

# Wildlife Management Notes

## No 5. GRAY AND FOX SQUIRRELS



The gray squirrel (*Sciurus carolinensis*) and the fox squirrel (*Sciurus niger*) are members of the order Rodentia and family Sciuridae. Both are arboreal species that require mature forests for shelter and food. They spend the majority of their time in native hardwood trees such as oaks and hickories, and occasionally in pines.

They can be distinguished from one another by size and color characteristics. Size ranges from one to 1.5 pounds for adult gray squirrels and from 1.5 to 2.5 pounds for adult fox squirrels. Gray squirrels vary in length from 17 to 20 inches and fox squirrels vary from 18 to 27 inches in length.

The gray squirrel varies in color from gray to brownish-gray with a white underbelly and white tips on the tail hairs. The fox squirrel is noted for its characteristic salt and pepper coloration with yellowish to orange pigments on its upper body parts, and pale yellow to orange underside and orange tips on the tail hairs.

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### HABITAT REQUIREMENTS

Gray and fox squirrels require mid- to late-succession forests, however, they will forage in some early successional stages such as clearcuts, forest openings, or cropland. Both species can be found in bottomlands, on bluffs, and along rivers.

Suitable habitat must contain food sources through all seasons. Food is provided by fruit- and nut-producing hardwoods, fungi, conifers, agricultural crops, and the buds, flowers, and inner bark of some trees and shrubs. The most productive habitats have a variety of tree species.

### Gray Squirrel

Gray squirrels are somewhat more restricted in distribution and habitat preference in Oklahoma than the fox squirrel. The gray squirrel is found only east of the 97th meridian in mature bottomland forests, hardwood uplands, forested ridges and oak-hickory-pine forests. Gray squirrels apparently prefer areas with denser

understories than fox squirrels. In east-central Oklahoma, the gray squirrel will not be found in post oak-blackjack oak uplands or open pecan orchards, both of which are prime habitat for the fox squirrel. Gray squirrel habitat in Oklahoma is being lost because of the following: 1) continual conversion of bottomland forests to grasslands, croplands, and pecan orchards; 2) clearing of forests along tributary streams to make room for agricultural production; and 3) channeling of streams. Thus, the species distribution and abundance may continue to decline.

The gray squirrel requires a variety of trees and shrubs that provide adequate hard mast (e.g., acorns and nuts), floral parts, buds, fruit (also called soft mast), cones, or samaras as supplemental diet resources. An ample supply of potential den cavities must also be present for escape from predators, shelter from weather, and a place to rear their young.

## **Fox Squirrel**

The fox squirrel utilizes a large variety of habitat types. It can survive in areas of only a few trees or in heavily timbered regions. Fox squirrels seem to prefer areas with a relatively open understory. For this reason, they can often be found in wooded farm lots, park-like woods, and along fence rows. Fox squirrels are most abundant in prairie-oak-hickory forest transition zones. Prescribed burning, annual floods in bottomlands and light grazing help to modify understory habitat features in favor of the fox squirrel.

In Oklahoma, there are no records of fox squirrels existing in the panhandle, however, they exist extensively throughout the rest of Oklahoma. The fox squirrel resides in hardwood forests, dense timber along streams, open pecan orchards, bottomland forests, post oak-blackjack oak forests, and upland oak-hickory forests. The fox squirrel is located along all streams except along the Cimarron River in the extreme southwestern portion of the state.

## **FOOD**

In fall and winter, the major food source for both squirrel species is hard mast such as pecans, acorns, and hickory nuts. The mast produced by heavy-seeded tree species generally determine carrying capacity for squirrels in a given area. As a result, squirrel populations often fluctuate with changes in hard mast yields.

In Oklahoma, hard mast trees often produce sporadically in a five- to seven-year cycle. During this cycle, there may be one excellent hard mast crop, one mast crop failure, and three to five years of poor to moderate mast production. Because of the periodic nature of mast crops, a variety of flora species must be present to provide alternate food sources and more stable habitat conditions. Important soft mast producing species include mulberry and blackberry. Maple, black gum, Osage orange, black cherry, and grape are also good food sources. Squirrels often ingest fruits, berries, bark, fungi, roots, bulbs, floral parts, and in some cases animal parts (insects, other invertebrates, etc.). A more inclusive list is shown in Table 1.

Squirrels consume an average of 1.5 pounds of mast (dry weight) per week. It takes 30 to 40 pounds of mast to sustain one squirrel through the breeding season. In the

event of a hard mast failure, competition for food becomes intense and subadults will be forced from their home ranges by adults. This increases mortality in the subadult class, seriously affecting recruitment and population stability.

**Table 1: Seasonal Food Preferences of Fox and Gray Squirrel**

**SPRING**

oak buds, flowers  
 black walnut flowers  
 elm flowers  
 hickory flowers  
 maple buds, flowers, seed, bark  
 osage orange seed  
 fungi  
 magnolia  
 black gum  
 willow flowers  
 corn seed  
 pecan buds, flowers  
 bulbs  
 insects  
 bird eggs

**FALL**

acorns  
 hickory nuts  
 black walnuts  
 osage orange seed  
 grapes  
 maple seed  
 dogwood seed  
 chinquapin  
 magnolia  
 pine seed  
 fungi  
 corn seed  
 hornbeam  
 pecans  
 blackgum  
 blackberry  
 bark

**SUMMER**

hickory nuts  
 black walnut  
 acorns  
 mulberries  
 grapes  
 blackberries  
 maple seeds  
 hackberry seeds  
 black cherry fruit  
 hornbeam  
 hop-hornbeam  
 pine seed  
 bulbs  
 fungi  
 insects

**WINTER**

acorns  
 hickory nuts  
 black walnuts  
 osage orange seed  
 elm  
 soybeans  
 magnolia  
 pecans  
 sweetgum  
 hazelnut  
 dogwood seed  
 pine seeds  
 hornbeam  
 hop-hornbeam  
 bark

**WATER**

Both fox and gray squirrels will readily drink free-standing water. Although available water is attractive to squirrels, it is not a limiting factor. Squirrels generally fulfill their daily water requirements from dew and succulent vegetation in their diet.

**COVER**

Den sites are preferred over leaf nests by both species for escape from predators and protection from weather, and for rearing their young. Preferred cavities are predominantly in 40 to 50 year old stands, have entrance holes two to four inches in diameter,

are 12 to 20 inches deep, and are situated in the trunk or in a large limb of the tree. Limb cavities seem to be preferred over large hollow trees with large openings.

Radio tracking has shown that up to nine different shelters may be used on an annual basis by one animal. If there is a high population density, two to three all weather shelters should be available per squirrel per acre.

Fox squirrels are more likely than gray squirrels to use leaf nests in winter to raise their young. Leaf nests are usually built in trees with supporting grapevines. Fox squirrels need access to three or four trees with grapevines per acre, whereas grays need two or three.

## **MAN-MADE SQUIRREL BOXES**

Nest structures can be made of wood, used rubber tires, or old ammunition boxes. Inner dimensions should be approximately 9.5 inches by seven inches by 18 inches. The entrance hole should be near three inches in diameter.

### **Gray Squirrels**

Shelters should be situated 18 to 20 feet high in trees with no cavities or dens, arranged so that the entrance faces away from prevailing winds, and placed at a density of two to four per acre.

### **Fox Squirrels**

Adult females tend to use shelters if they are anchored securely in the canopy of a tree with a limb above the structure, and close to a field edge. Subadults of both sexes and adult males are more likely to use them if they are placed below the canopy and away from the forest edge.

## **HOME RANGE**

Home ranges for fox and gray squirrels can span one to 20 acres. The overall shape of the minimum home range is noncircular and somewhat linear, with lengths up to four times greater than the width.

### **Gray Squirrels**

Gray squirrel populations have definite social hierarchies with dominant individuals possessing and defending the largest home ranges. Males range further than females. In fall, subadults may disperse up to a mile to find a new home range.

### **Fox Squirrels**

Fox squirrels tend to be less gregarious in nature than the gray squirrel. Generally, individual territories are not defended except near nest and den sites.

## STANDARD MANAGEMENT PRACTICES

### Gray Squirrels

In either pine-hardwood or hardwood habitat types, stands should be at least 10 to 40 acres in size. If squirrels are located in an area of at least one square mile, 1/3 of the stands should be retained in the 50-year age class or older. Understory control, when used, should be kept to a minimum, favoring mechanical control methods over chemical. Some den trees and mast producers should be protected to meet the needs for food and shelter through all seasons. If hardwood inclusions of five acres or larger exist within pine dominated forests, they should be considered stands and treated as such in managing for squirrel habitat.

### Fox Squirrels

The fox squirrel does not require a definite stand size or distribution pattern in pine type forests. In such cases, habitat needs can be met through improvement, manipulation, and retention of key hardwood areas. In oak-gum-cypress types, stands should be limited to 20 to 60 acres in size, and harvest cuts should be proportioned to maintain a high percentage of stands in a mast-bearing age class.

## ROTATION

### Gray Squirrels

Habitat quality for the gray squirrel is significantly affected by rotation length, stocking, and overall species composition. Stands that consist of 30- to 50-year age classes yield a moderately productive habitat, while stands that are made up of 50- to 100-year age classes have higher productivity.

If there is an equal balance of age classes, rotations of 80 years or longer are desired, unless in oak-hickory forests where 70-year rotations are adequate.

### Fox Squirrels

In pine-type forests, any rotation length is possible if mast and den trees are provided. However, rotation should not be less than 80 years in oak-gum-cypress forests.

## REGENERATION

Selection cutting or shelterwood cutting are the preferred regeneration methods when squirrel management is the objective. Essential den sites and mast producing trees are lost when clearcutting and seed tree methods are used. Squirrels will forage, to some extent, along seed tree and clearcut edges. Habitat losses during regeneration periods can be lessened by longer rotations, retention of mast and den trees in key areas, and practicing selection cutting.

Habitat can be maintained or improved by using regeneration methods to increase mixed hardwoods, excluding cattle from the area, encouraging advanced reproduction of

oaks and hickories and retaining half-acre sites of deciduous trees, for den replacement per 20 acres. When tree corridors are present along drainages and connected to interior key areas, squirrel use of harvest units increases. Isolated key areas or inclusions in clearcut harvest units are not used when they are more than 525 feet from a mature forest edge. Examples of key areas for squirrels are: 1) areas that are maintained for dens in older hardwoods that will not be regenerated until adequate replacement is available; 2) hardwoods that meet the need for mast consumption and den sites; and 3) inclusions that produce seasonally important foods that may be limited within given forest types.

## **SITE PREPARATION**

### **Gray Squirrels**

Den sites and key mast-producing areas should be protected. If understory is thinned, mechanical means or site-prep burns should be used in lieu of herbicides to maintain the variety of soft mast species.

### **Fox Squirrels**

Transition zones should be kept in hardwoods and excluded from underplanting with pine. Mechanical preparation should be used in pine plantations to preserve species of soft mast that are available. Mast producers and den sites in key areas should be protected.

## **INTERMEDIATE TREATMENTS**

### **Thinning**

Stand composition should reflect an array of tree species that will assure year-round food supplies. Oaks should comprise 50 percent of the tree species in key areas. Thinning should be done early and frequently to ensure rapid development of full crowns. Recognized den trees should be retained.

### **Prescribed Burning**

#### **GRAY SQUIRRELS**

Generally, prescribed fire has limited but important application in gray squirrel habitat management. However, prescribed burning may be used to rejuvenate and improve production of decadent soft mast producers and sporadically to perpetuate den tree formation. Perhaps fire's most important role in gray squirrel management is for site preparation for oak regeneration. Fire puts oak seedlings and saplings at a competitive advantage over less fire-tolerant species. Oaks also require mineral soil for germination, a condition created following some prescribed fires.

#### **FOX SQUIRRELS**

Prescribed fire improves habitat conditions for the fox squirrel by reducing understory density. Winter burns may be conducted at three- to five-year intervals in pine

types. If burns are more frequent than three-year intervals, understory fruit production may decline. Prescribed fire is an important tool in perpetuating a continual supply of den trees. As with the gray squirrel, fire is an important tool to manage for oak regeneration.

## DIRECT HABITAT IMPROVEMENTS

Full crown release of selected hard mast-producing species can improve mast production by reducing competition from surrounding trees for nutrients, light, and space. Mast production can be increased by nurturing mature trees with full crowns and by using selection cutting to encourage preferred mast production. Food and cover species may be planted but are of limited benefit compared to other practices. Nest boxes can be used but are not recommended on a large scale because of destruction caused by weather, vandalism, and the high cost of installation and maintenance. Road access within hardwood habitats should be minimized.

## OTHER SPECIES THAT BENEFIT FROM SQUIRREL MANAGEMENT

raccoon	wild turkey
wood duck	Cooper's hawk
barred owl	red-tailed hawk
screech owl	sharp-shinned hawk
deer	red-shouldered hawk
wrens	red-eyed vireo
white-breasted nuthatch	flycatchers
brown-headed nuthatch	wood thrush
woodpeckers	some warblers

## MANAGEMENT OPTIONS / SIP COST-SHARE OPPORTUNITIES (See your Forest Stewardship Planner for details.)

### Low Intensity

Building of man made nest boxes (SIP-8; WH3)  
Prescribed burning (SIP-8; PB3, PB4)

### Medium Intensity

Building of man made nest boxes (SIP-8; WH3)  
Planting of food and cover species (SIP-8; DH3, FP3, NG3, SL3, WA3)  
Planting herbaceous and woody understory plants (SIP-8; UH3, US3)  
Prescribed burning (SIP-8; PB3, PB4)

### High Intensity

Building of man made nest boxes (SIP-8; WH3)  
Planting of food and cover species (SIP-8; DH3, FP3, NG3, SL3, WA3)  
Planting herbaceous and woody understory plants (SIP-8; UH3, US3)  
Planting hardwoods (SIP-8; PT4)  
Wildlife thinning (SIP-8; HT3, NT3)  
Releasing mast trees (SIP-8; MR3)  
Prescribed burning (SIP-8; PB3, PB4)

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