Rabbits

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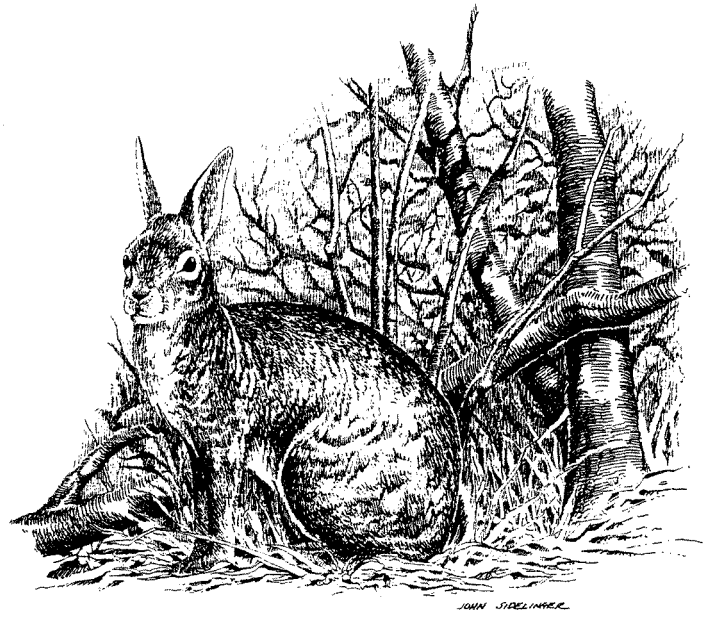

Rabbits, or lagomorphs, resemble rodents. But unlike rodents they have relatively large hind legs, large ears, a short fluffy tail, and 2 sets of upper incisors. Like rodents their incisors grow continually. They can either walk or hop, and are fleet and elusive when evading predators. They normally are silent but are capable of several different vocalizations. Rabbits of the genus *Silvilagus* are widely distributed throughout the South, occurring in every county.

Several species of rabbits occur in southern forests wherever there is sufficient low vegetation to provide adequate food, and cover as protection from predators. The eastern cottontail, distinguishable by a rusty nape patch, is a regular inhabitant of a wide variety of habitats throughout the entire region (Hall 1981), from the highest mountains to marshes and bottoms. The Appalachian cottontail is a similar species, but slightly smaller and darker because of its dark guard hairs. It is found from Pennsylvania southwesterly down the Appalachian Mountains into northeastern Georgia.

Two other rabbit species occupy moist habitat mostly in the southerly portions of the South. The dark brown marsh rabbit is found from coastal Virginia southerly along the Coastal Plain to about the western boundary of peninsular Florida. The species is normally associated with Coastal Plain swamps and marshes. Another species, the swamp rabbit, is found north and west of the range of the marsh rabbit. Swamp rabbits are darker than eastern cottontails, and larger than either cottontails or marsh rabbits. They usually occupy riparian zones, swamps, and marshes.

Two true hares are found only in limited portions of the South. The snowshoe rabbit is found in the northern portions of the United States and Canada, and only rarely into the South at higher elevations along the eastern mountains (Hall 1981). The black-tailed jack rabbit,

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a species of the western United States open savannah and grassland habitat, extends into eastern Texas and Oklahoma and northwestern Arkansas. Apparently it has expanded its range into previously forested areas as stands have been harvested and habitat is opened and converted to pasture. It feeds on grass, forbs, and sometimes crops. The species is longer lived and less fecund than the cottontail or swamp rabbit (Schmidly 1983).

STATUS

Eastern cottontails and swamp rabbits are the 2 species for which substantial information is available and are the main focus of this chapter. They have been widespread and primary game species throughout the South (Table 1). Estimated harvest for southern states for the 1996/97 hunting season was lowest for Florida (20,833) and East Texas (41,244); and conversely was highest in Tennessee and Arkansas, each with close to a million rabbits harvested.

Due to a variety of ecological factors, rabbit densities frequently fluctuate widely over time. But southern rabbit populations appear to have declined substantially in the last 25 years. Every state but Georgia reported major reductions in rabbits harvested from 1970 to 1995 (Table 1). There probably are fewer rabbit hunters and rabbit hunting opportunities now than in the past. But the main cause of the decline is attributed to loss of early successional habitat such as fields and very young forest stands. Specifically, swamp rabbit populations have decreased in Kentucky and southwide due to diminishing wetland habitat, such as bottomland and riparian hardwoods (Sole 1994).

Table 1. Estimated rabbit[a] harvest by state.

State	Harvest 1996-97	Harvest 1970-71
Kentucky	755,625	837,400
Virginia	494,372	1,421,620
Tennessee	1,066,200	1,032,122
North Carolina	348,504 (1995-96)	1,707,030
South Carolina	285,919	854,800
Georgia	366,428 (1995-96)	798,357
Florida	20,833	429,734
Alabama	217,100	1,062,000
Mississippi	386,921	1,281,138 (1976-77)
Arkansas	969,046 (1994-95)	1,175,351 (1983-84)
Louisiana	721,500	850,000
East Texas	41,244	326,000 (1981-82)
East Oklahoma	155,216	117,454

[a]Mostly eastern cottontail rabbits, but includes some swamp rabbits, Appalachian cottontails, and marsh rabbits.

There are several species of rabbits throughout the South. The cottontail is the most abundant and widespread.

LIFE HISTORY

Rabbits are mainly active at night but will forage during daylight especially during periods of low light. Normally during the day, cottontails rest in a shallow depression in the ground, called a form. Both species can swim well, but the swamp rabbit readily takes to water to escape predators.

Foods.—Rabbits consume an extremely wide variety of predominantly plant matter. During the warm growing season mostly herbaceous grass and forbs are consumed. For example, sedges, grasses, and forbs, among a wide variety of other types of plants were summarized as important swamp rabbit foods (Allen 1985). During winter when succulent material is not readily available, dry herbaceous material is eaten by rabbits, as well as bark, buds, and twigs. Agricultural crops, such as corn, clover, alfalfa, and soy beans, also are consumed where available (DeCalesta 1971). Rabbits can be a problem by damaging crops, orchards, or ornamental plants. Stems and twigs are neatly clipped at a 45% angle by rabbits but bark is consumed in an irregular pattern. Lagomorphs are noted for reingesting the greenish soft fecal pellets produced in the cecum. Free water usually is not consumed; adequate moisture is obtained from succulent foods.

Predators and parasites.—A number of mammals, such as coyotes, bobcats, foxes, weasels, raccoons, house cats, and dogs are significant predators. And several avian predators, such as red-tailed, red-shouldered, and broad-winged hawks; barred and great-horned

owls; and crows prey on rabbits. In a study analyzing food habitats of crows with a sample of several thousand, young cottontails were found to be the most frequent food item (Kirkpatrick 1950). A variety of snakes take mostly young rabbits. Additionally, hunting can be a significant mortality factor.

Rabbits may harbor ectoparasites, such as ticks, fleas, and mites; and endoparasites, such as flukes, tapeworms, or roundworms (Lowry 1974). Several other parasites and diseases infect rabbits. Rabbits are parasitized by botfly larvae, usually located around the neck and chest area. The egg of the fly is laid in the hair of the rabbit, hatches into a maggot, and the maggot penetrates the skin and develops between the skin and muscle. Afterwards they exit and pupate before becoming an adult fly (Madson 1963). Some 25% of sampled rabbits in an area in Kentucky were infected with botfly larvae (Bruna 1951). Rabbits can be host for the larval form of the canine tapeworm. Rabbits also can be infected with coccidiosis, caused by a protozoan. Tularemia is a bacterial disease usually transmitted by ticks or fleas which can infect rabbits and other mammals, and previously has decimated some rabbit populations. It is transmissible to humans, such as this author. Rabbit carcasses intended for human consumption should always be fully cooked to kill any possible pathogens.

Reproduction/Mortality.—Gestation for cottontails is 27-32 days. Females excavate a shallow depression for a nest, usually in dense and often grassy cover on a well-drained site. They line the nest with vegetation and then with body fur (Casteel 1966) and place a cover over the nest. Litter sizes are variable. In a study in Kentucky (Bruna 1951), there were 3 to 6 young in 104 of the total 108 litters, 7 young in 3 nests, and 9 young in a single nest. Further south in Georgia, 3 or 4 young are typical (Pelton and Jenkins 1971). Female cottontails sometimes vigorously attempt to defend their nest from predators.

Dawn and dusk are usual feeding times for recently-born litters. The mother cottontail removes the nest cover and crouches over the nest while the young suckle. Young cottontails develop and mature rapidly. Their eyes are open within a week of birth and they are weaned and independent at 3 or 4 weeks of age. They may reproduce during the same year in which they are born.

Cottontails are very prolific. Females are in estrus immediately after giving birth and usually mate then. Several litters each year are typical and up to 6 litters may be produced by a single female in one breeding season (Lowry 1974).

Productivity of swamp rabbits is less than cottontails. Gestation is somewhat longer (36-38 days), litters are smaller (average of 2 in a study area in Mississippi) (Palmer et al 1991), and juveniles normally don't breed (Martinson et al. 1961).

Nest success rate and survival of young and adult rabbits usually is low. For example, in the Kentucky study only 10% of 36 nests were successful. Nests were lost to farm operations including spring burning of broomsedge fields, adverse weather such as heavy rain, and predation (Bruna 1951). In the midwest it was concluded that on average only about half of all young cottontails survived long enough to leave the nest (Madson 1963). And adult rabbits also suffer high losses. In an Illinois study, average annual mortality was 79% and was higher during years when the population was hunted (Rose 1977).

Spring is the main reproductive period, although cottontail reproduction has been documented during much of the year in the South. In Kentucky, documented breeding occurred from January to September, but 68% of the nests were found March through May (Bruna 1951). A similar pattern was documented in Georgia, where annual reproduction started in February and peaked in March, April, and May when 80 to 100% of females collected were pregnant. None of the females collected from November through January were pregnant (Pelton and Jenkins 1971). A similar mainly early spring reproductive period was documented for swamp rabbits in Mississippi (Palmer et al. 1991).

Due to seasonal patterns of natality and mortality cottontail populations undergo fluctuations of large magnitude each year. For example, in Kentucky cottontail summer densities after the primary spring reproduction period were several times higher than those of late winter (Giuliano et al. 1993).

HABITAT

Rabbits are found in a wide variety of general habitats from fields to forests, but specifically are associated with early successional grass/forb and brushy vegetation. Generally, rabbits fare well in areas of high habitat diversity with early successional habitat such as small crop fields, fallow fields, and forest regeneration stands. Dense forest stands with closed canopies, little light penetration through the canopy, and sparse low vegetation are poor rabbit habitat. Large pastures or crop monocultures also are poor rabbit habitat. Much of the decline of cottontail populations in the midwestern U.S.

is attributed to the expansion of clean farming and reduced weed and brush patches (Allen 1984). And swamp rabbit habitat throughout the South has been drastically diminished from conversion of riparian forests to agricultural land and reservoirs.

Several studies have documented specific habitat preferences. In North Carolina, radio-instrumented eastern cottontails preferred brushy areas to woodlots or open crop fields (Allen et al. 1982). In the Coastal Plains of Georgia, more than 4 times the number of cottontails were captured in the tall weeds-broomsedge habitat type than in cultivated areas or forest types (pine, pine-hardwood, upland hardwood, or bottomland hardwoods) (McKeever 1959). Cottontails nest in a variety of habitats with dense low vegetation. In a Kentucky study, broomsedge was the best early nesting cover but grass was preferred later in the season (Bruna 1951).

The Appalachian cottontail typically is associated with conifer forests with ericaceous understory vegetation at high elevations, but recently also has been found at moderate elevations in Kentucky. Although the eastern cottontail and swamp rabbit may occur together, the cottontail usually is associated with herbaceous vegetation in upland habitat. The swamp rabbit is associated more with woody cover in moist habitat; such as riparian areas along streams and rivers (Taylor and Lay 1944). In the Atchafalaya Floodplain of Louisiana, location of pellets deposited reflected habitat use. Swamp rabbits deposited pellets on 24% of logs in the bottomland hardwood type, but only 6% of logs in the cottonwood-willow type and less than 1% in the cypress-tupelo type (Heuer and Perry 1976).

Cover interspersed with or very near food sources is important for adequate rabbit habitat. Key areas which are important for rabbits include brushy thickets such as abandoned home sites, railroad rights-of-way; and blackberry, cane, briar, or honeysuckle patches. Thickets and other escape cover, such as mammal burrows and brushy fencerows appear to be particularly important to rabbits during winter after frosts have substantially reduced vegetation density.

Overall, good habitat can support up to 3 cottontails per acre and somewhat fewer swamp rabbits. In Kentucky, estimated cottontail populations varied from 0.1 to 2.3 per acre on 5 different areas (Giuliano et al. 1993).

MANAGEMENT

Silvicultural activities which set back plant succession and reduce forest overstory and midstory are positive for rabbits, which benefit from grass/forb and brush level vegetation, such as blackberry or plum thickets. Stand or tree harvesting increases light penetration to the ground, promotes growth of low vegetation, and benefits rabbits. For example, several studies have noted the beneficial effects of natural tree fall or tree harvest on habitat suitability for swamp rabbits (Allen 1985).

Rabbits are associated with early successional habitat, with abundant food and cover *(J. Dickson)*.

Prescribed fire is a practice that normally benefits rabbit populations. For example, in a pine-hardwood forest in the Piedmont of Alabama, eastern cottontail rabbit pellet counts were higher in areas which had been burned 1 and 2 years before than in unburned areas (King et al. 1991). Fire kills the exposed parts of low vegetation and promotes resprouting of small woody vegetation and grass/forb growth.

Some land management activities, such as burning or haying, during spring may destroy rabbit nests. Delaying these practices until after the main spring reproductive period should increase nest success.

Succulent vegetation normally is limited after frost during winter. Small fields of winter forage crops or wildlife food plots, with plantings such as winter grasses or clover, interspersed with appropriate cover will benefit winter rabbit populations.

Dense cover is very important to rabbits for hiding and escape from predators (Anderson and Pelton 1977). Where fall crops have been harvested or escape cover is limited, maintaining dense thickets or creating substantial artificial brush piles can help protect rabbit populations from predators during winter (Madson 1963). Brush piles will decay and diminish after a few years and will need to be replenished.

HUNTING

Rabbit hunting has been a long-term tradition in the South. Historically, cottontails and swamp rabbits have provided more hunting recreation than any other game species for southern sportsmen, and fried rabbit has been a welcome staple of many southern meals. Historically, in the South and elsewhere many youngsters began their first hunting with rabbits. Usually shotguns with low velocity loads are used for the fleet, elusive quarry. Rabbits are not hard to kill. Rabbits may be hunted by jumping them from their form. They usually flush more readily from sparse cover than dense cover where apparently they feel safer. They are flushed more readily by slow and erratic hunter movements than by faster and more steady movements (Anderson and Pelton 1977).

A popular and traditional hunting technique is to use dogs to flush and usually also to trail rabbits. When trailed by hounds, rabbits will stay within their home range and usually eventually will run within range of the hunters, often near where they were first jumped. The cry of the trailing hounds adds to the excitement of the hunt. Beagles are a popular choice for this widespread sport; their small size, and scenting and trailing abilities make them well suited for running rabbits. And their pleasing nature makes them good pets. As with hunts for many other species, often the social aspects of the hunt are very important. A typical rabbit hunt in Tennessee consisted of 3 hunters with dogs, hunting 4 hours, jumping 6 rabbits, and harvesting 3.3 rabbits per party trip (Tennessee Wildlife Resources Agency 1996).

Rabbit hunting has been a popular activity in the South. Participation has wained as forests have matured and deer hunting has become more popular *(Outdoor Oklahoma)*.

There can be conflicts between rabbit hunting and other hunting and trapping activities. A recent problem is the increase of white-tailed deer throughout the region resulting in rabbit hunter interactions with deer hunters, and the propensity of rabbit hounds to trail deer. Another problem sometimes encountered in trapping season is rabbit dogs getting caught in traps set for furbearers.