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Abstract

LEE, L.E., ROBL, N., BUGMAN, A., NGUYEN, A.T.N., JENNINGS, T.L., WEIMER, H., LENHART S.M. and J.C. NEW, Jr. Modeling feral cat population dynamics in Knox County, TN. National Institute for Mathematical and Biological Synthesis, Department of Mathematics, College of Veterinary Medicine and Department of Statistics, Operations, and Management Science, University of Tennessee, Knoxville, TN, College of Veterinary Medicine, University of Wisconsin, Madison, WI, College of Veterinary Medicine, University of Illinois, Urbana-Champaign, IL and Companion Animal Initiative of Tennessee, Knoxville, TN.

Feral cats (*Felis catus*) are recognized as a problem internationally due to their negative impact on wildlife, their potential to spread infectious disease to people and other animals, and much of society's perception of them as nuisances. Trap-neuter-return (TNR) programs, a popular method employed to control feral cat populations, are currently used on a limited basis in Knox County, Tennessee. Despite the frequent use of TNR programs, their effectiveness remains controversial. Here, we present a mathematical model to predict population shifts of feral cats in selected managed colonies under the current TNR program. We predict feral cat population changes for closed colonies over a period of five years in one month time steps for three age classes. We tested different TNR parameters to assess how targeting spay/neuter programs seasonally might better address the feral cat problem. Current TNR efforts lack specific targeting and possess limited ability to curb population growth. Seasonal targeting of TNR efforts at a 53% spay rate of all age class predicted a zero percent growth and stabilization of the feral cat population growth over a five year period compared to non-targeting which would require TNR efforts throughout the year at 60% and a higher number of total spays. Seasonal targeting at a 100% spay rate of the only adult age class showed the most dramatic population decline with the fewest total number of spays required over the five year period. Non-targeting at a 100% spay rate of only the juvenile age class throughout the year gave a decline after two years but requires a greater number of total spays. Targeting TNR intervention at adult females during the time prior to mating season (December – February) in areas highly populated by feral cat colonies may further decrease the feral cat population. These results suggest a more efficacious and economical strategy than non-targeted TNR programs, and provide a humane and cost-effective alternative to trap-euthanasia (TE).