

EFFECTS OF FIRE ON MEXICAN SPOTTED OWLS
(*Strix occidentalis lucida*)
IN SAGUARO NATIONAL PARK

PROGRESS REPORT FALL 1996

Submitted to:

Saguaro National Park
3693 S. Old Spanish Trail
Tucson, AZ 85730

Prepared by:

David W. Willey, Research Specialist
COLORADO PLATEAU RESEARCH STATION
BIOLOGICAL RESOURCE DIVISION
UNITED STATES GEOLOGICAL SURVEY
Northern Arizona University
NAU Box 5614
Flagstaff, AZ 86011-5614

NOVEMBER 1996

Saguaro Nat'l Park
NRBIB Files
Please Sign Out File

EFFECTS OF FIRE ON MEXICAN SPOTTED OWLS IN SAGUARO NATIONAL PARK

Introduction

The spotted owl (*Strix occidentalis*) has been the focus of agency and public concern for over two decades (Simberloff 1987, Salwasser 1987, Ganey 1988). Spotted owls are associated with mature, multi-layered forests (Gould 1977, Forsman et al. 1984, Franklin et al. 1990, Ganey and Balda 1989), and may be declining throughout their range following loss of suitable nesting habitat due to logging and catastrophic fire (Forsman et al. 1984, Carey et al. 1990, Franklin et al. 1990, Block et al. 1995).

The Mexican spotted owl (*S. o. lucida*) occurs in forested highlands and canyons throughout the southwestern United States (MacDonald et al. 1990, Block et al. 1995). No previous studies have investigated the impacts of natural and prescribed fire on Mexican spotted owls that occur in the "sky island" mountain ranges of southeastern Arizona. This research project addresses the impacts of prescribed fire on the movements and habitat-use of Mexican spotted owls located in the Rincon Mountains of Saguaro National Park.

Background Information

Though widely distributed in the southwest, the Mexican spotted owl often occurs in small isolated subpopulations restricted to habitat "islands" (Ganey and Balda 1989, Willey 1989, Block et al. 1996). In response to perceived threats by timber harvest (Smith 1990) and other perturbations (Smith 1991) the Mexican subspecies was listed as "threatened" in March 1993 (Block et al. 1996). Little information has been available on the distribution, habitat-use, or nesting status of the isolated group of spotted owls that occur in the Rincon Mountains of Saguaro National Park (Smith 1991). In addition, limited information is available on the potential impacts of fire on this species (Peter Stacey, pers. comm.).

In northern Arizona, Ganey (1988) investigated several sites where spotted owls showed an affinity for closed-canopy mixed-coniferous forests and pine-oak woodlands. However, a wide range of habitat types were occupied and the owl seemed to show flexibility in habitat-use in contrast to spotted owls in the Pacific Northwest. In Saguaro National Park, anecdotal records (Kline 1994) suggested that one to two pairs of spotted owls were present in mixed-coniferous forest near Mica Mountain south of Rincon Peak. The forests where spotted owls were located near Mica Mountain are susceptible to catastrophic wildfire (Kline 1994, Rick Anderson, pers. comm.). Park fire specialists believe that fire suppression in the Rincons has resulted in the accumulation of heavy fuel loads, including deep litter beds, pine thickets, and ladder fuels (Kline 1994).

Information on the response of Mexican spotted owls to prescribed and natural fire in the Rincon Mountains will help the park service maintain future management options for spotted owls and prescribed fire. This information will also be important to other land managers in the southwest faced with decisions related to re-introducing natural fire into various forest ecosystems. In light of the national attention focused on the impacts of habitat disturbance to spotted owls, investigation in Saguaro National Park is highly warranted.

OBJECTIVES

Overall, the goal of the proposed research is to survey all forest habitat in the upper elevations of the Rincons for Mexican spotted owls and monitor their movements and habitat-use with radiotelemetry. During the recent work period I accomplished the following objectives:

1. Surveyed for spotted owls in mixed-conifer and pine-oak vegetation types above 6500 ft. in the Rincon Mountains.
2. Monitored spotted owls using radiotelemetry at sites where owls were located in the vicinity of Mica Mountain.
3. Surveyed prey and habitat characteristics along transects established near spotted owl territories and prescribed fire burn units.

METHODS AND RESULTS

Spotted Owl Surveys

Surveys for spotted owls were conducted in the Rincon Mountain district of Saguaro National Park in mixed-conifer and pine-oak forests above 6500 ft. from May to August 1996. The survey area encompassed all coniferous forest habitat between the northern boundary of the park near Mica Mountain south to Rincon Peak. We surveyed within the study area using a combination of cruise and point surveys (Forsman 1983, Franklin et al. 1990). We used the human voice to mimic spotted owl calls at our calling stations. At fixed calling stations: observers mimicked spotted owls by giving a variety of calls for 3-5 minutes, followed by approximately 3-5 minutes of listening for a response, then calling again (Ganey 1990). Stations were called for 15-20 minutes. Four-note location calls, bark calls, and contact calls were used by the callers at each calling station (Forsman 1983, Ganey 1988, Ganey 1990). Calling routes were systematically

placed within the survey area so that complete coverage of the area was accomplished. Complete coverage means that any owl within the area could hear the owl callers from a station at least once.

Spotted owls were heard during the surveys at five primary locations. After receiving owl responses, UTM coordinates of the owl's position were recorded on 1:24000 scale maps. Daytime follow-up visits were conducted to locate roosting owls and nest sites, and to collect regurgitated pellets. Five spotted owl pairs were located during the surveys. Pairs were located at the following locations: Spud Rock, Helen's Dome, Italian Spring, Spud Rock Spring, and Rincon Peak. The Spud Rock Spring pair produced 2 juvenile owls that were observed near the spring until they dispersed out of the area in early September. Fish and Wildlife Service aluminum leg bands were placed on all of the owls. Colored leg bands were placed on the juveniles prior to dispersal.

Radiotelemetry

We visited sites located during the surveys during the early evening or morning hours to trap the adult owls and attach transmitters. At trap sites (typically a nesting area or frequently used roost area) we imitated a variety of spotted owl calls (see Ganey 1990) to illicit a response and pinpoint the owl's location. Once an owl was located, we place bal-chatri traps in prominent locations directly under the target owl and/or tethered live rodents beneath the owl as a diversion while using a 3.5-m noose pole (Forsman 1983). Once an owl was trapped it was quickly restrained, hooded, and prepared for tail-mounted radio attachment (tail feathers were cleaned with rubbing alcohol to provide a surface for attachment) (Kenward 1987). Radio transmitters (Hollow Hill Inc., Ontario, Canada), weighing 5.5-6.0 gm with an average signal life of 12+6 months, were attached to the central retrices using quick-set epoxy and un-waxed dental floss. Radio signals were received using TR-1 and TR-2 receivers and handheld H-antennas (Telonics Inc., Mesa, Ariz.). Nocturnal locations were obtained by triangulation of compass bearings from ≥ 2 permanent tracking stations.

Accuracy tests will be conducted within each study area to produce error polygons around triangulated positions (White and Garrot 1990). During the majority of nocturnal tracking periods, observers remained close enough to the owls to maintain error polygons ≤ 10 ha. Nocturnal tracking was done on foot from ridges and cliff rims above the owl sites using headlamps. During nocturnal tracking periods, each owl was tracked six continuous hours during tracking sessions spaced across all hours of the night every 3-7 days. We attempted to keep sampling level equal for all owls; however, because of poor weather, owl movements and

equipment failure, the sampling effort was not spread equally among the radio-tagged owls.

All ten adult spotted owls (5 males and 5 females) were captured and had radio-transmitters attached to their tail feathers. Radiotelemetry was used at each of 5 owl territories to track owl movements. During winter 1996/97, the re-location data will be loaded into a database (QuatroPro) and used to identify seasonal movements, locate roost and nest core areas, map home ranges, and finally, identify habitat use patterns of the owls. Preliminary inspection of the movement data showed that the owl pairs focused their movements in activity centers located near frequently used roost sites, or the nest (Spud Rock Spring pair). Activity centers were typically less than 1000 acres in size and occurred primarily within mixed-conifer and Ponderosa pine vegetation. The adults remained within the general vicinity of the activity centers until early September when larger nocturnal movements occurred and roost sites became scattered along the fringe of the breeding home-ranges. Several owls began to move downslope into pinyon-juniper vegetation.

Habitat Use Analysis

Spotted owl roost sites were quantified by homing in on roosting owls during the day. Habitat variables were measured at each roost site to quantify habitat composition and structure. Roost plots were centered at roost sites and at 30 random points located along transects placed in and adjacent to home-ranges. Twenty vegetation and topographic variables were recorded within 0.04 ha plots following methods modified from Rinkevich (1991). The microsite habitat variables included: ground cover type (e.g. rock, bare ground, litter, dead and down logs, grass, forbs, shrubs, and cactus); tree species composition and individual tree dimensions (height, DBH, condition, canopy cover); basal area of large trees; and several canyon structural features (width, height, number caves and ledges). Slope, aspect, and elevation of the roost sites was also recorded. Foraging habitat used by spotted owls was identified by collecting night time relocations. We will identify habitat types used by spotted owls and compare these to the range of available habitats (generated from a nonmapping technique) to describe habitat use patterns and possible habitat preferences of spotted owls (Neu et. al 1974). Habitat will be assigned to types based on land form and vegetation characteristics following Brown (1982).

Prescribed Fire and Spotted Owls

In order to understand mechanisms that underlie patterns of owl response to fire, a controlled experiment was begun by taking advantage of two prescribed burns conducted by the park service near the owl territories, the Meadow and Spud Rock Burns. We collected "pre-fire treatment" movement and habitat use data for

five owl pairs. Owl behavior (foraging and diurnal) was assessed before and after the burns by using radio-telemetry and conducting daytime roost observations. In addition, three 200-m line transects were randomly placed within each burn unit. Habitat composition and structure, and small mammal present, were sampled at survey stations placed every 20-m along the transects before and after the burns were conducted.

Preliminary inspection of the owl data (movement and roost observations) suggests that the Meadow Burn did not proximately affect owl movements and implies that the Meadow Burn occurred outside nearby owl homeranges. No smoke from the Meadow burn was observed at owl roosts. In contrast, the Spud Rock Burn occurred within nearly 75% of an owl's home-range (the Spud Rock male). The female owl from the Spud Rock territory was observed to "hoot" at the fire and adjust her roost away from the fire boundary. In addition, smoke was observed at the female's roost area but no obvious behavioral effects were witnessed. Long-term effects of the fires will be assessed by monitoring owl movements, locations of activity centers, and habitat use during the 1997 breeding season.

PROJECT SCHEDULE: Winter 1997/98

November-February: Data entry and analysis and progress report preparation.

March-August: additional surveys and radiotelemetry monitoring of movements and habitat-use. Post year measurement along all habitat/prey transects in the burn units.

September-November: Data entry report preparation.

LITERATURE CITED

- Brown, D. E. 1982. Biotic communities of the American Southwest-United States and Mexico. Desert Plants Vol. 4, Nos. 1-4.
- Call, D. R., R. J. Gutierrez, and J. Verner. 1992. Foraging habitat and home-range characteristics of California Spotted Owls in the Sierra Nevada. Condor 94:880-888.
- Capen, D. E., J. W. Fenwick, D. B. Inkley, and A. C. Boynton. 1986. Multivariate models of songbird habitat in New England Forests. Pp. 171-176 in J. Verner, M. L. Morrison, and C. J. Ralph (Eds.), Wildlife 2000. Univ. Wisconsin Press, Madison, WI.
- Carey, A. B., J. A. Reid, and S. P. Horton. 1990. Spotted

- owl home range and habitat use in southern coast ranges.
J. Wildl. Manage. 54:11-17.
- Forsman, E. D. 1983. Methods and materials for locating and studying spotted owls. Gen. Tech. Rep. PNW-162. Portland Oregon; U.S. Dept. of Agri., Fors. Serv., Pacific Northwest Forest and Range Exp. Sta. 8p.
- Forsman, E.D., E. C. Meslow and H. M. Wight. 1984. Distribution and biology of the spotted owl in Oregon. Wildl. Monogr. 87. 64pp.
- Forsman, E. D., and E. C. Meslow. 1986. The spotted owl. Audubon Wildl. Rep:743-761.
- Franklin, A. B., J. P. Ward, R. J. Gutierrez, and G. I. Gould, Jr. 1990. Density of northern spotted owls in northwest California. J. Wildl. Manage. 54:1-10.
- Ganey, J. L. 1988. Distribution and habitat ecology of Mexican spotted owls in Arizona. M.S. Thesis Northern Arizona Univ., Flagstaff. 229pp.
- Ganey, J. L. 1990. Calling Behavior of spotted owls in northern Arizona. Condor 92:485-490.
- Ganey, J. L., and R. P. Balda. 1989. Distribution and habitat use of Mexican spotted owls in Arizona. Condor 91:355-361.
- Gould, G. I. 1977. Distribution of the spotted owl in California. West. Birds 8:131-146.
- Johnson, J. A., and T. H. Johnson. 1985. The status of the spotted owl in northern New Mexico. New Mexico Dep. Game and Fish. Santa Fe, NM. Contract No. 516.6-73-03.
- Kenward, R. 1987. Wildlife radio tagging. Academic Press, London. 222pp.
- Kline, N. C. 1994. Biological evaluation for implementation of a prescribed burn in the Rincon Mountains of Saguaro National Monument. Unpubl. Report for Natural Resources Office.
- Neu, C. W., C. R. Byers, and J. M. Peek. 1974. A technique for analysis of utilization-availability data. J. Wildl. Manage. 38:541-545.
- Rinkevich, S.E. 1991. Distribution and habitat characteristics of Mexican Spotted Owls in Zion National Park, Utah. MS thesis Humboldt State University, Arcata, CA. 62pp.

- Salwasser, H. 1987. Spotted owls: Turning a battleground into a blueprint. *Ecology* 68:776-779.
- Schoener, T.W. 1981. An empirically based estimate of home-range. *Theor. Pop. Biol.* 20:281-325.
- Simberloff, D. 1987. The spotted owl fracas: Mixing academic, applied, and political ecology. *Eco.* 68:766-772.
- Smith, R. N. 1990. Endangered and threatened wildlife and plants; finding on a petition to list the Mexican Spotted Owl as threatened or endangered. *Fed. Reg.* 55:90-7054.
- Smith, R. N. 1991. Endangered and threatened wildlife and plants; proposal to list the Mexican Spotted Owl as threatened. *Fed. Reg.* 56:56344-56355.
- Sokal, R.R., and F.J. Rohlf. 1981. *Biometry*. W.H. Freeman and Co. New York. 859pp.
- Swihart, R.K., and N.A. Slade. 1985. Testing for independence of observations in animal movements. *Ecology* 66:1176-1184.
- White, G, and R. A. Garrot. 1990. *Analysis of wildlife radio tracking data*. Academic Press, Inc. San Diego.
- Wilkinson, L. 1990. *SYSTAT: The system for Statistics*. Evanston, IL: SYSTAT, Inc.
- Willey, D. W. 1989. Spotted owl inventory on the Kaibab National Forest, Utah. Contract No. 43-8156-9-0273. Submitted to North Kaibab Ranger District. 20pp.
- Worton, P. J. 1989. Kernel methods for estimating the utilization distribution in home-range studies. *Ecology* 7:164-168.