Diurnal Habitat Selection and Home-range Size of Female Black Bears in the Ouachita Mountains of Oklahoma

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Black bears (*Ursus americanus*) in upland habitats in the southeastern United States generally prefer hardwood forests. We studied habitat use by female bears (n = 13) in a recolonizing population in the oak-pine (*Quercus-Pinus*) forests of the Ouachita Mountains of southeastern Oklahoma during 2001–2002. Sizes of annual ranges of female bears averaged 14.5 and 21.0 km^2 as estimated by minimum convex polygon and adaptive kernel methods, respectively. Based on compositional analysis, pine-hardwood and oak-hardwood poletimber stands were the highest-ranked habitat types at the study-area scale annually and during summer, whereas sawtimber of shortleaf pine (*Pinus echinata*), regeneration areas, and oak-hardwood sawtimber were the highest-ranked habitats at the home-range scale. Selection varied on a seasonal basis and by scale, but bears consistently avoided pine-hardwood sawtimber stands. The unusual preference for pine stands by black bears in our area may be tied to local forest management practices, which include thinning and burning. ***© 2007 Oklahoma Academy of Science***

INTRODUCTION

Black bears historically occurred in the Ozark and Ouachita mountains of Arkansas, Missouri, and Oklahoma. After extirpation of bears from Oklahoma in 1915 and this region of Arkansas in the 1940s (Clark and Smith 1994), a highly successful translocation of 254 black bears from northern Minnesota and Manitoba, Canada, to the Ozark and Ouachita mountains of Arkansas took place between 1958 and 1968 (Smith and Clark 1994). Growth and expansion of this population in Arkansas led to bear recolonization of the Ouachita Mountains of southeastern Oklahoma since the mid-1980s (Bales et al. 2005).

Upland habitat for black bears (*Ursus americanus*) in the southeastern United States is predominantly oak-hickory (*Quercus–Carya*), oak-pine (*Quercus-Pinus*), or mixed-mesophytic forests containing a variety of food-producing understory plants (Pelton 2003). In the Ouachita Mountains of the Interior Highlands of Arkansas, female bears used immature poletimber stands of oak-hickory forest more than expected if use was random and used stands of shortleaf pine less than expected throughout the year (Clark et al. 1993, 1994). Those patterns appeared to be related to availability of soft and hard mast with the exception of avoidance of food-rich, pine regeneration areas (Clark et al. 1994). Researchers speculated that this exception was a result of exclusion of females from these habitats by males (Clark et al. 1994).

A rapid increase in bear abundance and distribution in southeastern Oklahoma, con-

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comitant potential for increased human-bear interactions, and lack of site-specific data on bear ecology motivated our study. Data on habitat and spatial ecology of an established population of black bears in similar terrain in Arkansas (Clark et al. 1993, 1994) were used for comparison. Based on these earlier results, we predicted that female bears would use regeneration stands less than expected and poletimber hardwood stands more than expected. Specifically, our objectives were to quantify home-range size and describe habitat use of female black bears in the Ouachita Mountains of Oklahoma.

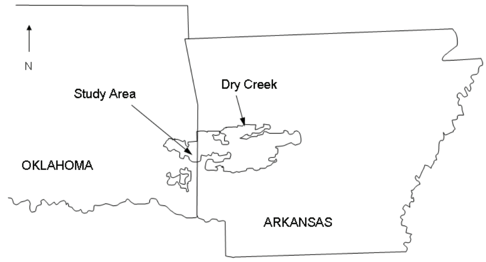

Figure 1. Location of study area in southeastern Oklahoma in which habitat use by female black bears was evaluated relative to the Dry Creek study area in Arkansas (Clark et al. 1993*a*).

METHODS

Study area

We conducted this study in the Kiamichi and Choctaw districts of the Ouachita National Forest, LeFlore County, southeastern Oklahoma. We also accessed Honobia Wildlife Management Area, managed by Oklahoma Department of Wildlife Conservation, located in LeFlore and Pushmataha counties. East-west ridges characterized the Ouachita Mountains, with elevations of 400–813 m. The southeastern Oklahoma climate consisted of mild winters (average January temperature = 3.9°C) and hot, humid summers (average July temperature = 27.7°C); however, temperatures may be lower in higher elevations (Oklahoma Climatological Survey, Norman, Oklahoma). LeFlore County receives an average of 122 cm of rainfall annually (Oklahoma Climatological Survey, Norman, Oklahoma).

Rolley and Warde (1985) described 3 main cover types for the area including pine forests (primarily on south-facing slopes), deciduous forests (primarily on north-facing slopes and creek bottoms), and mixed pine-deciduous forests. Pine forests were characterized by an overstory dominated by shortleaf pine, a midstory including winged elm (*Ulmus alata*), sparkleberry (*Vaccinium arboretum*) and low blueberry (*V. vacillans*), and an understory including greenbriar (*Smilax* spp.), poison ivy (*Toxicodendron radicans*), and little bluestem (*Schizachyarium scoparium*). Deciduous forests had an overstory dominated by oaks (e.g., white oak, *Q. alba*, and northern red aok, *Q rubra*) and hickories (mockernut hickory, *C. tomentosa*, and black hictory, *C. texana* ; Rolley and Warde 1985), a midstory of dogwood (*Cornus florida*) and redbud (*Cercis canadensis*), and an understory of panicum (*Panicum* spp.) and wildrye (*Elymus* spp.). Mixed pine-deciduous forests were a blend of the above species and occurred primarily at lower elevations in transitional zones between pine forests and deciduous forests (Rolley and Warde 1985).

Capture and handling

We captured black bears with Aldrich spring-activated snares modified for bear safety (Johnson and Pelton 1980) and barrel traps in May–August and October–November, 2001–2002. We used standard handling procedures (Bales et al. 2005), which were approved by the Institutional Animal Care and Use Committee at Oklahoma State University. Twenty-eight adult females (≥ 36 kg) were fitted with radiocollars equipped with mortality sensors (Telonics Inc., Mesa, Arizona) and a cotton spacer (Hellgren et al. 1988).

Spatial analyses

Home range.—We relocated radiocollared bears 5–10 times monthly using triangulation (3 azimuths obtained in < 50 min; most in < 30 min) by ground telemetry with receivers and hand-held H-type antennas. Telemetry station Universal Transverse Mercator (UTM) coordinates, azimuth, and time of reading were recorded. All radio locations were obtained during daylight hours (0700–1900 h). Locational estimates of radiocollared bears were assigned UTM coordinates with LOCATE software (Pacer Computer Software, Truro, Nova Scotia, Canada; Nams 1990). To determine triangulation error of assisting personnel, test collars were placed in topographic positions and distances from the observer consistent with typical bear radio locations (Clark 1991). Two individuals assessed observer error of the telemetry system (Clark 1991), which was determined by calculating average distance from true locations to > 10 test locations per observer using SAS (SAS Institute Inc. 2001). Thereafter, four observers conducted radio telemetry.

Home ranges were estimated by the convex polygon (Mohr 1947) and adaptive kernel (Worton 1989) methods using Animal Movements Extension (Hooge and Eichenlaub 1997) in ArcView (ESRI, Redlands, California). The convex polygon model is not constrained by assumptions of distribution and independence of observations; however, it is sensitive to sample size, may not be asymptotic, has a convex shape, and may overestimate home range because of outliers (van Manen 1994). The kernel estimator is a nonparametric, scaled-down probability density function placed over each data point (Worton 1989). Annual home ranges were estimated only for bears with ≥ 20 radio locations, and seasonal ranges were estimated only for bears with ≥ 10 radio locations per season. We focused on two seasons based on food availability and bear behavior: summer (May–Aug) and autumn (Sep–Dec). We regressed annual and seasonal estimates of home-range size on number of radio locations per bear to assess the potential for underestimation of home-range size due to small sample sizes.

Habitat analyses.—Habitat selection was determined at 2 spatial scales (Johnson 1980): the level of the study area (landscape-level or 2nd-order selection) and the level of the home range (home-range-level or 3rd-order selection). In the landscape-level analysis, availability was considered the habitat composition of the composite home range of radiocollared females, and use was considered the vegetation types that composed an individual's home range. In the home-range level analysis, the vegetation-type composition of the home range was considered available habitat for a given individual and the specific types used by that individual were considered used habitat. We used forest cover maps and stand data for the Kiamichi and Choctaw districts provided by the United States Forest Service as 1:24,000 ArcInfo (ESRI, Redlands, California) coverages developed through their Continuous Inventory Stand Condition management system. Sixteen stand types were combined into 6 vegetation categories for analysis (Table 1). Condition classes had site-specific definitions in which "immature" and "mature" referred to the age of the stand and "poletimber" and "sawtimber" referred to the size of trees. In the Ouachita National Forest, Oklahoma, immature poletimber included trees < 24.4 cm diameter at breast height (dbh) and < 70 years old; mature poletimber included trees < 24.4 cm dbh and > 70 years old; immature sawtimber included trees > 24.4 cm dbh and < 70 years old; and mature sawtimber included trees > 24.4 cm dbh and > 70 years old (R. L. Bastarache, United States Forest Service, personal communication).

We combined coordinates for bear locations with the vegetation stand-type layer using the geoprocessing extension for ArcView (ESRI, Redlands, California). The study-area polygon and home-range polygons for 13 adult female bears with >20 radio locations also were intersected with the same vegetation stand-type layer using the geoprocessing extension. Areas for individual stand-type patches within study area

Table 1. Fifteen forest stand-types were combined into 6 categories for compositional analysis to describe habitat use of female black bears in Ouachita National Forest, LeFlore County, Oklahoma, 2001–2002.

Stand type	Vegetation category	Percent of Area
Hardwood-pine immature sawtimber Hardwood-pine mature sawtimber Pine-hardwood immature sawtimber Pine-hardwood mature sawtimber	Pine-hardwood sawtimber (PHS)	3.4
Oak-hardwood immature sawtimber Oak-hardwood mature sawtimber	Oak-hardwood sawtimber (OHS)	0.4
Oak-hardwood poletimber Scrub-oak poletimber	Oak-hardwood poletimber (OHP)	17.1
Pine-hardwood poletimber	Pine-hardwood poletimber (PHP)	9.2
Shortleaf pine immature sawtimber Shortleaf pine mature sawtimber Shortleaf pine poletimber	Shortleaf-pine sawtimber (SLPS)	55.6
Shortleaf pine regeneration Shortleaf pine seedling & sapling Pine-hardwood seedling & sapling Scrub-oak regeneration	Regeneration (REGEN)	14.3

and home ranges were determined using Patch Analyst (Elkie et al. 1999) for ArcView (ESRI, Redlands, California).

Data were analyzed by compositional analysis (Aebischer et al. 1993), a multivariate, rank-based method for determining preference. Individual animals were considered replicates. We also generated random points within the composite home range using Random Point Generator v. 1.1 (Jeness Enterprises, Flagstaff, Arizona) in ArcView (ESRI, Redlands, California). Distributions of distances of bear locations from all road types and all paved roads were compared with a distribution of random points with Chi-square analyses using 4 categories of distances that varied by analysis: ≤ 4,000 m, 4,001–8,000 m, 8,001–12,000 m, and ≥12,001 m from a paved road and ≤ 500 m, 501–1,000 m, 1,001–1,500 m, and ≥ 1,501 m from any road.

RESULTS

Home range

A total of 824 radio locations was obtained for 28 female black bears from July 2001 to January 2003. Of those locations, 686 for 13 bears remained after eliminating individual bears with < 20 radio locations. Observer error of the 2 individuals with >10 test locations each averaged 311.2 m (SE = 81.9) and 278.1 m (SE = 104.9).

Estimates of home range (95% adaptive kernel and 95% minimum convex polygon) were not positively related ($P > 0.05$) to number of radio locations for either annual or seasonal periods, although kernel estimates of range size were negatively related to number of radio locations for annual ($P = 0.08$) and summer ($P = 0.03$) periods. Based on these results, we assumed that bias in home-range estimates due to sample size were negligible.

Mean estimates of annual, diurnal home ranges for females using 100% and 95% minimum convex polygon methods were 24.9 km^2 (SE = 4.3, *n* = 13, range: 7.1–41.7 km^2) and 14.5 km^2 (SE = 2.7, n = 13; range: 2.9–35.2 km^2), respectively. The estimate of mean annual home range using the 95% adaptive kernel method was 21.0 km^2 (SE = 4.3, *n* = 13; range: 8.4–56.1 km^2; Table 1). During summer (May–Aug 2001–2002), estimates of home ranges averaged 13.3 km^2 (SE = 2.2, *n* = 10), 11.9 km^2 (SE = 2.4, *n* = 10), and 21.3 km^2 (SE = 3.0, *n* = 10) by 100% minimum convex polygon, 95% minimum convex polygon, and 95% adaptive kernel methods, respectively. During autumn (Sep –Dec 2001–2002), estimates of home range averaged 16.7 km^2 (SE = 3.7, *n* = 13), 11.1 km^2 (SE = 2.1, *n* = 13), and 15.7 km^2 (SE = 3.0, *n* = 13) by 100% minimum convex polygon, 95% minimum convex polygon, and 95% adaptive kernel methods, respectively.

Habitat analyses

Habitat use was nonrandom for landscape-level analysis on an annual basis (χ^2 = 23.8, *df* = 5, $P < 0.001$; Table 2). Pine-hardwood poletimber was selected relative to oak-hardwood sawtimber ($P = 0.007$) but did not differ in rank from the other 4 habitat types ($P \geq 0.11$). Habitat use was nonrandom for landscape-level analysis in summer (χ^2 = 20.0, df = 5, $P < 0.05$) and autumn (χ^2 = 17.4, df = 5, $P < 0.05$; Table 2). In summer, pine-hardwood poletimber ranked highest among all vegetation types. However, its selection did not differ from oak-hardwood poletimber, shortleaf-pine sawtimber, or regeneration areas ($P \geq 0.12$). Pine-hardwood sawtimber ranked lower than oak-hardwood poletimber and pine-hardwood poletimber ($P \leq 0.04$). Oak-hardwood sawtimber was lower in rank than all other vegetation types ($P \leq 0.04$). In autumn, regeneration areas and shortleaf-pine sawtimber ranked 1st and 2nd respectively, among all vegetation types although their selection did not vary statistically from oak-hardwood poletimber and pine-hardwood poletimber ($P \geq 0.15$). Pine-hardwood sawtimber was lower in rank than shortleaf-pine sawtimber and regeneration ($P \leq 0.02$). Oak-hardwood sawtimber also was lower in rank than oak-hardwood poletimber, pine-hardwood poletimber, shortleaf-pine sawtimber, and regeneration

Table 2. Rank of habitat types used by female black bears for compositional analysis in Ouachita National Forest, LeFlore County, Oklahoma, 2001–2002.

Order of analysis	Period	Ranking: Highest					Lowest
2nd	Annual	PHP[1]	OHP	REGEN	SLPS	PHS	OHS
2nd	Summer	PHP	OHP	REGEN	SLPS	PHS	OHS
2nd	Autumn	REGEN	SLPS	PHP	OHP	PHS	OHS
3rd	Annual	SLPS	REGEN	OHS	OHP	PHP	PHS
3rd	Summer	SLPS	OHS	REGEN	PHP	PHS	OHP
3rd	Annual	SLPS	OHS	PHP	OHP	REGEN	PHS

[1]PHP = pine-hardwood sawtimber, OHP = oak-hardwood poletimber, REGEN = regeneration, SLPS = shortleaf pine sawtimber, PHS = pine-hardwood sawtimber, OHS = oak-hardwood sawtimber.

($P \leq 0.03$). Those results indicated that in each season, the relative proportion of oak-hardwood sawtimber in individual female home ranges compared with the composite range of all monitored female bears ranked the lowest.

Habitat use was nonrandom for home-range-level analysis on an annual basis ($\chi^2 = 19.1$, df = 5, $P < 0.05$; Table 2). Selection for shortleaf-pine sawtimber, regeneration areas, and oak-hardwood sawtimber was greater than for pine-hardwood sawtimber ($P \leq 0.04$). Selection of the other 3 types were ranked, in order, oak-hardwood poletimber, pine-hardwood poletimber, and pine-hardwood sawtimber. Radio locations of bears were less likely to be in pine-hardwood sawtimber relative to its availability within an individual home range than any other vegetation type.

Habitat use was nonrandom for home-range-level analysis in summer ($\chi^2 = 19.9$, df = 5, $P < 0.05$) and autumn ($\chi^2 = 24.9$, df = 5, $P < 0.001$; Table 2). Radio locations of bears in summer were more likely to be in shortleaf-pine sawtimber relative to its availability within individual home range than any other vegetation type because this habitat ranked highest among all vegetation types. However, its selection did not vary statistically from the next 2 highest-ranked types, oak-hardwood sawtimber and regeneration ($P = 0.15$ and 0.22, respectively). Selection of the other 3 habitat types was ranked, in order, pine-hardwood poletimber, pine-hardwood sawtimber, and oak-hardwood poletimber. In autumn, shortleaf-pine sawtimber and oak-hardwood sawtimber ranked 1st and 2nd respectively, among all vegetation types. Bears were less likely ($P = 0.02$) to be in pine-hardwood sawtimber in autumn relative to its availability within individual home ranges than shortleaf-pine sawtimber or oak-hardwood sawtimber.

Average distances of bear and random locations from nearest paved road were 3,018 m (SE = 98, $n = 815$) and 2,674 m (SE = 103, $n = 815$), respectively. Distributions of distances of bear radio locations and random locations to paved roads differed ($\chi^2 = 88.6$, df = 3, $P < 0.001$), with bears less likely to be found ≤ 4,000 m from paved roads than random points (Fig. 2). Average distances of bear and random locations from nearest road of any type were 399 m (SE = 10, $n = 815$) and 546 m (SE = 16, $n = 815$), respectively. Distributions of distances of bear radio locations and random locations to all roads differed ($\chi^2 = 88.0$, df = 3, $P < 0.0001$), with bears more likely to be found ≤ 500 m from roads than random points (Fig. 2).

DISCUSSION

Home range

Home-range estimates for adult female black bears in Oklahoma were similar to those reported for other areas (range = 7–49 km²; Garshelis and Pelton 1981, Warburton and Powell 1985, Powell et al. 1997, Pelton 2003). Clark (1991) reported that home ranges of adult females averaged 34.7 km² in the Interior Highlands of Arkansas, which are similar in habitat composition to our study area. Old-growth and mature, late-

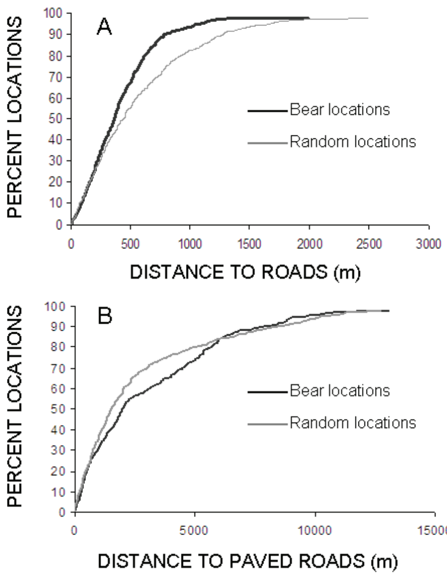

Figure 2. Cumulative percentages of distances of bear locations and random points to A) all roads and B) only paved roads in Ouachita National Forest, LeFlore County, Oklahoma, 2001–2002.

successional forests provided most habitat requirements for black bears in the southern Appalachians (Powell et al. 1997); therefore, bears typically occupied small home ranges in that region. Climate and topography influence quantity, quality, and distribution of black bear foods, which probably set constraints on the size of bear home ranges (Amstrup and Beecham 1976, Rudis and Tansey 1995). The range of annual home-range estimates in our study suggested that some females were located in areas where resources were abundant, whereas others were located where resources were more widely distributed. Overall, it appeared that females in our study area occupied suitable habitat and, relative to other populations, required average-sized areas to meet their requirements.

Habitat analyses

Compositional analysis revealed only weak patterns of habitat selection at both scales. The small number of bears involved in the analysis (n = 13) and subsequent low power may have contributed to the inability to detect clear selection among habitats. Nevertheless, we were surprised to find that pine and mixed pine-hardwood stands ranked high at both scales. In many studies of habitat selection by black bears in the southern U.S., hardwood habitats, especially those dominated by oak, are highly preferred and pine stands are relatively avoided (Hellgren et al. 1991, Clark et al. 1993*a*, Clark et al. 1994). Habitat selection is often tied to stands of abundant soft and hard mast-bearing shrubs and trees, especially oaks (Pelton 2003). Productive stands of mast-bearing trees are important autumn habitat components, whereas older clearcuts may provide important soft mast in summer (e.g., *Vaccinium* spp., *Prunus serotina*, *Rubus* spp.; Pelton 2003).

Our result showing that female black bears used oak-hardwood sawtimber on an annual basis less than expected in landscape-level analyses differed from most published evaluations of black bear habitat use (Powell et al. 1997) and contrasts with results of Clark et al. (1994) in the same ecoregion. Oak-hardwood stands were 17.5 % of the Ouachita National Forest, Oklahoma, but only 13 % of our present study area. Upland hardwood forest types composed 17.5 % (Clark et al. 1993*b*) of the Arkansas study area of Clark et al. (1994). A scattered distribution of oak-hardwood habitat may explain the lack of selection for this vegetation type at the study-area scale. If available oak-hardwood stands are clumped, bears can more easily select home ranges that include those stands. However, it may be more difficult to include oak-hardwood stands that are widely distributed over the landscape in home ranges. Oak-hardwood sawtimber stands ranked high in annual and seasonal analyses at the home-range scale, indicating that bears with home ranges containing that habitat type selected it.

Mature pine stands were used more than expected on an annual basis in home-range-level analyses. Those results differ from earlier work in the Ouachita Mountains of Arkansas (Clark et al. 1994) and elsewhere (Pelton 2003), perhaps because of local forest management techniques. The Ouachita National Forest in Oklahoma has an intensive pine management program, with no commercial timber sales within hardwood stands (R. L. Bastarache, United States Forest Service, personal communication). A combination of thinning of timber stands and prescribed fire opens all levels of vegetation, resulting in warmer soil temperatures, increased nitrogen availability, and increased surface light intensity (Masters et al. 1993). These management practices encourage earlier growth and increased production of herbaceous and soft-mast producing vegetation (Masters et al. 1993), especially areas managed by shelterwood and group-selection prescriptions (Perry et al. 1999). Total production of soft mast was greater in harvested stands than in unharvested stands in the Ouachita Mountains of Arkansas and Oklahoma (Perry et al. 1999).

Management practices also may explain the high ranking of regeneration areas in analyses of habitat selection at both levels for bears in our study. Clearcuts and regeneration stands produce more soft mast than unharvested areas and areas managed using other silvicultural techniques in the Ouachita Mountains of Arkansas and Oklahoma (Perry et al. 1999) and other southeastern pine forests (Stransky and Roese 1984). Harvested areas in Ouachita National Forest are burned within 5 years of harvest, which reduces standing dead vegetation and ground litter accumulation that can inhibit herbaceous vegetation growth (Masters et al. 1993). Other studies of black bear habitat use in southeastern states have shown the importance of regenerating clearcuts to bears (Hellgren et al. 1991). Clark et al. (1994) found that bear habitat use was related to production of soft mast in the Ouachita Mountains of Arkansas.

Female bears in the Ouachita Mountains of Arkansas used regeneration areas less than expected during all seasons (Clark et al. 1994), in contrast to our area. It was suggested that exclusion of female bears by male bears explained presence of feeding sign in those areas in conjunction with relatively low numbers of radio locations of females (Clark et al. 1994). We documented female-biased adult and cub sex ratios and high female population density in our study area (Bales et al. 2005). Furthermore, we found that female bears used highly suitable habitats based on model validation. Those factors suggested limited exclusion of females from suitable habitats by males and may explain the importance of regeneration areas to females in the Ouachita Mountains of Oklahoma.

Our results for summer were similar to those reported by Clark et al. (1994) in the same ecoregion using landscape-level analyses to evaluate bear habitat selection. Bear use of immature poletimber stands of white oak (*Q. alba*)-red oak (*Q. rubra*)-hickory in the Ouachita Mountains of Arkansas was greater than expected in early and late summer (Clark et al. 1994). During early summer, oak-hickory poletimber and sawtimber had the highest Food Value Index (FVI), whereas shortleaf-pine regeneration habitats had the highest FVI during late summer (Clark et al. 1994). Female bears in Oklahoma used pine-hardwood and oak-hardwood poletimber stands more than expected during summer. Both studies found that shortleaf-pine habitats were ranked lower than mixed oak and hardwood stands.

Stands of immature poletimber and sawtimber of oak-hickory were used in autumn more than expected by bears in the Ouachitas of Arkansas (Clark et al. 1994). Those stands, along with shortleaf-pine mature sawtimber, were the most important hard-mast producing habitats (Clark et al. 1994). Results from our study differed from those reported by Clark et al. (1994) because bears in Oklahoma used oak-hardwood poletimber and sawtimber stands less than expected during autumn. Another difference between the two Ouachita studies was that female bears in Oklahoma used regeneration and shortleaf-pine sawtimber stands more than expected, but bears in Arkansas used regeneration and shortleaf-pine stands less than expected during autumn.

Area characteristics (e.g., roads, human activity) also may influence habitat use by bears. Road density often is correlated with human activity, influencing hunter (illegal or legal) access in remote areas. Roads may attract bears in protected areas with no hunting season (Brody and Pelton 1989, Hellgren et al. 1991); however, bears may avoid roads in areas with unrestricted vehicle use and an open hunting season (Brody and Pelton 1989, Hellgren et al. 1991). In our study, bears appeared to avoid paved roads but were closer to all roads (which were mostly graveled or dirt) than random points. Paved roads, especially high-speed or divided highways, have significant impacts on black bear survival (Edwards 2002). Frequency of road crossing or proximity to roads of an individual bear is a result of a trade-off between resource exploitation and potential mortality because crossing a paved road increases mortality risk (Brody and Pelton 1989). It is likely that bears in the study area avoided paved roads due to potential mortality. However, graveled and dirt roads have a lower traffic volume and vehicles must travel at lower speeds due to inhospitable road conditions. We observed bears traveling such roads, and it appears these roads provided important travel corridors with little threat of mortality.

Our results illustrate the plasticity of habitat use by black bears to forest type and management. Selection of mature pine forest by black bears in a region of mixed pine and hardwood forest differed from most previous observations but may have been related to local management practices and subsequent food production.

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