

# Owl surveys in Rocky Mountain and Great Sand Dunes National Parks: Final Report



**November 2009**



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Tech. Report # M-NPS-GRSA-08-1



# ROCKY MOUNTAIN BIRD OBSERVATORY

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

**Core Values:** *(Our goals for achieving our mission)*

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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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Northern Saw-whet Owl, by Tom Munson. Used with permission.

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## EXECUTIVE SUMMARY

Rocky Mountain Bird Observatory conducted surveys for Mexican Spotted Owls and other owl species in Rocky Mountain National Park in April and May, 2007 and May 2008 and in Great Sand Dunes National Park in April and May, 2008. Surveys were accomplished by broadcasting owl calls at designated points along roads and trails within potentially suitable Spotted Owl (*Strix occidentalis*) habitat in the National Parks.

In Rocky Mountain National Park, we completed 393 point surveys of at least 10 minutes duration (4814 total survey minutes) at 211 locations. We surveyed 78% of the established broadcast locations on at least two occasions, separated by at least 7 days. In Great Sand Dunes National Park, we completed 372 point surveys of at least 10 minutes duration (5136 total survey minutes) at 195 locations. We surveyed 61% of locations on at least 2 occasions, separated by at least 7 days.

We did not detect any Spotted Owls in either National Park. In Rocky Mountain National Park we obtained 16 detections of Flammulated Owls (*Otus flammeolus*), 31 detections of Great-horned Owls (*Bubo virginianus*), 1 detection of a Northern Pygmy-Owl (*Glaucidium gnoma*), 3 detections of Long-eared Owls (*Asio otus*) and 53 detections of Northern Saw-whet Owls (*Aegolius acadicus*). In Great Sand Dunes National Park we obtained 19 detections of Flammulated Owls, 3 detections of Western Screech-Owls (*Megascops kennicottii*), 38 detections of Great-horned Owls, 1 detection of a Northern Pygmy-Owl, 19 detections of Long-eared Owls, 2 detections of Short-eared Owls (*Asio flammeus*) and 11 detections of Northern Saw-whet Owls. These counts do not include any owls knowingly detected on more than one occasion in a night of surveying. However, individual owls were likely recorded on multiple visits to the same location. The distribution data for each species will help the NPS manage these species and their habitats.

## **ACKNOWLEDGEMENTS**

This project was funded by the National Park Service (NPS), through a cooperative agreement between the NPS and Rocky Mountain Bird Observatory. NPS personnel were extremely helpful in implementing this project: Jeff Connor originally approached us with the idea for this project and provided GIS coverages of Rocky Mountain National Park. At Rocky Mountain National Park, Judy Visty procured research permits and Cheri Yost made our stay at McGraw Ranch Research Center extremely comfortable, and provided invaluable logistical assistance. At Great Sand Dunes National Park, Phyllis Pineda Bovin procured research permits and provided logistical support, Fred Bunch arranged housing and assisted with project planning, and Andrew Valdez provided GIS coverages of Great Sand Dunes National Park.

I thank Angela Johnson, Beth Stallman, Doug Clark and Justin Buller for conducting owl surveys in dark, cold and snowy conditions. Thanks to the many individuals at RMBO who contributed to this project, especially Rob Sparks and David Pavlacky for GIS support.

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## INTRODUCTION

The Mexican Spotted Owl (*Strix occidentalis lucida*) is a medium-sized nocturnal owl found in mixed coniferous forests and canyons of the southwestern United States and northern Mexico. In the Rocky Mountains of Colorado and elsewhere, the Mexican Spotted Owl is found in mixed coniferous forest composed of Douglas-fir, white fir, limber pine, ponderosa pine, and other tree species (Rinkevich et al. 1995). The Mexican Spotted Owl was listed as Threatened under the Endangered Species Act in 1993. Historic observations of Mexican Spotted Owls were reported as far north as Larimer County, Colorado (Webb 1983, Kingery 1991). There are no records of Spotted Owls in the Sangre de Cristo Mountains, which encompass the montane portion of Great Sand Dunes National Park.

In consultation with the US Fish and Wildlife Service, the National Park Service (NPS) was asked to identify and manage potential Mexican Spotted Owl habitat (Jeff Connor, National Park Service, personal communication). In addition, NPS was asked to establish whether Mexican Spotted Owls are present or absent within areas scheduled for fuels treatments.

Rocky Mountain National Park (ROMO) contains potentially suitable Spotted Owl habitat. Although there are no recent records of Spotted Owls in ROMO, the Park had not been systematically surveyed for Spotted Owls before our survey in 2007. Furthermore, few surveys for Mexican Spotted Owls in Colorado outside of canyons have taken place in spring, the time during which Spotted Owls are most responsive to surveying.

It is unknown whether Great Sand Dunes National Park (GRSA) contains potentially suitable Spotted Owl habitat. No spotted owls have ever been recorded in the Sangre de Cristo Mountains.

## Objectives

1. Survey within potentially suitable Mexican Spotted Owl habitat in ROMO and GRSA to determine whether Spotted Owls are present.
2. If Spotted Owls are present, locate roost and nest sites, determine owl reproductive status and capture and band all Spotted Owls found.
3. Survey for and locate additional owl species within potentially suitable Spotted Owl habitat.

## METHODS

### Study Area

#### Rocky Mountain National Park

Potentially suitable spotted owl habitat was identified by ROMO personnel and transmitted to RMBO in the form of Geographical Information System (GIS) files (Figure 1). Forest cover types identified as potentially suitable Spotted Owl habitat in ROMO included Aspen (*Populus tremuloides*), Cottonwood (*Populus spp.*), Riparian, Mixed Conifer, montane Douglas Fir (*Pseudotsuga menziesii*), and Ponderosa Pine (*Pinus ponderosa*).

#### Great Sand Dunes National Park

Potentially suitable spotted owl habitat was not identified by GRSA personnel. However, GRSA provided RMBO with vegetation cover maps in the form of GIS files. We focused our surveys in forest and woodland areas dominated by Aspen, Ponderosa Pine, and Pinyon-Juniper (*Pinus edulis* and *Juniperus scopulorum*; Figure 2).

### Methods

Rocky Mountain Bird Observatory surveyed portions of Rocky Mountain National Park identified by ROMO as composed of potentially suitable for Mexican Spotted Owls, as described above. The portion of the habitat surveyed was restricted to areas accessible via established roads and trails. Although we had originally proposed surveying off-trail in less accessible areas, we found this was too dangerous to undertake on the spring snow pack in the dark. Due to the rugged terrain in much of GRSA, we limited our surveys to areas that were accessible by road or trail or by off-trail hiking on the lower slopes of the mountains.

Owls are strongly territorial during their breeding season, and readily respond to perceived conspecific intruders. Consequently, when a person imitates an owl's calls within the owl's territory, the owl usually responds by calling back and often flying closer to the person. We took advantage of this behavior by broadcasting recorded owl calls at fixed broadcast locations (survey points). We established survey points approximately 0.5 km (0.3 miles) apart, depending on local topography.

RMBO conducted surveys from 5 April to 1 June 2007 in ROMO, from 1 April to 20 May 2008 in GRSA and from 27 to 31 May 2008 in ROMO. All surveys occurred between dusk and dawn. We timed the surveys to target the peak of the breeding season of Spotted Owls (April-May), during which the owls are most responsive to broadcast calls. In addition to surveying for Mexican Spotted Owls, we also broadcast recorded calls of other owl species known to occur within



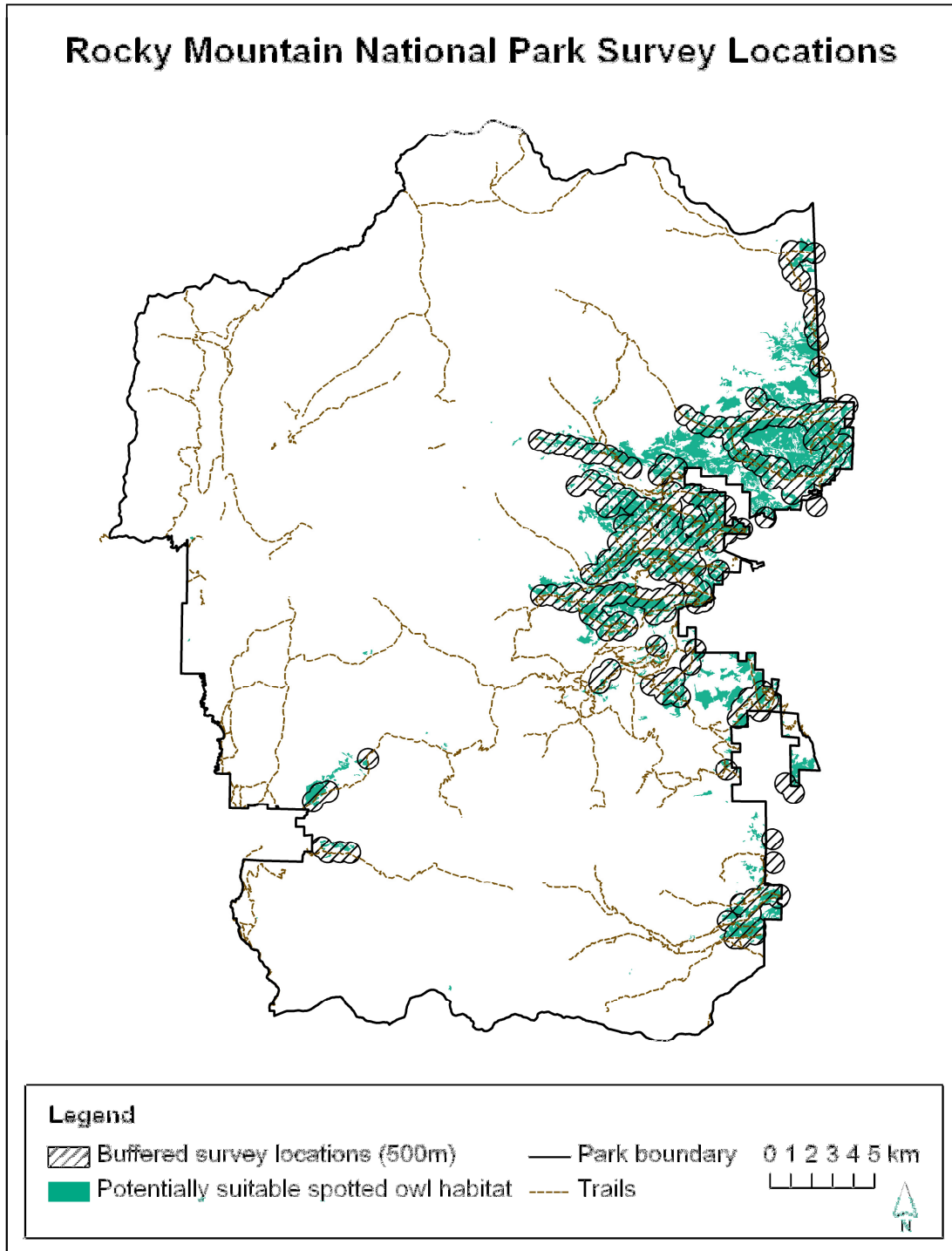


Figure 1. Potentially suitable Mexican Spotted Owl habitat and locations of owl broadcast surveys in Rocky Mountain National Park, 2007 and 2008.

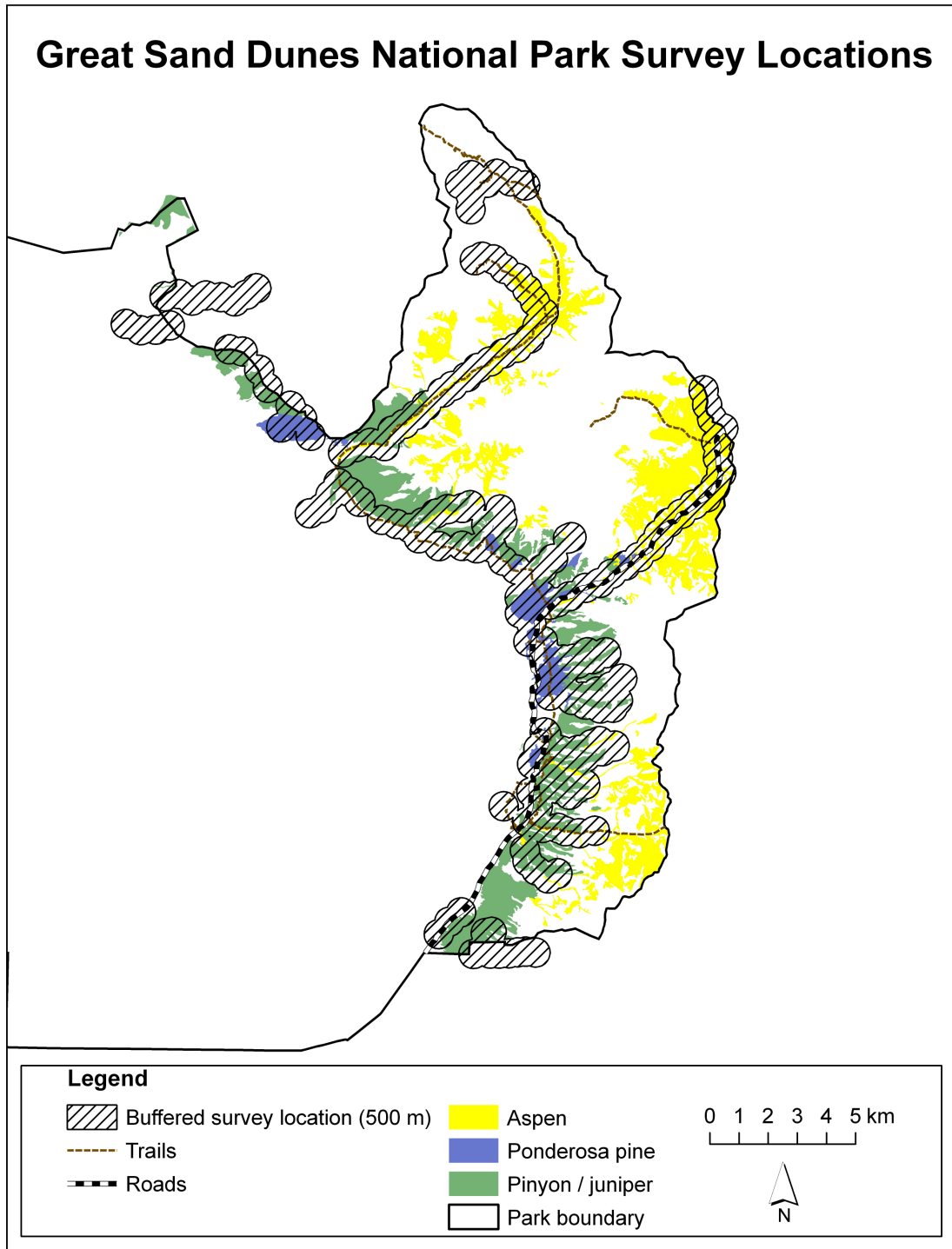


Figure 2. Potentially suitable Mexican Spotted Owl habitat and locations of owl broadcast surveys in Great Sand Dunes National Park, 2008.

ROMO and GRSA: Long-eared Owl (*Asio otus*), Boreal owl (*Aegolius funereus*), Northern Saw-whet Owl (*Aegolius acadicus*), Flammulated Owl (*Otus flammeolus*) and Northern Pygmy-Owl (*Glaucidium gnoma*). Although the Pygmy-Owl is diurnal, it can sometimes be heard calling at dusk. We did not broadcast calls of Great Horned Owls (*Bubo virginianus*) because Great Horned Owls are known to prey on smaller owl species. We did, however, record the locations of all Great Horned Owls detected during our surveys.

Each survey was at least 10 minutes in duration, and consisted of alternating periods of broadcasting owl calls and listening for responses. We recorded the exact locations of survey points using handheld Global Positioning Systems (GPS) and the Universal Transverse Mercator (UTM) system. For each owl detected, we took a compass bearing to the owl, estimated the distance to the owl, plotted its location on a topographic map and estimated UTM coordinates of the owl from the map. We recorded the sex of the owl whenever it could be determined (usually distinguished by the pitch of the owl's call). Most individual responses were probably male owls, based on owl behavior. On several occasions we detected a male and female owl of the same species in proximity to each other.

As call points were surveyed, the observer also recorded the date, time, and weather data (temperature, percent cloud cover, wind speed). We were prepared to capture, band, and determine the reproductive status of any Spotted Owls located during the surveys (Blakesley 2007).

We created maps of survey points, owl detection locations and vegetation cover using the UTM coordinates of survey points and estimated owl locations and the GIS vegetation data provided by the National Parks. We mapped a 500-meter radius buffer around each survey point to illustrate and estimate the effective area covered by the broadcast surveys. We used GIS to calculate the proportion of potentially suitable Spotted Owl habitat surveyed in ROMO and the proportion of various cover types surveyed in GRSA.

## RESULTS

### Rocky Mountain National Park

We completed 346 point surveys of at least 10 minutes duration (4210 total survey minutes) at 203 locations in 2007. We surveyed the majority of the established broadcast locations on two occasions, separated by at least 7 days. We completed 51 point surveys of at least 10 minutes duration (604 total survey minutes) in ROMO in 2008. Forty-three of the surveys were visits to points that only received one visit in 2007; the remaining 8 surveys were in areas inaccessible to us in 2007. Across both years we surveyed 78% of 211 survey locations at least twice.

We did not detect any Spotted Owls in ROMO. We obtained 16 detections of Flammulated Owls (Figure 3), 31 detections of Great-horned Owls (Figure 4), 1 detection of a Northern Pygmy-Owl (Figure 5), 3 detections of Long-eared Owls (Figure 6), and 53 detections of Northern Saw-whet Owls (Figure 7). No owls were detected from the surveys in ROMO in 2008. Although we attempted to avoid recording detections of an individual owl more than once per survey night, the same individual may have been detected on multiple survey occasions. Therefore, the number of detections cannot be converted to the total number of owls present. However, the Long-eared Owls probably represent 3 individuals. A pair was detected together on one occasion, and a single individual was seen on another occasion approximately 8 km from the location of the pair.

Assuming that surveys in 2007 and 2008 covered a 500 meter radius area around each point, we surveyed 60% of potentially suitable Mexican Spotted Owl habitat within ROMO.

In addition to the broadcast surveys, I followed up on an observation of a juvenile owl that was observed in Rocky Mountain National Park on 16 October 2007 by a ROMO employee. The employee thought it may have been a spotted owl. I went to the same location (Sprague Lake parking lot area) on 28 October and observed (heard and saw) a juvenile Great Horned Owl as well as an adult male and an adult female Great Horned Owl. Presumably, the juvenile owl was the same one seen on 16 October.

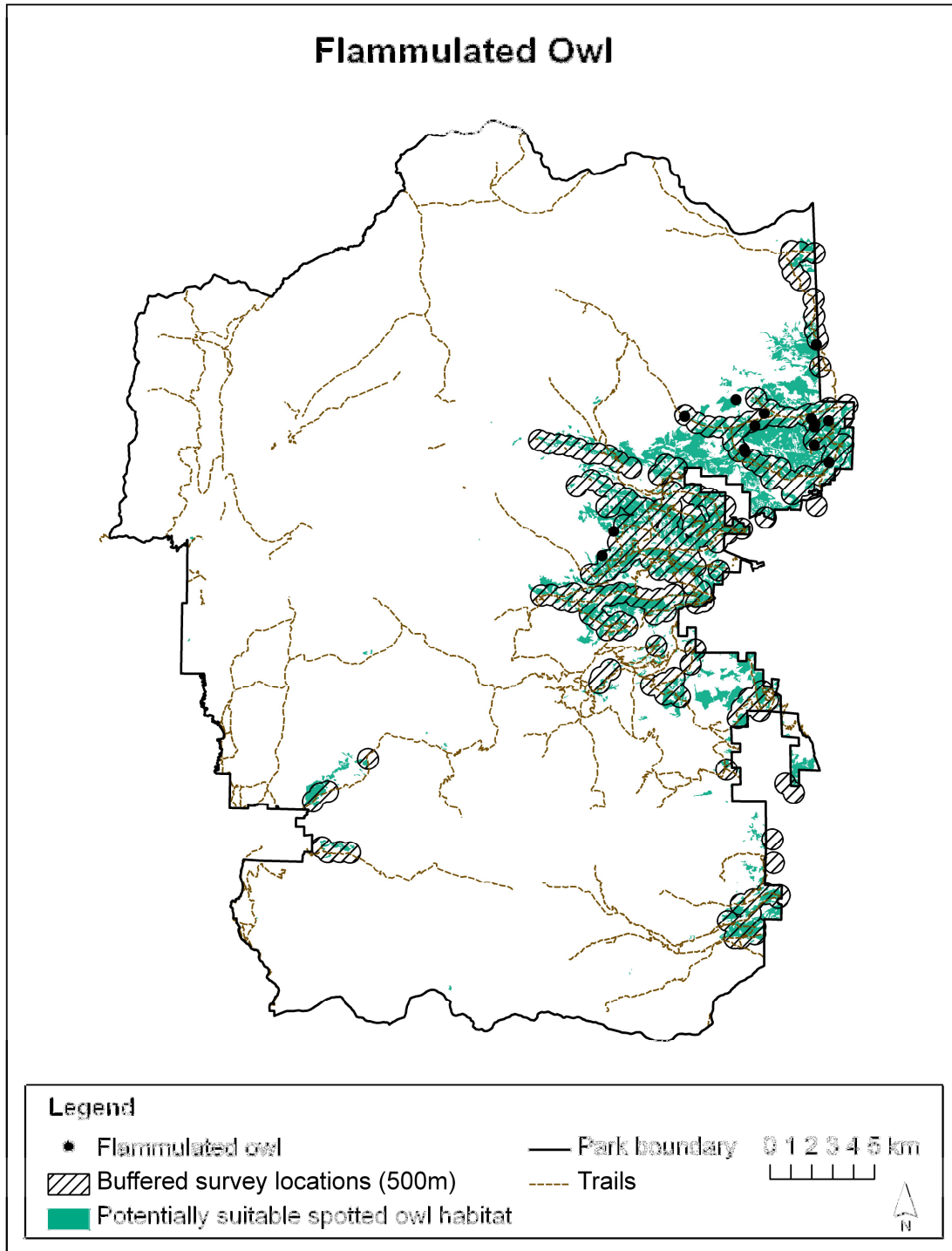


Figure 3. Locations of Flammulated Owl detections in Rocky Mountain National Park, 2007.

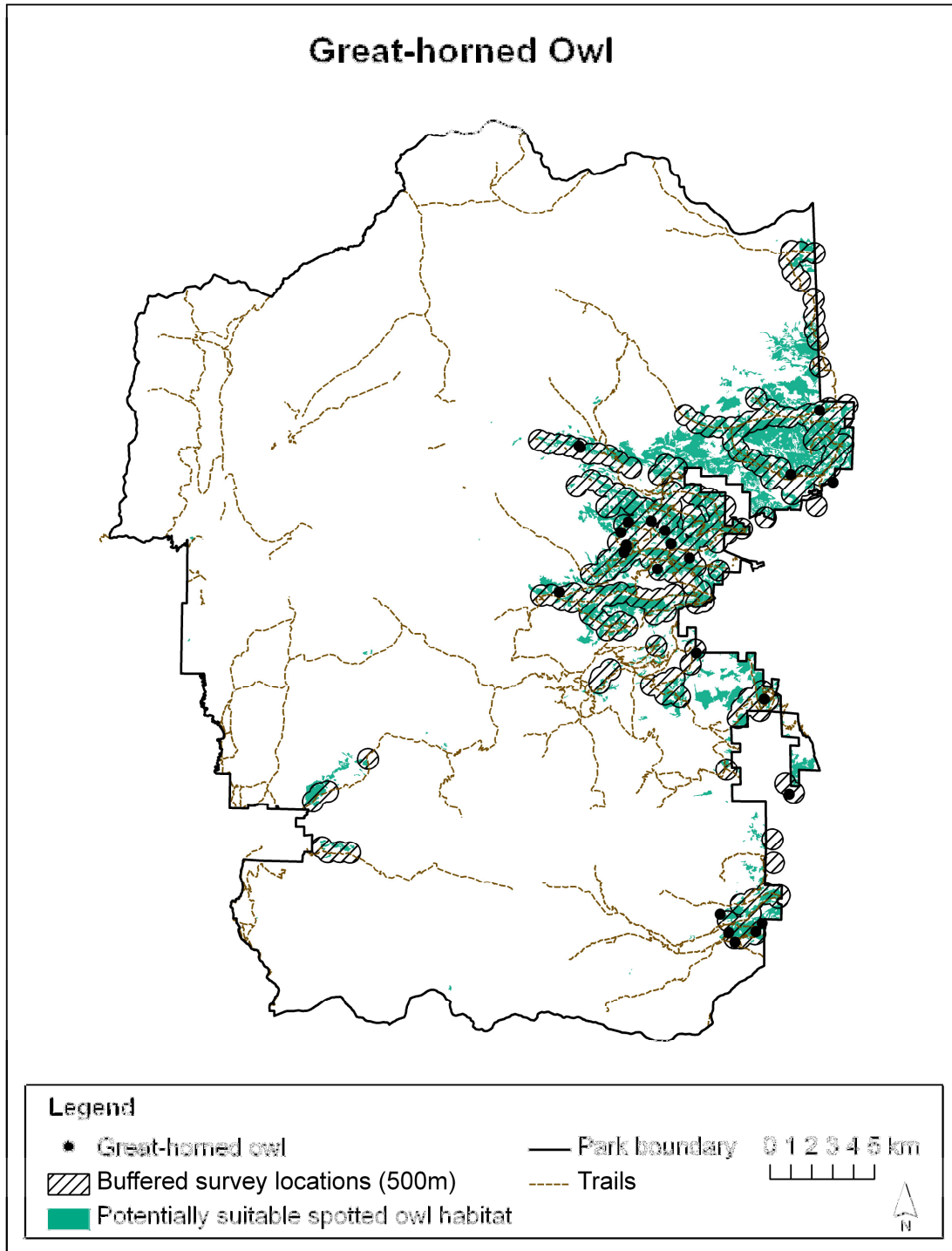


Figure 4. Locations of Great Horned Owl detections in Rocky Mountain National Park, 2007.

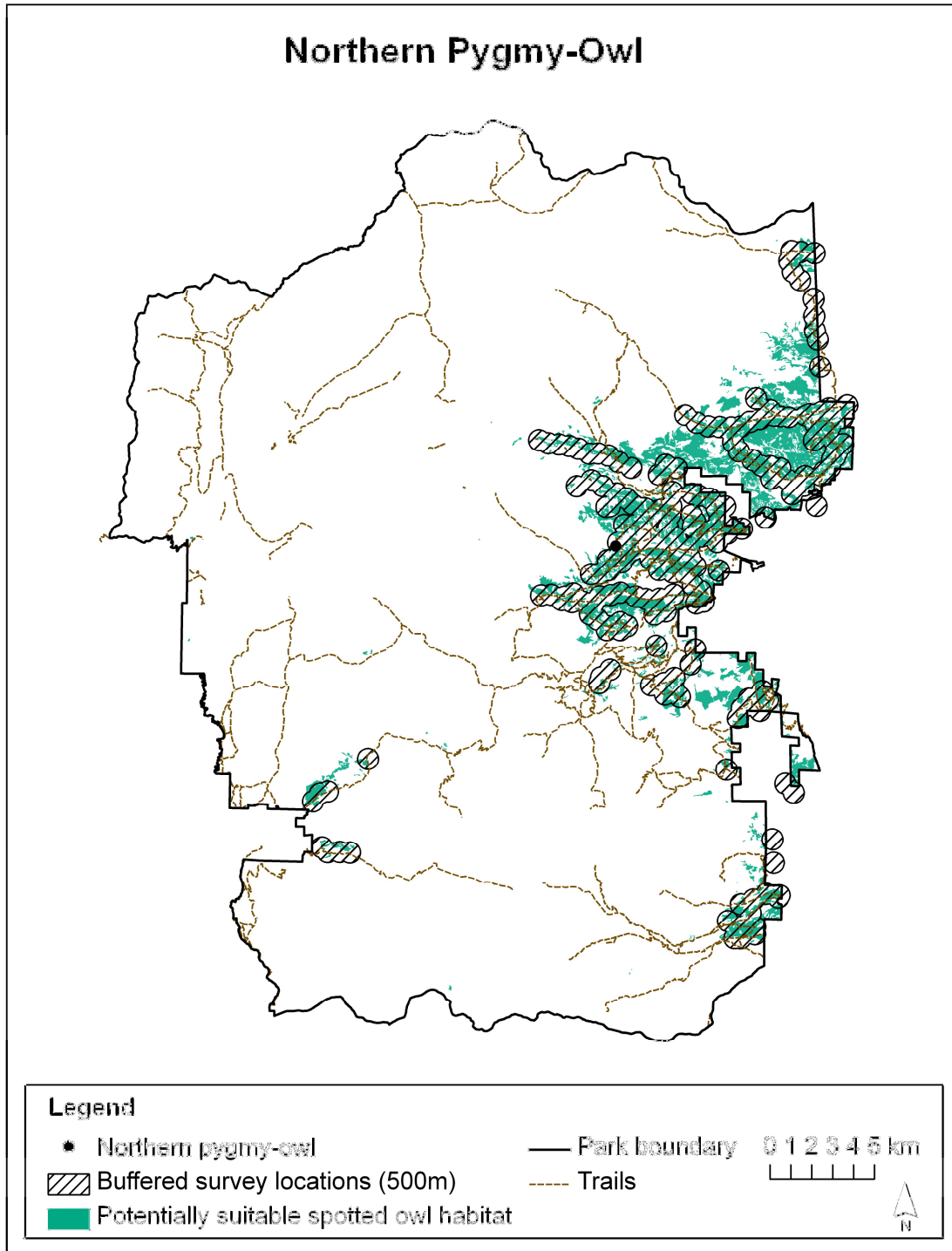


Figure 5. Locations of Northern Pygmy-Owl detections in Rocky Mountain National Park, 2007.

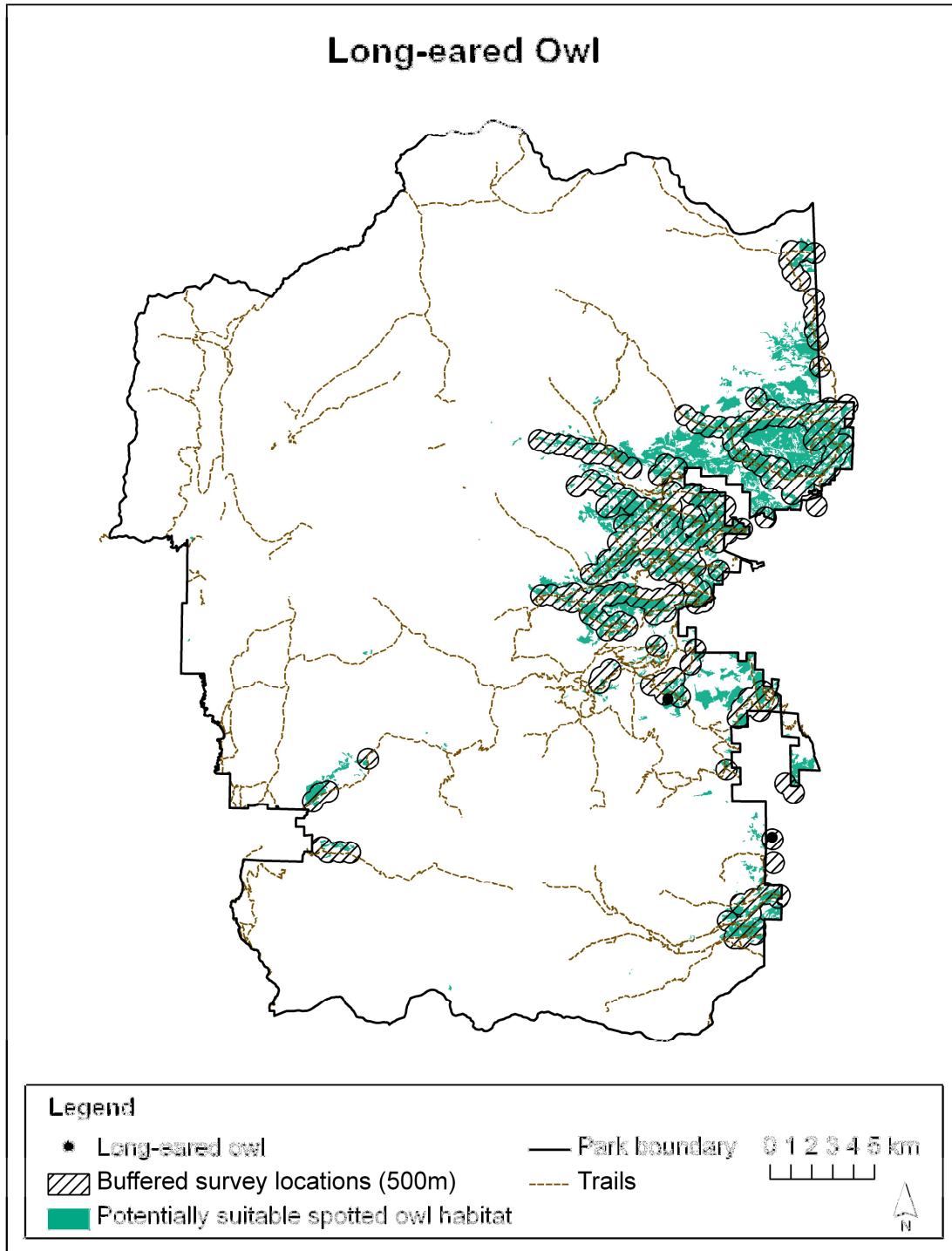


Figure 6. Locations of Long-eared Owl detections in Rocky Mountain National Park, 2007.



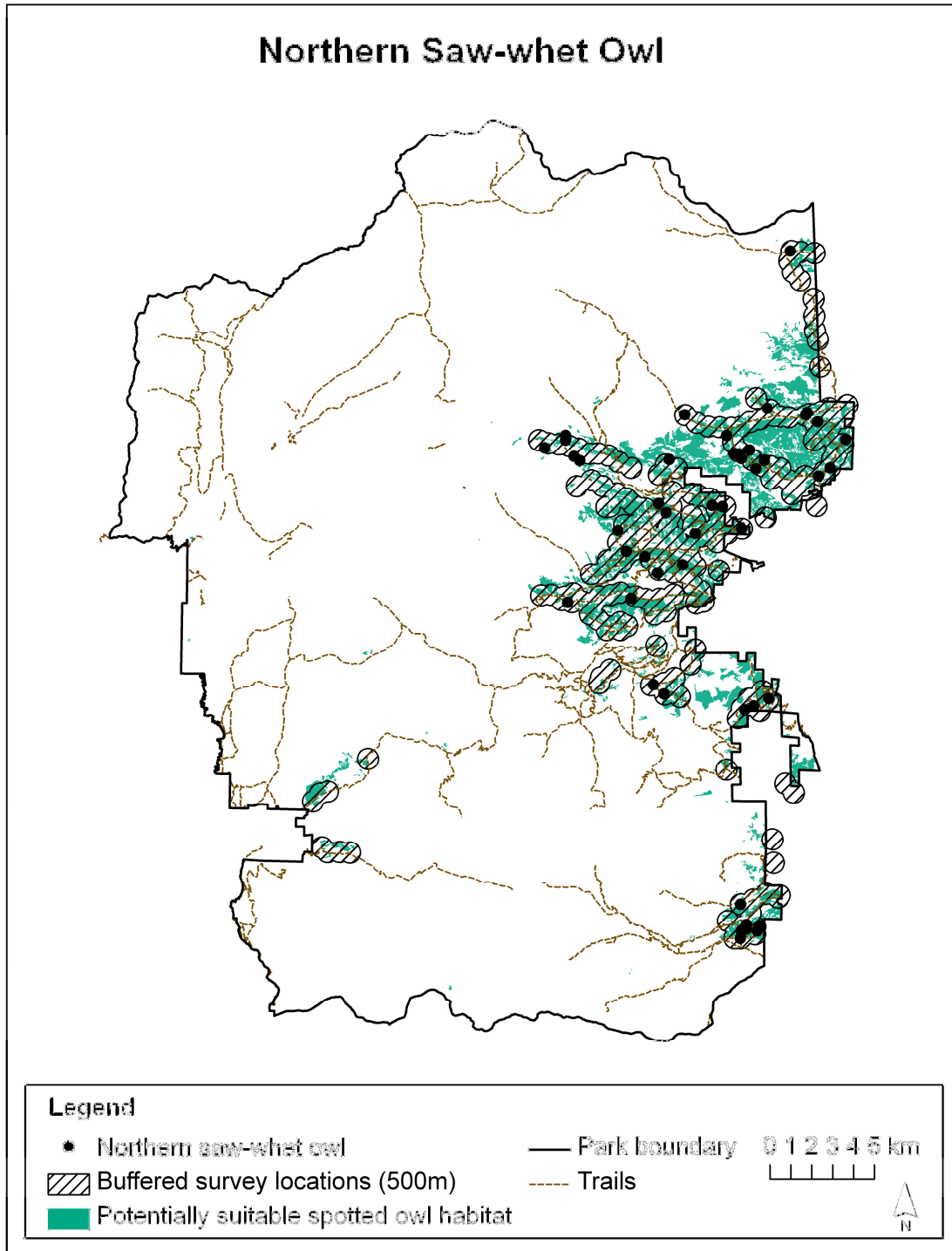


Figure 7. Locations of Northern Saw-whet Owl detections in Rocky Mountain National Park, 2007.

### Great Sand Dunes National Park

We completed 372 point surveys of at least 10 minutes duration (5136 total survey minutes) at 195 locations in GRSA in 2008. We surveyed 61% of locations on at least 2 occasions, separated by at least 7 days. Assuming that surveys covered a 500 meter radius area around each point, we surveyed 93% of the Ponderosa Pine, 56% of the Pinyon/Juniper, and 26% of the Aspen stands in the Park.

We did not detect any Spotted Owls in GRSA. We obtained 19 detections of Flammulated Owls (Figure 8), 38 detections of Great-horned Owls (Figure 9), 2 detections of Western Screech-Owls (Figure 10), 1 detection of a Northern Pygmy-Owl (Figure 11), 19 detections of Long-eared Owls (Figure 12), 2 detections of Short-eared Owls (Figure 13), and 11 detections of Northern Saw-whet Owls (Figure 14). Although we attempted to avoid recording detections of an individual owl more than once per survey night, the same individual may have been detected on multiple survey occasions. Therefore, the number of detections cannot be converted to the total number of owls present.

### General

Flammulated Owls are migratory, and are not present in Colorado until late April or early May. We broadcast Flammulated Owl calls throughout our field seasons (beginning 5 April 2007 and 1 April 2008) and recorded our first Flammulated Owl detection in ROMO on 3 May 2007 and in GRSA on 5 May 2008.

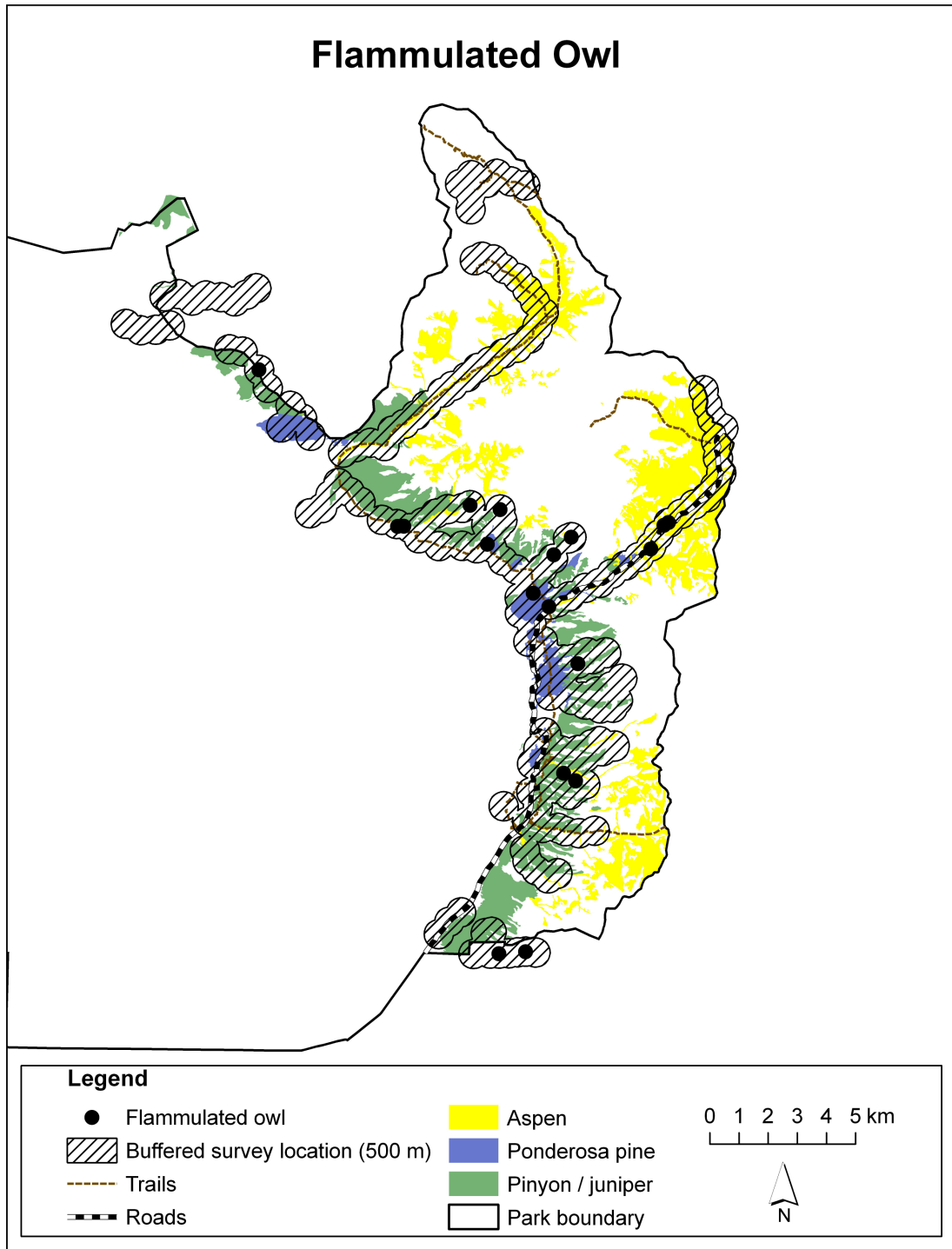


Figure 8. Locations of Flammulated Owl detections in Great Sand Dunes National Park, 2008.

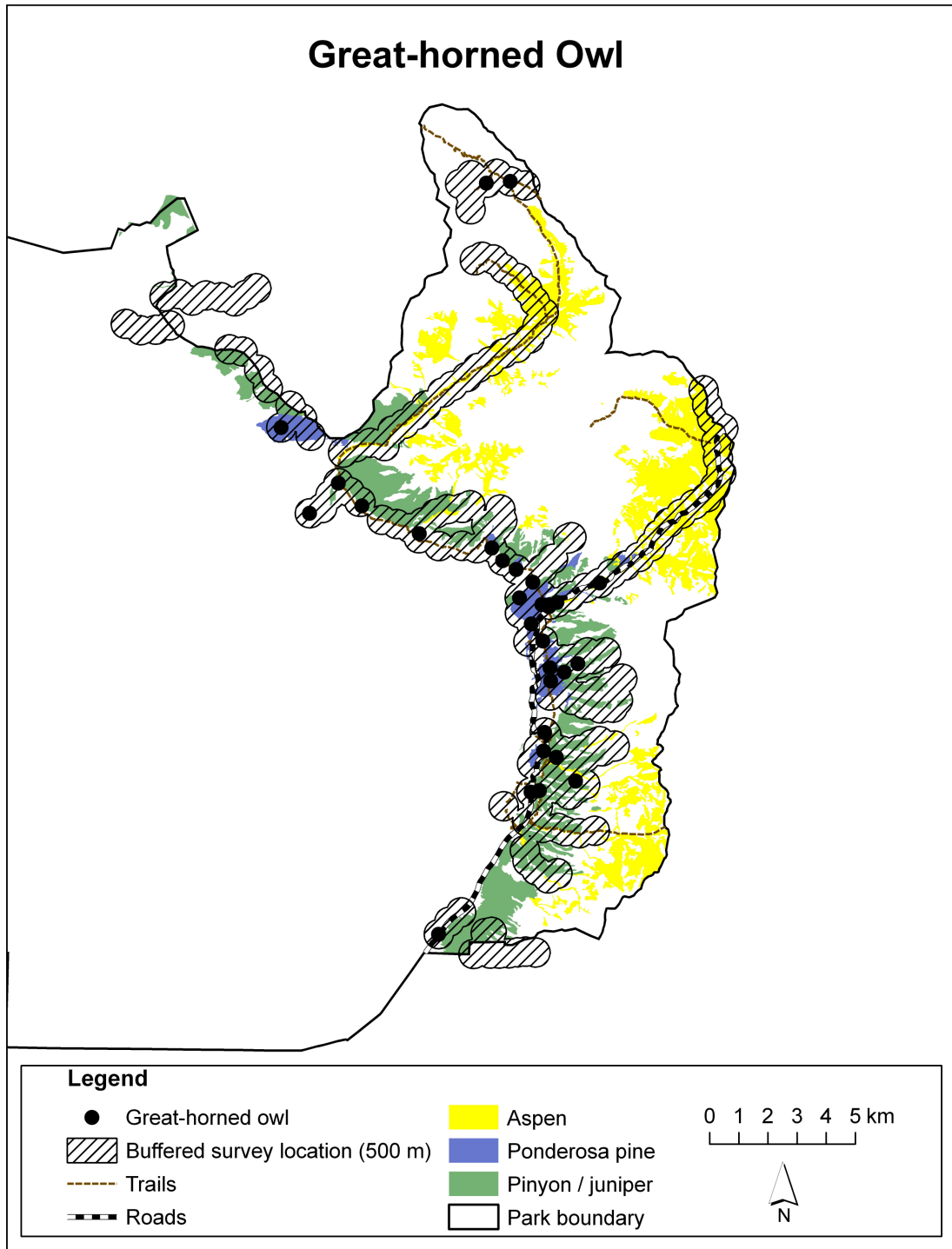


Figure 9. Locations of Great Horned Owl detections in Great Sand Dunes National Park, 2008.

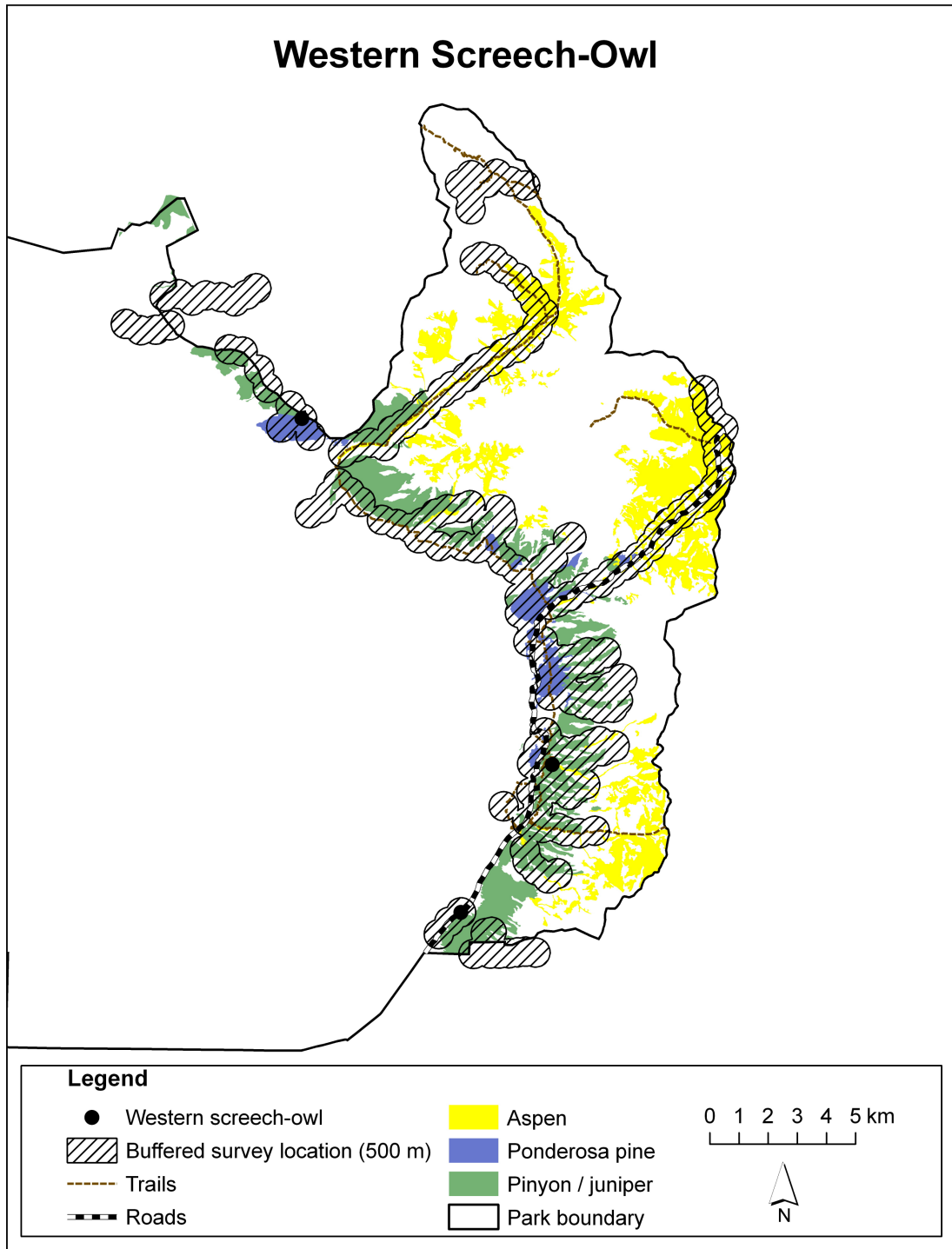


Figure 10. Locations of Western Screech-Owl detections in Great Sand Dunes National Park, 2008.

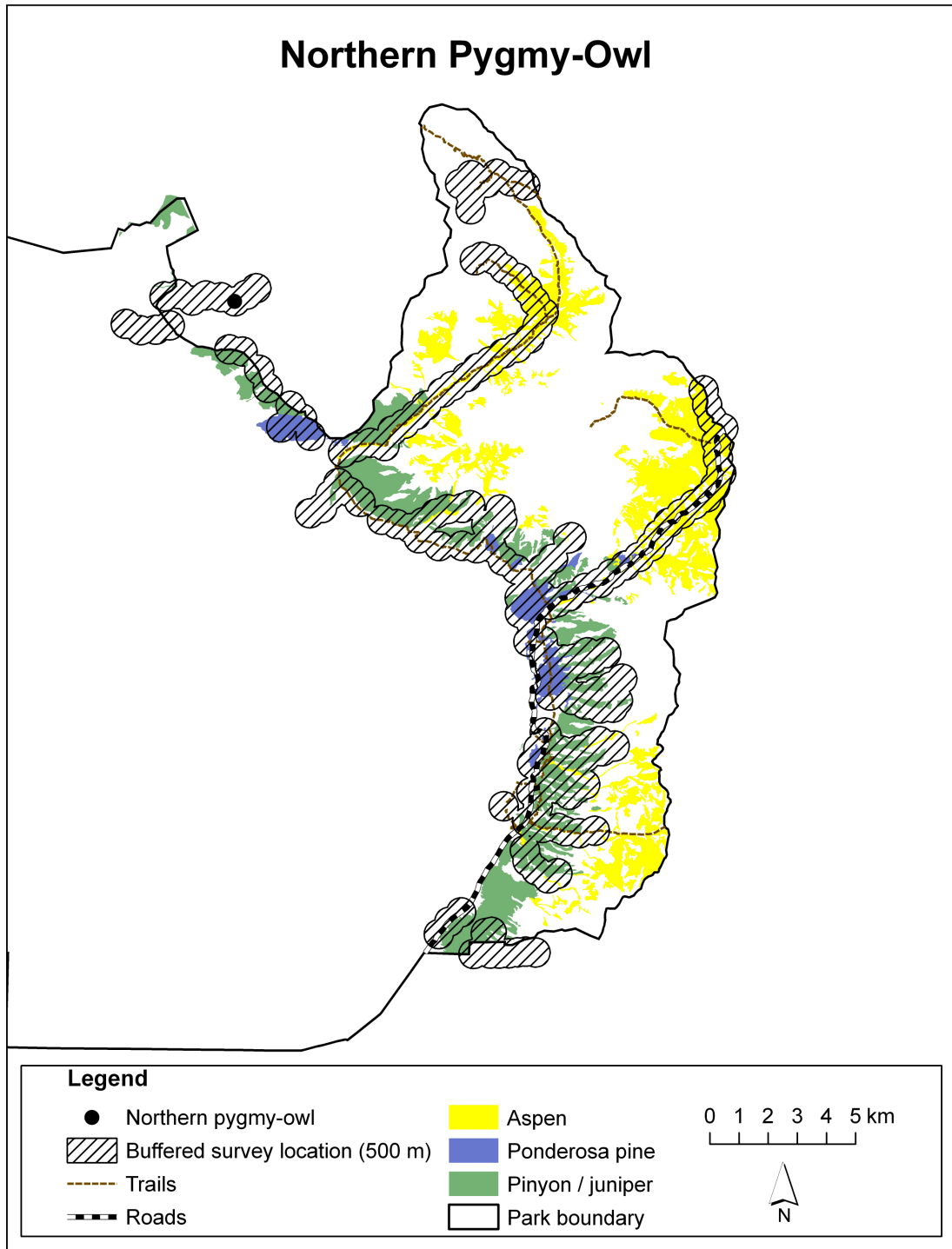


Figure 11. Locations of Northern Pygmy Owl detections in Great Sand Dunes National Park, 2008.

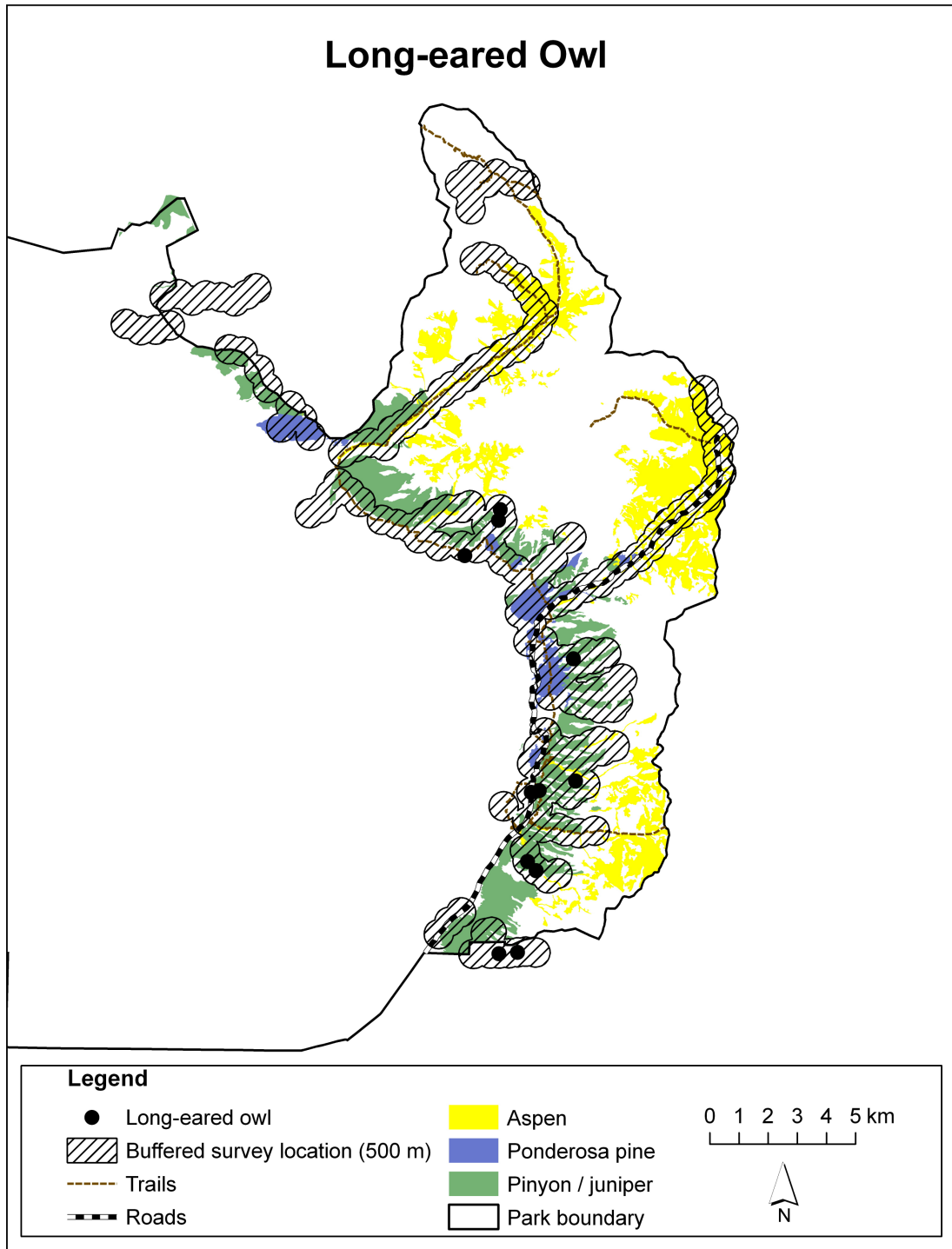


Figure 12. Locations of Long-eared Owl detections in Great Sand Dunes National Park, 2008.

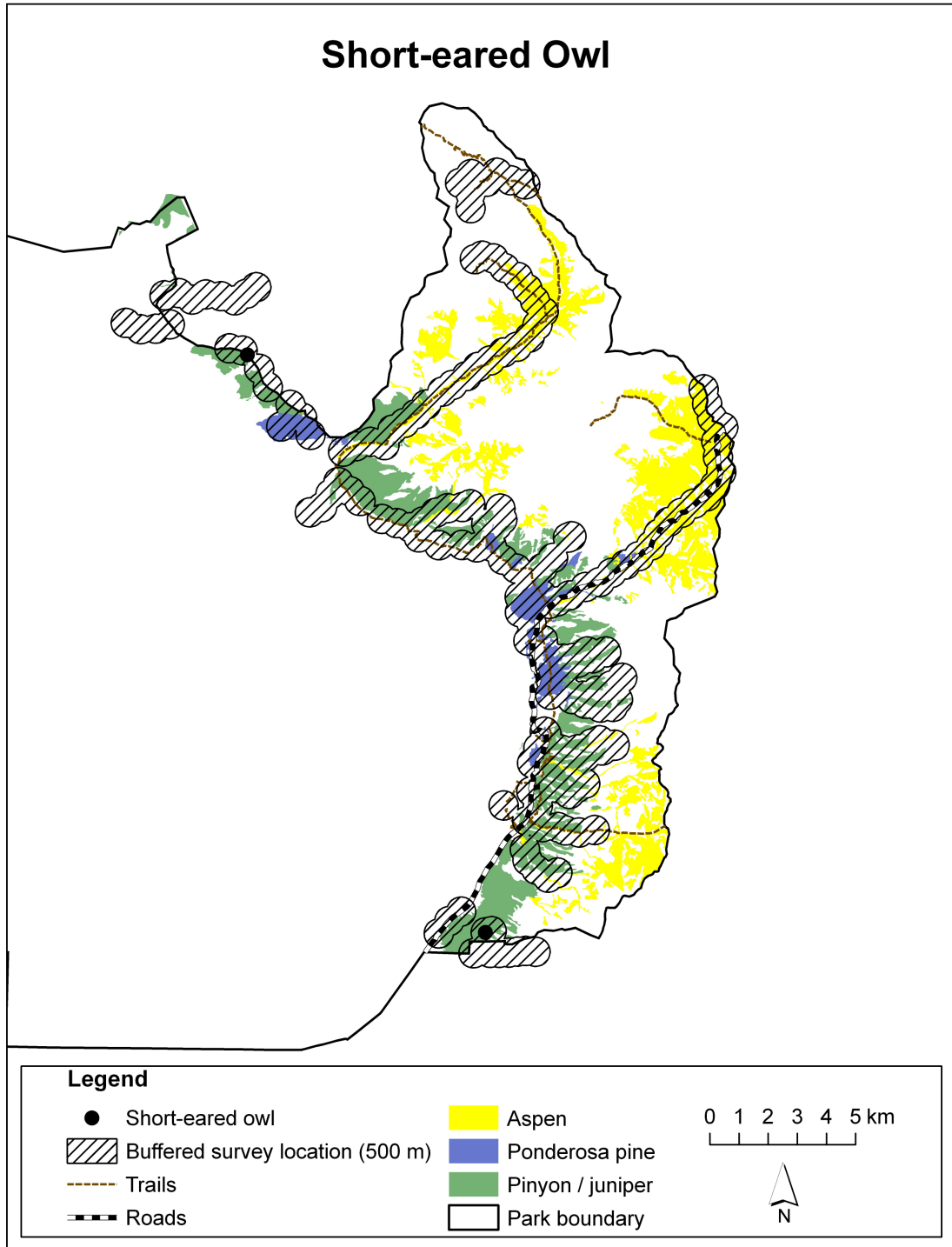


Figure 13. Locations of Short-eared Owl detections in Great Sand Dunes National Park, 2008.



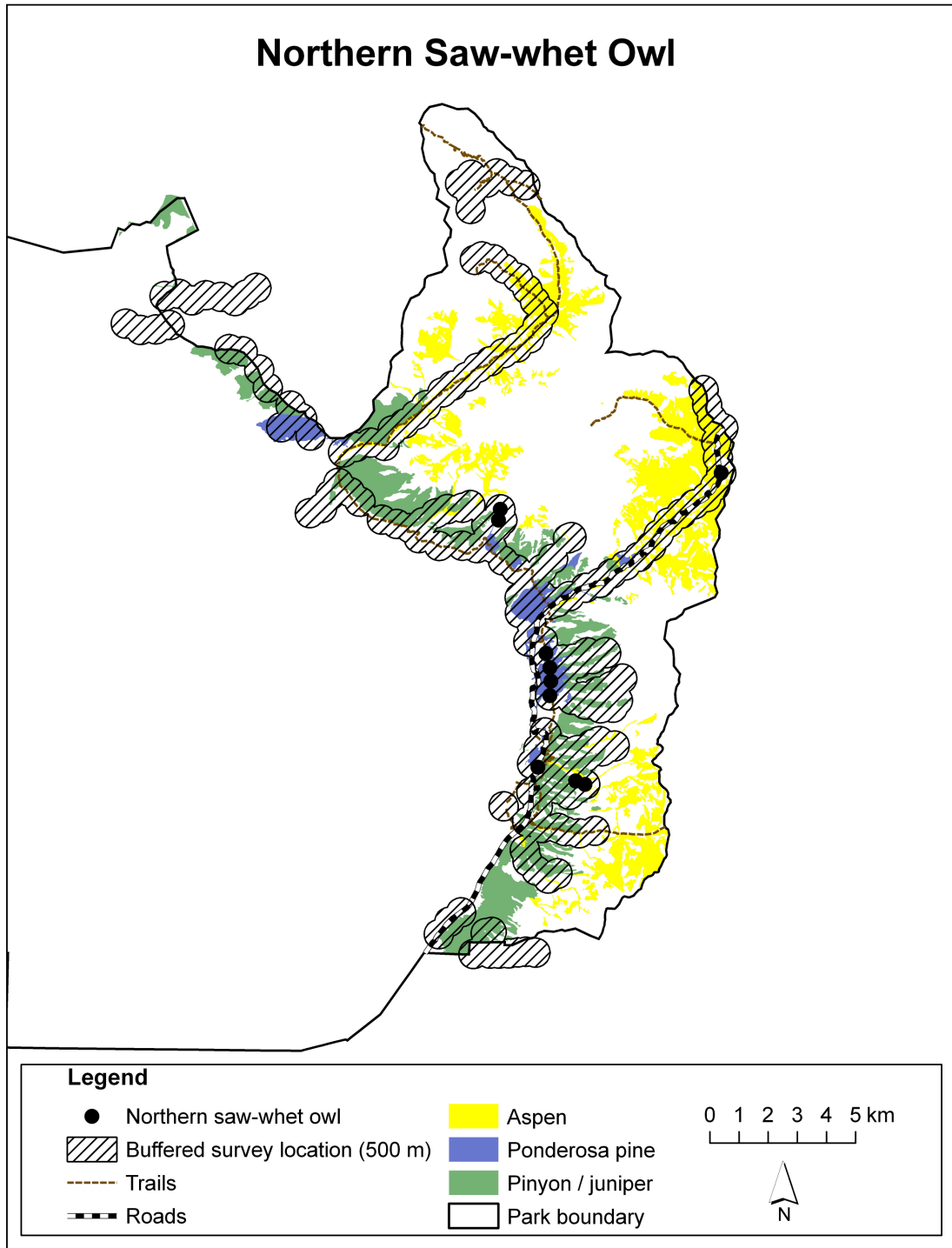


Figure 14. Locations of Northern Saw-whet Owl detections in Great Sand Dunes National Park, 2008.

## DISCUSSION AND RECOMMENDATIONS

Some areas identified as containing potentially suitable Mexican Spotted Owl habitat could not be safely accessed at night due to lack of trails and steep slopes. Figures 1 and 2 illustrate the areas covered by broadcast surveys, assuming that broadcast surveys could be heard by an owl 500 m away, and the observer would hear an owl calling up to 500 m away. Although we could not assess the distance at which an owl could hear the broadcast calls, Spotted Owls often respond to calls up to (and beyond) 1.5 km away (personal observation). Therefore, the effective area surveyed for Spotted Owls may be larger than that illustrated in Figures 1 and 2.

In the Sacramento Mountains of New Mexico, the per-visit probability of detecting a pair of Mexican Spotted Owls at a site, given that an owl pair was present, ranged from 0.49 to 0.81 among studies, with an average = 0.62 (Lavier 2006). Presumably, the probability of detecting a single owl at a site would be higher (less effort is required to detect an individual owl than to detect an owl pair). Given a per-visit detection probability of 0.62, the probability of detecting an owl after 2 visits = 86%. Therefore, it appears unlikely that Mexican Spotted Owls were present in Rocky Mountain nor Great Sand Dunes National Parks in the areas surveyed in 2007-2008.


We located seven owl species in the two National Parks. The distribution data for each species will help the NPS manage these species and their habitats. Furthermore, the owl location information provides a starting point for any future research or management project requiring knowledge of owl nesting locations.

The Flammulated Owl is listed as a Species of Greatest Conservation Need by the Colorado Division of Wildlife, a Sensitive Species by the US Forest Service, Region 2, a Bird of Conservation Concern by the US Fish and Wildlife Service, and a bird of Continental Concern by Partners in Flight. Any future surveys for Flammulated Owls in Rocky Mountain and Great Sand Dunes National Parks could make use of the techniques employed by RMBO. Because we broadcast calls of Flammulated Owls during all of our surveys, we were able to identify the approximate date on which this species arrived at the two National Parks in the spring. Future surveys targeting Flammulated Owls should begin no earlier than May.

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## APPENDIX A. DATA FORM

Rocky Mountain Bird Observatory					OWL BROADCAST SURVEY FORM							
Park: _____		Date: ____/____/____ <small>dd / MON / yyyy</small>		Observer 1: _____		Observer 2: _____						
Cloud cover: _____ <small>nearest 10%</small>		Precip: _____ <small>0 = none, 1 = light rain, 2 = light snow</small>		Wind: _____ <small>Beaufort</small>		Broadcast: _____ <small>R = random O = ordered</small>		Follow-up?: _____ <small>Y / N</small>				
<b>Survey Information:</b>						<b>Owl Detection Information:</b>						
Area	Point	Start Time	End Time	Survey Minutes	Call point location		How		Detect. Time	Min. to Detect.	Initial owl location	
					UTME	UTMN	Species	Sex			Detected	Bearing
<b>Beaufort:</b>				<b>km/h</b>	<b>mph</b>	<b>cues:</b>						
1		0		0	Smoke rises vertically.							
2		1-6		1-3	Wind felt on exposed skin. Leaves rustle.							
3		7-11		4-7	Leaves and smaller twigs in constant motion.							
				<b>Beaufort</b>	<b>km/h</b>	<b>mph</b>	<b>cues:</b>					
				4	12-19	8-12	Small branches begin to move.					
				5	20-29	13-18	Smaller trees sway.					
				6	30-39	19-24	Large branches in motion					
<b>NOTES ON BACK OF FORM? Yes / No</b>												

## APPENDIX B. FIELD PROTOCOL

OWL SURVEY PROTOCOL – Rocky Mountain Bird Observatory

April 2007

**BROADCAST SURVEYS:** Place call points approximately 500 m apart. Take advantage of topography and easy-to-locate landmarks such as trail junctions in placement of call points. GPS all call point locations every time they are surveyed. Completely survey all potential habitat in the Park once before beginning the second round of surveys; complete the second round before beginning the third round, etc.

Broadcast owl calls for 10-12 minutes, in the specified order. Keep in mind that our target species is the Mexican Spotted Owl, so remain at the point for 10 minutes *beginning* the first time you broadcast a spotted owl call. Alternate periods of broadcasting with periods of listening. Most calls on the broadcast unit are 10-15 seconds. Play a call, listen 15-30 seconds, play the next call, listen, etc. Make at least 2 passes through the call series so that every species' call is broadcast twice. If you think you hear an owl, it is ok to re-play its call out of sequence and/or to remain at a point for more than 12 minutes to confirm owl locations and species. If the owl is close to you and it is safe to leave the road or trail, try to locate the owl and GPS its location. Remember to listen for indications of nesting females and/or young owls (chittering, begging calls, soft contact calls, etc). Notify your supervisor as soon as possible if any spotted owls are detected.

**FOLLOW-UP SURVEYS:** If it is convenient, begin each night's work following-up on a previous night's owl detection to try to locate nests. Sometimes this can be done in the afternoon, especially for Pygmy-Owls.

**BE SAFE.** Stay in contact with your coworkers – radio each other once an hour if you can. Sign out each night so Park Personnel know where you have been, and sign back in when you return, even if you are very tired.

**BE COURTEOUS:** Drive slowly on the road to the Park, and everywhere else in the Park.