2009 BLACK HILLS OWL SURVEYS

January 22, 2010

Rocky Mountain Bird Observatory
Tech. Report # M-SDBBA2-03

ROCKY MOUNTAIN BIRD OBSERVATORY

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***Vision**: Native bird populations are sustained in healthy ecosystems*

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2. ***Education** is critical to the success of bird conservation.*
3. ***Stewardship** of birds and their habitats is a shared responsibility.*

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- ***Researching** bird ecology and population response to anthropogenic and natural processes to evaluate and adjust management and conservation strategies using the best available science.*
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***Cover Photo**:* Eastern Screech-owl, by Bill Schmoker. Used with permission.

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EXECUTIVE SUMMARY

Surveys specifically targeting owls are the best way to truly understand the status and distribution of owls. There has been only one targeted owl survey in the Black Hills; an effort in March 2006 to locate Boreal Owls using call playbacks. To date, no special survey has targeted all owl species. As a result, owls are among the least known group of birds in the Black Hills.

The goal of this study was better understand owl status and distribution in the South Dakota portion of the Black Hills by undertaking special owl surveys during March, April and early May, 2009. Owls were surveyed at 165 roadside points, each point ½ mile apart along 14 different routes within breeding bird atlas blocks. The survey protocol consisted of broadcasting a sequence of owl vocalizations at each point and recording all owls heard or seen during a 10-minute period.

Previously-published Black Hills bird lists (e.g., Pettingill and Whitney 1965, Black Hills National Forest 2009) state that Great Horned Owl (*Bubo virginianus*) is a common species in the area, while Northern Saw-whet Owl (*Aegolius acadicus*), Long-eared Owl (*Asio otus*), and Eastern Screech-owl (*Otus asio*) are 'uncommon to rare.' In contrast, this study found that Northern Saw-whet Owl is by far the most common and widespread species, detected at 15% of all survey points and 93% of all routes, and at all elevations and in all months. Great Horned Owl was relatively uncommon but widespread, detected at 7% of all points and 47% of all routes. A small group of Long-eared Owls was detected in March in the Pringle-Custer area but not relocated in April or May, suggesting wintering birds. Only four Eastern Screech-owls were detected, all in lower elevation riparian zones, as expected.

Data collected during this survey contributed greatly to our knowledge of Black Hills owls and will be used as part of the second South Dakota Breeding Bird Atlas. However, one atlas block and 49 points were not surveyed and another 103 points were surveyed only one time. These should be surveyed again to ensure that no species goes undetected. Other recommendations include establishing a high-elevation spruce habitat survey route to target Boreal Owls (*Aegolius funereus*), conducting targeted Flammulated Owl (*Otus flammeolus*) surveys in June, and working to gain access to high elevation survey points in March and April.

ACKNOWLEDGEMENTS

Funding for the South Dakota Breeding Bird Atlas 2 and these owl surveys was provided through State Wildlife Grant T-41, study number 2541, administered by South Dakota Department of Game, Fish, and Parks. I thank US Forest Service Black Hills district biologists for providing permits, feedback and support during these surveys.

The following people volunteered to stand out in the cold and dark to survey owls: Adam Custer, Andrew Rooney, Blake Gipson, Brad Phillips, Elizabeth Krueger, Jean Adams, Jennifer Adams, Jennifer Fowler, Marissa Casey, Patricia Lynch, Penny Hanna, Rebecca Rosenblaum, Scott Weins, Shannon Miller, Tracy Wheeler and Willy Hyde. Thank you to everyone for their enthusiasm and dedication to increasing our knowledge of Black Hills birds.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

INTRODUCTION

For the second South Dakota Breeding Bird Atlas, 425 random blocks are being surveyed statewide in order to map the distribution of all South Dakota breeding birds. Thirteen forested blocks occur in the South Dakota portion of Black Hills National Forest. Another bird monitoring program - Monitoring Birds of the Black Hills - has been conducted annually since 2002. Few records of owls are recorded during either of these monitoring projects because surveys occur during June and July when owls are finished or almost finished breeding (Backlund and Dowd-Stukel 2006). For example, during nine years surveying at a total of 19,313 points, 25 owls of three species have been detected, 22 of which were Great Horned Owls (*Bubo virginianus*) (White *et al*. 2009). Surveys specifically targeting owls are the best way to truly understand the status and distribution of owls (Takats *et al*. 2001). There has been only one targeted owl survey in the Black Hills; an effort in March 2006 to locate Boreal Owls (*Aegolius funereus*) using call playbacks (J. Baker, *pers.comm.*). To date, no special survey has targeted all owl species. As a result, owls are among the least known group of birds in the Black Hills.

The goal of this study was to gain a better understanding of owl status and distribution in the South Dakota portion of the Black Hills by undertaking special owl surveys during March, April and early May, 2009. The specific objectives were to 1) supplement the summer breeding bird atlas data with data gathered during owl surveys within Black Hills atlas blocks, 2) establish permanent owl survey routes and points for use in future surveys, 3) determine the best month to conduct owl surveys, and 4) identify logistical problems with these surveys. Data collected during this survey will not only supplement breeding bird atlas efforts, but will serve as a baseline for comparison to future surveys.

METHODS

Survey Routes ("Toot Routes")

Survey points were set up every ½ mile along open Forest Service or County Roads going through each forested atlas block (Figure 1). Roads in the Higgins Gulch block (2R0260) were closed through March because of logging operations; all other roads theoretically were open. If there were not any trees within 100 yds of the road at the ½ mile mark, surveyors continued on until they reached trees to establish the next point. In some cases, routes were extended beyond atlas block boundaries. Because of the lack of spruce habitat within atlas blocks, we established two survey routes outside of blocks: along Playhouse Road in western Custer State Park, and Ditch Creek Road southwest of Deerfield Lake. We recorded the latitude and longitude of each point (GPS

datum WG83) and a description of the point location (e.g., mileage, nearby landmarks, road markers). If funding is available, these same points can be surveyed again in the future.

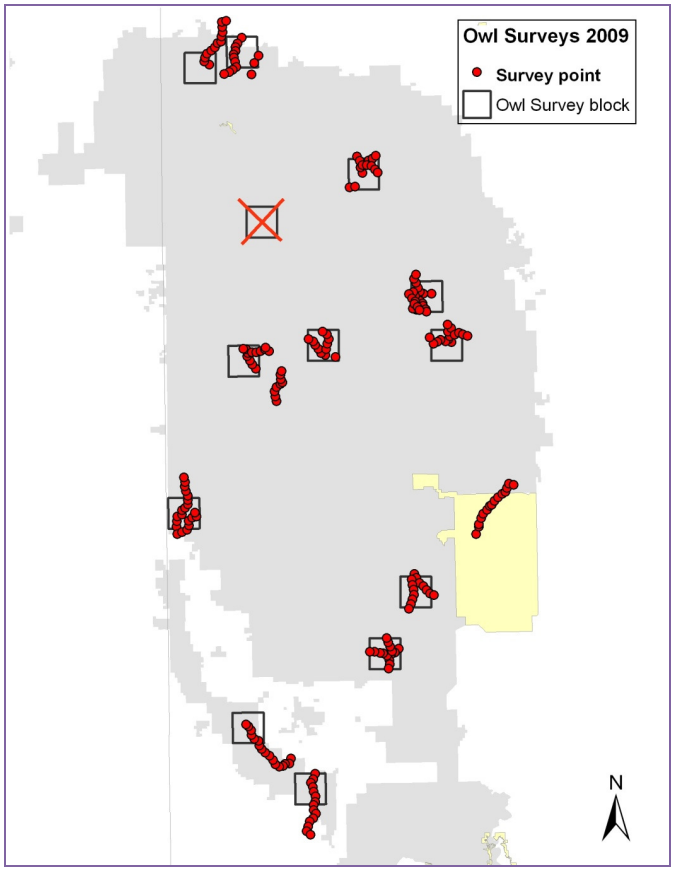

Figure 1. Location of survey points established for the 2009 Black Hills owl surveys. 'X' block is Harvey Springs which was inaccessible and not surveyed Gray shaded area is Black Hills National Forest and yellow shaded area is Custer State Park.

Target Owl Species

Four owl species are known to breed in the Black Hills: Great Horned Owl, Long-eared Owl (*Asio otus*), Eastern Screech-owl (*Otus asio*), and Northern Saw-whet Owl (*Aegolius acadicus*) (Cary 1901, Pettingill and Whitney 1965, Peterson, 1995, Black Hills National Forest 2009). Additionally, three owl species hypothetically could breed in the Black Hills: Barred Owl (*Strix varia*), Boreal Owl (*Aegolius funereus*), and Flammulated Owl (*Otus flammeolus*) (Tallman *et al*. 2002, Backlund and Dowd-Stukel 2006). Surveyors were trained to recognize the territorial calls of all seven species and

each survey team had a recording of the some of the alternate calls, to aid in call identification (Cornell Laboratory of Ornithology 2006).

Owl Survey Protocol

Survey protocol followed the recommended North American Owl Survey protocol (Takats *et al*. 2001) and was adapted from methods developed for 2008 owl surveys in Rocky Mountain National Park, Colorado (Blakesley 2009) and the Nebraska panhandle (Bly *in prep*). The protocol consisted of broadcasting a sequence of owl vocalizations at each point and recording all owls heard or seen during a 10-minute period. Observers then drove or walked to the next point.

Owl Call Playback
The playback sequence consisted of 30 seconds of the territorial calls of each of five owl species, each separated by 30 seconds of silence. The order of calls was Northern Saw-whet Owl, Eastern Screech-owl, Boreal Owl, Flammulated Owl, and Long-eared Owl. Great Horned Owl calls were not broadcast because calls of this predatory species reduce the chance that the smaller owls will vocalize (Blakesley 2009). The playback began with two minutes of silence and ended with three minutes of silence. The entire sequence with silent periods was ten minutes long, but observers were free to go through the broadcast at a slower pace if they felt they would get a better response by repeating certain species or pausing longer than 30 seconds between calls.

Recording Data
At the beginning and end of each evening's survey, observers recorded weather conditions - temperature in ^{o}F, wind speed on the Beaufort Scale, cloud cover to the nearest 10%, and precipitation.

At each point, observers wrote down the point number, start time, and end time (Appendix A). During the broadcast, observers recorded each owl heard or seen on a separate line on the data form. For each individual, we recorded species, how the bird was detected (only heard, only seen, both heard and seen), time period in which we initially heard or saw the owl (initial two-minute silence, during broadcast, after broadcast), and information about where the bird was initially detected. Observers had several options to record owl location: record compass bearing and estimated distance from observer, plot estimated location on a detailed map, record GPS latitude-longitude (datum WG83) if the bird was extremely near, or if there were two observers, triangulate. To triangulate, each observer, standing some distance apart, simultaneously took a compass bearing to the owl and wrote down the coordinates where they were standing. Finally, birds recorded at a previous point were listed as repeat = 'Y'. If no owls were detected during the 10-minute listening period, observers noted 'none' for Species.

Times, Weather Conditions, and Observers
All surveys started ½ hour - one hour after sunset. Finish time depended on route length and whether any walking was involved. Observers did not survey during heavy snow, heavy rain, or when winds were blowing greater than 10-12 mph (Beaufort Scale=3). For safety reasons, observers worked in pairs.

RESULTS

Survey Effort

A total of 210 survey points were established and of these, 165 were surveyed at least once (Table 1, Figure 2). Although we planned to survey each point at least two to three times, road closures, deep snow, poor road access, and bad weather reduced the number of days and areas we were able to survey. We could not access one atlas block, Harvey Springs, because of deep snow, even in mid-May. Elevation of surveyed points ranged from 1028 m to 2049 m. Seventeen people participated in the survey for a total of over 58 hours of survey time.

Table 1. Summary of Black Hills owl surveys in 2009, including location, dates, number of surveys and total number of owls detected.

ROUTE NAME	COUNTY	SURVEY DATES	NO. POINTS SURVEYED	NO. OWLS DETECTED
Fish Hatchery Gulch	Lawrence	3/18/09 5/5/09	14 10	9 7
Higgins Gulch	Lawrence	5/6/09	9	2
Nemo Road	Lawrence	3/12/09 5/7/09	12 4	6 0
Harvey Springs	Lawrence	not surveyed	n/a	n/a
Silver City	Pennington	4/13/09	9	4
NE Deerfield Lake	Pennington	4/17/09	7	4
Ditch Creek Road	Pennington	4/17/09	9	2
S. Fork Castle Creek	Pennington	5/13/09	5	1
Summer Creek	Pennington	3/19/09	10	2
Boles, Redbird Canyons	Custer	5/10/09	20	1
Cicero Peak	Custer	3/8/09 3/16/09 5/4/09	7 7 7	1 3 3
Playhouse Road	Custer	4/18/09 5/9/09	12 14	3 5
Carroll Creek	Custer	3/11/09 5/12/09	15 15	5 3
Pilger Mountain	Custer	5/11/09	7	1
Craven-Red Canyons	Fall River	3/17/09 5/8/09	12 15	5 6

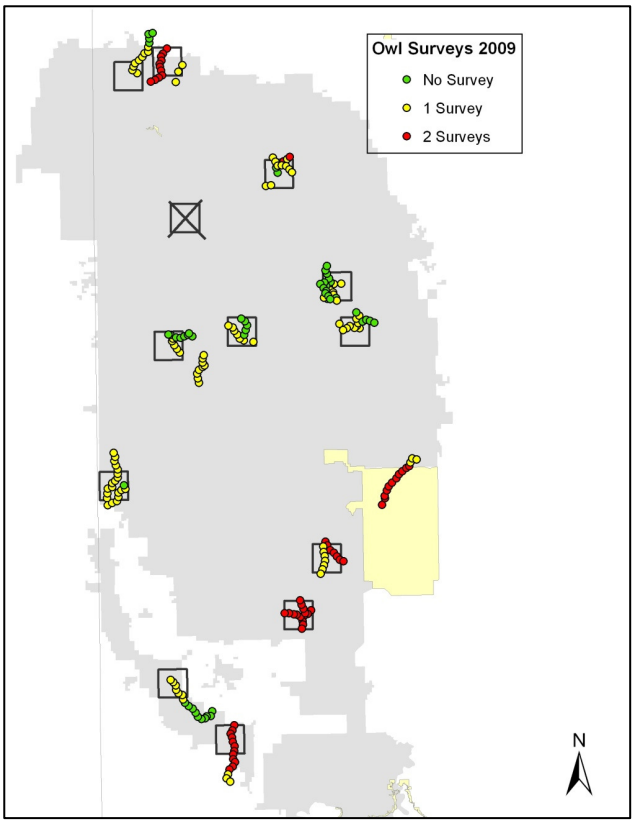

Figure 2. Location of points actually surveyed and number of surveys per point during the 2009 Black Hills owl surveys. Squares are atlas block borders; 'X' block is Harvey Springs which was inaccessible and not surveyed. Gray shaded area is Black Hills National Forest and yellow shaded area is Custer State Park.

Survey results

A total of 68 owls of four species were recorded during March, April, and May surveys (Table 2). Observers detected at least one owl at 59 points (27% of points). More owls were detected in March (0.38 owls/point) and April (0.37 owls/point) than in May (0.28 owls/point).

Table 2. Species, number of individuals, number of points, number of routes and elevation in meters at which owls were detected during 2009 Black Hills owl surveys.

SPECIES	NO. OWLS DETECTED	NO. POINTS DETECTED	NO. ROUTES DETECTED	MEAN ELEV. (RANGE)
N. Saw-whet Owl	35	33 (15%)	14 (93%)	1486 m (1120-2033 m)
Great Horned Owl	18	16 (7%)	7 (47%)	1481 m (1102-1850 m)
East. Screech-owl	4	4 (2%)	3 (20%)	1101 m (1096-1350 m)
Long-eared Owl	4	4 (2%)	2 (13%)	1538 m (1459-1683 m)
Unidentified Owls	7	7 (3%)	4 (27%)	1435 m (1111-1685 m)

Northern Saw-whet Owl was the most frequently detected species, recorded on all routes except Boles Canyon in western Custer Co. and during all three survey months (Figure 3). This species was found at the widest altitudinal range (almost 900 m) and highest elevation of any species (Table 2). Great Horned Owl, the second most frequently recorded species, was detected on almost half of the routes and during all three survey months (Figure 3). This species also was found at a relatively wide altitudinal range (Table 2). Three of the four Eastern Screech-owl detections occurred in riparian cottonwood stands; all at lower elevations and at the edges of the Black Hills (Figure 4, Table 2). Long-eared Owl was detected in a small geographic area and narrow altitudinal range (Figure 4, Table 2). This species was only recorded during March surveys; none were detected during April/May surveys at the same points.

Seven individuals could not be identified by call (Figure 5). In four cases, the call was too brief or too far away to identify to species. In three cases, calls were heard well but were unknown alternate or aberrant calls. One of these, on Playhouse Road, was heard at the same point during both April and May surveys. This bird was the only owl seen during the survey - it flew past on a moonlit night. The bird was a mid-sized, tuft-less bird, most likely a Barred Owl. However, species identity could not be confirmed.

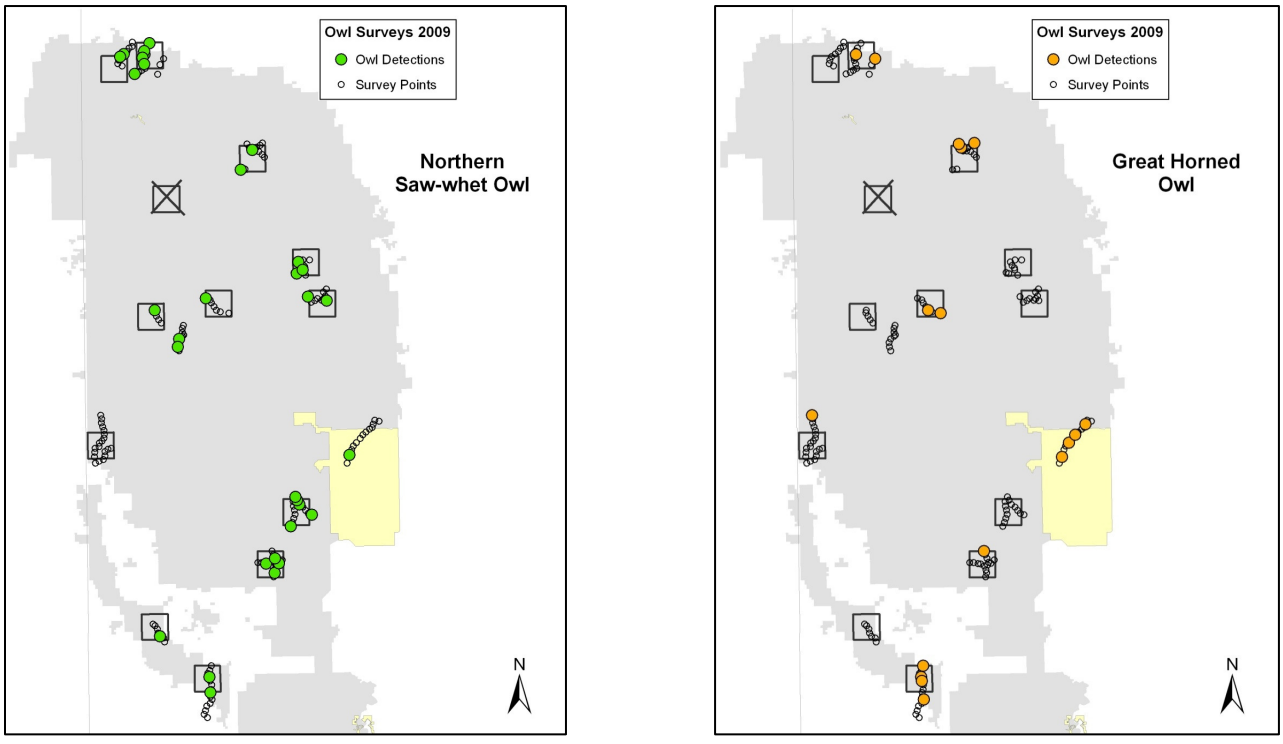

Figure 3. Location of points where Northern Saw-whet Owls (left map) and Great Horned Owls (right map) were detected during special Black Hills owl surveys, March-May 2009.

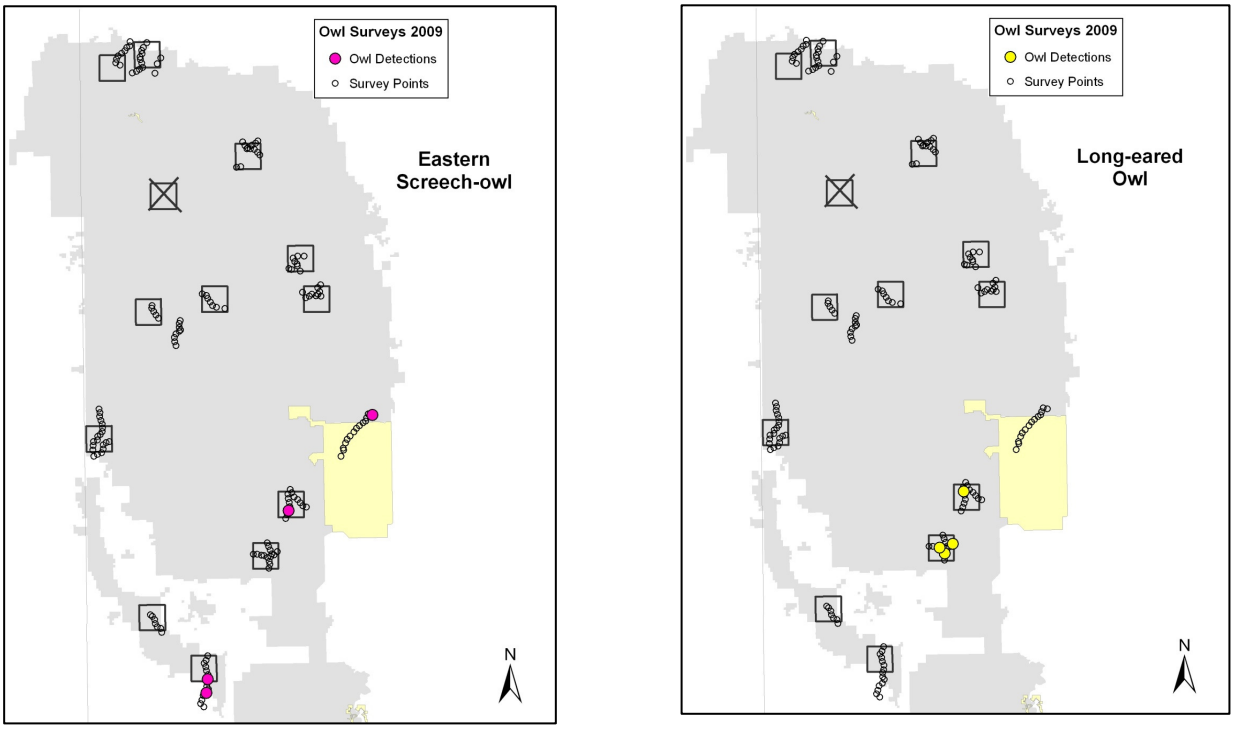

Figure 4. Location of points where Eastern Screech-owls (left map) and Long-eared Owls (right map) were detected during special Black Hills owl surveys, March-May 2009.

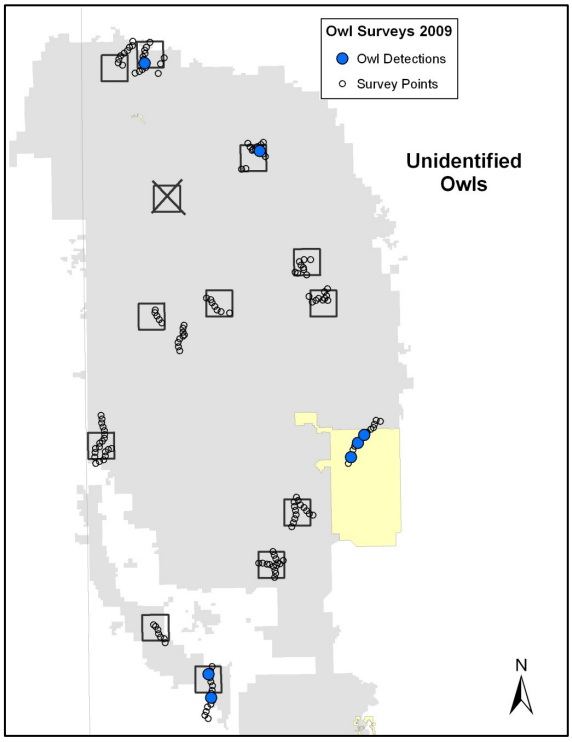

Figure 5. Location of Owls that could not be identified to species during special Black Hills surveys, March-May 2009.

Incidental Reports

Two credible reports of owl detections, both vocalizations, were reported during the survey period. In mid-March, an Eastern Screech-owl was calling outside a residence south of Pactola Reservoir within the Summer Creek atlas block (J. Fowler, *pers. comm.*). On May 17, a Barred Owl was calling at a private camping area between the town of Custer and Custer State Park (D. Backlund, *pers. comm.*).

DISCUSSION

Species Results

This study shows that Northern Saw-whet Owl is a common and widely-distributed species in the Black Hills. Previously-published accounts list the status of this species in the Black Hills as 'uncertain' (Pettingill and Whitney 1965), 'uncommon' (Tallman *et al.* 2002), or 'uncommon to rare' (Black Hills National Forest 2009). The first South Dakota Breeding Bird Atlas, conducted during 1988-1994, found this owl on two Black Hills random atlas blocks (Peterson 1996). The definitive publication on the Northern Saw-whet Owl does not list the species as breeding in the Black Hills or anywhere in South Dakota, Nebraska, or eastern Wyoming (Cannings 1993). The breeding distribution map for this species needs to be updated - targeted owl surveys have discovered that Northern Saw-whet Owl is 'locally abundant' in the Nebraska Panhandle (Bly *in prep*), it readily breeds in nestboxes in the forested buttes of Harding county, northwestern South Dakota (unpublished data: South Dakota Natural Heritage program and SDBBA2 databases, C. Miller *pers. comm.*), and now this study shows it to be common throughout the Black Hills. However, we do not know if the Black Hills population is migratory, partially migratory, or sedentary. Northern Saw-whet Owls commonly migrate through and overwinter in South Dakota (Tallman *et al.* 2003, Backlund and Dowd-Stukel 2006, Miller 2006). In this study, of the 19 twice-surveyed points where Saw-whet Owls were detected, birds were detected on both surveys (assumed to be the same individuals) at only four points. At eight points, birds were detected only during the March survey, while at seven points, owls were detected only during the April or May survey when the birds presumably were breeding. This suggests some movement but just may be a difference in detectability among time periods. Suggestions that the Black Hills population is 'probably nonmigratory' (Backlund and Dowd-Stukel 2006) or 'permanent' (Tallman *et al.* 2002) will need to be tested using specific research techniques such as radio telemetry, banding, or isotope analyses.

Great Horned Owl was widespread but not particularly common, compared to Northern Saw-whet Owl. Most accounts list the Great Horned Owl as 'common', possibly because this species is relatively conspicuous and loud (Black Hills National Forest 2009). The status and distribution of the other two owl species detected during this

survey were more in accordance with previous accounts. Both Eastern Screech-owl and Long-eared Owl are listed as 'uncommon to rare' in area bird lists and this study supports this assertion (Pettingill and Whitney 1965, Black Hills National Forest 2009). Eastern Screech-owls were found in lower elevation riparian zones, as expected. Pettingill and Whitney (1965), listing all known Screech-owl records to that point, found occasional reports of the species in the central Hills; thus the 2009 incidental report from the central Hills is not unheard of. The fact that Long-eared Owls only were detected in March during this survey suggests that these individuals were wintering birds that later left the area. An erratic and enigmatic species, Long-eared Owls do nest in the Black Hills but possibly not every year (Cary 1901, Pettingill and Whitney 1965, T. Clark *pers. comm.*).

Barred Owl is classified as 'accidental' in the Black Hills (Tallman *et al*. 2002). Records are scattered throughout the Black Hills - Spearfish Canyon (Harris 1986), Boles Canyon (Whitney *et al*. 1978) and from the south-central portion of the Hills - Wind Cave National Park (Whitney *et al.* 1978) and the Bismark Lake - Norbeck Wildlife Area-Hazelrodt area (P. Lynch *pers. comm.*) where the 2009 incidental report and possible individual seen during surveys occurred. The species prefers relatively mature forests, especially riparian forests, which currently occur in that portion of the Hills. This area should be the focus of more intense surveys in the future to determine if a small population does indeed exist.

The other two hypothetical species, Boreal Owl and Flammulated Owl, were not detected, probably because we did not survey in Boreal Owl habitat or during the summer when the migratory Flammulated Owl might be present. We will need to conduct surveys in high elevation spruce habitat and during June to have a chance at determining whether either of these species occur in the Black Hills.

Study Objectives

Surveyors detected owls on all Black Hills breeding bird atlas blocks that were accessible, contributing greatly to the atlas database. Prior to this survey, no owls were recorded on any block. However, one entire block and many points were not surveyed, and some, especially higher elevation points, received only one survey (Figure 2, Table 1). These points should be surveyed twice, especially during the prime months of March and April, to ensure that no species escaped detection.

May was a less optimal time for detecting owls. Not only did observers detect fewer owls per point, but most of the unidentified vocalizations occurred during this month. When owls reach the nestling stage of breeding, they are less likely to give the 'typical' territorial call and are more likely to give any of a variety of alternate calls, such as alarm calls, nest defense calls, food delivery calls, or nestling/fledgling begging calls. These calls are little studied, rarely recorded, and can be very similar among species (Cornell Laboratory of Ornithology 2006), complicating the ability to identify a sound in the dark. On the other hand, May was the only month that some higher elevation routes

were accessible; deep snow and unplowed roads prevented observers from reaching these areas in March and April. Although conducted at a suboptimal time, May surveys in two high-elevation routes, Higgins Gulch and South Fork Castle Creek, detected Northern Saw-whet Owls, which was better than no information at all. May also is not an optimal survey time for Flammulated Owls, which probably migrate through the area early- to mid-May. To determine if Flammulated Owls are potentially breeding in the Black Hills, rather than just migrating through, surveys should be conducted in June.

A major logistical problem was poor weather on survey nights. Blizzards, heavy rain, and high winds occurred in all three months, reducing the number of surveys to about half of the original schedule. This affected participants who came from out of the area or had only one night available to survey. The solution would be to expand the schedule of planned surveys and warn potential participants. A second major logistical problem was lack of access to high elevation sites because of deep snow and unplowed roads. In the case of Harvey Springs, the block we could not reach, the nearest access was seven miles from the edge of the block. The solution is to snowmobile into the area, camp overnight, and conduct the survey on snowshoes or skis. The same solution probably applies to March/April surveys in Higgins Gulch, South Fork Castle Creek, and any high-elevation spruce habitat route targeting Boreal Owl.

Currently-established survey routes and points sampled all major Black Hills forest habitats and elevations except for high-elevation spruce. Although we established two routes outside of atlas blocks because they contained spruce, spruce along these routes occur in relatively small and isolated patches and the elevation is relatively low. The largest and densest high-elevation spruce patches occur in the central-northwest portion of the Hills, between Deerfield Lake and Cheyenne Crossing, east of O'Neill Pass (Black Hills National Forest GIS database). This area includes the unsurveyed Harvey Springs block, which has relatively little spruce. If the Black Hills has a Boreal Owl breeding population, it most likely occurs in this area. A survey route along the upper portion of Boles Canyon Road, FR117, and through Manganese Draw would traverse suitable habitat.

Future Surveys and Recommendations

We plan to conduct the following surveys in spring 2010:

1. Two surveys at all points which were not surveyed in 2009
2. One more survey at all points which were surveyed only once in 2009
3. Attempt to set up survey route in Harvey Springs and survey
4. Attempt to survey other high-elevation points in March or April
5. Begin surveys on forested atlas blocks in Pine Ridge and Rosebud Indian Reservations

In addition, we recommend the following:

1. Establish at least one high-elevation spruce route for Boreal Owls and/or undertake an intensive wider search for Boreal Owls

2. Survey the western Custer State Park-Norbeck-Custer area intensively for Barred Owls
3. Participate in the western U.S.-wide Flammulated Owl survey, scheduled for 2010 and 2011, using their protocols and time-frame

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APPENDIX A. 2009 BLACK HILLS OWL SURVEY DATA SHEET

OWL BROADCAST SURVEY FORM - Black Hills 2009

Block/Route ID:	**Date:** mm/dd/yyyy	**Observer 1:**	**Observer 2:**

Temperature: (°F)	**start:** **end:**	**Cloud cover:** nearest 10%	**start:** **end:**	**Wind:** Beaufort	**start:** **end:**	**Precipitation:** 0=none, 1=light rain, 2=light snow	**start:** **end:**

Survey Information:

Owl Detection Information:

Point	Start Time	End Time	Species	How	During 1st Silence	During Broadcast	After Broadcast	Repeat?	Initial Owl Location: Distance	Bearing	Latitude (dd.dddd)	Longitude (dd.dddd

Beaufort:	mph	cues:
1	0	Smoke rises vertically.
2	1-3	Wind felt on exposed skin. Leaves rustle.
3	4-7	Leaves and smaller twigs in constant motion.
4	8-12	Small branches begin to move.

How Detected: H= heard only; S = seen only; HS = heard and seen

Species							
	GHOW	Great Horned Owl	NSWO	N. Saw-whet Owl	NONE	no owls
	LEOW	Long-eared Owl	FLOW	Flammulated Owl		detected
	SEOW	Short-eared Owl	BOOW	Boreal Owl	UNK	unknown
	EASO	E. Screech-owl	BNOW	Barn Owl		species