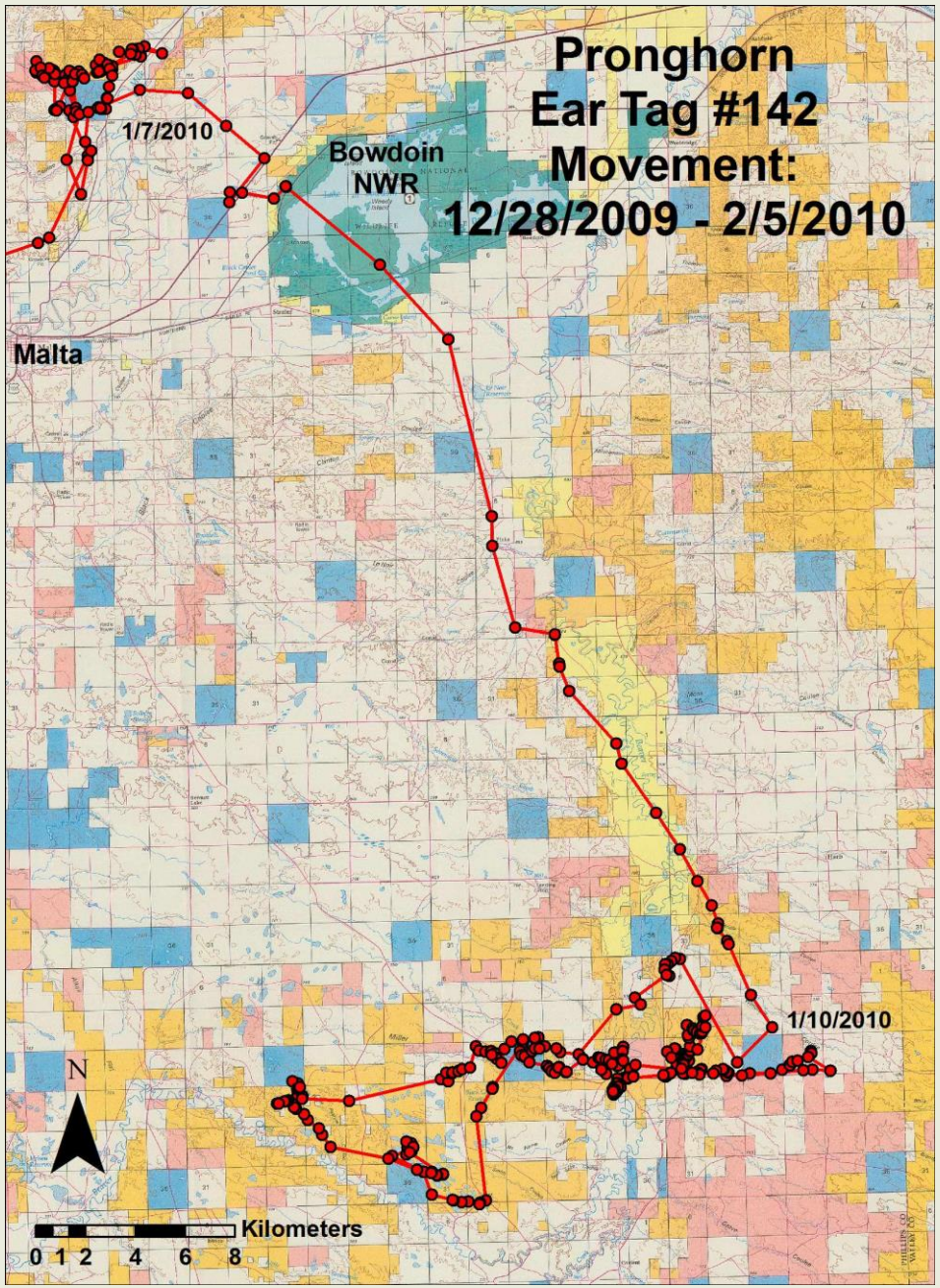
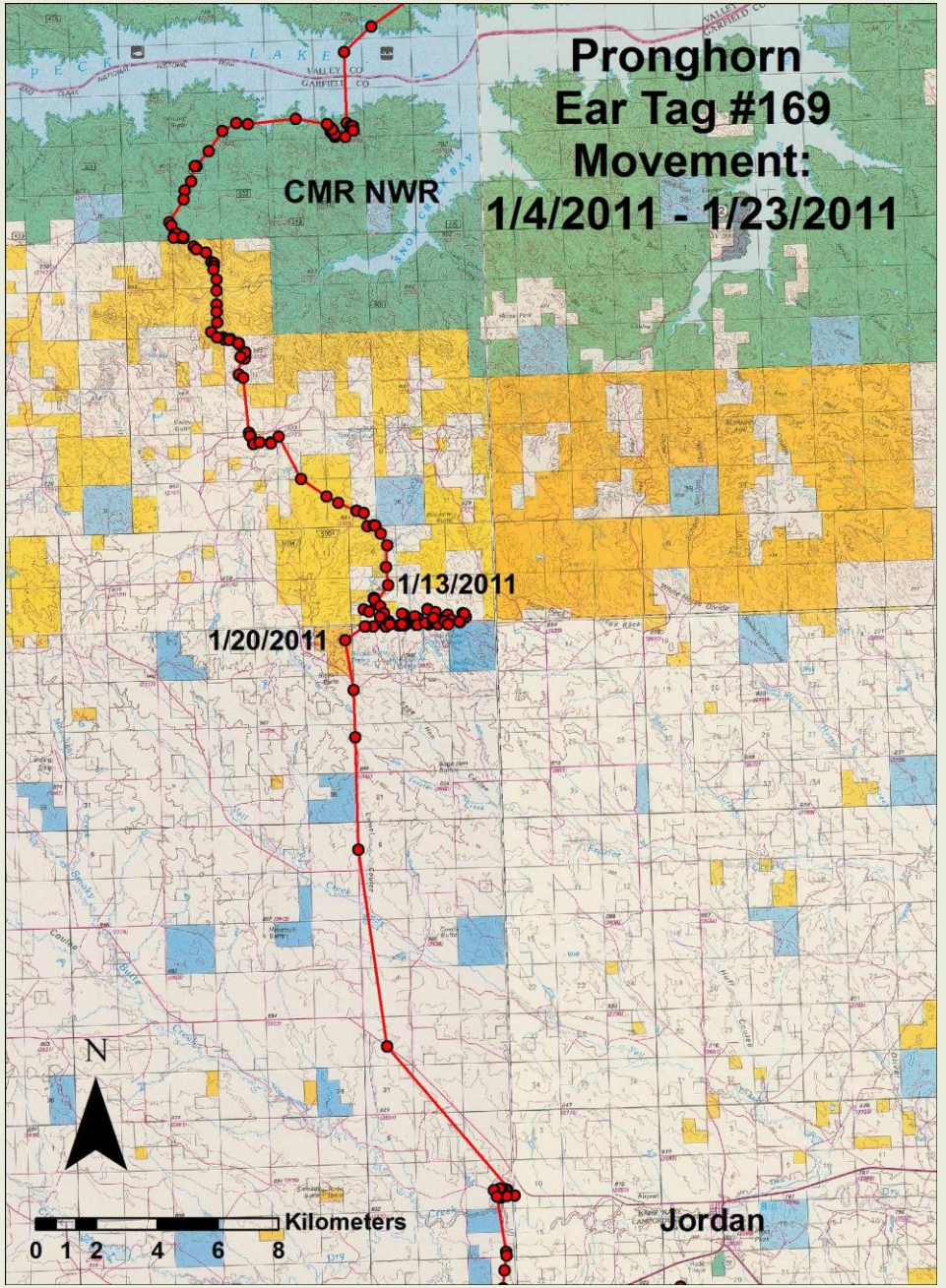
Problem Statement

Fences along roadways serve as safety measures to protect humans from vehicular collisions with wildlife and livestock and consequently, can act as semi-permeable or complete barriers to wildlife movement

Functional Connectivity - The degree to which landscapes sustain movements within and among a mosaic of habitat types and land uses


Pronghorn
Ear Tag #142
Movement:
12/28/2009 - 2/5/2010
1/7/2010
Bowdoin
NWR
Malta
1/10/2010
N
Kilometers
0 1 2 4 6 8


Pronghorn
Ear Tag #169
Movement:
1/4/2011 - 1/23/2011
CMR NWR
1/13/2011
1/20/2011
N
Kilometers
0 1 2 4 6 8
Jordan

Direct Mortality

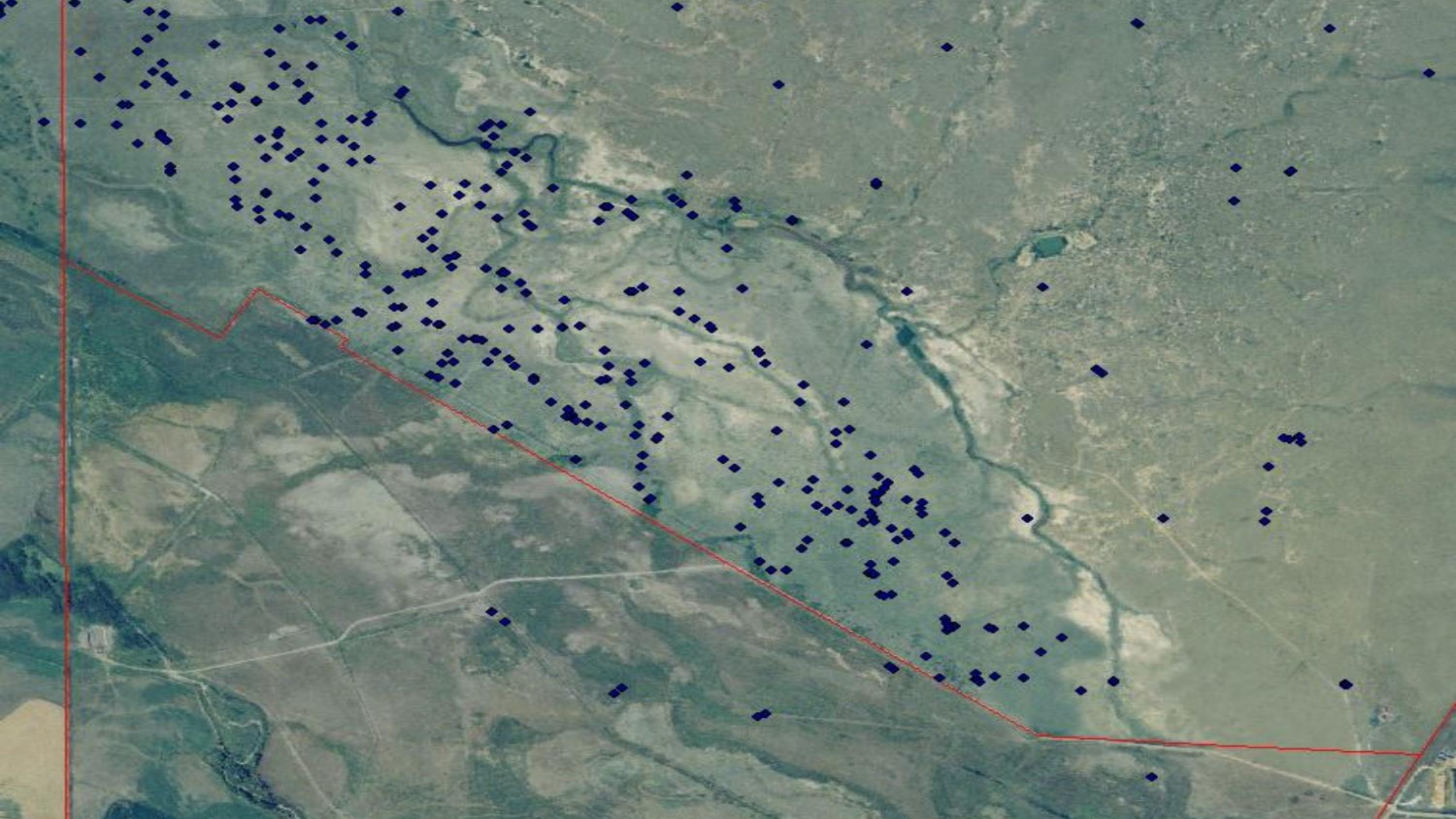
Photo: B. Downey

Barrier Effects

Stress & Injuries


2014-06-21 16:13:36 M 2/3
22°C
PC900 PROFESSIONAL
RECONYX

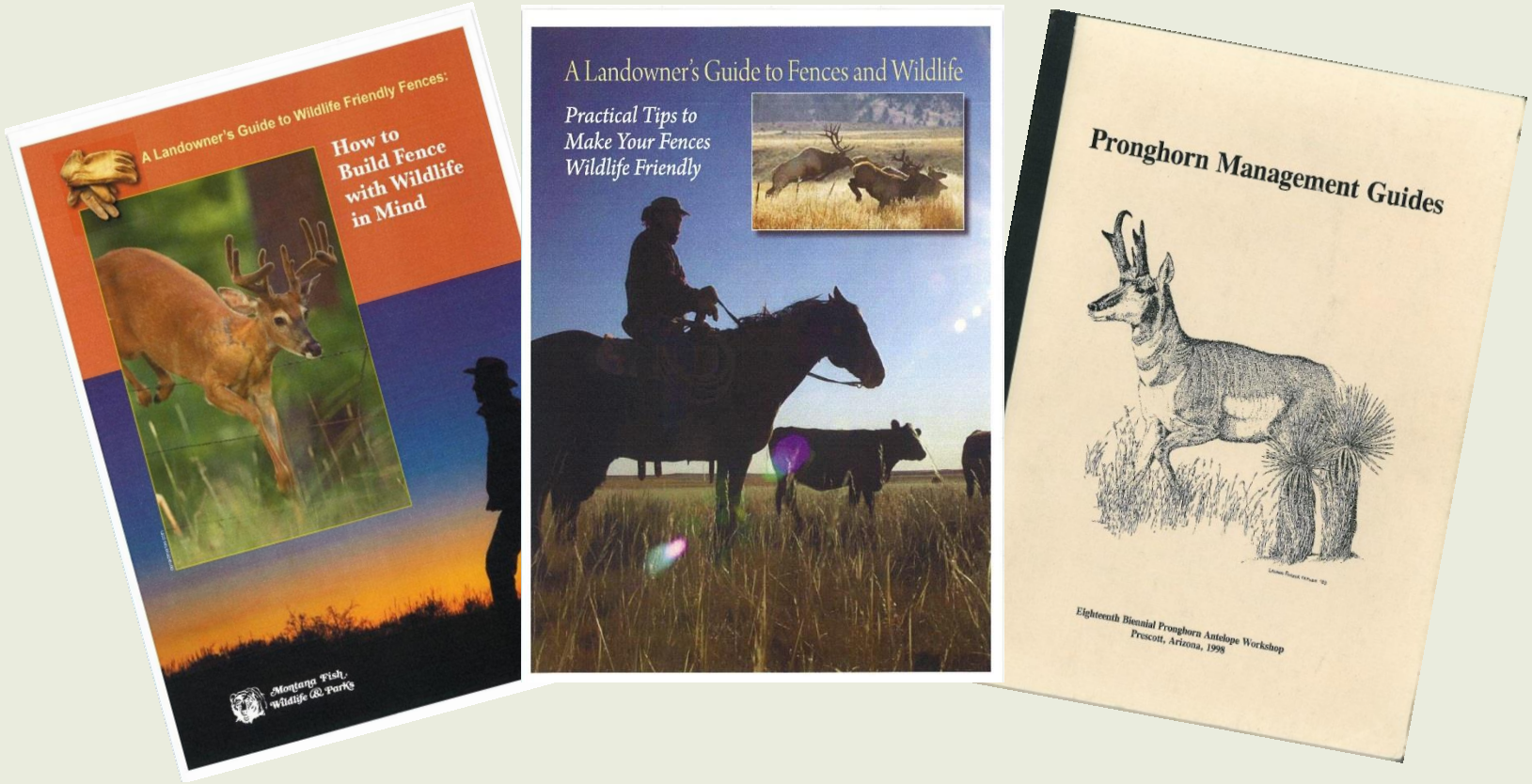
Photo: Gail Moser




2015-07-29 4:33:33 PM M 3/5
30°C
CAM03
RECONYX

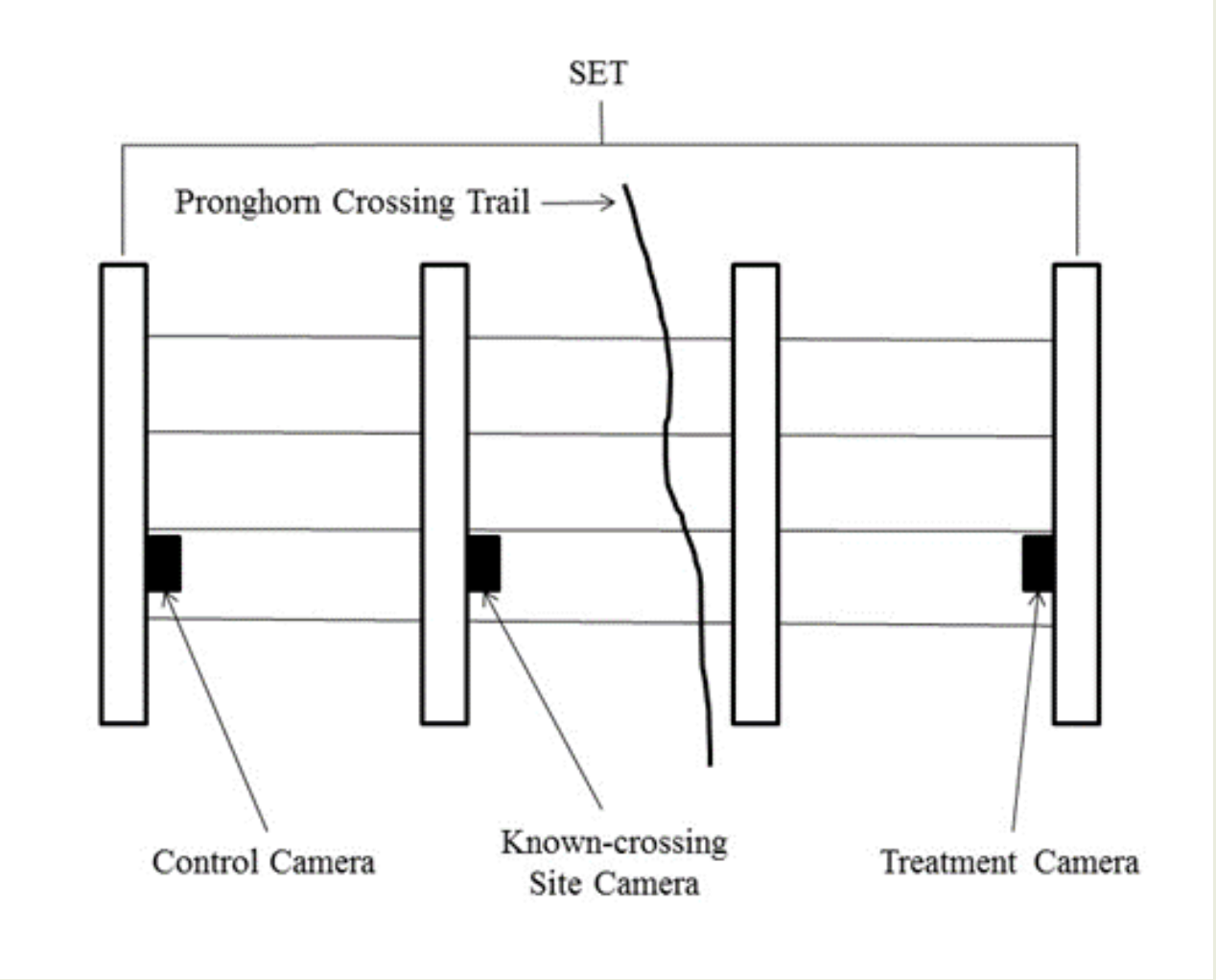
Test various fence modifications to sustain wildlife movement and control livestock

Management Guidelines



Methods: First Paper

- Use of Before-After-Control-Impact (BACI) experimental design to test the effectiveness of three fence modifications on pronghorn movement and assess minimum bottom wire height that sustain movements

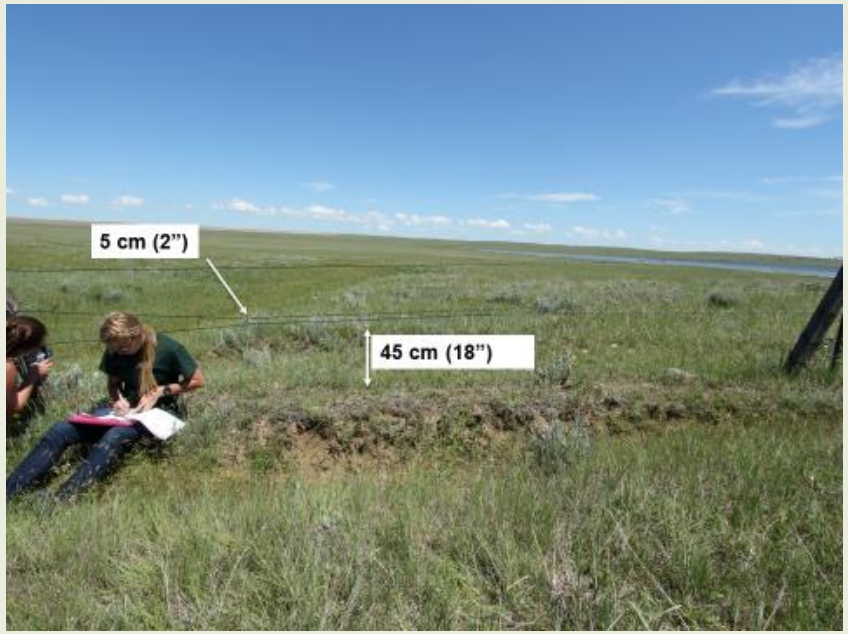



2016-12-16 2:11:53 PM M 1/5
-18°C
CAM24
RECONYX

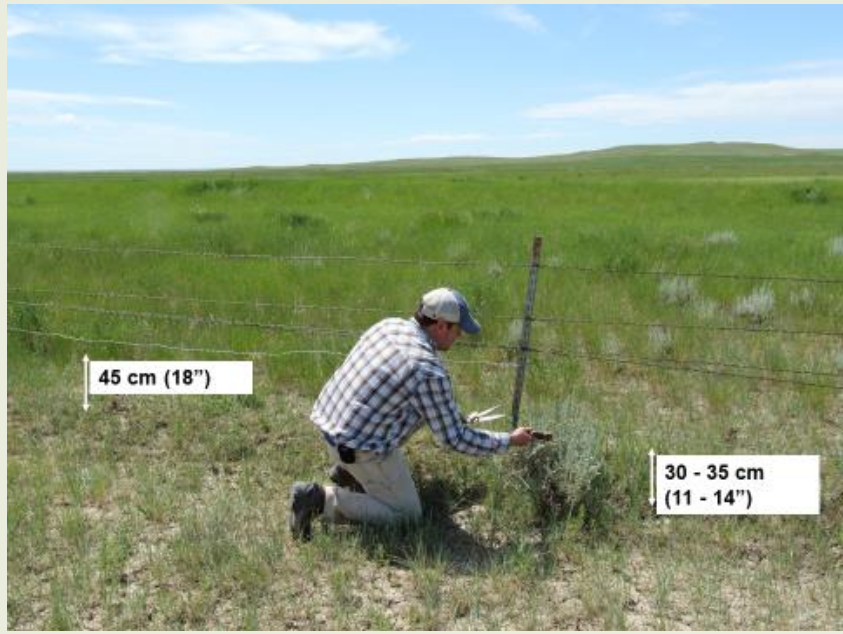

2017-01-06 11:55:36 AM M 2/5
-10°C
CAM31
RECONYX

Methods: First Paper

Goat Bar

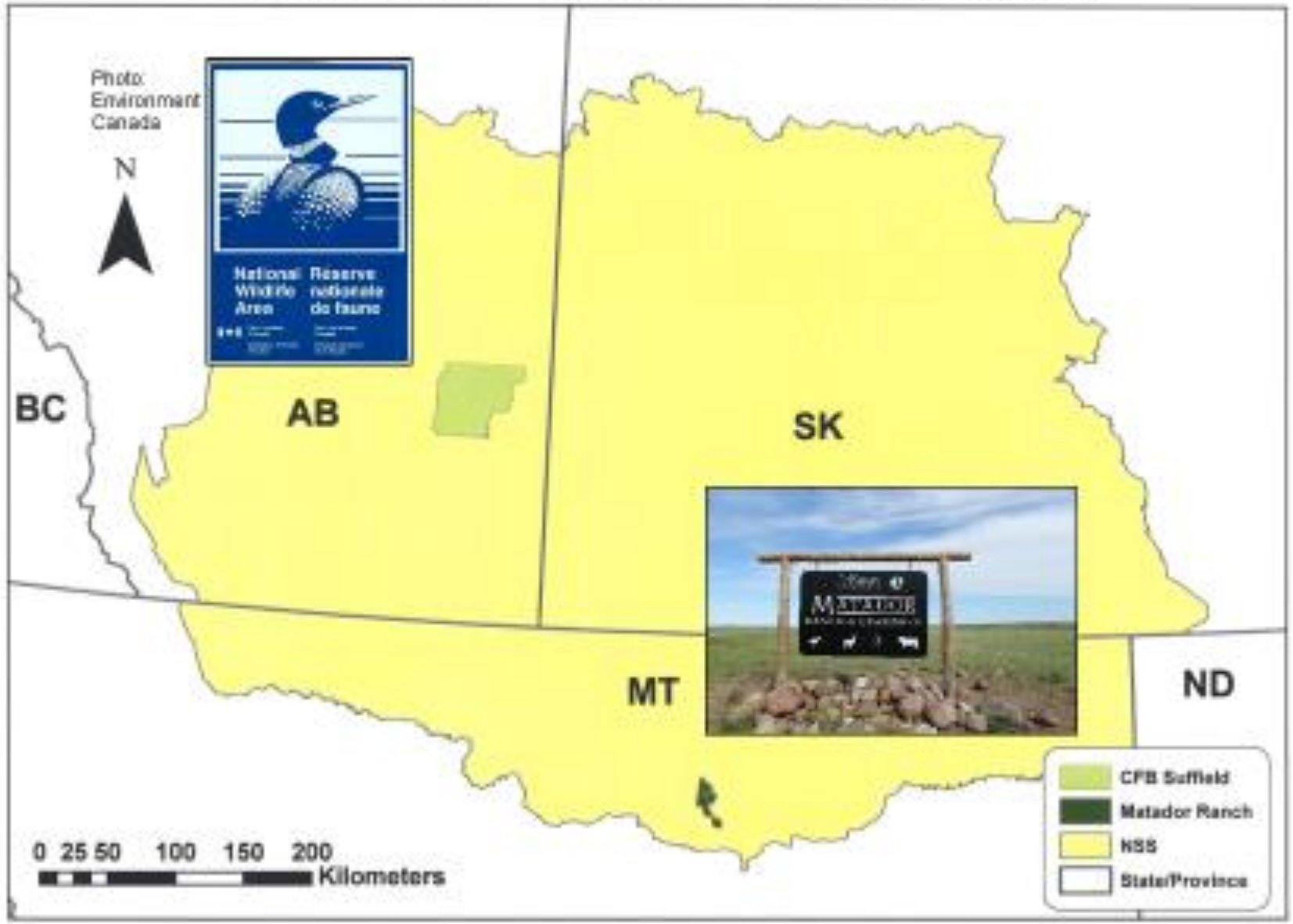


Carabiner

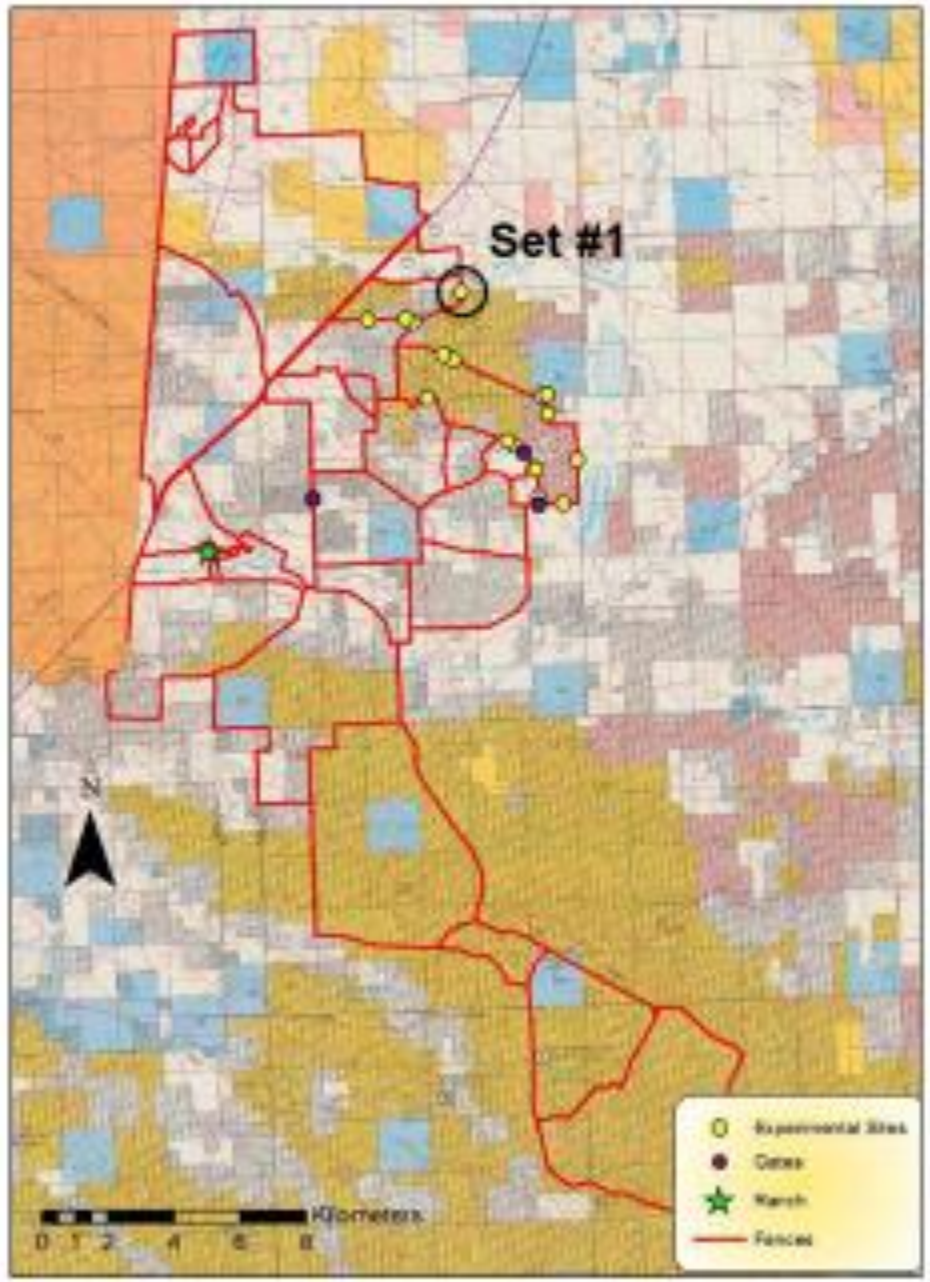


Smooth Wire

Study Areas within the Northern Sagebrush Steppe



Camera Locations- Matador



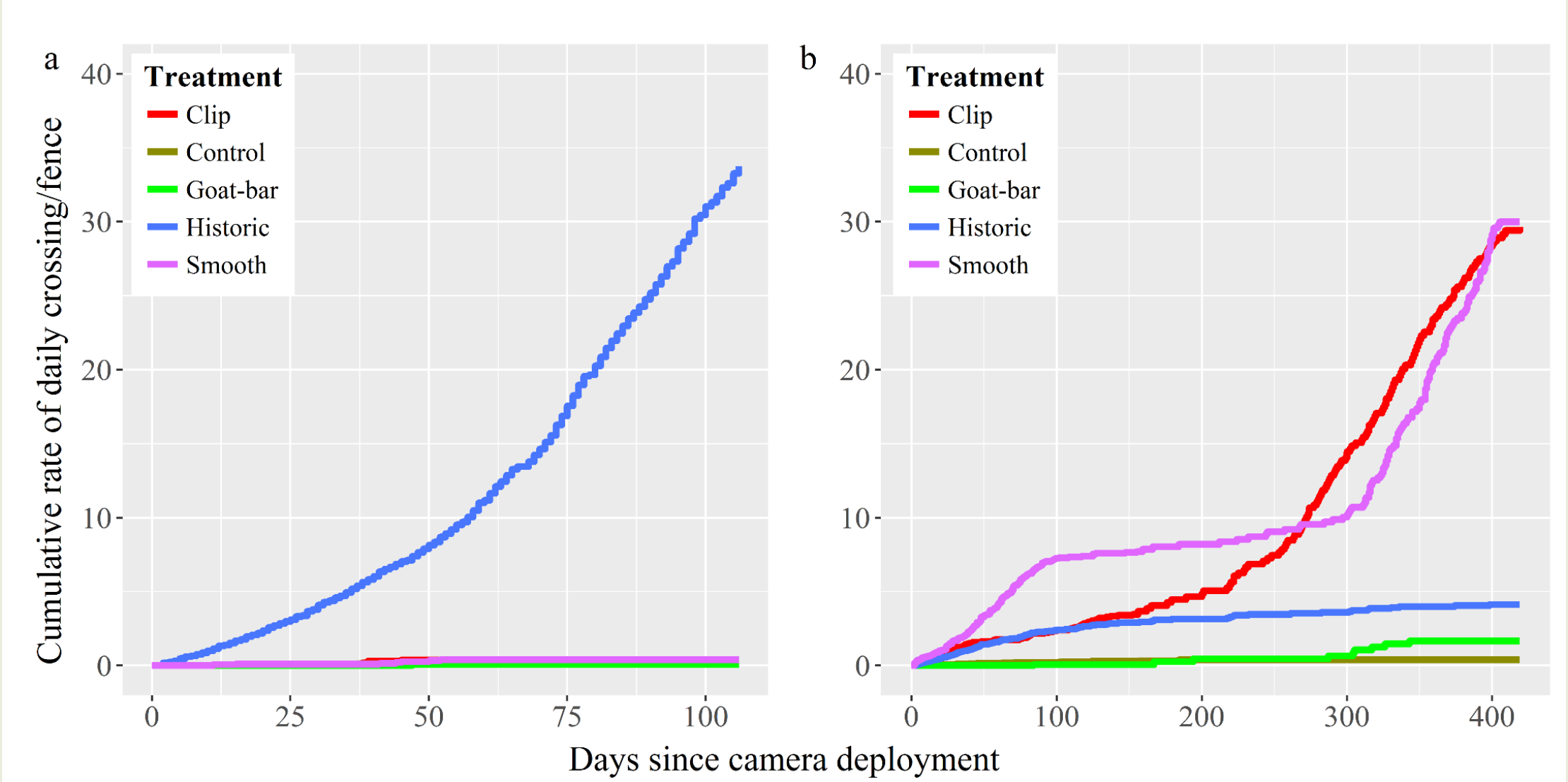
Set #1

Images, Images, Images!

Used standardized approach to record both wildlife and livestock behavior and interactions with fencing

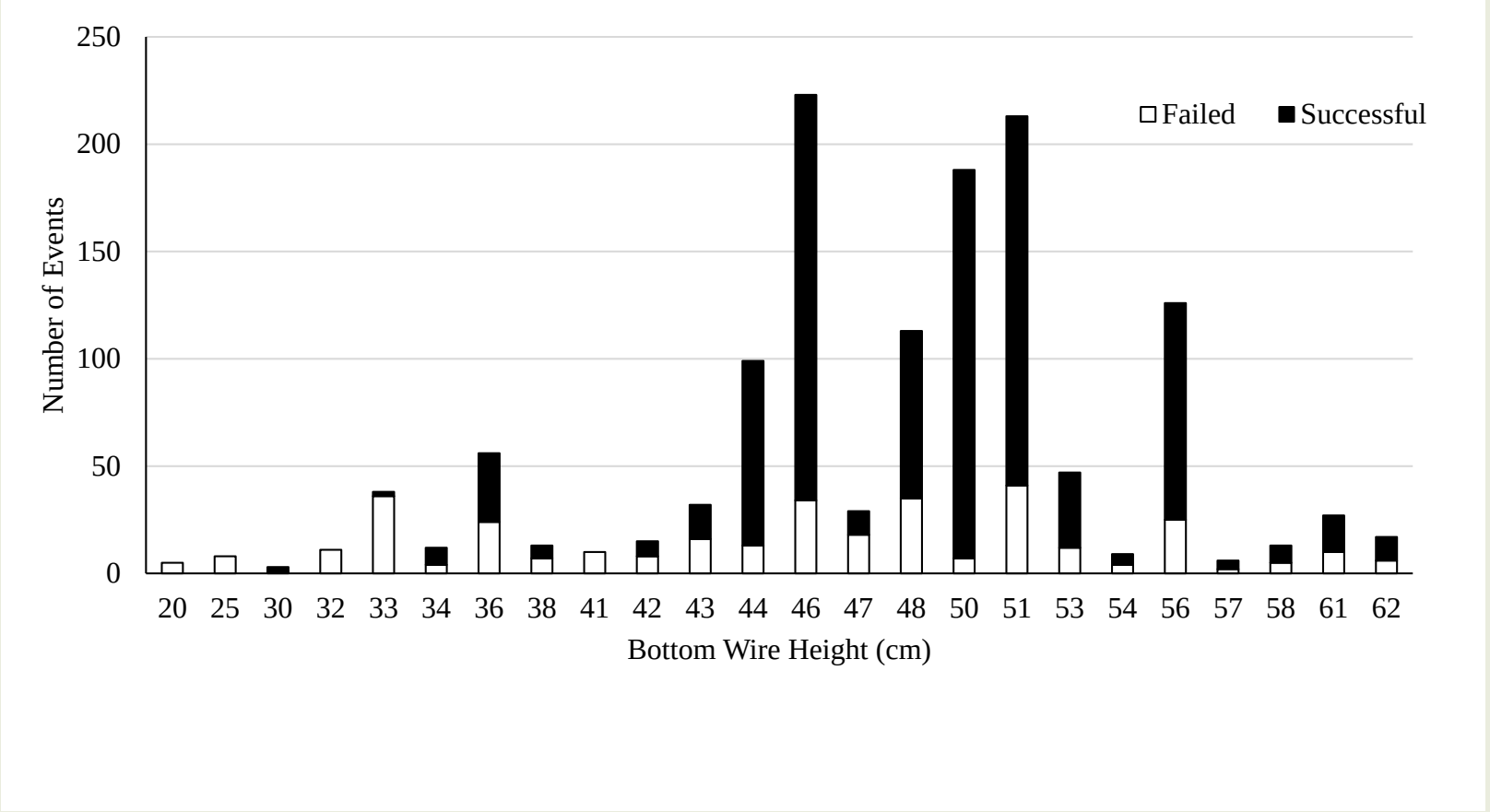
1.3 Million images processed in AB, 1.1 Million images processed in MT

Objective 1 Results: First Paper



Objective 1 Results: First Paper

Assess bottom wire height on fence crossing selection

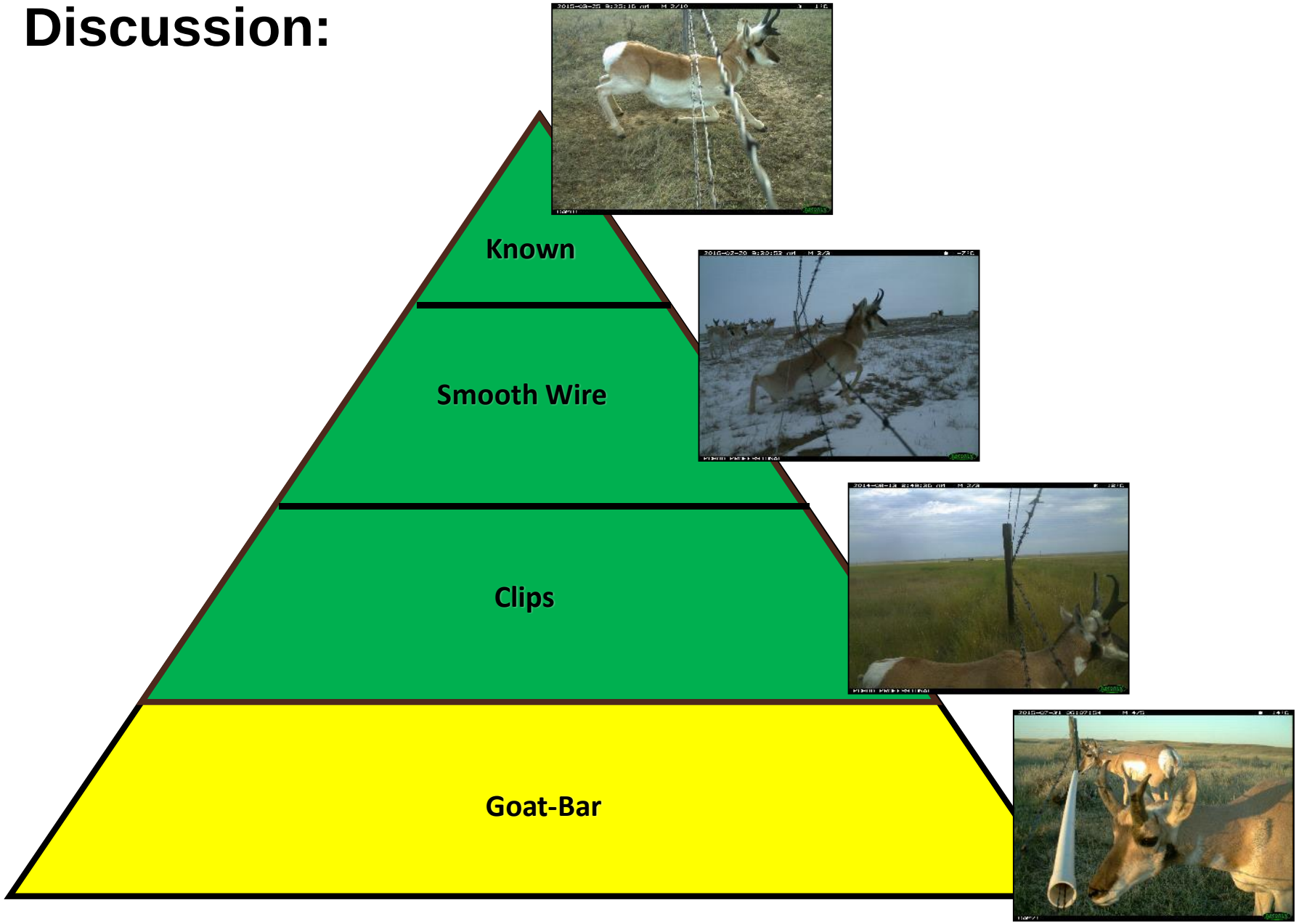


Before Period

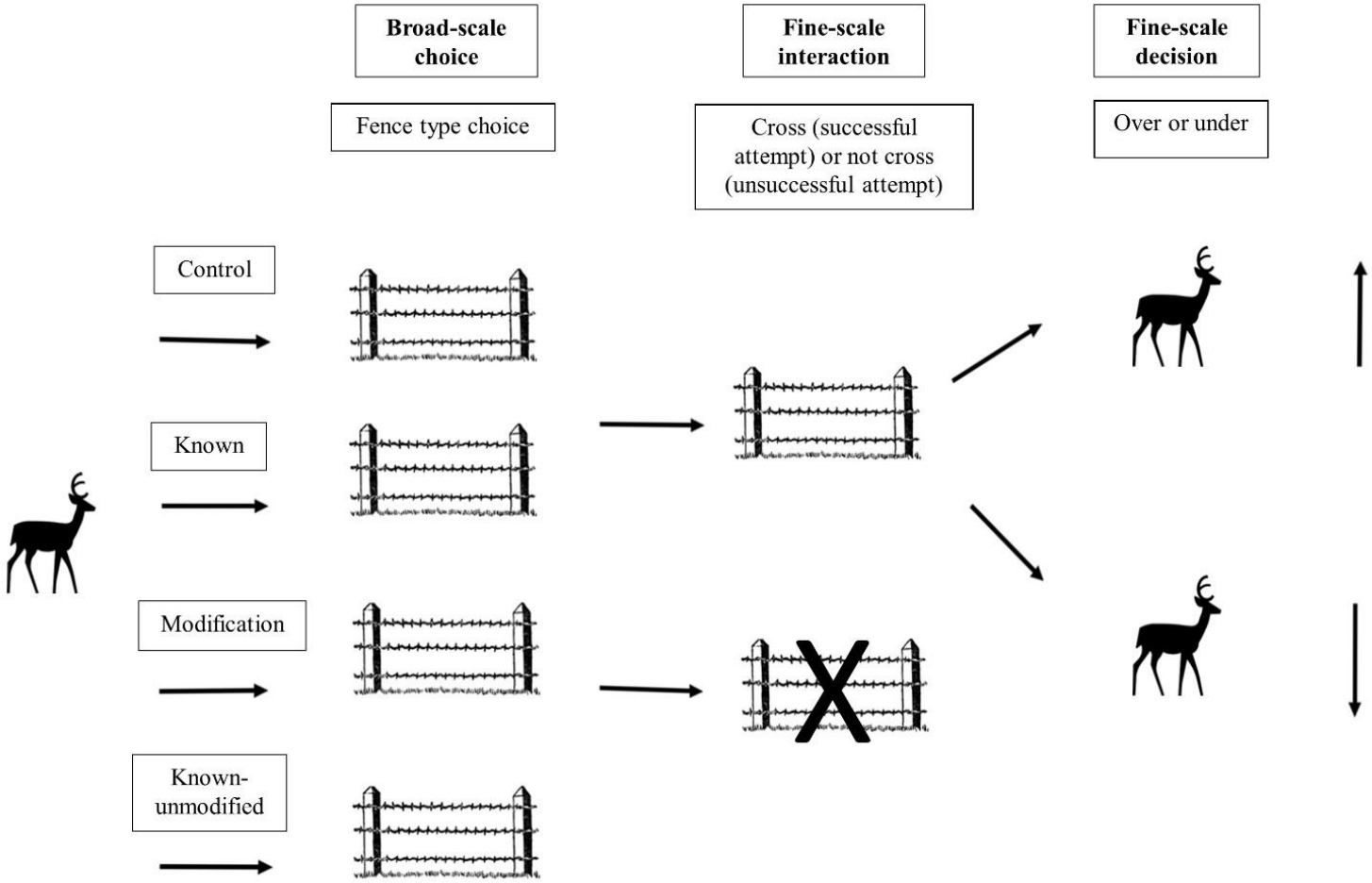
Livestock Interactions

-Recorded livestock behaviors at fence panels in AB (Before only) and MT (Before and After)
-Although many failed ‘attempts’ were recorded, only 1 calf during the 2-year study crossed at a fence site (control, known-crossing, modification).
-Crossing was ‘through’ the fence at a goat-bar modification
-Observation: livestock spent an inordinate amount of time at goat-bar sites

Discussion:

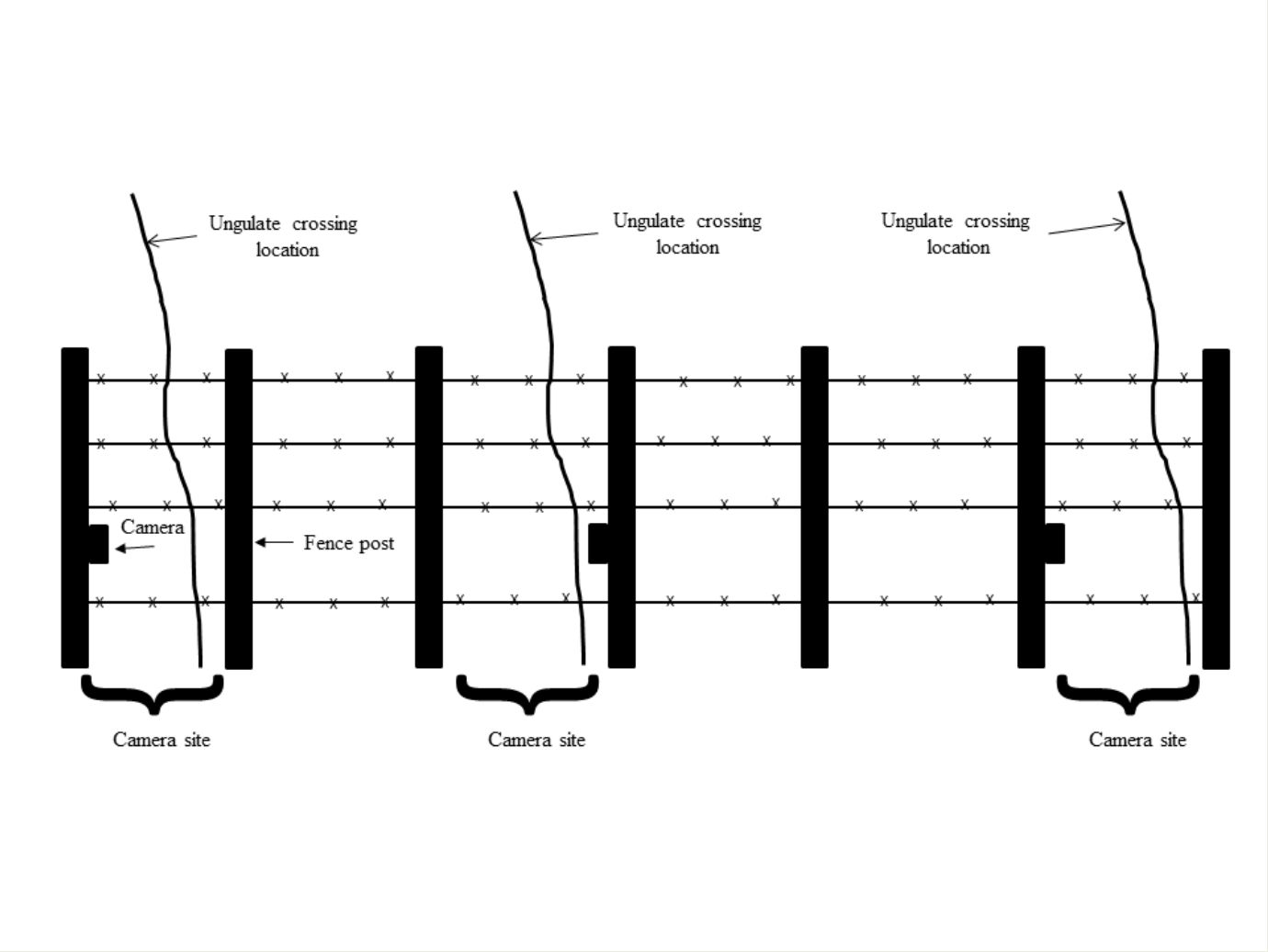


Multi-scale Fence Selection

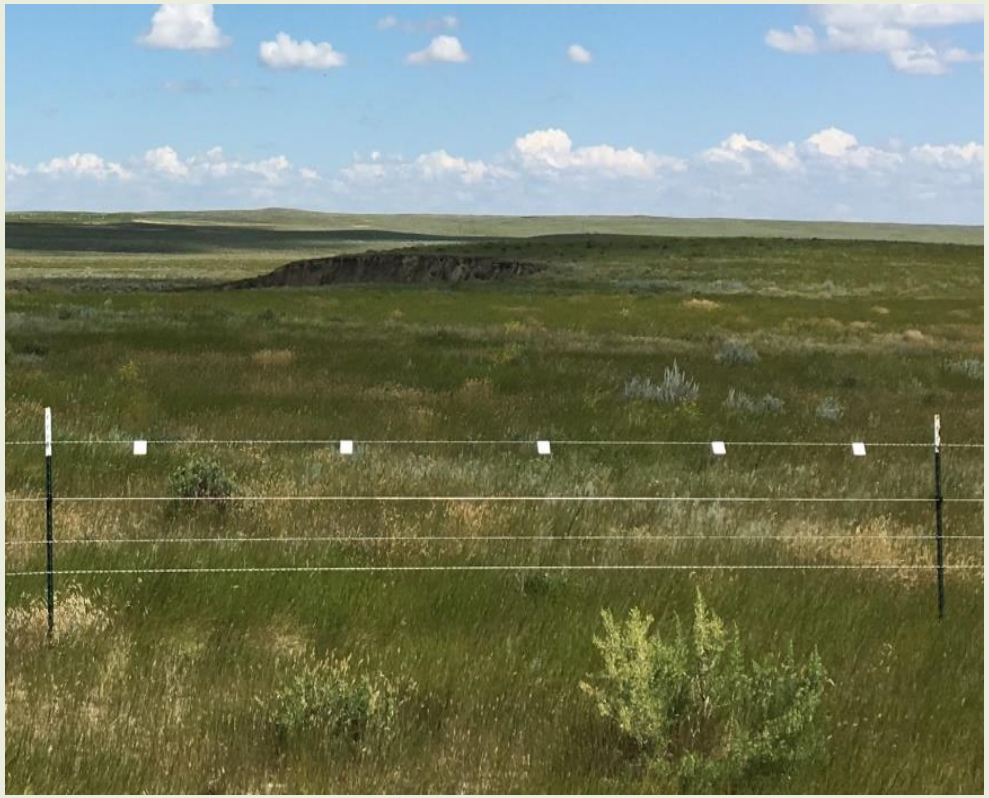


Methods: Second Paper

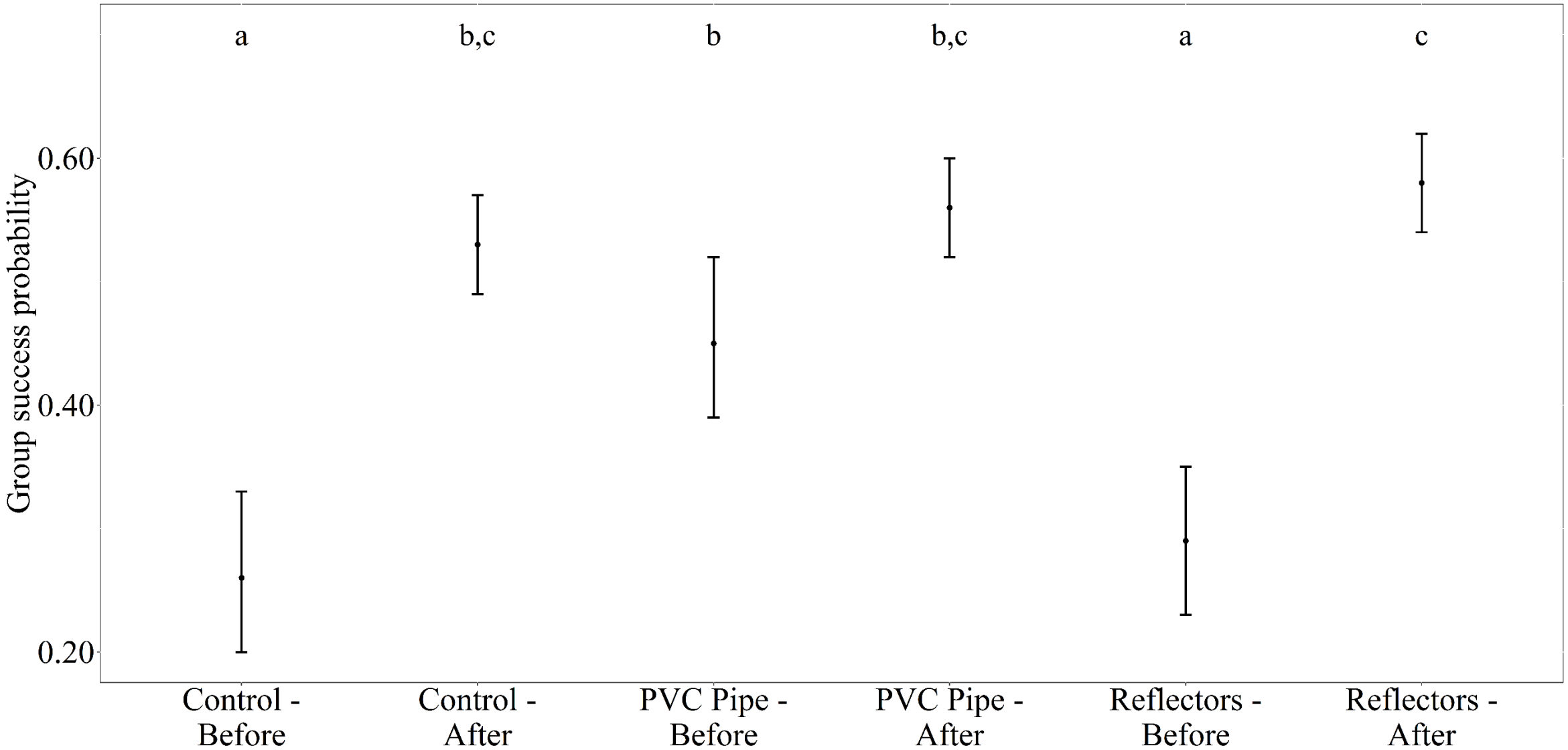
- Use of Before-After-Control-Impact (BACI) experimental design to test the effectiveness of two additional fence modifications on ungulate movements



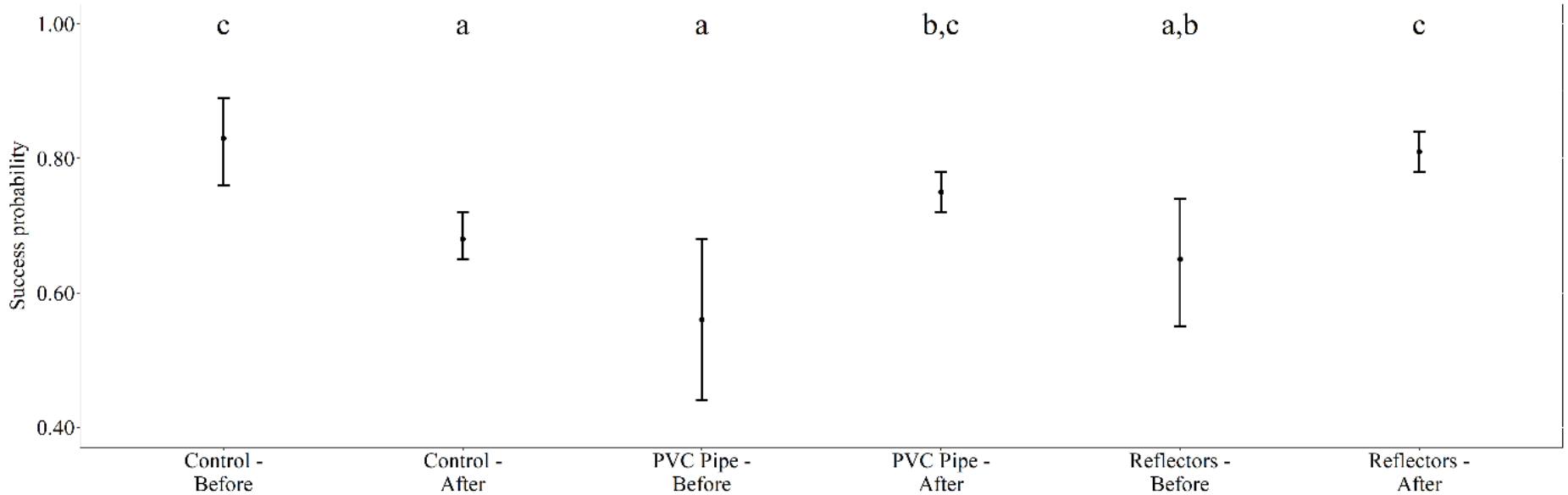
Methods: Second Paper

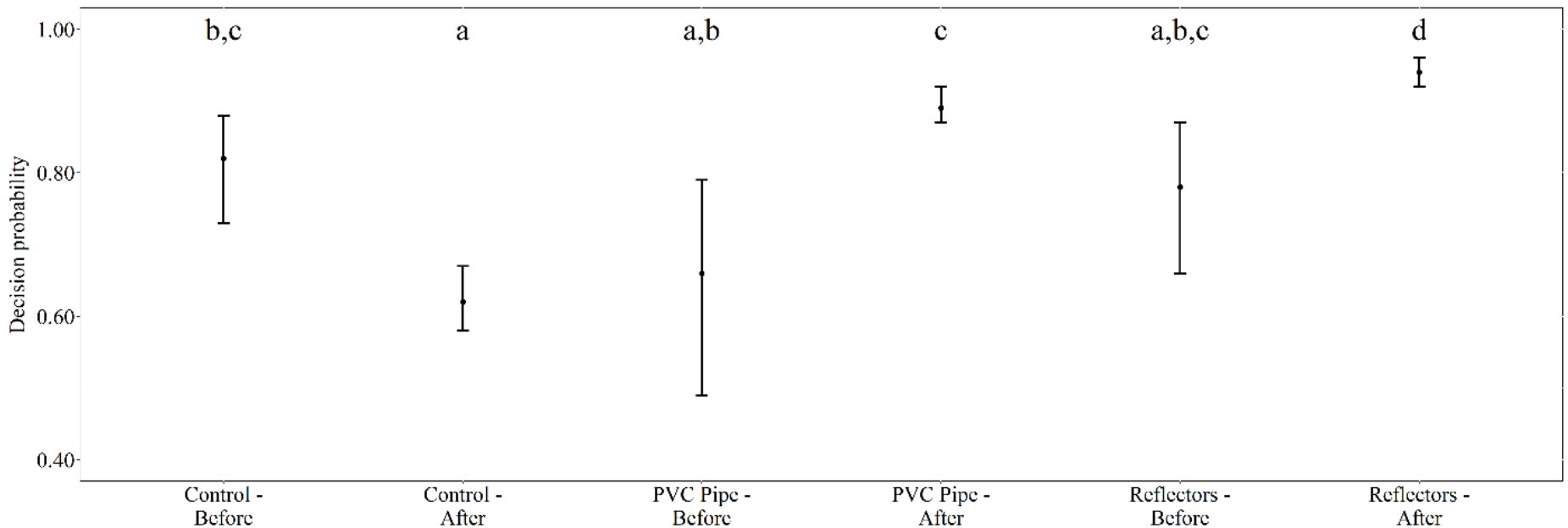


Pronghorn


a
b,c
b
b,c
a
c
0.60
0.40
0.20
Group success probability
Control - Before
Control - After
PVC Pipe - Before
PVC Pipe - After
Reflectors - Before
Reflectors - After

Mule Deer


c
a
a
b,c
a,b
c
1.00
0.80
0.60
0.40
Success probability
Control - Before
Control - After
PVC Pipe - Before
PVC Pipe - After
Reflectors - Before
Reflectors - After


b,c
a
a,b
c
a,b,c
d
1.00
0.80
0.60
0.40
Decision probability
Control - Before
Control - After
PVC Pipe - Before
PVC Pipe - After
Reflectors - Before
Reflectors - After

Inferences: Second Paper

- PVC pipe and Sage-grouse markers are not impacting the success of ungulate crossings.
- Modifications are creating a more visible fence and drawing animals in to then make fine scale selections and decisions. Decision results are not statistically significant but are biologically.
- Bottom wire height was in every model for every species.
- **Current field trials** include assessing electric fencing, PVC pipe and carabiner used to lower top wire – used to assess if deer species select to crawl under or jump over fencing.