

# Assessing Swamp Rabbit Distribution in Kentucky

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*Abstract:* Significant declines in forested bottomlands are a basis for concern about the status of swamp rabbits (*Sylvilagus aquaticus*) in Kentucky. Current swamp rabbit distribution was determined through staff surveys and field investigations. Kentucky Department of Fish and Wildlife Resources (KDFWR) personnel were surveyed to document their knowledge of swamp rabbit occurrence. County maps were marked to show areas where swamp rabbits were (1) thought to currently exist; (2) extirpated; and (3) areas which had potential habitat but unknown status of occupancy of swamp rabbits. These data indicated that swamp rabbits were extant in parts of 14 counties and extirpated from parts of 13 counties. Areas were identified in 14 counties where habitat was thought suitable but status of swamp rabbits unknown. Spot searches for swamp rabbits or their sign were completed at 280 sites. Rabbit fecal pellets were found at 137 locations in 20 counties. Populations were found along 12 stream systems. Potentially isolated populations occurred along 5 stream drainages. Field spot checks corroborated the field staff survey 66.5% of the time. Swamp rabbits were found where field staff had indicated they would be 60.0% of the time. Swamp rabbits were not found in areas field staff had indicated they were extirpated 76.0% of the time.

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In addition to the swamp rabbit, Kentucky is inhabited by the Appalachian cottontail (*S. obscurus*) and the more common Eastern cottontail (*S. floridanus mearnsii*) (Barbour and Davis 1974, Hall 1951, Chapman et al. 1982). The swamp rabbit is limited in distribution to the lowlands of 12 states along the Gulf Coastal Plain and lower Mississippi River drainage (Hall 1951, Chapman et al. 1982). Historically, swamp rabbits occurred in the western third of Kentucky, with highest populations in the Ohio River counties of Henderson, Union, Crittenden, and Livingston counties and in Hickman County along the Mississippi River (Fig. 1) (Barbour and Davis 1974). Barbour and Davis (1974) reported that the swamp rabbit was extirpated from Butler, Lyon, Christian, and Trigg counties.

The swamp rabbit is an important game species in 15 western Kentucky

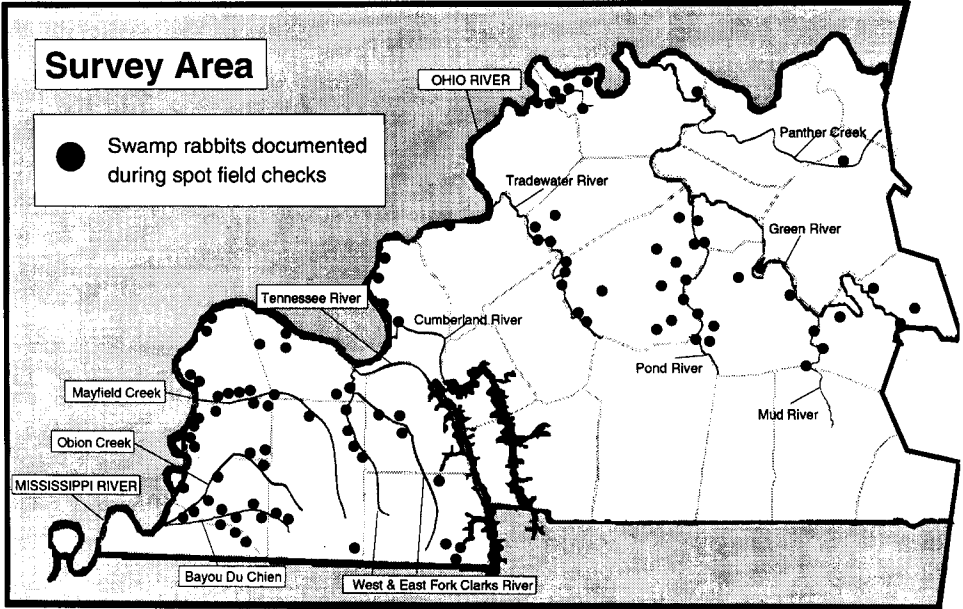


Figure 1. Historic range of Kentucky swamp rabbits and locations where swamp rabbits were documented during 1991–1994 spot field checks.

counties and has been considered an abundant animal in 4 of these (Barbour and Davis 1974). Densities up to 1.2 rabbits/ha have been recorded on some Ohio River islands (Barbour and Davis 1974). However, the overall population trend for swamp rabbits has been downward and the future for this species is in jeopardy due to loss of prime habitat (Allen 1985). The greatest threat to swamp rabbits has been drainage of wetlands for agriculture purposes. Dahl and Johnson (1991) reported that Kentucky has lost > 81% of its original wetlands. This is particularly significant to Kentucky swamp rabbits because nearly all of these wetlands were palustrine forest, which represent valuable swamp rabbit habitat.

Very little data are available concerning swamp rabbit habitat trends for Kentucky swamp rabbits. Nelson (1974) documented rate of swamp rabbit habitat destruction. His study revealed that, in 1959, 7,647 ha of swamp rabbit habitat was present on the study area. By 1965, this acreage had been reduced by 13.4%. A further reduction to 5,858 ha occurred by 1973 making the total reduction in swamp rabbit habitat during this 14-year period to be 23.4% (1,789 ha). This rate of habitat destruction equaled 1.67%/year and was considered typical of what was going on throughout the swamp rabbit range in Kentucky at that time.

Swamp rabbits are rarely found far from water or wetland habitat types (Chapman et al. 1982) and are dependent on bottomland hardwood forests along tributaries and estuaries of large rivers, streams, and wetland systems

(Lowe 1958, Chapman and Feldhamer 1981). The swamp rabbit's range is limited to within 2 km of water (Terrel 1972). Preferred habitat has been described as a system of small sloughs, low ridges, and grass dominated marshes. Consistently occupied home ranges monitored in Georgia contained either a floodplain pond, bordered riverine habitat, or both (Lowe 1958). Swamp rabbits readily swim and use water as escape cover (Conaway et al. 1960, Toll et al. 1960, Hill 1967, Terrel 1972). Seasonal flooding forces swamp rabbits out of lowland habitat onto higher ground within wetland areas or onto upland habitats. However, the swamp rabbit typically returns to the lowland areas following a flood event. Isolated, remnant stands of forested wetland habitat are poor quality habitat because floodwaters often force rabbits into unsuitable upland cover, increasing predation and other forms of mortality (Korte and Fredrickson 1977). Korte and Fredrickson (1977) also suggested sustainable populations of swamp rabbits could not occupy areas having <100 ha of suitable habitat.

Current status of the swamp rabbit in Kentucky is not well documented. Warren et al. (1986) list the swamp rabbit as an animal of special concern in Kentucky. This designation generally means not enough is known about the animal to determine its status. The objectives of this study were to determine current distribution of swamp rabbits throughout its historic range in Kentucky, and examine the usefulness of intra-agency surveys to examine distribution and population trends of wildlife species, with the swamp rabbit as a test case. Additionally, because swamp rabbit distribution and population levels have been significantly reduced due to habitat losses, the ultimate goal of this work was to identify isolated populations of the rabbits. Efforts are now being made to restore habitat where it is most needed to rejoin isolated populations.

## **Methods**

In June 1991, field personnel from the KDFWR were surveyed regarding the status of swamp rabbits throughout its historic range in Kentucky. County maps were used to designate areas where swamp rabbits were thought to currently exist; areas from where swamp rabbits were thought to have been extirpated; and areas that had suitable habitat, but where the status of the swamp rabbit was unknown.

Using these maps, spot check field searches were made during December 1991 and in January and February 1992 to look for swamp rabbits or their sign. Generally, an area covering from 0.2 ha to 6.0 ha was searched looking at downed logs, stumps, and brush piles. Fecal pellets on logs were the primary items considered as evidence of swamp rabbit presence (Terrel 1972). Once pellets were found on 1 or more logs, the search at that location was ceased in order to cover as many different locations as possible. I did not attempt to determine population levels. Only presence or absence of swamp rabbits and general notes for a particular search area were recorded.

After the first field season, swamp rabbit locations were plotted on U.S. Fish and Wildlife Service, National Wetland Inventory (NWI) maps. Cowardin et al. (1979) habitat classifications from the NWI maps were noted and this information used to identify new areas to search in subsequent field seasons. Further field searches were conducted during November 1993 and February 1994.

## Results

Data from field staff indicated swamp rabbits were extant in parts of 14 counties and extirpated from parts of 13 counties. The survey also identified areas in 14 counties where habitat was thought to be suitable, but status of swamp rabbits in the areas unknown.

This information and subsequent NWI map data was used to complete 280 spot field checks. Swamp rabbit pellets were found at 137 (48.9%) of the 280 search sites (Fig. 1). Nearly all (86.7%) of the swamp rabbit sign found (Table 1) was documented from PFO1A-temporarily flooded broad-leaved deciduous palustrine forest (55.1%) or PFO1C-seasonally flooded broad-leaved deciduous palustrine forest (31.6%) habitat types (Cowardin et. al 1979). Table 1 summarizes the habitat types in which swamp rabbit sign was found.

Except for the Tennessee River, swamp rabbit sign was found along every major stream throughout the historic Kentucky range of the species (Fig. 1). Sole (1994) provides an annotated listing of sites where swamp rabbits were found.

Field checks in areas identified by field staff as either having or not having swamp rabbits corroborated the staff survey information 66.5% of the time ( $N = 161$ ). Swamp rabbits were found in areas identified by field staff as having extant populations during 60.0% of the field checks ( $N = 95$ ). In areas where field staff indicated the swamp rabbit had been extirpated, swamp rabbits were not found during 76.0% of the spot checks ( $N = 66$ ). In areas where the habitat looked

**Table 1.** Distribution of sites in which swamp rabbit sign was found, by NWI habitat type.

NWI Habitat classification	% sites
Temporarily flooded broad-leaved deciduous palustrine forest	55.1
Seasonally flooded broad-leaved deciduous palustrine forest	31.6
Semipermanently flooded broad-leaved deciduous palustrine forest	3.5
Upland habitat	3.5
Seasonally flooded deciduous scrub-shrub wetland	3.5
Semipermanently flooded deciduous scrub-shrub wetland	1.0
Seasonally flooded deciduous palustrine forest	0.5
Semipermanently flooded palustrine forest	0.5
Semipermanently flooded emergent wetland	0.5
Total	99.7

good to field personnel but the status of swamp rabbits was unknown, swamp rabbits were documented 15.1% of the time ( $N = 73$ ).

Chi-square analysis ( $X^2 = 5.07$ ,  $P \leq 0.10$ ) rejected the hypothesis that there would be no difference in the field staff's accuracy in identifying habitat that had extant swamp rabbit populations and areas from which the swamp rabbit had been extirpated. This rejection was driven by the 40.0% error recorded from our efforts to document swamp rabbits in areas field staff had indicated the rabbits to currently exist in.

## Discussion

It is critical that state wildlife agencies begin to better monitor swamp rabbit distribution patterns and population trends, because this species is thought to be declining throughout its native range. This problem has been accelerated in the last 30 years because swamp rabbit habitat requirements are incompatible with modern land use practices such as drainage, channelization, and agriculture practices which impact the integrity of wetland habitats. Land uses creating isolated remnant woodlots and extremely narrow bands of wetland vegetation along stream and river channels virtually eliminate swamp rabbit habitat. Land clearing and conversion of bottomland forests to agriculture has been the primary factor contributing to loss of swamp rabbit habitat throughout its range (Allen 1985). Terrel (1972) estimated of the 40,500 ha of swamp rabbit habitat present in Indiana prior to settlement, only about 282 ha were still occupied by swamp rabbits with a total population of only 80 animals. Daily (1993) documented a 56% decline of bottomland hardwood forest to have occurred in Missouri since 1970, and noted much of the remaining bottomland forest to be highly fragmented.

My findings for Kentucky show that the swamp rabbit is still widely distributed throughout its historic range. Additionally, a negative spot check at a location does not mean that rabbits were not present. Some areas were checked during less than ideal conditions (during rain, immediately following heavy rain, periods of high water, and with snow cover) which precluded finding rabbit pellets on logs. Thirty-three (33) sites were rechecked with positive results being found at nine (9) (27.3%) sites during the second check. This type of sampling error likely caused the difference in agreement between the results of the field work during this study and the field staff survey results.

Potentially isolated populations appear to be located on Terrapin Creek in Graves County, Panther Creek of Green River in Butler County, Green River bottoms in Ohio County, South Fork of Panther Creek in Daviess County, and on Jonathon Creek and the Blood River in Calloway County.

Based on abundance of sign, populations appear to be thriving in Obion Creek in Fulton and Hickman counties; Mayfield Creek in Ballard, Carlisle, McCracken and Graves counties; Ohio and Mississippi river bottoms in Fulton, Hickman, Carlisle and Ballard counties; Clark River bottoms in Marshall

County; Tradewater River along the Caldwell-Hopkins county line; and the Pond River system along the Hopkins-Muhlenberg-McLean county lines.

Nearly a third (31.4%) of the swamp rabbit sign found was in woodlots <100 ha in size. These small woodlots ranged in size from 0.5 ha to 91.9 ha and were either completely isolated from similar habitat by an average distance of 370 m or connected to other similar habitat by corridors  $\leq 10$  m in width. Dailey (1993) found similar results in Missouri. This evidence raises questions regarding the 100 ha minimum size for suitable habitat reported by Korte and Fredrickson (1977) and may indicate flexibility in swamp rabbit habitat use when they occupy more fragmented areas.

The field staff survey proved to be a very good starting point for our work. There was a high degree of agreement between what the field staff survey indicated and what was found during the field spot searches. The differences between the survey types were driven by negative spot field checks in areas where field staff indicated the rabbits to be present. Not finding the rabbits in these areas may have been due to sampling error rather than the nonexistence of swamp rabbits in the areas.

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