

**Final Report**

**Point Count Survey for the desert cottontail (*Sylvilagus audubonii*) in Badlands National Park**

**Prepared for**

**South Dakota Game, Fish, and Parks**

**Study: BADL-01204**

**Date: April 25, 2013**

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# Introduction

The desert cottontail (*Sylvilagus audubonii*) is one of the more social cottontails that can be found in woodlands, grasslands, and desert environments of the western United States (Chapman and Willner 1978). They eat grasses, forbs, shrubs, and also cacti (Chapman and Willner 1978, deCalesta 1979). Unfortunately, the desert cottontail is a very short-lived cottontail, with an average lifespan of approximately one year (Chapman and Willner 1978). When the rabbits conduct their activities, Ingles (1941) found that the rabbits preferred still nights and were inactive when temperatures were above 80°F. In addition, the rabbits also do not seem to like wind (Chapman and Willner 1978). It has also been postulated that rabbits prefer not to be active during nights where there is a full moon, as the brightness of the moon may make the rabbit easier to detect for predators (Barrio 2010). In South Dakota, the desert cottontails are located on the western side of the state (SD GAP Analysis 2012). Historically, the cottontails were used for food amongst homesteaders, Lakota/Sioux Indians, and also towns across the Black Hills such as Rapid City and Deadwood Black Hills Daily Times (January 8, 1880, January 12, 1883).

Desert cottontails are a prey species, play a vital role in the western South Dakota arid/sagebrush habitats, and also a game species in the State. To date, habitat associations in woodland, degradation of pellets, dietary components are focused on in desert cottontail research (e.g. Kundalei and Reynolds 1972, Flinders and Hansen 1975, Flinders and Crawford 1977, Chapman and Willner 1978); however, the relative abundance and habitat association characteristics of the desert cottontail in the Badlands is relatively unknown. The purpose of this study was to determine a relative abundance estimate and habitat association of the desert cottontail.

# Methods

Point count surveys were taken in July, August, October, December 2012 and February, and March 2013 between dawn and dusk along Badlands Loop Road and Highway 44. The sky condition, temperature, and moon phase were recorded on the days of the survey. At each stop along the point count surveys, the time, habitat type, and wind were taken. Each time a rabbit was sighted, the time, temperature, distance from observer, and habitat type were taken. Binoculars were used to help identify if there were any rabbits or not.

Walks were taken along other areas of the Park, such as Window, Notch, Castle, Saddle Pass, Door, Cliff Shelf, Big Foot, and Pinnacles Trails.

# Results

## Badlands Loop Road

The rabbits seem to be located more near human-used or human made structures (Fig. 1). Six rabbits were identified in the Door/Window Trail, 3 were found between Norbeck Pass and Saddle Pass, one rabbit was found in Yellow Mounds, and four rabbits were identified by the Big Foot area (Table 1). In July, one was located by the Saddle Pass area (Fig. 2). Rabbits were not seen in tallgrass prairie habitats.



**Figure 1.** Desert cottontail by Cedar Pass located near Ben Reifel Visitor Center.

**Table 1.** Rabbit sighting, habitat type, time, distance from observer, windspeed, temperature, elevation, moon phase, and sky condition at which the rabbits were found along Badlands Loop Road.

<b>Rabbit sighting</b>	<b>Habitat type</b>	<b>Time from observer</b>	<b>distance</b>	<b>Windspeed</b>	<b>Temp (°F)</b>	<b>Elevation (ft)</b>
juvenile	Clay/sand/sagebrush	08:18	20m	none	73	
adult	Sagebrush/short mixed grass prairie	20:12	10m	none	91	2,506
adult	Cedar Pass – cabins, mowed grass, buildings	05:00	40m	none	72	
juvenile	Clay/sand/sagebrush near Big Foot Pass	06:29	20m	1-3mph	77	2,673
adult	Freshly mowed grass near Big Foot Pass picnic area	19:45	5m	none	88	2,673

July 2012. Sky: Partly cloudy/clear. Moonphase: waxing gibbous.

<b>Rabbit sighting</b>	<b>Habitat type</b>	<b>Time</b>	<b>distance from observer</b>	<b>Windspeed</b>	<b>Temp (°F)</b>	<b>Elevation (ft)</b>
adult	Sagebrush/clay	20:35	5m	1-3mph	84	
juvenile	Door Trail clay/short grass	07:45	2m	none	79	2,682
adult	Door Trail	07:45	10m	none	79	2,682
adult	Door Trail	07:45	15m	none	79	2,682
adult	Window Trail clay/short grass	08:20	8m	none	79	2,667
adult	Window Trail	08:20	15m	none	79	2,667

August 2012 Sky: Mostly cloudy. Moonphase: waxing gibbous.

<b>Rabbit sighting</b>	<b>Habitat type</b>	<b>Time</b>	<b>distance From obs.</b>	<b>Windspeed</b>	<b>Temp (°F)</b>	<b>Elevation (ft)</b>
Large adult	Clay/ short grass – Yellow Mounds	17:37	10m	1-3mph	68	2,740
Adult	Big Foot Pass	18:18	20m	4-7mph	68	
adult	Cedar Pass Lodge – mowed grass	07:00	20m	4-7mph	48	
adult	Cedar Pass Lodge – mowed grass	07:00	20m	4-7mph	48	

adult	Big Foot Pass – mowed grass	08:09	5m	7-11mph	50	2,673
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October 2012 Sky: Clear Moonphase: waning crescent.

No cottontails were sighted in December or February. This may be because of the cooler winter temperatures that desert cottontails do not seem to prefer (Chapman and Willner 1978).

Rabbit sighting	Habitat type	Time	distance from observer	Windspeed	Temp (°F)	Elevation (ft)
adult	Cedar Pass Lodge - grass	17:51	10m	0-3mph	45	
adult	Door Trail – clay/short grass	18:15	2m	7-11mph	39	2,682

March 2013 Sky: Mostly sunny Moonphase waxing crescent. Sky: cloudy, waning crescent.



**Figure 2.** Adult desert cottontail stretched out by Saddle Pass along the Badlands Loop Road at dusk.

Moreover, numerous fecal pellets and rabbit tracks were located on Window and Door Trails underneath of the walkway. The pellets are not present by Fossil Trail, Castle Trail, Homestead, or Cliff Shelf Trail (Fig. 3). Humans present in the area may keep coyotes and rattlesnakes away and that may explain why there are rabbits present in the Cedar Pass area. A park ranger at Ben Reifel Visitor Center said that there are 3 rabbits that live under the walkway next to Ben Reifel Visitor Center.



**Figure 3.** Vegetation along Cliff Shelf Trail may be too much vegetation for the desert cottontail.

When walks were taken, the rabbits may not be located near Fossil Trail because there is sparse vegetation. On the other hand, they might not be located in Cliff Shelf Trail because of the thick vegetation (Fig. 3). However, where rabbits were located, they were in a mixture of sagebrush/clay formation habitat.

Where the fecal pellets were present at Door and Window Trails, there was a good mixture of sagebrush/clay formation.



**Figure 4.** Potential desert cottontail habitat near the Homestead stop along Badlands Loop Road.

Castle Trail and Homestead stops which have potential habitat of a mixture of clay/sand/sagebrush habitat (Fig. 4). The desert cottontails do not seem to be located in prairie habitats seen in Figure 5. When conducting the point counts during winter, no desert cottontail tracks or scat were found.



**Fig. 5** Desert cottontails do not seem to prefer this habitat.

#### Highway 44

No desert cottontails were sighted along Highway 44. This may be due to the combination of short and long grass prairie habitat.

#### Relative abundance for Badlands Loop Road

$P = AN/WY$  (Equation 1)

A is area of habitat, N is the total number of seen, W is the total distance walked and Y is twice the average distance from the observer to the rabbit. The average distance from observer to rabbit was 13.1 meters.

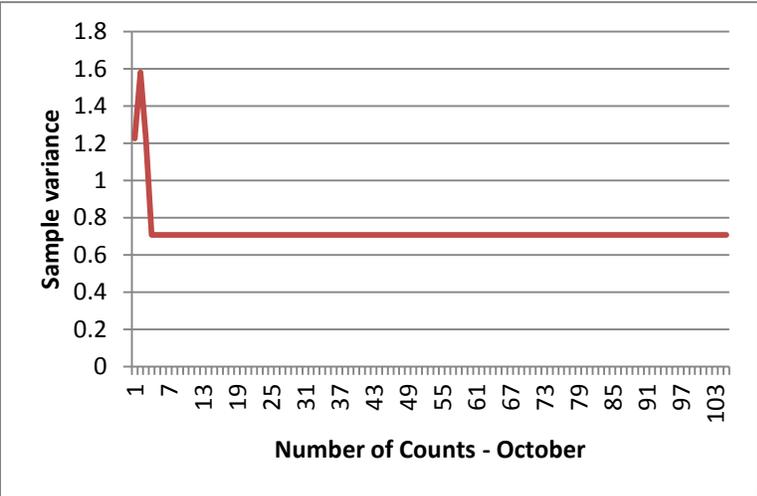
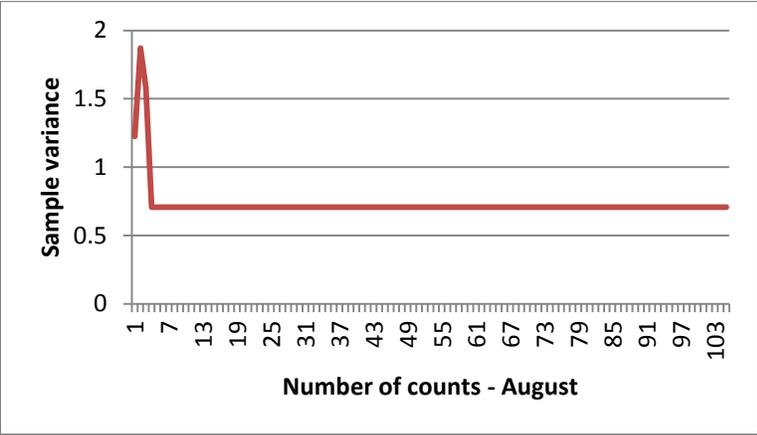
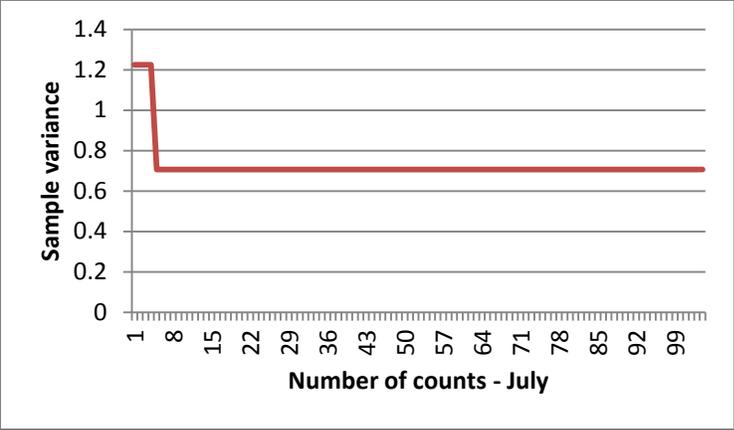
406 miles\*18/409\*26=

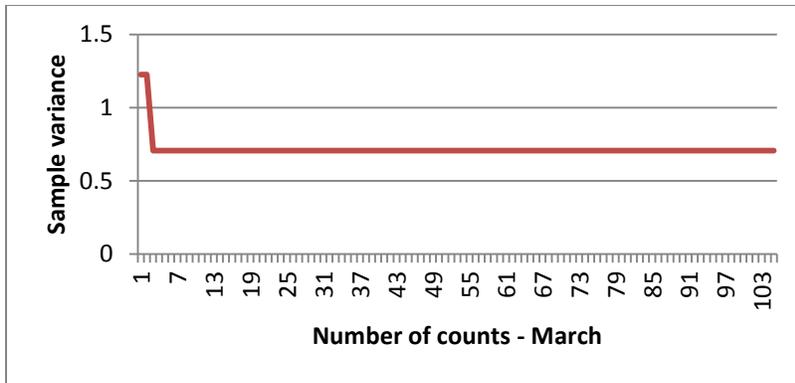
This equation says that there are **.68** desert cottontails per mile along the Badlands Loop Road.

Average sample variance was 0.058, average SD=0.221, Average SE = .021548

In a Poisson distribution, the variances are roughly proportional to the mean. In a couple of instances, that was true – that the data would fit Poisson. Equation was adapted from Burnham et al. (1980).

The Poisson data was transformed with the square root transformation and here is the sample variance for July, August, October, March data:





## Future Research

It seems as though the Badlands desert cottontail is very unique as it could be an insular population, as it is hard to determine if there is a desert cottontail population that surrounds the park. This espouses questions as to what the home range of the desert cottontail in the Badlands is and furthermore, it is difficult to determine where the rabbits are located during the day and how the desert cottontails traverse through the Badlands. For example, only one time a rabbit was seen at the Yellow Mounds area. Questions arise as to how it got there or how many more are out there that were unseen. Although in March, there seemed to be a warren- like structure under the boardwalk of the Door Trail (Fig. 5). Potentially, this could be where rabbits are during the day. Looking at the map, it is intriguing to ask how far these cottontails move to breed for mixing of genes or does the Big Foot rabbit have their own breeding population separate from the Yellow Mounds? Future work could radio-collar these cottontails with a camera to determine where the rabbits spend their day, how they traverse through the Badlands, how social the cottontails are, and the more specific vegetation that is eaten.



**Figure 5.** Warren like structure under the Door Trail boardwalk?

## Potential Threats to population

Erosion and weathering continue to occur in the Badlands National Park, with erosion occurring at about 1" per year. For the rabbits that utilize warrens inside of the Chadron formation of the Badlands, eventually, this may mean finding alternative cover.

Vine weed was found in a few areas throughout the park in July and August (Fig. 6). This weed is an invasive non-native weed to South Dakota, which is difficult to get rid of (Wrangle 1997).



**Figure 6.** Vine-weed growing in Badlands National Park.

There seemed to be dog tracks just slightly off trail at the Window Trail. Rabbits would fear the scent of dogs (Fig. 7).



**Figure 7.** Dog tracks just off the window trail.

## Acknowledgements

A big thank you to South Dakota Game, Fish, and Parks with the Small Wildlife Diversity Grants program to fund this study and a big thank you to the National Park Service to provide me with a research permit to study the desert cottontail in the Badlands National Park. I also want to thank my husband and my mom for coming out with me a couple of times for an extra pair of eyes to search for desert cottontails!

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