

Appalachian Cottontail

Sylvilagus obscurus

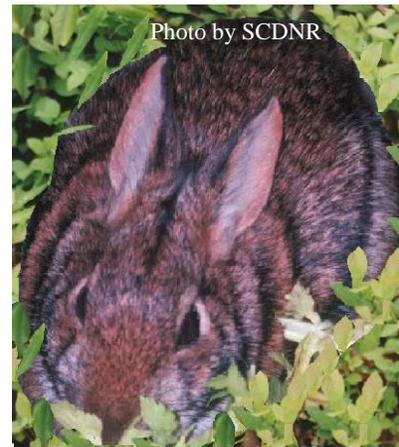
Contributors (2005): Mary Bunch (SCDNR), Rickie Davis (Clemson University), Stanlee Miller (Campbell Museum, Clemson University), and Rob Harrison (SCDNR)

Reviewed and Edited (2012): Steve Fields (Culture and Heritage Museums)

DESCRIPTION

Taxonomy and Basic Description

Appalachian cottontails were recently described by Chapman, Cramer, Deppenaar, and Robinson in 1992. The species was previously known as New England cottontail (*Sylvilagus transitionalis*) but was reclassified to Appalachian cottontail (*Sylvilagus obscurus*) based on chromosome number and exacting skull measurements. Ruedas et al. (1989) described the southern cytotype, now known as the Appalachian cottontail (Chapman et al. 1992), as having a smaller diploid chromosome complement than the northern cytotype (the New England cottontail) (46 and 52, respectively). Although analysis of a region of mitochondrial DNA does not support the new species designation (Litvaitis et al. 1997), the Integrated Taxonomic Information System (USDA 2005) recognizes the new designation.



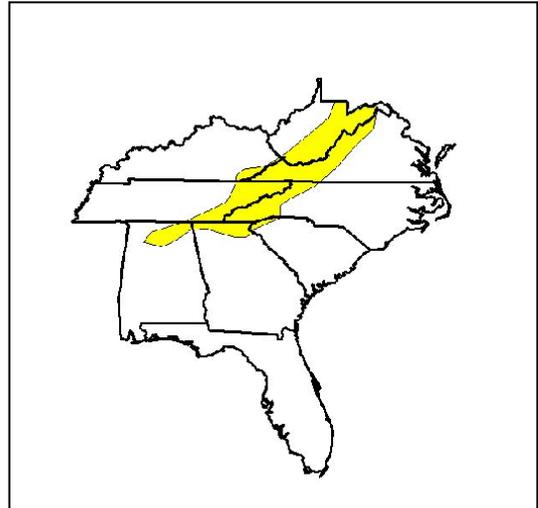
New England and Appalachian cottontails are indistinguishable without cranial examination or karyotyping (Chapman et al. 1992). The two are distinguished in the field by geographical location rather than by external features; those that occur south or west of the Hudson River in New York are Appalachian cottontails.

As with all “cottontails,” including the sympatric Eastern cottontail (*Sylvilagus floridanus*), the underside of the Appalachian’s tail is white. The fur is rusty-brown with black hairs. There are seldom any white hairs on the forehead and the ears are somewhat rounded (Chapman 1975) and less ‘mulish’ in appearance than Eastern cottontails. Sometimes the anterior ear margin is black or very dark in sharp contrast to the white hairs inside. Eastern cottontails have a rusty orange patch at the nape of the neck and often have the appearance of a dark saddle across their backs (Chapman 1975); the Appalachian cottontail has a reddish nape patch but is more uniformly dark. Live specimens have a very dark iris relative to Eastern cottontails (Bunch and Dye 1999). Appalachian cottontails have a diffuse gray cheek patch, lacking in the Eastern cottontail. The most reliable characteristic to distinguish Appalachian from Eastern cottontails is the presence of a dark patch between the ears in Appalachian cottontails (Litvaitis et al. 1991; Chapman et al. 1992). These differences between the Eastern and Appalachian cottontails are so subtle that identification usually requires handling of the animal. These two species are easily distinguished by skull characteristics (Chapman 1975).

The Appalachian cottontail is the smallest rabbit species in the southeast; adults weigh 0.8 to 1.1 kg (1.75 to 2.42 lbs.). They range in total length from 386 to 430 mm (15.5 to 17 in.), with an average ear length of about 58 mm (2.3 in.) (Chapman 1975). Weights of South Carolina specimens in the Campbell Museum of Natural History at Clemson University average 1.05 kg (2.32 pounds).

Status

In South Carolina, Appalachian cottontails are considered uncommon or rare and therefore vulnerable (S3). They are also considered rare in Georgia (Ozier 1999), Tennessee and North Carolina (NatureServe 2013). The Appalachian cottontail is still listed as apparently secure globally (G4). The fact that populations that occur in South Carolina are at the limit of the range of the species increases the responsibility of SCDNR to monitor the status of the population. Any changes to the viability of the species might likely occur on the periphery of its range.



POPULATION SIZE AND DISTRIBUTION

Appalachian cottontails occur in mountain habitat and range from the Hudson River in New York, southward through Pennsylvania and Maryland, and continue southward in the Appalachian Mountains into northwestern South Carolina, northern Georgia and Alabama. Appalachian cottontails are better adapted to colder climates than Eastern cottontails (Chapman et al. 1977). The Blue Ridge escarpment represents the extreme southeastern extent of the range for Appalachian cottontails.

The noncontiguous arrangement of Appalachian cottontails in the southeast is described as a mosaic distribution (Chapman et al. 1992). In South Carolina, the species is found only in the mountains of the three northwestern counties at elevations as low as 274 m (900 ft.), but more typically above 487 m (1600 ft.) (Bunch and Dye 1999). The Blue Ridge Mountain province in South Carolina has elevations between 365 and 1066 m (1,200 and 3,500 ft.) above sea level (Myers et al. 1986). Appalachian cottontails are restricted to the southern Appalachian ecoregion in South Carolina, which comprises only 1.7% of the state's total land area (Myers et al. 1986).

Distribution is patchy across the mountains of Oconee, Pickens and Greenville Counties. Suitable habitat is not uniform and continuous throughout the mountains. However, the Appalachian cottontail does not occur in all suitable mountain habitats. Some sites that appear suitable based on cover, forage, and elevation are occupied by Eastern cottontails, both Eastern and Appalachian cottontails, or no rabbits at all. Therefore, estimates of Appalachian cottontail populations cannot be extrapolated using remote sensing such as aerial photographs to identify habitat.

Density estimates have not been made for this rabbit in the southern end of their range; however, densities in South Carolina are expected to be similar to those found in other states. A density estimate from Virginia approximates one rabbit per two hectares in six to seven year-old clearcuts (Blymer 1976). Laseter (1999) estimated a density of 0.8 rabbits per hectare in eastern Tennessee. In western Maryland, home ranges are identified as 2 to 10 hectares (4.9 to 24.7 acres) for females and 4 to 9 hectares (9.9 to 22.2 acres) for males (Sommer 1997).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Ericaceous cover (heath-like plants) is a component of all sites occupied by Appalachian cottontails in the state (Bunch et al. 1997), which is consistent with previous reported requirements (Chapman et al. 1992). The cover varies and includes mountain laurel (*Kalmia latifolia*), blueberries (*Vaccinium* spp.), blackberry vines (*Rubus* spp.), greenbriar (*Smilax* spp.) and cane (*Arundinaria gigantea*). Sites with Appalachian cottontails range from ridgetops of pine-heath communities to mixed pine hardwoods and extend down slopes into riparian sites (Paul and Quay 1963). Forest or stand ages vary and include young clearcuts and pine plantations less than 4 years old; overstocked pine plantations approaching thinning age; and mature pine, pine-hardwood and hardwood forests (Bunch et al. 1997; Bunch and Dye 1999). Appalachian cottontails have not been noted in pastures, orchards or wildlife plots, but have been captured near the edges of linear food plots. Sole (1999) reported captures at reclaimed mine sites.

Good rabbit habitat is not thoroughly understood. Reproduction and rabbit health have been linked to salt availability (McCready and Weeks 1992), stem density and quality (Lochmiller et al. 1995) and availability of cover (Barbour and Litvaitis 1993; Smith and Litvaitis 2001). Appalachian cottontails require dense understory vegetation (Laseter, 1999). Appalachian cottontails consume more forbs and are less dependent on grasses than Eastern cottontails. However, both rabbits eat significant amounts of woody material in the winter (Spencer and Chapman 1986).

CHALLENGES

Due to regional differences between habitats in the southern Appalachian mountains and the New England area, management needs for the Appalachian cottontail are likely very different from management needs for the New England cottontail. Therefore, lack of species-specific makes it difficult to successfully manage for the Appalachian cottontail.

Small patch size (less than 2.5 hectares or 6.1 acres) and habitat fragmentation are known to lead to low survival rates of New England cottontails (Barbour and Litvaitis 1993). Habitat fragmentation, often due to development, may limit Appalachian cottontails to public lands with extensive private inholdings and to areas where large public tracts are separated by private holdings; such areas currently exist in northeastern Greenville County.

Indirect displacement by Eastern cottontails is a possible threat, particularly where both species are found sympatrically and permanent clearing takes place for pastures, lawns, orchards, golf courses and housing developments. Eastern cottontails benefit more from grasses (Spencer and

Chapman 1986) and large grassy areas than Appalachian cottontails; the latter needs more cover (Litvaitis et al. 1985; Barbour and Litvaitis 1993; Sommer 1997). Although Eastern cottontails are not capable of evicting New England cottontails from occupied habitats and vice versa (Probert and Litvaitis 1996), once habitats are modified to favor Eastern cottontails and they move into the site, it is unlikely that New England cottontails will displace them. Because Appalachian cottontails are similar to New England cottontails behaviorally and in cover and habitat requirements (Tefft and Chapman 1987; Probert and Litvaitis 1996), they are expected to respond similarly.

Hunting is not known to adversely affect the species in South Carolina; however, pregnant and lactating rabbits have been captured in February before the end of hunting season on March 1. Species-specific rabbit hunting data are not currently collected, and small game hunting pressure is believed to be light in the mountains. It is currently legal to possess and move all native rabbit species in the state of South Carolina. However, release of Eastern cottontails into habitat of Appalachian cottontails remains a threat of undetermined proportion or likelihood. Historically, moving and releasing rabbits was a common practice (Chapman and Fuller 1975). Once Eastern cottontails are established, they cannot be displaced via interspecific competition. Eastern cottontails can colonize neighboring disturbance patches more quickly than Appalachians because the latter requires dense cover in close proximity while Eastern cottontails are well adapted to foraging in open areas (Smith and Litvaitis 2000). Therefore, the Eastern cottontail more easily accesses new habitat (Probert and Livaitis 1996).

Cottontails are taken by a wide variety of predators including cats, dogs, coyotes, foxes, bobcats, mink, weasels, birds of prey and snakes. Any activity that increases the density of predators, or any changes in habitat that make Appalachian cottontails more vulnerable to predation (Litvaitis and Villafuerte 1996), are a threat.

CONSERVATION ACCOMPLISHMENTS

The species was first documented in South Carolina by a 1940 museum specimen collected by W. Perrygo and J. Hoyt. In the 1980's, the South Carolina Department of Natural Resources (SCDNR), initiated survey work with Check for Wildlife funds to verify the species' presence in South Carolina.

SCDNR tested a discriminate model developed by Litvaitis et al. (1991) for field identification of Appalachian (then known as New England) cottontails. Identifications were confirmed by mtDNA analysis and skull characteristics. The model was 77.7% accurate on southeastern specimens. One consistent external feature was the black spot or strip between the ears in Appalachian cottontails (Bunch and Dye 1999).

A study was conducted in the Sumter National Forest to assess whether Appalachian cottontails would be displaced after timber harvest in a mature pine-hardwood forest. This forest was adjacent to or near two habitats: a young clear cut and an orchard, which were occupied by Eastern cottontails. The mature pine-hardwood stand was cut and burned. Eastern cottontails used the site as it regenerated, and Appalachian cottontails did not reappear at the site until seven years after site regeneration (Bunch and Dye 1999).

In South Carolina, a significant amount of appropriate Appalachian cottontail habitat in the southern Appalachian ecoregion is on public land or is otherwise protected, including the Andrew Pickens Ranger District of the Sumter National Forest, ten Heritage Preserves, and the Jocassee Gorges; the latter is managed by SCDNR. Suitable habitat is also on several large state parks and some tracts owned or held in easement by various land trusts, including over 12,140 ha (30,000 acres) of mountain land under a conservation easement held by The Nature Conservancy. Over 65,559 ha (162,000 acres) of mountain lands are protected in some capacity.

CONSERVATION RECOMMENDATIONS

- Encourage land acquisitions or conservation easements which will provide mountain habitat linkage. Consider regional partnerships for habitat protection in the Blue Ridge Escarpment.
- Discourage or avoid creation of new, permanent, early successional habitat on mountain sites on public lands adjacent to existing populations of Eastern cottontails until the impact of Eastern cottontails on Appalachian cottontails is better understood.
- Evaluate the impact of hunting on Appalachian cottontails. Breeding condition should also be noted in harvested animals to evaluate seasons and bag limits. If rabbit identification by hunters is unreliable, heads and tissue samples can be collected and used to improve accuracy.
- Conduct an ecoregion-wide Appalachian cottontail distributional and density survey using mtDNA analysis of fresh fecal pellets.
- Partner with states throughout the entire range of both Appalachian and New England cottontails to provide materials and samples for expanded mtDNA analysis of these rabbit populations and support nuclear genome analysis for these species.
- Determine best management practices for Appalachian cottontails in the southeast through habitat measurements and manipulations.
- Measure the effectiveness of salt licks and fertilizing sites on Appalachian cottontail condition and reproduction.
- Evaluate prescribed burning as a tool for proper habitat management.
- Periodically survey selected sites for Appalachian and Eastern cottontails.
- Discourage moving and releasing Eastern cottontails.
- A demonstration area for Appalachian cottontails could be developed in the mountains in conjunction with efforts to highlight other species of conservation concern in South Carolina. This demonstration area would also provide research opportunities for new information on management and ecological needs of the species.
- Develop web links and educational materials to help educate the public about wildlife diversity, especially that of rabbits, in the mountain ecosystems.

MEASURES OF SUCCESS

Surveys of distribution and density, paired with long-term monitoring of harvests and use at specific sites will help assign status information to the species and set appropriate harvest limits and seasons. Researching the effects of controlled burns and supplemental salt will help public and private landowners know if those actions will benefit Appalachian cottontails.

LITERATURE CITED

- Barbour, M.S. and J.A. Litvaitis. 1993. Niche dimensions of New England cottontails in relation to habitat patch size. *Oecologia*. 95:321-327.
- Blymyer, M.J. 1976. A new elevation record for the New England cottontail (*Sylvilagus transitionalis*) in Virginia. *Chesapeake Science*. 17:220-221.
- Bunch, M.S., S. Miller and A. Sparano. 1997. Low elevation records of *Sylvilagus obscurus* in South Carolina from diverse habitats. Poster paper at Seventh Colloquium on the Conservation of Mammals in the South-Central United States. Black Mountain, North Carolina.
- Bunch, M.S. and A.S. Dye. 1999. Bat, Woodrat, and New England Cottontail survey and technical guidance. W-91-1-W-91-3 final report for U.S. Fish and Wildlife Service. South Carolina Department of Natural Resources. Columbia, South Carolina. 60 pp.
- Chapman, J.A. 1975. *Sylvilagus transitionalis*. *Mammalian Species*. 55:1-4.
- Chapman, J.A. and K.B. Fuller. 1975. Our changing cottontails. *Atlantic Naturalist*. 30:55-59.
- Chapman, J.A., A.L. Harman and D.E. Samuel. 1977. Reproductive and physiological cycles in the cottontails of western Maryland and nearby West Virginia. *Ecological Monographs* 56. The Wildlife Society. Washington, DC. 73 pp.
- Chapman, J.A., K.L. Cramer, N.J. Deppenaar and T J. Robinson. 1992. Systematics and biogeography of the New England cottontail, *Sylvilagus transitionalis* (Bangs, 1895), with the description of a new species from the Appalachian Mountains. *Proceedings of the Biological Society of Washington*. 105:841-866.
- Kovach, A.I., M K. Litvaitis and J.A. Litvaitis. 2003. Evaluation of fecal mtDNA analysis as a method to determine the geographic distribution of a rare lagomorphs. *Wildlife Society Bulletin*. 31:1061-1065.
- Laseter, B.R. 1999. Estimates of population density of the Appalachian cottontail (*Sylvilagus obscurus*) in eastern Tennessee. MS Thesis. University of Memphis. Memphis, Tennessee.
- Litvaitis, J.A., D.L. Verbyla and M.K. Litvaitis. 1991. A field method to differentiate New England and eastern cottontails. *Trans. Northeast Section Wildlife Society*. 48:11-14.
- Litvaitis, J.A. and R. Villafuerte. 1996. Factors affecting the persistence of New England cottontail metapopulation: the role of habitat management. *Wildlife Soc. Bull.* 24:686-693.

- Litvaitis, M.K., J.A. Litvaitis, W. Lee and T.D. Kocker. 1997. Variation in mitochondrial DNA of the *Sylvilagus* complex occupying the northeastern United States. *Can. J. Zoology*. 75:595-605.
- Lochmiller, R.L., D.G. Peitz, D.M. Leslie, Jr. and D.M. Engle. 1995. Habitat-induced changes in essential amino-acid nutrition in populations of eastern cottontails. *J. Mammalogy* 76:1164-1177.
- Myers, R.K., R. Zahner and S.M. Jones. 1986. Forest Habitat Regions of South Carolina from Lansat Imagery. Department of Forestry, Clemson University FRS No. 42. 31 pp.
- NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. (On-line) Accessed Feb. 21, 2013 at <http://www.natureserve.org/explorer>.
- Ozier, J.C. 1999. *Sylvilagus obscurus (transitionalis)* (Appalachian cottontail). In: Protected Animals of Georgia. Georgia Department of Natural Resources, Wildlife Resources Division. Pp 27-28.
- Paul, J.R. and T.L. Quay. 1963. Notes on the mammalian fauna of the Toxaway River Gorge, North Carolina. *Journal of Elisha Mitchell Society*. 84:124-126.
- Probert, B.L. and J.A. Litvaitis. 1996. Behavioral interactions between invading and endemic lagomorphs: implications for conserving a declining species. *Biol. Cons.* 76:289-295.
- Ruedas, L.A., R.C. Dowler and E. Aita. 1989. Chromosomal variation in the New England cottontail, *Sylvilagus transitionalis*. *J. Mammalogy*. 70:860-864.
- Smith, D.F. and J.A. Livaitis. 2000. Foraging strategies of sympatric lagomorphs: Implications for differential success in fragmented landscapes. *Can. J. Zoology* 78:2134-2141.
- Sole, J.D. 1999. Distribution and habitat of Appalachian cottontails in Kentucky. *Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies*. 53:444-448.
- Sommer, M.A. 1997. Distribution, habitat, and home range of the New England cottontail (*Sylvilagus transitionalis*) in western Maryland. MS Thesis. Frostburg State University, Frostburg, Maryland.
- Spencer, R.K. and J.A. Chapman. 1986. Seasonal feeding habits of New England and eastern cottontails. *Proceedings of the Pennsylvania Academy of Science*. 60:157-160.
- Tefft, B.C., and J.A. Chapman. 1987. Social behavior of the New England cottontail, *Sylvilagus transitionalis* (Bangs) with a review of social behavior in New World rabbits (Mammalia: Leporidae). *Rev. Ecol. (Terre Vie)*. 42: 235-276.