

# 2014 Landmark Q1 Report

Prepared by
Adventurers and Scientists for Conservation
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http://www.adventurescience.org/landmark.html

#### **Abstract:**

Land**mark** is an ongoing collaboration between Adventurers and Scientists for Conservation (ASC) and the American Prairie Reserve (APR). This project is designed to gather information to aid the Reserve's management team in understanding multiple parameters related to wildlife usage and interaction with the landscape.

Our use of emerging technologies and "Adventure Scientist" volunteers to collect data brings a unique variety of backgrounds and skills to bear in assisting this highly ambitious conservation effort.

In our initial two months of survey work, nine Adventure Scientists surveyed transects totaling 426 miles, resulting in the documentation of 3,443 animal observations, 227 human artifacts, 23 measurements of hydrologic features, 9 badger holes, 4 dead animals, 3 grouse collisions with fences, and more. Additionally, the Adventure Scientists spent 22 hours spotting from high points on the Sun Prairie property, yielding 108 wildlife observations. Moreover, twenty-three remote sensing camera stations were installed along fencelines and maintained at regular intervals, providing a total of 859 documented wildlife observations which were recorded in HD video.

Major components of our work throughout the initiation period of this project include fine tuning our methodology and identifying the most useful components of the collected data. We have refined our methods and worked to ensure reliable data collection.



# **Table of Contents**

Abstract	2
Project Overview	5
Project Design	5
Volunteer recruitment	
Volunteer screening - Who is an "Adventure Scientist"?	5
Volunteer stint length	6
Oversight	7
Background, Justification & Methods	7
Equipment	7
Wildlife Transects	7
Transect placement/selection	7
1. Animal Observations	88
2. Human Artifacts	
3. Badger Holes	10
4. Stream Flows	10
5. Russian Olive Trees	11
6. Carnivore Signs and Collections	11
7. Other way points of interest	11
Camera trapping	12
Background and Justification	
Location selection	
Camera placement	
Lens direction	
Camera servicing	
Camera settings	13
Fence Interactions	
Scoping	
Location selection	14
Results & Discussion	
Transects	
Animal Observations	15
Camera Traps	16
Bison	
Mule deer	17
White-tailed deer	18
Pronghorn	
Elk	
Coyote	
Raccoon	
Porcupine	
Desert Cottontail	
White-tailed Jackrabbit	
Black-tailed prairie dog	25

Sharp-tailed grouse	25
Greater-sage grouse	
Ring-necked pheasant	27
Burrowing owl	28
Golden eagle	29
Dead animals	29
Human Artifacts	30
Badger Holes	30
Hydrologic Features	31
Russian Olive Trees	32
Other waypoints of interest	32
Broken fences	32
Grouse collisions	33
Camera trapping	33
Spotting	34
Additional Notes	
Observer Reliability	35
Future Opportunities	
Acknowledgements	
Works Cited	38
Appendices	39
Sample Data Forms	39
Animal Observation Data	



This document is intended to present the data we have collected in a manner that is digestible to both an academic and non-scientist crowd and is supplemented with digital maps, photography, videos, and other interactive materials which are available upon request.

#### **Project Overview and Goals**

Adventurers and Scientists for Conservation (ASC) and the American Prairie Reserve (APR) have joined forces to create an innovative collaboration called Land**mark.** This is an ongoing effort to collect a multitude of information that can be used by a variety of stakeholders to improve decision making on and surrounding the Sun Prairie property of the American Prairie Reserve. Our goal is to move toward biodiversity centered management along the "Freese scale" including increasing wildlife abundance and decreasing fragmentation of the Reserve.

Our efforts placed crews consisting of six individuals at a time, who lived full-time on the American Prairie Reserve beginning in early February 2014. Throughout the months of February and March, crews hiked transects that were between 8-11 miles, searching for wildlife and wildlife signs in addition to collecting data on human artifacts, hydrologic features, grouse collisions with fencelines, and more. Additionally, crews placed and maintained 23 remotely triggered camera traps in an effort to better understand wildlife interactions with fences.

In addition to the collection of scientific data, we have placed a strong emphasis on recording the aesthetics and experience of being on the prairie. Throughout the inaugural months of this endeavor, volunteers have endured temperatures as low a -23°F and have faced snow, wind, sleet, and mud. Throughout their time on the Reserve, volunteers regularly documented their experiences through social media, blogging, and video diaries.

This effort brings non-scientists to work collecting scientific information, hence our methodology has included extra precautions to ensure the integrity of the data collected.

# **Project Design**

#### Volunteer Recruitment

Beginning in November 2013, ASC launched a recruiting website, created blog posts, and leveraged social media to solicit applications for volunteers. Posts were also aired on Gregg Treinish's (ASC's Executive Director) National Geographic blog, the NOLS listserve, the Texas A&M (TAMU) website, as well as the Society for Conservation Biology's webpage. By January, more than 40 people had applied for the first 12 positions. Crewmembers were selected by December 15th for a February 3rd start date. A total of 92 people had applied to the project before March 31st.

#### Volunteer Screening - Who is an "Adventure Scientist"?

ASC screened and selected applicants based on several factors, including the following:

1. Backcountry experience

Initial applicants were required to demonstrate that they could safely operate in the extreme conditions that February and March bring to the prairie. Applicants were screened based on prior outdoor experience through a series of questions that were designed to illustrate how an individual would handle difficult situations.

2. Prior experience working in remote conditions and/or on a team Applicants with experience in other challenging environments (Peace Corps, field work in Alaska, work in Yellowstone and Glacier National Parks, etc.) were given priority because of the remote setting of the project and necessity of sharing close quarters on the Reserve.

#### 3. Prior scientific experience

Because of the large applicant pool, we were able to select for individuals who had prior data collection experience. The ASC model is based on placing non-scientists into opportunities to contribute to conservation through data collection. However, especially in the beginning of the Land**mark** project, we felt that some built-in leadership would be a strong addition to crews.

4. Creative interests (writing, photography, videography)

One of our strong desires with Land**mark** is to document the aesthetics and the experience of traversing and living on the prairie. Crew members were selected with with an eye towards building a team with a variety of media skills. Over time their recorded experiences will form a narrative of living and working on an expanding wildlife reserve.

#### 5. Interest in conservation

Walking 12 miles in zero degree weather requires a strong work ethic, but also a sense of purpose. We gave priority to crew members who demonstrated a strong interest in conservation.

#### 6. Sense of adventure

Intangible, but critically important, this quality of spirit was a commonality to members of the winter crews. Crew members were selected who had a history of pursuing new experiences and personal challenges.

#### Volunteer Stint Length and Stipend

During February and March, nine Adventure Scientists contributed more than 1,675 hours of work to the Land**mark** project. Individual crewmembers volunteered an average of 5.6 weeks and worked an average of eight hours per day.

One of the ways we have worked to maintain consistency with data collection is to encourage "holdovers" from crew to crew who can provide leadership and guidance to incoming crew members. Four individuals were "holdovers" moving into March.

Crew members were offered \$300 to cover expenses while living on the prairie.

#### **Oversight**

At the beginning of each month, ASC staff conducted an intensive two-day training session during which volunteers learned project protocols and practiced these protocols in a hands-on supervised manner.

Volunteers were then expected to continue data collection with regular check-ins with ASC staff. ASC staff members were readily available for troubleshooting over the phone and made four independent visits to the reserve during the months of February and March. Additionally, phone calls were scheduled once per week between APR, ASC, and the Landmark crews.

ASC staff regularly monitored incoming data, which was available over the web and updated on a daily basis thanks to the use of tablets to collect the data. This provided the opportunity to catch any inconsistencies and to troubleshoot them on a daily basis.

Several crew members had had extensive leadership and scientific data collection experience prior to joining Land**mark** crews.

# **Background, Justification and Methods** *Equipment*

Throughout all aspects of Landmark, data have been recorded using Google Nexus 7



tablets, customized "GoFomz", Garmin Etrex 20 GPS units, Canon sx50 cameras, compasses, state-of-the-art rangefinders, Brunton binoculars and spotting scopes, and a tape measure. Data were uploaded on a daily basis via a satellite internet connections available at the "Lazy J Ranch."

Our tablets are equipped with 8MP cameras and GPS sensors. Various softwares have been installed to ensure uniformity, simplicity, and usability.

The use of emerging technologies in data collection helped to ensure the accuracy of data collected and enabled us to troubleshoot inconsistencies with data on a daily basis.

#### Wildlife Transects

#### Transect placement/selection

The Sun Prairie section of the APR (31,000 acres) was divided by ASC staff into nine transects of similar length and difficulty and routed to provide between .5 and 1-mile resolution coverage of the entire Sun Prairie property. Starting and ending points for transects were chosen primarily based on accessibility from roads and with a desire to maintain a <1 mile distance that volunteers would need to walk on either end of a transect.

Transects were refined based on volunteer input that only became available after transects had been walked a minimum of one time.

Transects were generally 8-11 miles in length and were followed via GPS tracks; the GPS tracks served as a guideline for crew members to follow. Transects were hiked six times per three month season, generally twice per month,

by teams of two observers who were instructed to record the following:

- 1. Animal Observations
- 2. Human Artifacts
- 3. Badger Holes
- 4. Hydrologic Features
- 5. Russian Olive Trees
- 6. Carnivore Signs
- 7. Other Waypoints of Interest



Crew members made additional observations from existing roads. These were recorded as transects that are labeled as "driving/other."

#### 1. Animal Observations

#### Background and Justification

Many species abundances on the Reserve are unknown and believed to be below carrying capacity (Kunkel and Austin 2014). Additionally, very little fine scale and local data are currently available for these species (Kunkel and Austin 2014).

Our Q1-2014 objective was to determine local seasonal density or relative use of each species utilizing the Sun Prairie property through raw counts of species observed with distance and angle also recorded. Future analysis will be conducted using "DISTANCE" software to determine the density and variance of use by these species.

#### Method

Crew members were trained on differences between several species that had potential to be observed on the Sun Prairie property, with special attention given to similar appearing species such as white-tailed deer, mule deer, and pronghorn. Upon observation of a living animal, multiple parameters were recorded using GPS-enabled tablets that auto-populate location and date/time fields, coupled with Garmin handheld GPS units, Canon sx50 superzoom cameras, compasses, and electronic rangefinders that provide consistency when estimating distance to any given animal. It should be noted that all distance data recorded before March 22nd, 2014 is recorded as an estimate due to difficulties with our rangefinders. After March 22nd, 2014, upgraded rangefinders (Vortex Optics Ranger 1000) were used and should be considered accurate.

Observers were instructed to record their location at the time of sighting and to obtain a bearing and distance from the location in which an animal was first observed.

When counting numbers of animals, each individual observer on the transect was instructed to count silently and once each team member had his/her count, numbers were shared and averaged.

Habitat types were recorded at the location the observer was standing when he/she viewed the animal, not at the location of the animal itself. This was done to avoid guessing, especially when animal observations took place from large distances away.

Weather and ground conditions were recorded at the moment of initial animal sighting.

All crew members were instructed to obtain a photo of the animal if possible using Canon sx50 cameras that were provided to each team of two observers.

In order to better understand species identification reliability, and acknowledging that each individual observer brings various levels of identification skills, we required that the reliability of each observation be recorded on a 1-3 scale where 1 = sure, 2 = probable, and 3 = not sure. We have chosen to display all observations in the maps on our results sections; however, we encourage others to be aware of these reliability rankings when utilizing raw data.

In cases where duplicate observations were suspected (mostly this occurred with bison observations), crew members were instructed to record only 1 sighting per 0.25 mile. While it is possible that an individual or group of animals moving across the Reserve were counted more than once due to being observed by more than one Land**mark** crew, we felt this occurrence was highly unlikely due to the fact that crews walking transects on the same day were often miles apart at any given time and only able to observe wildlife from their singular location within in a vast landscape. Additionally, because direction of travel, bearing, and distance was recorded, we are further able to eliminate suspected cases of dual counting.

#### 2. Human Artifacts

#### **Background and Justification**

Human artifacts including trash and archeological artifacts have been observed throughout the Sun Prairie property. Our objective is to record locations of these objects in order that they might be removed or protected by APR staff as needed.

#### Method

Human artifacts were defined as any man-made object present on the Reserve with the exception of standing fences. This includes trash, farming equipment, discarded or dilapidated fences, Native American relics, well heads, and more. Objects were recorded regardless of age, size, or other factors.

To avoid duplicating entries of individual artifacts observed on repetitive transects, volunteers refer to an ever-evolving set of notes on each transect which outlines what has previously been recorded.

Observations of objects not previously documented were recorded with photo and GPS enabled tablets.

Subjective assessments as to whether items can be moved by hand were intended to aid the Reserve team in assessing the equipment that may be needed should they choose to remove any of the objects.

Counts of the number of items present at any given location were the result of individual counts conducted by each team member present which were then averaged and recorded.

#### 3. Badger Holes

### **Background/Justification**

Limited data currently exists statewide on badgers whose numbers are likely low due to prairie fragmentation and loss of prairie dogs (Clark 1982). Our objective is to begin establishing a baseline of badger relative abundance through a combination of animal observations and documentation of their holes.

#### Methods

Crew members received training on the size, shape, habitat and additional signs that may be present near badger entrance or exit holes. All crew members were instructed to err on the side of caution and to record suspected badger holes even if the observers were not sure about the species responsible for the hole. As a result, some holes may be recorded as badger holes when they are in fact the result of the actions of other species.



Holes were measured for length and width across the hole-center.

All observations were recorded with GPS and photo-enabled tablets.

#### 4. Stream Flows

#### **Background and Justification**

Water is often in short supply throughout northeast Montana (NOAA 2014). Our objective was to gain a temporal and spacial distribution of water flowing across the Sun Prairie in order to determine what, if any effect this might have on wildlife behavior throughout the property.

#### Methods

Crew members were instructed to record all observations of water encountered during transects that was present in naturally occurring sources. Stock ponds were not recorded.

Observers ranked the presence of water using the following five categories:

- 1. Standing Puddles
- 2. Flowing Trickle

- 3. Flowing Up to One Foot Deep
- 4. Significant Current More Than One Foot Deep
- 5. Waist-Deep Flow

Stream flow waypoints were recorded with a photo and GPS-enabled tablet.

In all cases, photos were taken to assist with observations.

#### 5. Russian Olive Trees

#### **Background and Justification**

Russian Olive Trees, which are present on the Sun Prairie property are considered an invasive species, and concerns exist that they could out compete native species (Katz 2003). Our objective was to record locations of these trees and present them to the Reserve team for future control as needed.

#### Method

Crew members received training on identification of this invasive species mostly through images of trees.

When trees were encountered during transects, each team member was instructed to estimate the height of the tree. The results were averaged and recorded along with the tree location and a photo.

# 6. Carnivore Signs and Collections Background and Justification

Little is currently known about the current abundance of carnivores utilizing the Sun Prairie property (Kunkel and Austin 2014). Our objective is to assess level of use and abundance of carnivores throughout the property.

#### Method

Crew members received basic training in carnivore scat and track identification and were instructed to record observations of animal signs related to bobcat, cougar, swift fox, and black-footed ferret. Observers were instructed to err on the side of caution and to record observations that were potentially related to the species listed above. As a result, several observations may have been recorded of other species and independent verification of carnivore signs should be made by professionals.

When plausible, DNA samples were collected in unused plastic bags that were turned inside out to use as collectors. Samples were then placed inside the initial bag, then into a secondary bag and sealed. If samples contained moisture, they were removed from the bags, dried on newspaper or other paper towels overnight, and subsequently returned to bags or, if necessary, placed in new bags.

GPS locations of collection sites were recorded on GPS-enabled tablets and undisturbed specimens were photographed prior to collection with a scale object in frame.

#### 7. Other waypoints of interest

Crew members were instructed to record observations of animal signs, apparent grouse collisions with fences, and/or anything else they noticed while on transects that might



have been considered of interest to the Reserve team or others.

When observations were related to wildlife, observers were instructed to make a best guess of the species responsible. These guesses are intended to assist with identification and should not be considered reliable species identifications.

All observations were recorded on GPS and photoenabled tablets.

# **Camera Trapping on Fences Background and Justification**

To hold bison while ensuring ready passage of other wildlife, APR has implemented the use of high voltage (3,000 – 9,000 volts) electrified fences consisting a barbed top wire, a smooth and electrified second wire, a barbed third wire, and a smooth and raised bottom wire. Our objective in Q1 2014 was to record observations of wildlife interacting with these fences on HD videos in order to observe whether various species appeared to cross or avoid APR's perimeter fences.

#### **Location Selection - Perimeter Fences**

Using GIS maps obtained from APR staff, eighteen general areas were selected near intersections of riparian habitat with perimeter fences that surround the Sun Prairie property of the Reserve. These sites were selected with the hope of observing a variety of charismatic species that typically utilize riparian areas. Crews then located these preselected waypoints using Garmin handheld GPS units and hiked along the fence in the immediate vicinity of these points looking for areas that met the following criteria:

- 1. Largely clear of brush and tall grasses that could provide false-triggers.
- 2. Areas that contain natural features that might concentrate wildlife traffic.
- 3. Areas showing a high concentrations of tracks in snow that was present for much of the initial months of the Land**mark** project.

An additional five cameras were placed at areas of high wildlife traffic identified by tracks in snow or mud, or from hairs caught on fence barbs. These placements were not standardized and are distributed in grassland, sagebrush and riparian zones.

Perimeter fences consist of both barbed and smooth wire, with the second wire electrified with high-voltage. The lowest rungs of these fences were originally placed at 18 inches and designed to permit the safe and easy passage of wildlife.

#### **Camera Placement**

Cameras were placed on vertical metal fence posts above the top rung. Early in the month of February, a system was developed involving a foam anchor that allowed us to tighten the camera and adjust the lens direction easily. Early observations that were taken before this tightening process showed camera movement due to high winds and various wildlife species licking or rubbing the cameras.

#### **Lens Direction**

Cameras were generally placed facing north and east to minimize false triggers from glare.

#### **Camera Servicing**

In order to ensure functionality, cameras were visited on average of every two weeks. Weather and road conditions were the most consistent factors in making the duration between services variable.



Memory cards were changed with each servicing, and, if needed, batteries were replaced.

#### **Camera Settings**

Cameras were set as follows:

CAMERA SETTING:	SET TO:
Mode:	Video
Image Size*:	5M Pixel
Image Format*:	Full Screen
Capture Number*:	3 Photo
LED Control:	Medium
Camera Name:	(this should be the camera site number)
Video size:	1280x720
Video length:	30S
Interval:	58
Sensor level:	Auto
NV shutter:	Low
Camera mode:	24 hours
Format:	Execute
TV out:	NTSC
Time stamp:	On
Set clock:	(chose set to set the time and date)
Field scan:	Off
Coordinate Input:	On (enter lat/long location of the camera site)
Video sound:	On
Default set:	Cancel

#### **Fence Interactions**

Wildlife observations caught on camera were categorized three ways based on individual

interactions with fences: no interaction (NI), deterred (D), and crossing (C). Any activity not explicitly captured in the video clip was not assumed to have taken place. Partial crossings and cases without an approach to a fence received a "NI" label. A "C" was counted as such only when the entire body crossed the



plane of the fence. Each fence crossing (C) was labeled to specify if the animal went over (O), under (U) or through (T) the fence. The O, U, or T was only assigned to observations that were clear and obvious in each clip. Interactions received a "D" label when an animal started to cross a fence and then ran in the opposite direction.

When more than one animal was present in an individual clip, their interactions were documented as separate observations. Because we could not identify individuals with any degree of accuracy from one recording to the next, even when we suspected repeated observations of the same animal from one recording to the next, they were counted as independent observations.

### Scoping

#### **Background and Justification**

Scoping data was collected to supplement animal observations recorded during transects. Stationary positioning and observations are commonly used in determining animal abundance and densities (Gese 2001).

#### Methods

#### **Location Selection**

Scoping sites were chosen based on visibility of the surrounding terrain. Hills that provided at least 180-degrees of visibility were considered acceptable as observation points.

Teams of two volunteers remained at each chosen location for three hours. Using a combination of high-powered spotting scopes and binoculars that were provided to the project by ASC sponsor Brunton Outdoors, the teams scanned for wildlife and recorded each animal sighting as a wildlife observation.

Distance to individual or group center was recorded early in February using Simmons LRF



600 Laser Rangefinders, which we found to be unsuitable for use on the flat landscape of the prairie, and later with Vortex Optics Ranger 1000 rangefinders.

Bearings to individual or group centers were recorded using a standard hand compass.

Numbers of animals present were counted silently by each individual observer and averaged.

#### **Results and Discussion**

#### **Transects**

Land**mark** crews drove a total of 76 miles and hiked 350.1 miles on a total of 51 transects. Each transect was surveyed on average, four times.

#### **Animal Observations**

A total of 351 individual wildlife observations were made of 3,443 animals between February 3 and March 31, 2014, including observations of 14 different species. Our average was more than 8 animal sightings per mile. Observations are grouped below by family.

Users of this data should be aware that substantial spatial sampling bias is likely present in the data due to limited coverage, repetition of our transects, and from the repeated use of existing roads.

It should be noted that all distance data recorded before March 22nd, 2014 is recorded as an estimate due to difficulties with our rangefinders. After March 22nd, 2014, upgraded rangefinders were used and should be considered accurate.

Table 1. Summary of animal observations by species.

	Species	Observations	Largest Group	Avg. Group Size
Ungulates:	Bison	1618	120	12
	Mule Deer	713	51	9
	Whitetail Deer	102	12	6
	Pronghorn	628	120	29
	Elk	8	6	3
Carnivores:	Coyote	17	2	1
Sm. Mammals:	Porcupine	1	1	1
	Desert Cottontail	2	1	1
	Prairie Dog	44	12	4
	White-Tailed Jackrabbit	1	1	1
Birds:	Sharp Tail Grouse	143	20	6
	Greater Sage Grouse	139	60	9
	Ring Necked Pheasant	26	9	3
	Golden Eagle	1	1	1
	Burrowing Owl	1	1	1

	Species	Observations	Largest Group	Avg. Group Size
Ungulates:	Bison	1618	120	12
	Mule Deer	713	51	9
	Whitetail Deer	102	12	6
	Pronghorn	628	120	29
	Elk	8	6	3
Carnivores:	Coyote	17	2	1
Sm. Mammals:	Porcupine	1	1	1
	Desert Cottontail	2	1	1
	Prairie Dog	44	12	4
	Jack Rabbit	1	1	1
Birds:	Sharp Tail Grouse	143	20	6
	Greater Sage Grouse	139	60	9
	Ring Necked Pheasant	26	9	3
	Golden Eagle	1	1	1
	Burrowing Owl	1	1	1

#### **Camera Traps**

Twenty-three remotely triggered camera traps recorded a total of 859 animals between February 3 and March 31, 2014. Several observations of birds, rodents, and other species that we believed to be of little importance to the Reserve management team were intentionally omitted from the following results.

Table 2. Summary of camera trap results by species indicating animal behavior.

	Species Bison Mule Deer		Behavior						
	Species	Observations	Crossed Fence		No Interaction				
Ungulates:	Bison	558	67	1	509				
5-10-1 <del>-1</del> -10-10-10-1	Mule Deer	82	14	0	34				
	Whitetail Deer	67	22	2	43				
	Pronghorn	6	2	0	4				
	Elk	17	2	2	13				
Carnivores:	Coyote	13	3	1	6				
Sml Mammals:	Desert Cottontail	49	16	1	32				
	White-Tailed Jackrabbit	2	1	0	1				
Birds:	Sharp Tail Grouse	1	0	0	1				
	Greater Sage Grouse	23	3	0	20				

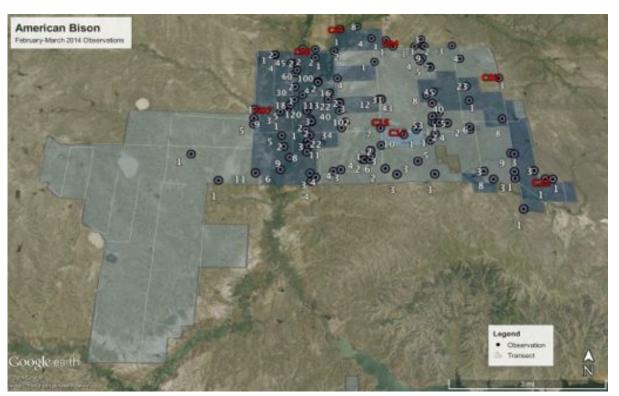
#### Bison:

Throughout the observation period, bison movements were restricted by the use of electrified fences surrounding the eastern side of the Sun Prairie property.

*Transects* - As was expected, the vast majority of sightings were concentrated inside the fenced area. Two bison bulls were observed in the western pasture, these bulls had crossed into this pasture during the fencing of this pasture last fall. Crews recorded a total of 131 independent bison observations between Feb 3 and March 31, 2014. Included in these observations were a total of 1,618 animals. Our largest single herd count consisted of

120 animals. The average herd size was 12 animals.

*Cameras* - Bison were observed at eight distinct camera traps. A total of 588 animals were observed, of which 67 crossed the fence (two cameras had open fences and all crossings took place at these openings), 1 bison was deterred by the fences, and 509 had no interaction with the fences. An additional 11 animals were observed on 2 cameras that did not include fences.



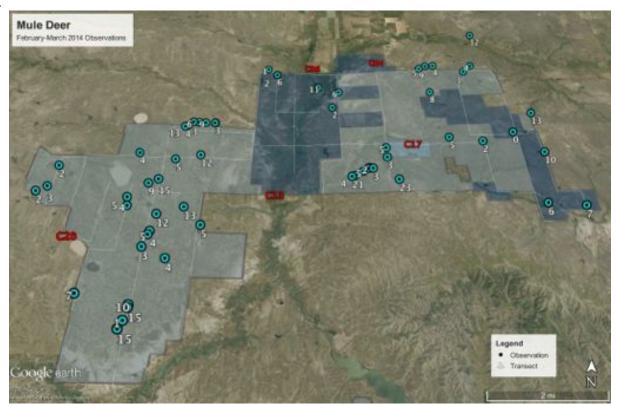
**Figure 1.** Bison observations with numbers indicating the size of the group.

#### **Mule Deer:**

Mule deer were observed throughout the Sun Prairie property and appeared to be more densely concentrated on the western portion of the property. Several mule deer were aware of cameras and often they backed away from them.

*Transects* - Crews recorded a total of 78 mule deer observations, which amounted to a total of 713 animals. Our largest single herd count consisted of 51 animals. The average herd size was 9 individuals.

Cameras - Mule deer were observed at five of the camera locations, with 41 independent observations amounting to a total of 82 animals. Of the animals observed, 14 crossed fences, no animals were deterred by the fences, and 34 did not interact with fences. Of the mule deer that crossed the Sun Prairie fences, 4 crossed over, 10 crossed under, and none crossed directly through the fence.



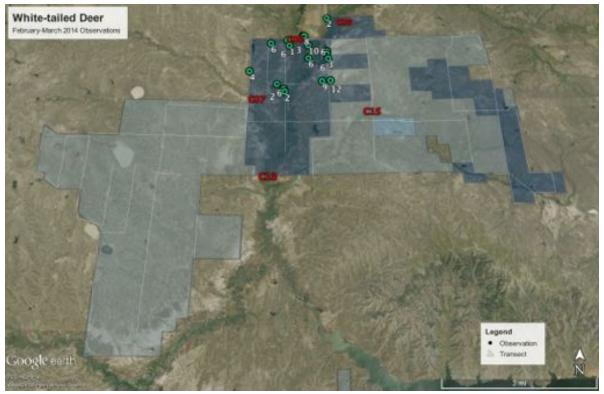
**Figure 2.** Mule deer observations with numbers indicating the size of the group.

#### White-Tailed Deer:

White-tailed deer observations were strongly concentrated towards the north central portion of the Sun Prairie property and were not observed at all in other portions of the property.

*Transects* - Crews recorded a total of 18 independent white-tailed deer observations, amounting to a total of 102 individual animals. Our largest single herd count consisted of 12 animals. The average herd size was 6 animals.

Cameras - White-tailed deer were observed at five of the camera traps and 38 independent observations, amounting to a total of 67 animals that were recorded. Of these animals, 22 crossed fences, 2 animals were deterred by the fences, and 43 had no interaction with the fences. In several instances (especially near camera C06) on the cameras, crossing under the bottom wire appeared difficult for white-tailed deer. Of the white-tailed deer that crossed the Sun Prairie fences, 10 crossed over, 12 crossed under, and none crossed directly through the fence.



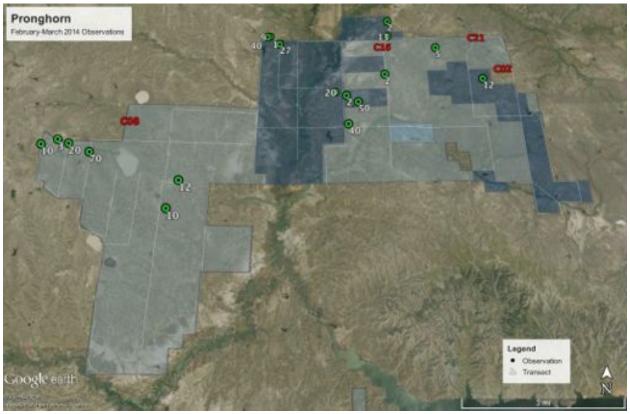
**Figure 3.** White-tailed deer observations with numbers indicating the size of the group.

#### **Pronghorn:**

Pronghorn were observed throughout the Sun Prairie property, though there appeared to be a stronger concentration in the northern portions of the property.

*Transects* - Crews recorded a total of 22 independent pronghorn observations, which amounted to a total of 628 animals. Our largest single herd count consisted of 120 animals. The average herd size was 29 animals.

*Cameras* - A total of 6 pronghorn were observed at 4 camera traps. Of those animals, 2 crossed the fence, none were actively deterred by the fences, and 4 had no interaction with the fences. Of the pronghorn that crossed the Sun Prairie, both crossed under the bottom wire.



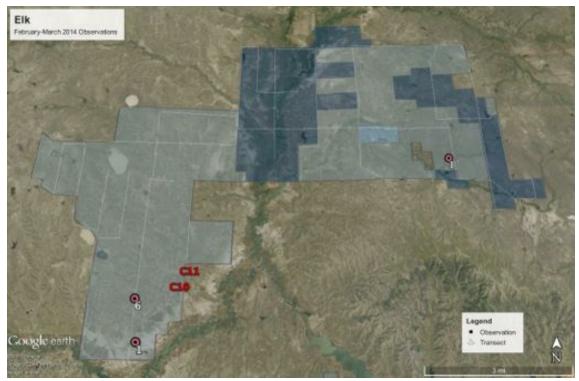
**Figure 4.** Pronghorn observations with numbers indicating the size of the group.

#### Elk:

Elk were observed in the southernmost portions of the Sun Prairie and in far lower numbers than other ungulates present on the Reserve.

*Transects* - Crews recorded a total of three independent elk observations while walking transects, which amounted to a total of 8 individual animals. Our largest single herd count consisted of 6 animals. The average herd size was 3 animals.

Cameras - Elk were observed at two of the camera traps, with 13 independent observations amounting to a total of 17 animals that were observed. Among the elk observed, 2 crossed fences, 2 animals were deterred by the fences, and 13 had no interaction with the fences or a slight touch of the fence (4). Both elk that crossed fences did so directly through the fences. In several cases, elk appeared to notice cameras and backed away slowly while staring at them. These same elk do, however, appear to remain near those cameras for quite some time.



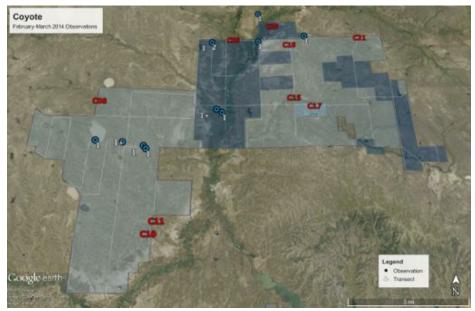
**Figure 5.** Elk observations with numbers indicating the size of the group.

#### Covote:

Coyotes were observed throughout the Sun Prairie property with the vast majority being observed as lone individuals.

*Transects* - Crews recorded a total of 15 independent coyote observations, amounting to a total of 17 individual animals. The largest group size was 2 animals and the average group size was 1 animal. Only two observations were of more than one animal.

Cameras - Coyotes were observed at nine of the camera traps with 13 independent observations. A total of 13 animals were observed, of which 3 crossed fences, 1 animal appeared to be deterred by the fences, and 6 had no interaction with the fences observed on camera. The 3 remaining animals were observed on a camera that did not include fences in the field of view. Several of the coyotes observed on camera appeared to take particular note of the cameras and 3 ran away from these cameras after looking directly at them.



**Figure 6.** Coyote observations with numbers indicating the size of the group.

#### Raccoon:

*Transects* - No raccoon were observed during transects.

*Cameras* - Raccoon were observed at one of the camera traps with 5 independent observations.

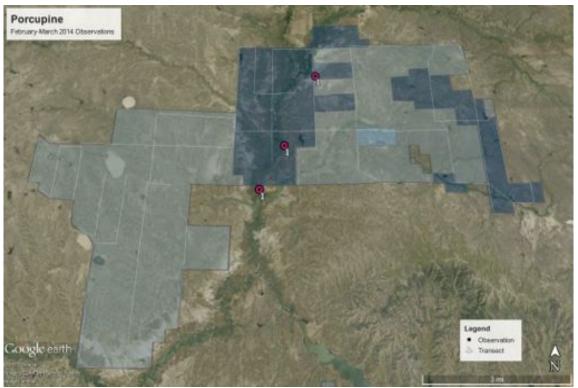


Figure 7. Racoon observations

#### **Porcupine:**

*Transects* - Three porcupines were observed in the central deeded portion of the Sun Prairie. All observations occurred mid-day and all were solo individuals.

*Cameras* - While one porcupine was observed on the cameras prior to the study period, none were present on cameras between February 3rd and March 31st and therefore is not displayed below.



**Figure 8.** Porcupine observations with numbers indicating the size of the group.

#### **Desert Cottontail:**

Desert Cottontail were observed spread widely throughout the Sun Prairie.

*Transects* - Crews recorded a total of 2 independent desert cottontail observations, amounting to a total of 2 individual animals.

*Cameras* - Desert Cottontail were observed at nine of the camera traps, with 47 independent observations amounting to a total of 49 animals observed.

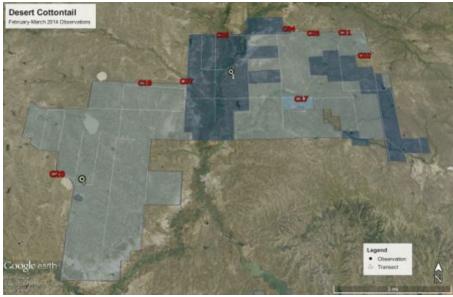


Figure 9. Desert cottontail observations

### White-tailed Jackrabbit

3 observations of a White-tailed Jackrabbit were recorded on the property.

 ${\it Transects} \hbox{ - Crews recorded one observation of White-tailed Jackrabbit while hiking transects.}$ 

Cameras - Two observations of White-tailed Jackrabbit were observed on camera 7.

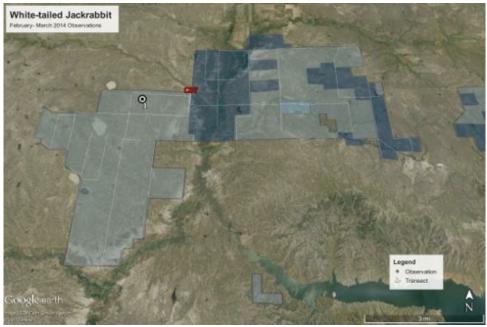


Figure 10. White-tailed Jackrabbit observations

#### **Black-Tailed Prairie Dog:**

Prairie Dogs were observed primarily in the central portion of the property, with one large town being observed on the eastern portion of Sun Prairie.

*Transects* - Crews recorded a total of 12 independent Black-Tailed Prairie Dog observations, amounting to a total of 44 individual animals (that were counted). Our largest single group count consisted of too many animals too count (>100).

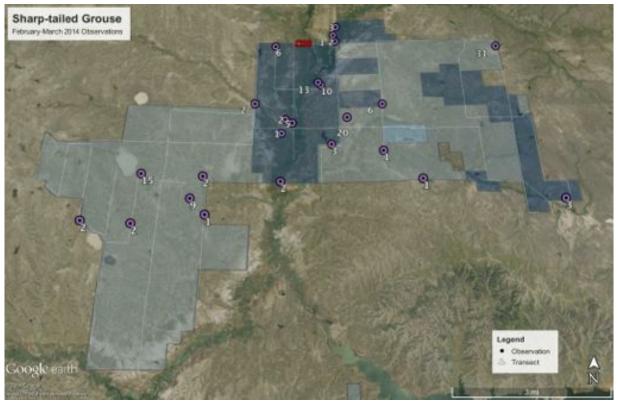


**Figure 11.** Black-tailed prairie dog observations with numbers indicating the size of the group, and pink areas indicating previously known prairie dog towns.

#### **Sharp-Tailed Grouse:**

*Transects* - Crews recorded a total of 24 independent sharp-tailed grouse observations, amounting to a total of 143 birds. Our largest single flock count included 20 birds. The average group size was 6 grouse.

Cameras - One individual sharp-tailed grouse was observed at camera C06.



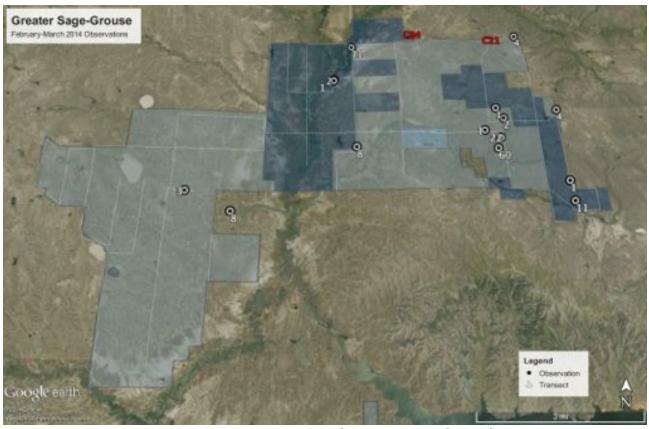
**Figure 12.** Sharp-tailed grouse observations with numbers indicating the size of the group.

#### **Greater Sage-Grouse:**

Greater Sage-Grouse observations occurred in higher concentrations towards the eastern edge of the Sun Prairie property.

*Transects* - Crews recorded a total of 15 independent Sage-Grouse observations, amounting to a total of 139 birds. Our largest single flock size consisted of 60 birds. The average flock size was 9 birds.

*Cameras* - Greater Sage-Grouse were observed at two of our camera traps. A total of 23 birds were observed at these two cameras. Of the birds observed at camera traps, 18 appear to be males. It was not possible to distinguish whether 5 of the birds were a male or female.

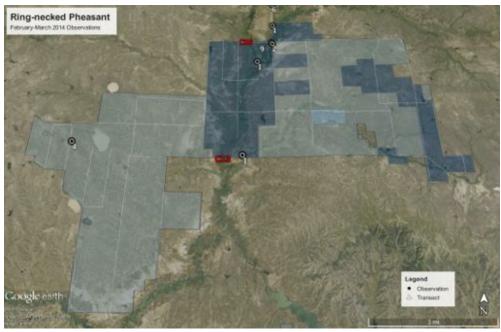


**Figure 13.** Greater Sage-Grouse observations with numbers indicating the size of the group.

#### **Ring-Necked Pheasant:**

*Transects* - Crews recorded a total of 8 independent ring-necked pheasant observations, amounting to a total of 26 individual birds. Our largest single flock count consisted of 9 animals. The average flock size was 3 birds.

*Cameras* - Ring-necked pheasants were observed at nine of the camera traps with 3 independent observations, amounting to a total of 3 birds were observed. All three birds were males.

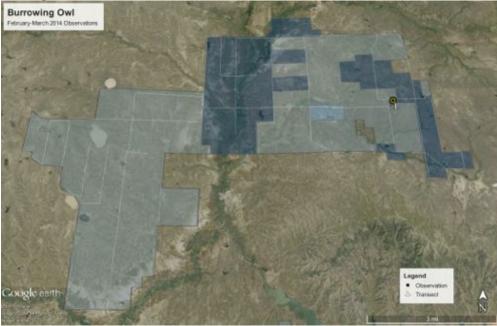


**Figure 14.** Ring-necked pheasant observations with numbers indicating the size of the group.

### **Burrowing Owl:**

One burrowing owl was observed near a prairie dog town on the eastern side of the

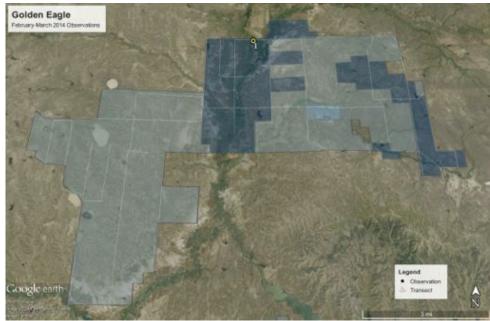
property during a transect.



**Figure 15.** Burrowing owl observations with numbers indicating the size of the group.

# **Golden Eagle:**

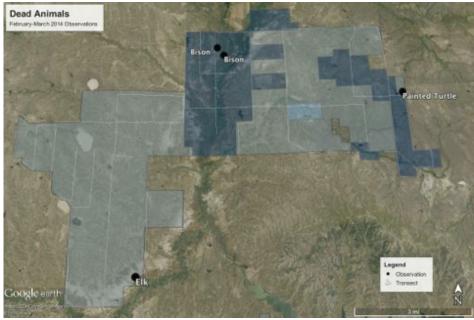
One golden eagle was observed in the north central portion of the reserve during a transect.



**Figure 16.** Golden eagle observations with numbers indicating the size of the group.

#### **Dead Animals:**

While several bones were observed, only intact carcasses or easily identifiable species were recorded. Dead animals that were recorded included two bison, one painted turtle, and one elk skull.



**Figure 17.** Dead animal observations with species indicated.

#### **Human Artifacts:**

Human artifacts were seen throughout the reserve while walking transects. Artifacts were considered anything left from humans and included structures, machinery, garbage, etc. In total there were 25 independent observations of human artifacts. Of those, 12 were of garbage of various types (fencing, tires, etc.), 8 were structures (wells, windmills, signs, etc.), 4 were leftover equipment (e.g. abandoned farming equipment), and 1 was a grave site. All were marked and described for either cleanup and removal or protection, whichever was appropriate.



**Figure 18.** Human artifact observations with descriptions of artifact type indicated.

#### **Badger Holes:**

Volunteers marked badger holes across the reserve when walking transects. Five distinct badger holes were observed while on transects. All observations included photographs which are available in the digital supplemental data.

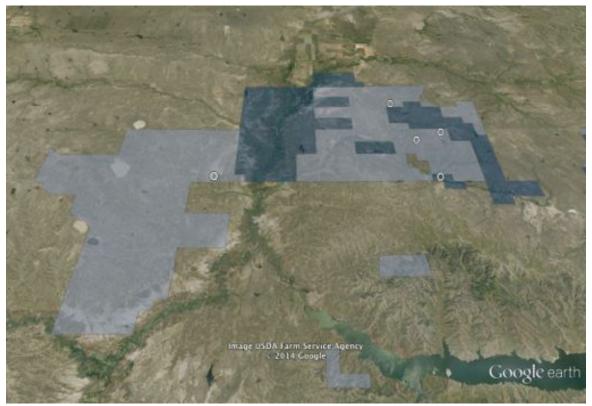


Figure 19. Badger hole observations.

#### **Hydrologic Features:**

Understanding stream flow across the Reserve is important, as many of the streams are ephemeral and only flow periodically throughout the year. Volunteers recorded the hydrologic features of Sun Prairie by estimating water depth. Results are shown in figure 19 where larger icons depict deeper streams and higher flow rates.

The following categories were used to distinguish between flow and depths:

- 1. Standing Puddles
- 2. Flowing Trickle
- 3. Flowing Up to One Foot Deep
- 4. Significant Current More Than One Foot Deep
- 5. Waist-Deep Flow

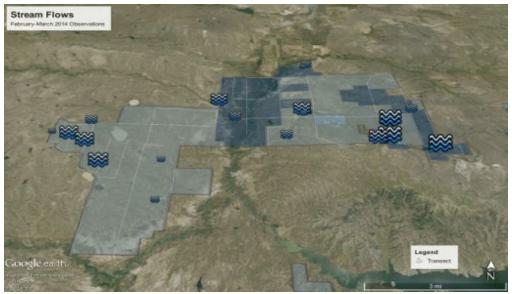


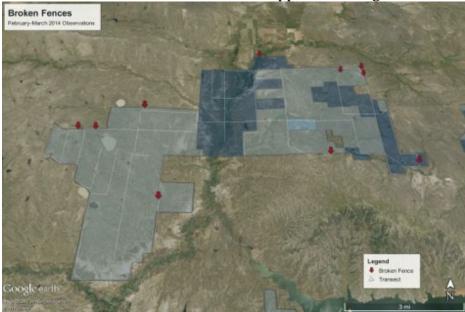
Figure 20. Hydrologic feature observations with size indicating depth of flow

#### **Russian Olive Trees:**

No Russian Olive Trees were found during February or March.

# Other Waypoints of Interest:

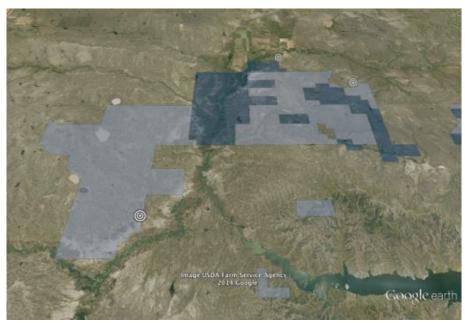
**Broken Fences -** Ten broken fences were observed on Sun Prairie's fences. Their locations are visible below. Photos are available of each on supplemental digital data.



**Figure 21.** Arrows indicate breaks in the external fence line of the Sun Prairie.

#### **Grouse Collisions:**

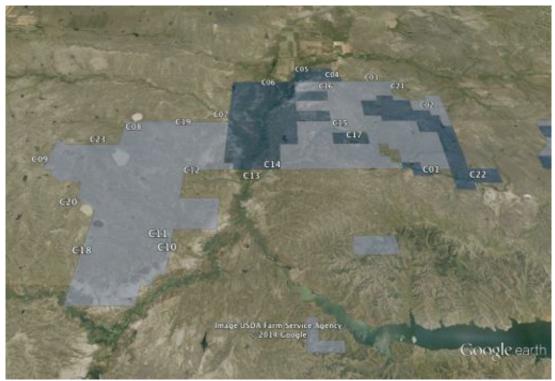
Three collisions were observed where grouse had apparently collided with fences. We were unable to determine species based on feathers alone, and an expert should be consulted to distinguish between grouse species observed.



**Figure 22.** Where evidence of grouse/fence interaction has been observed.

#### **Camera Trapping:**

Camera traps were set up throughout Sun Prairie primarily to investigate wildlife-fence interactions. Cameras were regularly maintained and crew members visited each camera approximately every two weeks to replace memory cards and check batteries. Camera locations are shown in figure 23. A summary of the camera trap observations by species can be found in table 2.



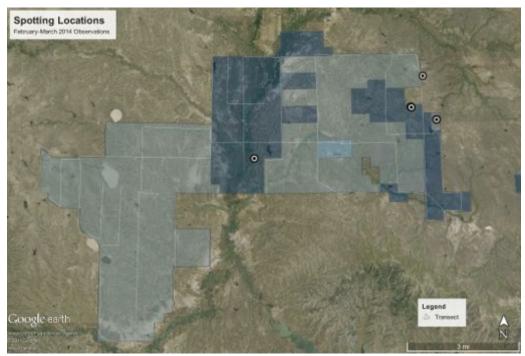
**Figure 23:** Camera sites on internal and external reserve fence lines.

#### **Spotting:**

High points were selected throughout Sun Prairie for scoping wildlife as an additional way to survey wildlife. Spotting took place at four distinct stations, and stations are shown in figure 24. Through 21.8 hours of spotting at four distinct spotting sites, Land**mark** crews recorded 18 independent wildlife observations that included 148 animals. Table 3. provides a summary of the species observed.

Table 3. Summary of species observed at spotting locations.

5-	Species	<b>Number Animals Observed</b>	<b>Largest Group</b>	Avg. Group Size
Ungulates:	Bison	90	48	8
	Mule deer	12	12	12
	White-tailed Deer	6	6	6
Sml Mammals:	Porcupine	1	1	1
	Prairie Dogs	1	1	1
Birds:	Duck	4	2	2
	Canada Geese	35	35	35



**Figure 24:** High points designated as scoping sites.

## Additional Notes Observer Reliability

In its initial phase, the Land**mark** project has been wildly successful. We have had full rosters of volunteers, have successfully collected thousands of wildlife observations including interactions of numerous wildlife species with fences, and offer here actionable information for the Reserve teams. Undeniably, scrutiny about the validity of wildlife data collected during citizen science research is common. We view Land**mark** as an opportunity to show that when done properly, data collected by non-scientists can be defendable, reliable, and incredibly useful.

We have experienced multiple challenges and have worked to overcome them in several ways.

Crew members are trained thoroughly at the beginning of each month to identify wildlife species common to the American Prairie Reserve. However, each Landmark volunteer has a different background in wildlife identification and their knowledge varies widely. Crew members work together to make positive identifications of plants and animals, photograph the species for data validation when possible, and note any uncertainty. Likewise, counts and distances to wildlife often must be approximated, especially when there are large groups of animals or they are far away. However, estimates are always made collaboratively by Land**mark** volunteers to reduce uncertainty, and estimations are noted in the data sheets. With this in mind, all Land**mark** crew members are thoroughly trained with a specific emphasis on avoiding errors that could commonly be made, such as between similar-sized ungulates or small mammals. All data collected is done so under the close

supervision of ASC staff. When any doubt exists, Land**mark** volunteers are instructed to err on the side of caution and document each observation extensively, meaning that in most cases our data is verifiable through more than one method. For example, when possible, each observation is paired with a photograph for data validation. We have verified many sightings and find our field data to be quite accurate. All observation photos are available in the digital data supplements. Additionally, the use of technology such as tablets, GPS units, rangefinders, and our ability to observe data collected on a daily basis all mean that observer error is greatly minimized through auto-populating data fields, drop down menus, and constant verification of data.

Weather and road/hiking conditions can make the goal of walking transects and servicing remote cameras every two weeks difficult. Volunteers must navigate adverse conditions, but make every effort to meet that goal and keep on schedule. Crews are given flexible days to accommodate such delays and are instructed to note any deviations from the schedule.

Each camera site requires its own considerations to avoid false-triggers and ensure capture of useful data. As the crews become more familiar with each site, the sensitivity and placement are being adjusted for the best results.

We have found that several memory cards have failed to record data or become unreadable upon collection. We are working to find the best solutions for this issue.

We have found that many challenges exist when reverse geocoding photographs and have found ways to bypass this obstacle that have allowed this to become more efficient.

#### Implications of data/results

As this is report contains only our first two months of data collection, it is premature to draw any firm conclusions and this report will serve to assess and adapt our methods and analysis of data. We believe data collected to date indicates that our sampling of a few species may eventually provide enough data to estimate local seasonal and local density (e.g. grouse and deer via DISTANCE analysis). For some species the scale we are sampling is probably too small to determine density and thus including more Reserve units may better allow determination of relative use and abundance (pronghorn, coyote). We are continuing data collection this spring/summer quarter to get a better sense of these issues.

We will add camera sites along standard (non electrified) barbed wire fence to compare animal crossing rates to our electrified fences.

We will record any occurrences of some select imperiled species including swift fox.

#### **Future Opportunities**

We have identified several opportunities to maximize the potential of this project and offer the following as potential additions to the current scope of the Land**mark** project. Any additions must be coordinated between management of APR and ASC. These include but are not limited to the following:

- Guided outings with donors, students, and community members:
   ASC can provide opportunities for large and small groups on the Reserve that will fully engage a variety of individuals in our ongoing data collection effort and provide them the opportunity to engage intimately in the conservation and landscape.
   These outings would be appropriate for groups ranging from students 11 years-old to corporate groups and donors.
- Database and data management solutions:
   Data management is a major undertaking for a project of this scope. ASC can develop and provide data management solutions to make accessing and organizing the data generated by the project as seamless and easy as possible for APR. By designing a customized database and regularly updating and maintaining it we can provide near real-time access to Landmark data beyond its raw form.
- Website management:
   Similar to data management, ASC can provide website design and management services for a dedicated Landmark page that would include interactive maps; regularly updated blogs that include storytelling, videos, and photography; social media; and more.
- Expansion to other portions of the Reserve:

  Currently the Landmark program focuses on the Sun Prairie region of APR. ASC could replicate the Landmark program to other areas of the Reserve, providing simultaneous data collection using common protocols across multiple properties.
- Education program to engage students around the world:
   ASC has successfully developed and implemented educational programing
   (curriculum development, live streaming Q&A's to classrooms, etc.) for past
   projects. Building on previous success, we can tailor educational programming for
   students to learn about and engage with the Northern Great Plains, as well as the
   Reserve and Landmark.
- Visual media:
   ASC can provide additional visual media coverage of the Landmark to engage a wider audience.

#### Acknowledgements

Launching this project in such a short time frame (three months from initiation to launch) would not have been possible without the support of many people. First, we'd like to thank the pioneering Land**mark** crews for their trust and sense of adventure. Thomas Ward, Rob Pudner, Colleen Ferris, Cayley Faurot-Daniels, Anthony Mancuso, Amanda Smith, Beth Schadd, Merrill Warren, and Ryan Rock launched a historic project we know will be far better thanks to their hard work. It takes a tremendous leap of faith to travel to the Northern Great Plains in the middle of the Montana winter. The first crews established a

stone-solid foundation of hard work, camaraderie, and good decision making on which future crews will build.

We'd also like to thank the Reserve team, James, Lars, Ellen and Damien, for welcoming the crews and the ASC staff. The conversations over shared meals and around bison pens have been one of the highlights of the work.

The crews would like to thank John and Kirsty Stewart for their neighborliness on the prairie. From roping lessons, to crock pot loans, local beef, riding along to doctor calves, true stories, and good company. The friendship has been a highlight of the experience for the crews.

We would sincerely like to thank Kyran Kunkel, Curt Freese, Lance Craighead, Brent Brock, and Randy Matchett for your guidance on project design and scientific rigor.

Special thanks to Greg Tsarias for the use of several of his photos in this report.

Finally, thanks are due to the entire team at the American Prairie Reserve for their support of the collaboration. From fried chicken dinners to discussions about data protocols, photo editing, human resources and strategic planning, Land**mark** has benefited from the attention and contributions of individuals across the APR staff.



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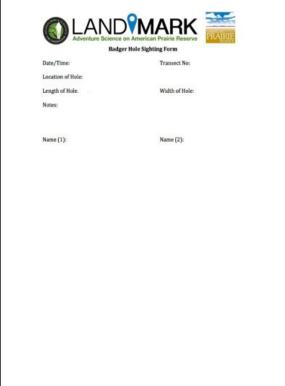
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#### Appendix 1 - (Sample Data Sheets)

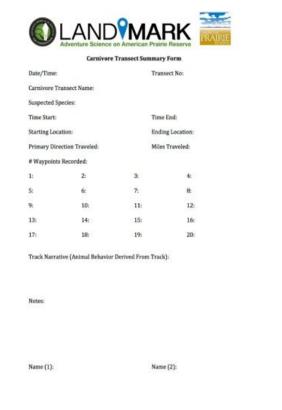














Date/Time:

Waypoint Name:

Location:

# of Items:

Can Items Be Moved By Hand (Yes/No):

What is your best guess of what it is?

Additional Notes:

Name (1): Name (2):



#### Fence Crossing Form

Start Time: End Time: Longitude:

Fence Transect Name: Current Ground Conditions:

Number of Fence Crossings Observed:

What Species Did You See Tracks of That You Were 100% Sure About?:

Notes:

Name (1): Name (2):



#### Stream/River Flow Form

Date/Time: Transect No:

How Much Water Is In the Stream?

0: None
1: Standing Puddles
2: Flowing Trickle
3:Flowing
4:Significant Current More Than One Ft. Deep.
5: Waist Deep Flow

Name (1): Name (2):



Transect No.: Date/Time:

Waypoint Name:

Distance to Olive Tree:

Compass Bearing to Center of Stand:

Height of Largest Tree:

Did You Capture a Photo (Yes/No):

Notes:

Name (1): Name (2):

# **Appendix 2 - Animal Observation Data**

# Bison:

			8,64	ation		414						
Observation	Date and Time	Transact No.		Langitude (deg)	No. Animals	Ontenor to Group Cember Zyalk)	Animal Between	Direction Of Travel	Printel	Weather	Ground Conditions	Observer
	75P-34 19-30	Other/Driving	47.3973649	-007.767922		79	Greating/Teading	Desironey	Box	Gran/Calm	Scottle .	Thomas Word.
	2/9/34 16:42	Other/Snicre	47.7649953	1007.7794907	128	308	Greating/Tending	Stationery	Yes.	Cean/Calm	Ory	Thomas Ware
1.3	375/14 16:37	Otherbring	47.3453128	- GELTLY LOTTER		88	DiscrepTeeling	Blattonery	711	Clear/Calm	Dry	Thomas Ware
- 4	DW16937	Other Driving	47.779847	-UCF.7663139	- 4	79	Craing Teeding	Butterery	Tee		Wind Boars Star Trees	Coleen ferms
. 3	1/6/14 12:05	Other Duniel	47.7584137	-0.07.76907973	. 3	319	Greating Texating	Butterney	799		Wind Blown Star Snow	College ferries
	4/9/14 12:15	Other Driving	47.7630209	-12F.7723948	39	400×	Laying Down	Storomery	796		Street Stown Literatures	. Amende Smith
	\$157 HENRY	Otherstroom	47.7759561	-16F3M6257K	. 9	400×	GRAZINg/Texting	Stationery	Yes		Wind Bown learSnow	Cayles Record Gene
	208/34 (3:09	Other Snivrag	47.7907903	-1007.77W0418		1.5	Greening Textiling	Buckeyey	714		Wind Blown Int/Strow	Roll Publish
	2/6/24 11:43					400+	Gracing Treating	Distancy	Sec	Dear/Calm	Wind Bown lon/Snow	Thomas Ward
110	2(1)(14,10-32)	7787	47,1230909	1007-6703422		198	Grazing/Teeling	Discovery	Ten		Wind Bown Son/Snow	Tony Mehricas
15	307018 (1):39	77108	47.7548029	-LEF ARRODOWA	- 2	4004	Drawing-Texting	Booking	510	-Cloudy	Wind Blown Stay Trees.	Thorium World
1.2	307034 13:34	77108	42.7584250	-107,701,3063		4004	draming/freding.	Storockery	Ten		Wind Bown Starffree	Thomas Ward
13	3/0/14 11:45	17108	47.7106804	-0.01.7647804	- 1	29	Rad Away	586	. No.		Writed Blown Startfrees	College Review
1.0	207034 12:49	TY106	47.7500001	+167.70H8463	. 2	6004	Greeing/Feoring	Stationary	769	Creat/Calm	Wind Bown los/Snow	Coleen fame
15	217134 12:49	77104	47.7521803	-507,767475	1	A00+	Greeny Teeping	Stationery	No.	Couds	Wind Bown loadsnow	Thomas Word
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18	379/18 9:30	Other Driving	47.7583903	-007.7704068	- 2	40.	Granny/Yeeding	Berny	Tes.	Cean/Calm	Strove	Roth Publish
19	3/9/14 11:00	7799	47,7943209	-00F.8150794	1	400+	Drawing Feeding	709	764	Winds	Smile	But Pulling
210	3/9/14 14:18	17700	47.7559674	-107.7s03888	13	400+	Graing/feiding	769	Yes.	Windy	Wind Bown Intelligen	Cavitiv Neuron-Servi
Th.	3/9/34 14:29	7706	47.79/2015	107.7767431	19	45	Drawing/felding	Batterieve	Rec.	Wordy	Strone	Not Publish
29	2/9/34 16:07	TTRE	47.790373	-15F-7779463	100	1600 w	Greating Teaching	N	No	Windy	Snow	Sub Pubrer
23	3/19/04 (0:30)	Other/Snines	47.7903467	+197.747916K		188	Other		700		Wind Blown Inschaed	College Ferre
39	2/10/14 8:45	Otherstriang	47.7627113	-107.7611198	113	4001	Disserng Feeding	Balleney	704		Wind River Drafflein	America Smith
25	2730/14/9/56	TTDE	47.761139	-107.7177601	- 3	400+	Laying Down	Stationery	No.	Clean Carry	Street	Son Pudner
29	3710/16 18:41	1709	47,7546964	-cor.rygetox	- 1	325	Straining/Yeading		700	Dest/Care		Consen furms
29	3710/14 11:07	Other/Driving				400+	Drawing/Yeeding	Stationary	No		Write Board Starffree	Tony Mahouse
28	3/20/14 10:27	77'06	47.7569001	-107.70K300W	- 5	180	Stationery	Stationary	Yes	Court Calm	Snow	Auto Pudmer
29	3/10/14 12:59	7794	47.7943903	187.7198572		400+	Graning/Yearing	Stationary	West.	Cast/Calm	Stock	Act Putter
36	3/10/14 13:05	7796	47.7952126	187.7136294	19	340	Stationary	Stationery	Yes	Coan/Caire	Street	Note Pudmer
- 10	3/19/14 13:47	77706	47,790,9000	127,724963		179	Mationary	Madeney	700	Direct/Culter	Show	Both Paulter
10	2/10/14 15:14	7706	47.79/70807	-UST.T102018	40	400+	Grains/Treding	Buttersery	Au	Cres/Cale	Store	Ann Pulling
10	3/10/16 15:16	T7196	47.79/2070	-127.73(t/be)	10	400+	Orsens/Teeding	Balansay	No.	Crox/Calm	String	Not Politic
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25		7796	47.7475233	-187 X351316		279	Laying Down	Stocomery	700	Cearcain		
56	3/10/14 16:09		47.7500123		12	308	Grung/feeding	Stationary			Strong	Auto Pustner
92	2/12/14 9:00	Other/Driving		-187.711.890K		900 v	Greeny-feeding	Stationery	716	Crear, Calm	Snow	Cayles Feuret-Sam
	3/12/14 10:40	17568	47.73796	107,7973469	10	6501	Graphing Teaching	Stationary	715	Cear, Caim	Snoe	Acto Publish
28	3/12/14 11:46	7726	47.3436263	1027,7607667			Stationary	Bladenery	Tes	Clean/Calm	Show	America Smith
	3/13/16 19:01	7798	47,7798878	UST.TTRAKER	304	129	Graning Tooling	Metoracy	Yes	Ciral/Calm	Grove	America Smith
40	3/13/16 15:40	7708	47,7903803	-107.7971961	- 2	4004	Drawing/feeding	W	798	Windy	Brow	America Stricts
40	3/12/14 16:32	TYBE	47.5679293	-127.7637563		350	Course Tending	Boconery	. 84	WHAY	Blow	Non-Pulmer
10	2/12/14 9:19	Other/brinsh	47,7791303	HIEF.7662801	- 4	310	Greating/Textons	Stationery	50	CearColm		No horse
40	202014908	Other/Driving	47.7629664	-DEF.779380W		296	Greating/Teaching	Stationery	No	Raining	Wind Bown Darbnow	
104	3/34/34/34/38	Others Driving	47,76621588	101.7581275	. 5	4004	Greeng Treding	Stationery	- Ann		Wind Blown little Treat	Amenie Smith
45	2014/14 14:00	OtherStrong	47.7663261	1007,7581124	30	A00+	Graning Tending	Surienay	Alte	Clean/Calle	Snow	Tony Hancuse
46.	3/34/34/34/33	Others Drowing	47.7885294	-107.7994S	45	4004	Graning/Teeding	Blackmary	Tee		Stred Board becknow	Colleen Ferris
47	3/04/54 14:04	Other Driving	47.76623146	-007.7151184	15	400+	Drawing Teeding	Managery	Au.	Clean/Calm	Muddy	Tony Manouse
48	3/14/14 14:49	Others briefly	47.340888	-027.5406280		10	Grazing/Yesony		50.	CHACCHE.	Polity	Caying Novice-Dark
49	3/14/14 15:09:	Other Driving	40.3400290	107.7406763	109	4004	Dreamy/feeding	Bononey	Ann.	Wordy	Poddy	Cayley Revot-Dans
. 50	3/14/14 15:30	Other/Solving	47.7455757	-007.7406363	1	#00×	Greating Teeting	Shahenary	- 60		Wind Brown Inschool	Gayles Fascett Dans
50	3/14/14 14:43	Other Sovrey	47.76625071	187.2551251	340	469**	Saying Down	Stationary	50		Wind Blown load/snow	America Smith
52	3/14/14 16:52	Other/Driving	47.7883796	-127.7898842		6001	Graning Tenting	NE.	Au	Clouds	Wind Boars Intelligence	Thomas Ware
33	3/14/14 17:04	Other/Driving	47.797790	-107.7501766	0.0	196	Greating/Renders	Stotlenery	Au.	Clean/Catin	Bully	Cayles Faurit Gara
34	3/17/14 #:33	Other Driving	47.7389091	-027,7103186		360	Dissing Teading	Stationery	Yes	Clouds	Dry	Thomas Ward
50	2717/14 9:30	Other/Driving	47.8009900F	-557.7409966	- 10	350	Orsaing/Yesding	Batteriery	60	Windy	Wind Blown Starfmow	
56	A/17/14 9:30	Other/briving	47.7358423	-187,7397131	. 9	336	Greating/Yearding	Batterary	Yes	Courts	Wind Nown Itselfmov	Thomas Word
57	3/15/14 15:38	Other/Driving	47.79691121	-187.7379994		166	fireting/heading	Bodoney	Aur	Winds	Mind Blown Starffrow	
				187.7967863								

100	810141006	OtherDriving	47.7240463	-007.8075840	4	179	Laying Down	Stationery	Ten		Wind Brown SolyShare	Amaneu Smoth
60:	3/18/14 P.28	Otherstown	47,77084779	-107.790501	3.6	400+	- Graphy Peeding	Stationery	Ten	Minds	Wind Stoan loc/Snow	forly Markovso.
4ti:	3738/14 7:58	Other/Driving -	47.77084526	-001/24/EMIT	.29	400+	Greating/feeding	Stationary	Rea	Winds	Wind Stown Jos/Snow	Tony Persons
F2	2/16/14 8:24	Other/Sriving	47,77085605	197.3666221	.00	#99 s	Greeing/Testing	Stationers	Ke	Winds	Wind River Ice/Snow	Terra Martinos
63	2/18/14 8:23	Other/Driving	47,77089612	107.7665266	769	W00*	Greeny Teacing	Shellerary	No.	Winds	Wind Store Str. Stole	Terry Warrouse
14	2/18/14 9:28	- Differ/Driving	47-7933847	107.7607963	. 3	600+	Granty Testing	Sharovery	Ret	Crear/Calm	Dis	Cayrey Flurish Current
65.	2/18/14 9 18	Other/Driving	47.7995323	-027.7898671	2	400+	- Granny/Teeding	Stationary	Part .	Windy	Dry	Amenda Smith
16	8/18/14 10:17	- Other/Driving	47.7391304	-coop. Firesona	- 10	400+	Grauting/Teaching	Stationery	. Poli	CHECK!	Multip	Contento Ferris
67	2/18/14 9:27	1798	47,75645414	-USP.30009KY	5	400+	Onorny/Teeding	Stationery	No	Winds	09	Thomas Hors
588	275/14 9:46	FTGA	47,75488352	-107-7159042	4	300+	Greening/Needing	Stationery	Tes	Winds	Bry .	Thomas Word
10	8/19/14 10:10	Other Striving	47.7906125	-107.7081268	3	6.248	Greating/Feeding	Stationery	No	Works	Multiple	Cayley Feuret General
70:	3/19/14 12:11	Differ Shiring	47,7573213	-947.6626222	3.	H00+	Gracing/Teeting	Stationery	No	Winds	Mutitie	Carley Found Denich
76	2010/14/12:57	17767	47.3633979	-107.4700921		H00+	Gracing/Teeting	Sharounary	Yes	Weds	Muddy	Time Memorale
72.	3/39/14 13:13	7797	47,7501081	-007 ATURKST	1	10.2	Drawing/Teeding	Buttoners	Ten.	Windy	Wind Black So/Snow	Carlesin-Ferris
tra i	3/19/14 15:24	1708	47.7539839	-107.8539778	1	120	Grazing/Yeading	Stationary	Yes.	White	Dry.	Arkenda Smith
14.	2/30/14 9/06	Other briving	47,75252595	-spr.77670s7	-24	#00+	Straying Feeding	Stationary	Ten	CleanColm	019	Amanda Simoti.
rs .	3/39/14 10:00	Other/Driving	47.80179027	-007.7533184	. 1	400.4	Grading/feeding	Stationary	Yes	Clear Calm	Dre	Amanda Smith
76	2/30/14 12:02	Other Brising	42,75732057	-107.7700041	4	294	Graphing/Reedling	Stationary	Yes	Crear/Calm	Hudto	Stemas Word
108	2/21/14 9:10	T7106	42.75(8) 585	-167.7235484	18	#00 s	Greating/Reading :	Shablemany	Yes	Cinac/Calm	Wind Steam Into Seese	Amanes Smith
w	2/21/14 9:54	777.06	47.7361461	-107.7182294		300+	Gracing/Yessing	Shallsonary	Tes	Cloudy	Wed Steam Lin/Steam	Thomas World
w	2/31/14 10:00	17100	47.757948	1007.752863	183	H00+	Greating/Tessing	Matternacy	Rea	Clear/Calm	Dry	Cavity Faunt-Deries
e :	3/21/14 10:42	7706	47.75806614	107.7569793	0	380	Sim Bedy		Title	Coudy	Wind Brown boy Snow	Tromas World
in in	2/21/14 10:30	TTD6	47,73038788	-127.7079996	53	300+	Gracing/feeding	Manusky	Ten	Clindy	stred Store toybers	Thomas World
10.	AG1/14 11:20	1706	47,75050439	-107.7097149		300+	Lawing Down.	Stationery	Ten	Courty	Wind Stort Ion/Store	Thirmas third
0	2/21/14 12:19	7706	47,79099031	-007.7127206		275	Lawing Down	Stationary	Tek	Minds	019	Amenda Smith
W.	3/21/14 12:27	1704	47.9899247	1014479.53c		300+	Granny/Torolog	Stationers	Ten	Croudy	Sev	Chomas Ward
6	3/31/14 14:48	7706	47.75467536	1007.Thoshee		300 +	Gracing/Seeding	Stationers	Ret	Coudy	6rv	Thomas Ward
	2/21/14 15:38	17706	47.7621024	107.7947883		276	Gracing/resting	Stationery	Ten	Chiudy	Dry	Thomas Ward
7	2/26/14 12:02	7762	47.7569764	-127,7996184		H00+	Grading/Testing	Metersery	Ten	CoarSale	Street	Amenda Smith
		7762	47.7942317	-107.A299094	30	400+			Tes	CHRICAN		
	2/26/14 14:30	1794				300	Crashing/feeding.	Bullionery			Broke	Amenda Simon
10	5/5/14/10:39	State State of	47.79475868	-107.7908009	40		Gracing/Reading	Materiality	Yes	CoayCalm	B/siye	Partit Moren
	3/4/14 9:37	Other/Driving	42.3943705	-157 K71MOR	.3	160	Laving Down	Stationery	No.	CeanCaim	Snew	Marriel Warren
6	3/9/14 9:13	Other/Driving	47.7758187	-007.6709489		20	Greens/reading	Stationary	THE	CrearCalm	\$100	Marris Warren
Q.	\$19,14.9-44	7796	47.73734236	-107.6863083		H00+	Lauring Delact	Shrinnery	Res	Coscillato	Brew	Torsy Harroune
a .	3(4)34.9(5)	Other/Driving	47,7919126	007.6902162	. a.	400	Stationary	Stationery	No	Crac/Calm	5104	Piprit Warren
100	2/6/14/12/21	TORT	47,7641238	-027470662	3	30	Laying Down	Manurary	Yes	Court Calm	Shoe	College Ferris
16	202124-0122	177.06	47.1396099	S07.7678768	3	200	Non-Reary		Ten	Clear/Calm	Bross	Marriel Warren
16	3/5/14 9:39	TTOS	47.73980809	-007.79KELLE		400	Literal Desert	Stationary	Ret	CHRISTIAN .	2506	Tony Plancouse
10	5/5/14/5/54	17705	47,75040733	-127.7949988	. 5	129	- Graving/Teeding	Stationary	No.	CHR/CMR	Brow	Toma Marricana
id.	375/14 8140	11106			19	4004	Warking	5W	Yes	Goody	Snow	Plantit Wydnet
risi .	MW14 19:53	7709			. 1	180	Lawing Drown	Stationers	No	Courte	Show	- Ryan Assol
000	364/14 (1:00	T704			45	100	Granny/Feeting	<b>ENTERNATY</b>	Ten	Circuity	Briss	<b>Partiti Maren</b>
011	366/34 11:51	77'06			40	400	Graving/Resiling	Shrining	Yes.	Citally	Snew	<b>Parrill Warren</b>
0.3	169/16 11:00	7700			1.	400	- Streeting Teating	Stationery	Ten	Windy	2764	Parril Spren
23	3/9/24 7/47	Other/Driving			-	13	Greating/Teeding	W.	Ten	Crest Calm	Multiple	Ryan Rock
34	5/9/24 8/35	OtherStrong	47.96554434	-107.977M63		400+	Graving/Yeading-	MARKAN	Pos	CHACCAN	Mudity	Conwell Ferrei
IN	5/5/14 9:17	Ottor/bridge			9	400+	Laying Sows	Shapenery	Box .	Countries	Muddle	Non-Schadt
166	\$1913 MILES	Other/Driving	47,48560094	160.9096		400+	Sinusing/Teeping	Stationery	No	Count Calm	Mudity	College Ferms
107	5/9/14 8:22	Other/Droving	47.9658A32	-957.9775563	- 6	460	Greating/Teresting	Stationers	No.	Gear/Gáre	Hudida	Harris Warren
18	30301611:50	7752	47.5856425	107 5775547	1	200	Solienary.	Stationers	Ten	Citaly	Hulkly	Dayley Feunit-Daniel
25	M10/14 15:07	7792	47.5896299	147.9779579	- 1	360	Leging Down	Stationery	Ten	Couly	Hulkly	College Person
		7708										
18	3/14/14 10:56	17000	47.7634269	107.7502994	40	800+	Grant/Feeling	Marriera	Ten	Cest/Calm	Dry	Cadreen Perms
10	3/38/34 (0.12	1700	47.7628674	-027.78001.01		300	Laying Down	Stationery	No	Court Calm	Multily	Marriel Styrren
12	3/16/14 10:40	77100	47.779909.2	-057.3786137	1	200	Groung/feeding.	Stationary	File	Countain	Multily	Partit Warren
13	ADM14 10:51	7706	47.7774008	-107,7596256		1010	Gramp*leading	Stationery	THE	CeacCén	Dry.	Consen Ferris
14	3/18/14 11:54	17106	47.3948584	-107,7767366		156	Lawing Down	Statemeny	Ten	Cracican	6n	Cayley Pound: Denet
10	3010/14/9/24	.7798	47.7540289	-107.71.0000*	1.81	400 v	GreenyTeering	Shirtness	Rela	Conclum	- Gru	Beth Schale
16	3/39/34 10:07	77106	47.7536675	1007.6899809	. 6	600 t	Greating/Teaching	SMIRITARY	No	Gran/Calm	Gry	Beth Schadd
13	3/19/14 10:09	7797	47.7577508	-107.8729409		164	Litering Desert	Stationary	Yes	Ceactain	Gry:	Steril Marret
18	3/20/24 10:50	1750	47.7723476	-107.6693556	23	5/5	Greeny/Yearing	W	Yen.	Winds	Dis	Byen Nook
18	3/19/14 10:38	TTOR	47.7242964	-007.6803298		400	Graying/Teating	Statooners	Ten.	Cherchin	Dry.	DWD-3x7w66
					122							
120					2	350	Stationary	Stationary	Ye			Colleen Ferr
121			47.7849004		1	400+	Grazing/Feeding		N			Beth Schad
122			47.7549982	-107.7545493	34	284	Grazing/Feeding		N		Dry	Ryan Rock
123					9	400	Walking	SW	N			Beth Schade
124	3/25/14 10	:47 TT09	47.759583	-107.799625	9	214	Grazing/Feeding	Stationary	N	o Windy		Ryan Rock
125	3/25/14 11	:00 TT06	47.781988	-107.7059934	5	400+	Grazing/Feeding		N	o Windy		Beth Schad
126			47.7813634		7	400+	Stationary	Stationary	N			Beth Schad
127			47.7609068		1	25	Grazing/Feeding		N			Beth Schad
128					2	350	Grazing/Feeding		N			Beth Schade
129			47.7699114	-107.7745916	1	100	Stationary	Stationary	N			Ryan Rock
130			47.738079		2	50	Grazing/Feeding		Ye			Beth Schade
						400						Beth Schado
131	3/25/14 13	:23 TT06	47.741986		6		Laying Down	Stationary	N			

# **Mule Deer:**

				ation		Andrew Pr. A.		Manager Av				
Observation	Date and Time	Transact No.	Carolitude (deg)	Complitude (dag) M	n. Animats	Distance to Group Contar (yels)	Animal Behavior	Proved Or Travel	Photor	Weather	<b>Ground Conditions</b>	Observer
	3/4/14 15:18		47.87(toeles	157.9896576	- 20	125	Apt Amey	M	50	Chargosin	Wind Blown Rox Snow	Gelieen Ferms
. 2	2/4/14 14:32	TTRE	47,9839749	107.9704461	30	125	Ran Away	N0	No		Wind Now Joe Snew	Tony Hancest
	2/4/17 16:36		47,87941448	107.9627908		175	Grazing/Yessing	- 16	No		Wind Stewn Joe Snew	Tony Hansan
	2907418-36	DENHIOWING.	47.97997088	-127.0826996 -127.0873936	2.	179	Drazing/Feeding	M	50	DIRECTORY.	Work Brown Too/Snow Dry	Coneen Rems
- 1	2/9/14 15:38	Denestorwing.	47,7817019	-107.7674746	31	3004	Stains/Feeding Rati-heav	54	60	Desiritary		Trons Ward
	2/9/14 17:28	Other Driving	47.892174	-187,8779736	13	130	Gracing-Teeding	Stationary	No		Wind Blown StarShow	Thomas Ward
	2/6/14 17:30	Other Grains	47,9791486	187.9429279	45	279	Grants Feeding	Stationery	No		Wind Blown Ico Sinow	Amenda Smith
	3/7/14 9:31	Dense Grising	47.8744969	107.5853554	33	4004	Grants Teeding	Stationery	Am	Course	Wed Seen ice/Snow	Shornes Ward
40	207/04 9:45	Diher Griving	47.8589.794	-187.7921632		8004	Grazing/Residing	Stationery	Non	Church	Wed Bloom Ing Snow	Thomas Ward
11.	207/04 9:49	Other Graving	47.8951924	487.7776075	35	6004	Gracing/Ressling	Stationery	Auto	Cleudy	Wed News Inches	Thomas Ward
1.2	3/1/14 10:11	DETHIRD WINE	47,77,79409	-127.6663999		136	Disting/feeding	Stationery	7604		Wind Nown Startfrow.	Thomas World
.13	2/11/14 12:08	TTEF	47,796/993	-107.67126	. 0	.01	Diller	- 1	No	Case Carry	Stole	Tony Manager
34	3/7/24 14:36	TTEF	47.796504	-157.0880094	1.1	0	Crossed a Force.		Yes :	CeardCorn		Amenda Smith
35	20114 17:35	Directioning.	47.6130812	-167.6777389	12	246	Searns/feeding	Stationery	40		Wind Brown Southness	Phornes Ward
36	2/1/14 17:35	Directorion.	47.6091775	>167.3709LS7	11	10.0	Rant Amore	NE	Sec.	Onety	Wind Brown Job/Snow	Thomas Ward
17	2/8/14 8:40	Other/Driving	47.8727775	187 9894195	29	4004	Granns/Feeding	Stationery	Nos.		World Blown Ico/Srow	Roth Pudner
18	2/8/14 8:42	Diher/Driving	47,8727626	-157.9853935	29	8004	Granny/Feeding	Stellenery	No.		Wind Stewn Joy Snow	Calcer Ferry
- 19	29/14 (7:13)	Directions	47,8704705	-187.969909W	21	1.12	Laying Disser	W	Yes		West Boses Jon/Stone	
30	3/10/14 7:92	DENKIDNING	47.9791996	-107.9807937		190	Drazing/feeding	Montenery	50		World Mover Southness	Thomas West
21	2710/14 8:36	Directioneries	47.808935	107,793496	3	200	Drazmy/Yesting	tomorary	No		Wind Street Stor Share	Thomas Ward
22	3/10/14 16:36	1706	47.7418406-	-167.7403962 -167.7503239			Stationary	3	Non-	Crear/Calm	fiv	Rob Publish
39	2/10/14 15:5K 2/10/14 17:4K	DENERGOUNG	47,7391584 47,8415942	-187,7522025	21	250	Stationary	2	No.	Cherritains CrestColm	Snow Wind Steam Into Snow	Rot Publish Claritin Secret Com-
25	3/12/14 7:54	Denunifortung	47.980731	167.981647	- 1	290	Great Programme	Stationery	Nes	CasoCain		Carvey Fauryl Dans
26	3/12/14 12:27	TTEE	42.7627276	-007.80904	3	6004	Laying Down	Stationery	7004	Winds	Snow	Box Fudner
27	2/12/14 12/12	TIES	47.7527288	107.624369		196	Laying Down	2	Time	Winds	Snow	Non-Publish
29	\$133774 53100	7722	47.79.77.196	-107.62771.79	- 5	4504	Laying Down	Stationery	heir	WORKS	Sinow	Rot Pudner
29	3/13/14 13:10	TTRE	47,7927279	-187-8068719		80	Scatoria/v	Nominary	700	WINDS	Show	Ros Pudner
30	2/12/14 14:05	9792	47,7905353	-187.8023536	13	400a	Grants Feeding	Somery	761	CracyCalm		Rob Pudner
11	2/12/14 14:11	773.2	47,7598792	187.8309614		4004	Grancy/Feeding	Stationery	Nes.	CoardCalm	Show	Rob Pudner
12	2/53/14 13:45	1123	47.69024918	107.8626272	1	250	Grazing/Reeding	100	Non		Wind Nown Ice/Stone	Amenda Smith
32	2/34/34 54:27	DENHIDRANA	47.7508966	-107,7469037	- 1	199	Kan Anay		760		Wind Stown Star Smow	
26	3/16/14 15:36	Other Online	47.7985306	1207,7808081		4004	Drawing/Yessing	Stationery	Trees.		Wind Stoon Jon Snow	College Rema
. 35	2/17/14 10:18	Other/forwing	47,7634515	107.6603079	10	300	Barn Nasty		No	Windy	Wind Mount Insuffrow	Tony Honouse
36	2/17/14 10:48	Denacionwing	47,7479945	-127.00EBW15	39	200	- Granna Peeding	- 6	No	WINDLY	Dry.	Tony Mehcuso
30	2/15/14 11:27	Other/Onking	47.79037413	157.7061589	- 5	319	Aprt Away	5	No	Windy	Wird Stein los/Snew	
36	3718/04 8:45	Other/Onlying	47,7885425	(107.7856424	- 2	4004	Granns/Feeding	Stationery	Aip	Winds	Bry	Amanda Smith
39	2014/14 9/55	Dinex/Driving	47,7708415	107.7903242	- 2	4004	Dozon/Feeding	Stationery	56	Winds	Wind Bloom Stay Scow	Roll Publish
40	2/19/14 13:00	TTDE	47.72680557	107.4641686	- 7	336	Kan Away	- 14	No	Winds	Dry	Thomas Word
41	SAMPLE TRUE	TTD6	41.76076143	-107,7108883		4004	Ram-Rimay	- 76	No	Workly	Wind Steam Star Snow	Amenda Smith
42	2/03/14 14/38	TYDE.	47,75094264	-107.7350037	- 3	235	Ram Reserv	190	56	Chuey	Dry	Ariseota Smith
40	2/21/14 19:18	7756	47.34650389	-187.7350805	2.0	275	Rate Away	. 9	No	Courty	Dry	fromas ward
44	8/31/14 13:39	17706	41.34(25.00)	-1EF.3440034 .	36	4004	BAR AMEY	546	40	Winds	Dry	Amenda Smith
45	3/34/14 (0:47	11114	47,7480066	167,8530425	4	4004	Ret Away		No	Cran/Com		Amenda Smith
46	2041412:57	TTRE	47.7930942	-167,8900229	- 3	4004	Stationary	Stationery	No		Wird Bown loadfrow	Rob Pusher
47	3/24/54 04/43	4,81	47.7936340	187.8995135		310	Stationers	Stationary	No.	Description		Cortoge Remis
49	2/24/14 14/52	DENextDriving TTEE	47,7911402	-187-8491990 -187-8491790	15	900	Distrip/Resting	Blatterary	No.		Wed Stein Street	Ros Pulmer Catheen Factor
							Ran Anny			Dearroam		
50	2/36/14 12:13	TTEE.	47.6945336 47.70908855	-107.841771 -107.8303876	10	200 400+	Snarry/feeding Rot Away	- 1	No		Wind Brown Startimen	Tem Mancaco
51	3/36/14 12:46	7783	47,71,79530	-187.6408484				-		CHRODAM		Carley Revise ban
52	206/14 12:47	TTER	47.71.60313	157.8401652		200	Ratt Assist	No.	No.	Case/Calm		Tony Pencine
54	2/26/14 12:58	TTER	47.7236737	167.6367279	-12	306	Grazing/Yesting Grazing/Yesting	Stationery	100	Ceariform	Muddy Wood Bloom Star/Show	Tony Hancasis Tony Hancasis
36	2/26/14 13/36	7704	47.72908833	187.6279200	13	8004	Balance	Biglionery	704	CasciCare		Amenda Smith
34	DWD4 DOS	TTDE	47.75290998	-107.668001E	2	270	Bart Smay	8	No	Car Core	Stoom	D Road
17	3/9/24 9:29	Other Driving	47,7919336	-107.0034403		400	Batt Sway	- 10	No	CHARLES		Marrie Woman
28	3/5/14 10:01	TTDS	47,7799942	-107.7565A32		300	Apr Amer	- 1	Am	Cleury	Snow	Cayley Faunts-Dans
										200000	07-27-2011	
59	3/6/14 10:43	TTDS	47.7775	-907,708611		200	Ran Away	N	No	Cloudy	Snow	Merrill Warren
60	3/6/14 13:17	7706	47.741564	-307,744444	18	400	Ran Away	8	Yes	Windy	Stow	Merrill Warren
62	3/10/14 14:12		47.985642 47.79266387	-107.9779524 -107.7037086	4	180	Ran Away Ran Away	5	Yes	Cloudy Clear/Calm	Muddy	Cayley Faurot-Danis College Ferris
63	3/22/14 B:23	TT03	47,79296387	-107.0532931	5	400+	Ran Away	SW	No	Clear/Calm	Dry Snow	Collean Ferris
64	3/22/14 8:23	1103	47,7298579	-107.8532931 -107.894339	2	200	Ran Away	N.	No.	Clear/Calmi Cloudy	Soon	Caviny Feurot-Danie
65		T703	47.6976568	-107.894339		130	Scationary	Stationery	Yes	Snowing	Snow	Ryan Rock
66	3/22/14 9:45 3/22/14 11:44		47.6890675	-107.8636242	15	400+	Stationary	Stationary	No.		Wind Blown Ice/Snow	College Festig
67	3/22/14 12:56		47,7167039	-107.8406274	5	400+	Ran Away	NE.	No	Cloudy	Snow	Ryan Rock
68	3/23/14 10:00		47.747694	-107.8240072	12	400+	Grazing/Feeding	Stationary	Yes	Snowing	Same	Mennii Warnen
69	3/23/14 11:03		47.762734	-107.819442	16	300	San Away	M	No	Cloudy	Snow	Merril Warren
70	3/23/14 12:11		47,72019	-107.81901	5	400	Grazing/Feeding	Stationary	Yes		Wind Blown Ide/Snow	
71	3/25/14 11:39		47.7914729	-107.7947473		300	Ran Away	W	No.	Windy	Dry	Merrill Warren
72	3/25/14 11:55		47.75508	-107.70378		300			No.	Windy		Beth School
73	3/25/14 13:00		47,7367873	-107.7310338	23	200	Grazing/Feeding Crossed a Fence	Stationary	Yes	Windy	Dry	Beth School
74	3/25/14 13:25		47.7421516	-107.7439504	23	400	Ran Away		No.	Windy	Dry	Beth Schadd
75	3/25/14 13:34		47,7394865	-107.7506349		350	Stationary	Stationery	No	Windy	Dry	Beth Schadd
76	3/26/14 8:43		47.741748	-107.7506349	2	200	Ran Away	bustomery	Yes	Clear/Calm	Dry	Merrill Warren
77	3/26/14 9:00	7703	47.6936739	-107.8417627	15	400	Walking:	58	Yes	Clear/Calm	Dry	Rear Rock
78	3/26/14 11:14		47,7267275	-107.8524215	4	200	Grazing/Feeding	Stationery	No	Clear/Calm	Dry	Beth Schedd

# **White-Tailed Deer:**

			Loc	cetion								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yels)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/8/14 14:16	TTQS	47.7663214	-107.7801731		80	Rart Away	N .	790	Windy	Write Brown Job/Sinow	Cayley Faurot-Daniel
2	2/8/14 16:19	7705	47,7670865	-107.7780652	- 1	90	Ran Away	NW.	No	Windy	Snow	Rob Pudner
3	2/9/14 16:26	TTQS	47,7897467	-107,779125		45	Ran Away	N	- No	Windy	Snew	Rob Pudner
4	2/10/14 14:41	TTQ9	47.7696532	-107.7846243		400+	Ran Away	366	No-	Clean/Calm	Wind Blown Jos/Snow	Thomas Ward
. 6	3/10/14 17:36	DENN'Drivins	47,7813494	-107.7674928	. 4	400+	Ran Away	748	Yes	Clear/Calve	Snow	Rob Pudner
6	2/12/14 6:39	Other/Driving	47,8006354	-107.7568955	2	18	Laying Down		766	Clean/Calm	Snow	Cayley Faunot-Daniels
7	2/12/14 8:49	Other/Driving	47,7674296	107.7675489	10	380	Ran Awey		Yes	Clean/Calm	Snow	Amende Smith
	2/12/14 13:33	7797	47,7674604	-107.7807954	3	370	Kan Away		No	Windy	Snow	Tory Manages
9.	2/12/14 16:02	9705	47,7811011	-107.7966203	3	400+	Rain Away		No	Windy	Snow	Tony Mancuso
10	2/18/14 7:65	Other/Driving	47,791801	+507.769842		300	Ran Away	5	No	Windy	Dry	Thomas Ward
11	2/18/14 8:44	Other/Driving	47.37084652	-907,760304		400+	Grazing/Feeding	58	This.	Windy	Wind Blown Joe/Snow	Tony Mancuso
12	2/20/14 9:40	Other/Driving	47,79185048	-107.7706187	- 3	3.75	Ran Away	5	760	Clean/Calm	Dry	Thomas Ward
13	2/21/14 12:46	77'09	47,7751239	-107.7995625	4	200	Laving Down	N .	Yes	Windy	Muddy	Cayley Feurot-Daniels
14	3/3/14 13/11	Other/Driving	47.78337272	107.7573805		400+	Ran Away	W	No	Clean/Calm	Snow	G Ryan
15	3/5/14 9:44	TTQS	47.7710504	-107.7596934	12	20	Ran Away		Yes	Cloudy	Snow	Merrill Warren
16	3/5/34 10:04	TTOS	47,7844951	-107.7571067		250	Rad Away		Two:	Cloudy	Snow	Cayley Faunit-Daniels
17	3/6/34 12:51	Tros	47.797967	-107.799333	- 6	250 250	Ran Away	NE	760	Cloudy	Snow	Ryan Rock
18	3/16/14 10:45			-107.7571858	-10	50	Ran Away	NE	No.	Windy	Huddy	Beth School

# **Pronghorn:**

			Les	MINA								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	<b>Ground Conditions</b>	Observer
100	2/4/14 16:01	7795	47.86355503	-107.8296952	80	0	Ren Away	5	No		Wind Blown Jos Snow	# Tony
2.	2/4/14 16:01		47.86364176	-107.8298047	80	0.	Ran Away				Wind Blown Josefinow	
3	3/5/14 17:29	Other/Driving	47,8635356	-107.8294941	120	200	Ran Away	56	160	Clear/Calm	Dry	A Thornas
4	2/6/14 10:33	Other/Driving	47.7430725	-107.8781061	70	400 -	Right Awary		No	Clean/Carm	Wind Blown los/Snow.	D College
5	2/10/14 10:04	1799	47,7545398	-107,7545816	40	360	Greeng/Reeding	5	986	Clean/Calm	Wind Blown losi Snow	A Thomas
4	2/16/14 10:46	Other/Driving	47.75356	-107.F4939	30	400+	Stationery	100	560	Clean/Celm	Snow	# Tony
7	2/10/14 13:39	7729	47.7917260	-107.7950061	40	400+	Ran Away	W. Co.	194	Clean/Calm	Wind Blown los/Snow	A Thomas
	2/14/14 14:39	Other/Oriving	47.79623982	-107.7981291	2	400 h	Laying Down	Stationary	No	Clear/Cath	Wind Blown Jos/Snew	C Amanda
	2/14/14 14:59	Other/Orlving	47,7885141	-107,7696501	27	400+	Grazing/Feeding	Stationary	566	Cloudy	Wind Blown Jos/Snow	A Thomas
10	2/18/14 7:13	Other/Driving	47.76779903	-107.7609538	20	400+	Ran Away	N.	No	Windy	Wind Blown Jos/Snow	# Tony
11.	2/18/14 7/34	Other/Driving	47.7885382	-107.7898637		400+	Drazing/feeding	76	700	Windy	Dry	C America
12	2/15/14 10:44	1707	42.3719122	-107.6899942	12	360	Ran Away	NW.	Nes	Windy	Wind Blown Job Snow	D College
13	2/20/14 6:51	TTRE	47,7475513	-167,894325	3	400+	Greeing/Feeding	Shattenery.	Nes.	Clean/Calm.	Wind Blown Job/Snow	O Collean
14	2/20/14 9:21	77704	47,7456842	-107.9015863	10	200	Grazing/Feeding	Stationery	No	Clean/Calm	Wind Blown los/Snow	C Amenda
19	2/20/14 12:48	7706	47.79188948	-107,7324973	1.1	300+	Ran Away	166	760	Courty	Dry	A Thomas
16	2/21/14 14:01	1706	47,77480193	-107,7352175	3	300+	Ran Away	NE		Cloudy	Ony.	A Thomas
100	2/24/14 9:36	Other/Oriving	47.79608523	-107.8886796	20	400+	Ken Away	W C	No	Clear/Calm	Stew	E Ceviev
18	2/26/14 13:13	1703	47,7236792	-107.8387331	10	300	Grazing/Feeding	Stationary	Nes	Clear/Calm	Wind Blown Job/Snow	F Tony
19	3/6/14 10:25	1706	47.786111	-987.79777W	5	400	Ran Away		160	Coudy	Snow	Marrill Warren
20	3/9/14 12:30	1799	47.791633	1007.796267	9	400+	Ran Away	5	Yes	Cleuty	Wind Blown Joe/Snow	Cayley Faurat-Danie
21	3/10/14 11:45	7702	47,733383	-107.834550	12	400+	Crossed a Fence	100	Yes	Clear/Celm	Muddy	College Forms
22	3/16/14 12:01		47.79885103	107.7318799	2	250	Drawing/feeding	Stationary	Sec.	Windy	Muddy	Beth Schade

# Elk:

			Loc	ation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/13/14 13:18	TT03	47.67999444	-107.8394758	1	0	Other	NW	Yes	Clear/Calm	Wind Blown Ice/Snow	Amanda Smith
2	2/13/14 13:55	TT03	47.69263604	-107.8417566	6	400+	Ran Away	S	Yes	Clear/Calm	Wind Blown Ice/Snow	Tony Mancuso
3	2/19/14 11:19	TT08	47.74111505	-107.6895315	1	0	Other	S	Yes	Windy	Dry	Amanda Smith

# Coyote:

			Loc	ation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (ydx)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1.7	2/3/14 23:23	TTOS	47.9859749	-107.9784481	2	120	Ran Away	5		Windy	Wind Blown Ice/Snow	
2	2/6/14 11:27	Other/Driving	47.7355969	+107.8599727	1	260	Ran Away	NE	No	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
3	2/7/14 9:27	Other/Driving	47.878659	-107.9855788	1	270	Ran Away	8	No	Clear/Calm	Wind Blown Toe/Snow	Thomas Ward
4	2/7/14 17:44	Other/Driving	47.8704479	-107.9070116	1	30	Ran Away	. 5	No	Clear/Calm	Wind Blown Ice/Snow	Thomas Ward
5	2/8/14 13:28	TTUS	47.7503138	-107.7818742	1	70	Stationary	NW	No	Windy	Snow	Rob Pudner
6	2/8/14 17:19	Other/Driving	47.8891878	-107.9855835	1	300	Ran Away	8	No	Clear/Calm	Wind Blown Jos/Snow	Cayley Faurot-Daniels
7	2/10/14 13:44	TTOS	47.7919443	-107.7245863	1	109	Ran Away	2000	No	Clear/Calm	Snow	Rob Pudner
8	2/10/14 17:35	Other/Driving	47.8064849	-107.7569113	1	400+	Ran Away	W	No	Clear/Calm	Wind Blown Jos/Snow	Cayley Faurot-Daniels
9	2/12/14 12:43	TTOS	47,7519138	-107.7855457	1+	400+	Other	Stationary	No	Clear/Calm	Snew	Amanda Smith
10	2/13/14 9:18	TT04	47.732093	-107.8284233	1	0	Other	Stationary	No.	Cloudy	Wind Blown Ice/Snow	Thomas Ward
11	2/13/14 9:29	TT04	47.7333649	-107.8300666	1	400+	Other	Stationary	No	Cloudy	Wind Blown Jos/Snow	Thomas Ward
12	2/13/14 9:40	TT03	47,73482804	-107.8431706	1+	400+	Other	Stationary	No	Clear/Calm	Snow	Amanda Smith
13	2/14/14 15:46	Other/Driving	47.7885404	-107.7898341	1	355	Other	5	No	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
14	2/18/14 8:38	Other/Driving	47.78853	-107.7898685	2	400+	Grazing/Feeding		No	Windy	Dry	Amanda Smith
15	3/5/14 10:26	TT05	47.789295	-107.7573854	1	15	Ran Away	5	Yes	Cloudy	Snow	Merrill Warren

# Porcupine:

			Loc	ation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/24/14 16:05	Other/Driving	47.7314138	-107.7856886	1	100	Stationary	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Thomas Ward
2	3/9/14 10:14	Other/Driving	47.74795	-107.773133	1	400+	Stationary	Stationary	No	Clear/Calm	Muddy	Ryan Rock
3	3/16/14 11:47	TT05	47.7773923	-107.7558083	1	220	Stationary	Stationary	Yes	Clear/Calm	Dry	Ryan Rock

# **Desert Cottontail:**

			Loc	ation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/10/14 13:53	Other/Driving	47.76848	-107.76875	1	10	Stationary	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Amanda Smith
2	2/13/14 11:20	TT03	47.71433257	-107.8594105	0	0	Other	Stationary	Yes	Cloudy	Snow	Tony Mancuso

# Black-Tailed Prairie Dog:

			Lo	cation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	<b>Ground Conditions</b>	Observer
1	2/7/14 16:08	TT07	47.758783	-107.6881761	0	25	Other	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Tony Mancuso
2	2/10/14 9:28	TT06	47.7493625	-107.7263331	0	0	Other	Stationary	Yes	Clear/Calm	Snow	Rob Pudner
3	2/10/14 10:43	Other/Driving	47.76356	-107,74939	3	100	Stationary	Stationary	Yes	Clear/Calm	Snow	Tony Mancuso
4	2/10/14 14:28	TT09	47,7711673	-107.7904183	12	200	Grezing/Feeding	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Thomas Ward
5	2/14/14 15:51	Other/Driving	47.7885419	-107.7898424	1	355	Ran Away	NE	No	Clear/Calm	Dry	Colleen Ferris
6	2/18/14 9:27	Other/Driving	47.7885415	-107.7898599	6	1000	Other	Stationary	No	Windy	Dry	Thomas Ward
7	3/3/14 12:46	TT05	47,7710727	-107.7574841	2	100	Stationary	Stationary	No	Clear/Calm	Snow	Merrill Warren
8	3/5/14 9:25	Other/Driving	47.7338725	-107.7783209	10	50	Stationary	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
9	3/5/14 9:35	TT05	47.7671684	-107.7552987	2	20	Stationary	Stationary	No	Cloudy	Snow	Merrill Warren
10	3/9/14 8:21	Other/Driving	47.9856549	-107.977559	1	50	Stationary	Stationary	No	Clear/Calm	Muddy	Merrill Warren
11	3/10/14 11:01	TT02	47,737617	-107.810117	5	100	Stationary	Stationary	Yes	Cloudy	Muddy	Cayley Faurot-Danie
12	3/10/14 14:59	TT02	47.7626	-107.7912	2	50	Stationary	Stationary	No	Cloudy	Muddy	Cayley Faurot-Daniel

# **Sharp-Tailed Grouse:**

			Loc	cation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Trevel	Photo?	Weather	<b>Ground Conditions</b>	Observer
1	2/10/14 11:12	TT09	47,7557754	-107,78025±3	5	42	Ran Away	N	No	Clear/Calm	Wind Blown Too/Snow	Thomas Ward
2	2/10/14 16:30	TT06	47.7441857	-107,7354065		30	Ram Away	0.00	160	ClearyCalm	Snow	Res Pusher
3	3/12/14 8:42	Other/Driving	47.794162	-107,758606	1	36	Stationary	Stationary	Yes	Clear/Calm	Snow	Cayley Faurot-Daniel
4	2/12/14 8:53	Other/Driving	47,7727403	107,767054	13	350	Stationary	Stationary	Yes	Clear/Calm	Snow	Cayley Faurot-Oanlel
5	2/12/14 12:36	TTOS	47,7517145	107,7656507	1	60	Stationary	Stationary	Yes	Clear/Calm	Snow	Amanda Smith
4	2/12/14 17:23	Other/Driving	47,7980314	-107.7568134	- 3	25	Ran Away	w	190	Windy	Muddy	Cayley Fauret-Daniel
2	2/13/14 9:57	TTOS	47,73529331	-107.8515577	15	900 40	Ran Away	66	No	Snowing	Snow	Yony Hancuso
	2/13/14 15:22	TT03	47,72691177	-107.8275432	9	40	Ran Away	56	No	Clean/Cam	Muddy	Tony Manouse
4	2/17/14 9:53	Other/Driving	47.7336141	-107,7177496	1	36	San Asses	w	No	Windy	Wind Blown Top/Snow	Thomas Ward
10	3/18/14 8:56	Other/Driving	47,788538	-107,7898491	6	400+	Grazing/Feeding	N	No	Windy	Dry	Amanga Smith
11	2/19/14 12:58	TTOB	47,72679029	-107.6520282	3	230	San Away	56	No	Windy	Muddy	Amende Smith
12	2/21/14 10:36	TTDS	47,7575501	107,7525937	20	50	Ran Away	N	190	Clear/Calm	Dry	Coviey Numb Daniel
13	2/24/14 11:08	TTOIL	47.7188231	-107.8760837	2	30	Agn Away	. 19	No	Clean/Carm	Wind Blown Ips/Snow	Tony Mancuso
14	3/3/14 12:32		47,77140848	-107,7656736	10	500	Ran Away	W	No	Clean/Calm	Snow	Herrill Warren
15	3/4/14 11:06	TTOT	47.7879968	107.67155	- 33	900	Ran Away	536	No	Clean/Calm	Snow	Colleen Ferris
16	3/5/14 8:45	TTOS	47,7471706	-107,7606436	3	2	Ages Aware	86	190	Windy	Wind Blown Top/Snew	Morrill Warren
17	3/5/14 9:14	TTOS	47.75722499	-107,7836111	2	50	Ran Away	NE .	No	Clear/Calm		Tony Hancuso
10	3/5/14 10:56	7709	47,7636	-107,799583	2	150	Rying	w	No	Cloudy	Snow	Ryan Rock
19	3/10/14 10:02	TTD4	47.721389	-107.82	1	20	Hyring		160	Clear/Calm	Modify	Tony Mancuse
20	3/10/14 14:41	TTD4	47.733611	107.785556	2		Rying	ADM	No	Cloudy	Mulity	Marrill Warren
21	3/16/14 12:21	TTOS	47,7911796	-107,7574706	2	40	Ran Away	NE	No -	Clean/Calm		College Ferris
22	3/23/14 9:28	Other/Driving	47.73507419	-107.82367	2	25	San Away	NOW	196	Snowing	Wind Blown Joersnew	Corbeen Ferma
23	3/25/14/9/17	TT06	47.7628156	-107.7344105		25	Rying	19	100	Windy	Dry	Beth School
24	3/26/14 10:59	TTQ3	42,7181526	-107.8332585	2	15	Rying		100	Clear/Calm	Dry	Beth Schedd

# **Greater Sage-Grouse:**

			Loc	cation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	<b>Ground Conditions</b>	Observer
1	2/7/14 13:15	TT08	47.7536485	-107/695439	1	20	Ran Away	8	No	Coudy	Wind Blown Ice/Snow	Thomas Ward
2	2/7/14 13:33	TTOB	47.7508277	-107.688548	22	50	Ran Away	W	No	Cloudy	Wind Blown Ice/Snow	Thomas Ward
3	2/7/14 13:44	TTQB	47.7469683	-107.6903674	60	130	Ran Away	S	No	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
4	2/7/14 15:13	TTOB	47.7286639	-107.6597577	11	400+	Ren Awey	NW .	No	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
5	2/7/14 16:02	TYOS	47.7354569	-107.6602955		300	Ran Away	W	No	Coudy	Wind Blown Joe/Snow	Thomas Ward
6	2/8/14 10:37	Other/Driving	47.7748103	-107.7663923	2	2	Ran Away	8	Yes	Cloudy	Wind Blown Joe/Snow	Thomas Ward
7	2/8/14 13:33	Other/Driving	47.7743587	107.7665672	2	52	Grazing/Feeding	Stationary	Yes	Clear/Calm	Wind Blown Ice/Snow	Thomas Ward
8	2/13/14 8:40	Other/Driving	47.72584236	-107.8132266		20	Ran Away	SW	Yes	Cloudy	Snow	Tony Manguso
9	3/3/14 13:24	Other/Driving	47.78851044	-107.7575108	11	150	Ran Away		No	Clear/Calm	Snow	Ryen Rock
10	3/4/14 8:20	Other/Driving	47.7607943	-107.6604339	4	60	Ran Away		No	Clear/Calm	Snow	Cavley Faurot-Daniels
11	3/5/14 8:55	TTOS	47.7481353	-107.7561107		50	Ran Away	- 5	No	Windy	Wind Blown Ice/Snow	Memili Warren
12	3/19/14 10:23	TT07	47.757916	-107.685986	2	40	Flying	NW.	No	Clear/Calm	Dry	Ryan Rock
13	3/19/14 10:37	TT07	47.7617856	-107.6890771	1	20	Rart Away	W	No	Windy	Dry	Merrill Warren
14	3/19/14 11:53	TT07	47.7918894	-107.6737817	4	12	Ran Away	5	No	Windy	Dry	Merrill Warren
15	3/23/14 9:17	TT04	47,7323478	-107.834213	3	25	Flying	S	No	Clear/Calm	Snow	Beth Schadd

# **Ring-Necked Pheasant:**

			Loc	cation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	<b>Ground Conditions</b>	Observer
1	2/6/14 8:06	Other/Driving	47.9859749	-107.9784481	2	100	Ran Away	SE	No	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
2	2/10/14 8:25	Other/Driving	47.8123148	-107.756925	6	25	Grazing/Feeding	W	Yes	Clear/Calm	Dry	Colleen Ferris
3	2/17/14 8:56	Other/Driving	47.79979475	-107.7569373	1	30	Ran Away	E	No	Clear/Calm	Dry	Cayley Faurot-Daniels
4	2/20/14 9:13	Other/Driving	47.77939858	-107.7674028	1	15	Grazing/Feeding	Stationary	Yes	Clear/Calm	Dry	Thomas Ward
5	3/3/14 13:33	Other/Driving	47,78986048	-107,7581459	9	5	Ran Away			Clear/Calm	Snow	
6	3/5/14 10:30	TTOS	47.7892711	-107.7573684	2	15	Ran Away	E	No	Cloudy	Snow	Cayley Faurot-Daniels
7	3/16/14 10:01	TTOS	47.7340097	-107.7765134	1	10	Ran Away	E	No	Cloudy	Muddy	Merrill Warren
8	3/22/14 9:50	TTO1	47.7388406	-107.8761873	4	50	Ran Away	S	No	Cloudy	Snow	Merrill Warren

# **Burrowing Owl:**

			Lo	cation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/19/14 9:55	TT07	47.7559135	-107.6840453	1	30	Ran Away	SW	Yes	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris

# **Golden Eagle:**

			Loc	ation								
Observation	Date and Time	Transect No.	Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	Ground Conditions	Observer
1	2/12/14 8:47	Other/Driving	47.7894125	-107.7675961	1	350	Stationary	W	No	Clear/Calm	Snow	Amanda Smith

# **Dead Animals:**

			Lo	cation								
Observatio	n Date and Time	Transect No.	. Latitude (deg)	Longitude (deg)	No. Animals	Distance to Group Center (yds)	Animal Behavior	Direction Of Travel	Photo?	Weather	<b>Ground Conditions</b>	Observer
1	3/16/14 11:48	TT05	47.7827865	-107.7786115	1	0	Dead	Dead	Yes	Clear/Calm	Dry	Cayley Faurot-Daniels
2	2/13/14 12:46	TT04	47.6857483	-107.8249831	1	0	Dead	Dead	Yes	Clear/Calm	Wind Blown Ice/Snow	Colleen Ferris
3	2/12/14 14:33	TT05	47.7790705	107.7742069	1	0	Dead	Dead	Yes	Clear/Calm	Snow	Tony Mancuso