CARNIVORE SCENT STATION SURVEY SUMMARY, 2015

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INTRODUCTION

Monitoring the distribution and abundance of carnivores can be important for understanding the effects of harvest, habitat change, and environmental variability on these populations. However, many carnivores are highly secretive, difficult to repeatedly capture, and naturally occur at low to moderate densities, making it difficult to annually estimate abundance over large areas using traditional methods (e.g., mark-recapture, distance sampling, etc.). Hence, indices of relative abundance are often used to monitor such populations over time (Sargeant et al. 1998, 2003, Hochachka et al. 2000, Wilson and Delahay 2001, Conn et al. 2004, Levi and Wilmers 2012).

In the early 1970’s, the U.S. Fish and Wildlife Service initiated a carnivore survey designed primarily to monitor trends in coyote populations in the western U.S. (Linhart and Knowlton 1975). In 1975, the Minnesota DNR began to utilize similar survey methodology to monitor population trends for numerous terrestrial carnivores within the state. This year marks the 39th year of the carnivore scent station survey.

METHODS

Scent station survey routes are composed of tracking stations (0.9 m diameter circle) of sifted soil with a fatty-acid scent tablet placed in the middle. Scent stations are spaced at 0.5 km intervals on alternating sides of a road or trail. During the initial years (1975-82), survey routes were 23.7 km long, with 50 stations per route. Stations were checked for presence/absence of tracks on 4 consecutive nights (old tracks removed each night), and the mean number of station visits per night was the basis for subsequent analysis. Starting in 1983, following suggestions by Roughton and Sweeny (1982), design changes were made whereby routes were shortened to 4.3 km, 10 stations/route (still with 0.5 km spacing between stations), and routes were surveyed only once on the day following route placement. The shorter routes and fewer checks allowed for an increase in the number and geographic distribution of survey routes. In either case, the design can be considered two-stage cluster sampling.

Survey routes were selected non-randomly, but with the intent of maintaining a minimum 5 km separation between routes, and encompassing the variety of habitat conditions within the work area of each survey participant. Most survey routes are placed on secondary (unpaved) roads/trails, and are completed from September through October. Survey results are currently stratified based on 3 'habitat zones' within the state (forest (FO), transition (TR), and farmland (FA); Figure 1).
Track presence/absence is recorded at each station and track indices are computed as the percentage of scent stations visited by each species. Confidence intervals (95%) are computed using bootstrap methods (percentile method; Thompson et al. 1998). For each of 1000 replicates, survey routes are randomly re-sampled according to observed zone-specific route sample sizes, and station visitation rates are computed for each replicate sample of routes. Replicates are ranked according to the magnitude of the calculated index, and the 25th and 975th values constitute the lower and upper bounds of the confidence interval.

RESULTS AND DISCUSSION

A total of 268 routes were completed this year. There were 2,449 operable scent stations examined on the 268 routes. Route density varied from 1 route per 564 km² in the Forest Zone to 1 route per 1,216 km² in the Farmland Zone (Figure 1).

Statewide, route visitation rates (% of routes with detection), in order of increasing magnitude, were opossum (3%), domestic dogs (10%), wolves (10%), bobcats (13%), domestic cats (27%), skunks (29%), coyotes (30%), raccoons (30%), and red foxes (31%). Regionally, route visitation rates were as follows: red fox – FA 27%, FO 31%; TR 35%; coyote – FO 19%, TR 40%, FA 46%; skunk – FO 18%, TR 38%, FA 45%; raccoon – FO 12%, TR 42%, FA 66%; domestic cat – FO 12%, TR 40%, FA 52%; domestic dog – FO 5%, FA 14%, TR 20%; opossum - FO 0%, TR 3%, FA 9%; wolf - FA 0%, TR 6%, FO 16%; and bobcat - FA 0%, TR 11%, FO 19%.

Figures 2-5 show station visitation indices (% of stations visited) from the survey’s inception through the current year. Although the survey is largely intended to document long-term trends in populations, confidence intervals improve interpretation of the significance of annual changes. Based strictly on the presence/absence of confidence interval overlap, there were no significant changes in indices compared to last year. However, several changes approached significance, including coyote increases in both the Farmland and Forest Zones and declines in skunk and raccoon indices in the Forest Zone (Figures 2 and 4).

In the Farmland Zone (Figure 2), red fox indices remain well below the long-term average, whereas raccoon and coyote indices remain above average. Indices for most other species remain near their long-term averages. The index for domestic dog detections in the Farmland Zone has recently undergone a decline to a record low.

In the Transition Zone (Figure 3), red fox indices have undergone a ‘cyclic’ fluctuation over the last 10 years but remain below the long-term average. Conversely, the Transition Zone coyote index remains above the long-term average. Indices for most other species are near their long-term average, though similar to the Farmland Zone, domestic dog detections are currently near a low point.

In the Forest Zone (Figures 4 and 5), most indices this year were near or moderately below their long-term averages. The primary exception is the bobcat index which remains well above its long-term average. Overall, there have been no long-term trends in forest indices except for the long-term increase in wolf indices and the recent 10-year increase in bobcat indices.

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LITERATURE CITED


Figure 1. Locations of existing scent station routes (not all completed every year). Insets show 2015 route specifics and the number of station-nights per year since 1983.
Figure 2. Percentage of scent stations visited by selected species in the Farmland Zone of Minnesota, 1977-2015. Horizontal line represents long-term mean.
Figure 3. Percentage of scent stations visited by selected species in the Transition Zone of Minnesota, 1978-2015. Horizontal line represents long-term mean.
Figure 4. Percentage of scent stations visited by selected species in the Forest Zone of Minnesota, 1976-2015. Horizontal line represents long-term mean.
Figure 5. Percentage of scent stations visited by wolves and bobcat in the Forest and Transition Zones of Minnesota, 1976-2015. Horizontal lines represents long-term mean.