

CARNIVORE SCENT STATION SURVEY SUMMARY, 2010

John Erb, Minnesota Department of Natural Resources, Forest Wildlife Research Group

INTRODUCTION

Monitoring the distribution and abundance of carnivores can be important for documenting 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 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).

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 35th anniversary 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 tab 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, farmland, and transition).

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 299 routes were completed this year (Figure 1). There were 2,738 operable scent stations examined on the 299 4.3 km routes. Route density varied from 1 route per 549 km² in the Forest zone to 1 route per 1,016 km² in the Farmland zone (Figure 1).

Statewide, route visitation rates (% of routes with detection) were highest for skunk (39%), followed by red fox (38%), raccoon (34%), domestic cat (28%), coyote (24%), and dog (21%). Regionally, route visitation rates were as follows: red fox – Farmland (FA) 22%, Transition (TR) 47%, Forest (FO) 40%; coyote – FA 37%, TR 37%, FO 11%; skunk – FA 41%, TR 48%, FO 33%; raccoon – FA 69%, TR 41%, FO 16%; domestic cat – FA 52%, TR 35%, FO 14%; and dog – FA 42%, TR 22%, FO 11%.

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 on the presence/absence of confidence interval overlap, the only significant change was a decline in the Forest zone red fox index (Figure 4). In addition, several changes occurred that approached significance, including increases in the Transition zone skunk index (Figure 2) and Forest zone wolf index (Figure 4). Both wolf and bobcat indices reached their highest level since the survey began, though confidence intervals, particularly for bobcats, are quite large (Figure 5).

Red fox indices remain well below their long-term mean in the Farmland zone (Figure 2), but appear to be, at least temporarily, rebounding in the Transition zone (Figure 3). The difference does not appear to be attributable to differences in coyote numbers, given similar and above-average coyote indices in the Farmland and Transition zones. However, coyote indices remain comparatively low in the Forest zone (Figure 4), likely attributable to the presence of wolves. While not significantly different from previous years, the point estimate for the Farmland zone raccoon index reached its highest level since the survey began.

ACKNOWLEDGEMENTS

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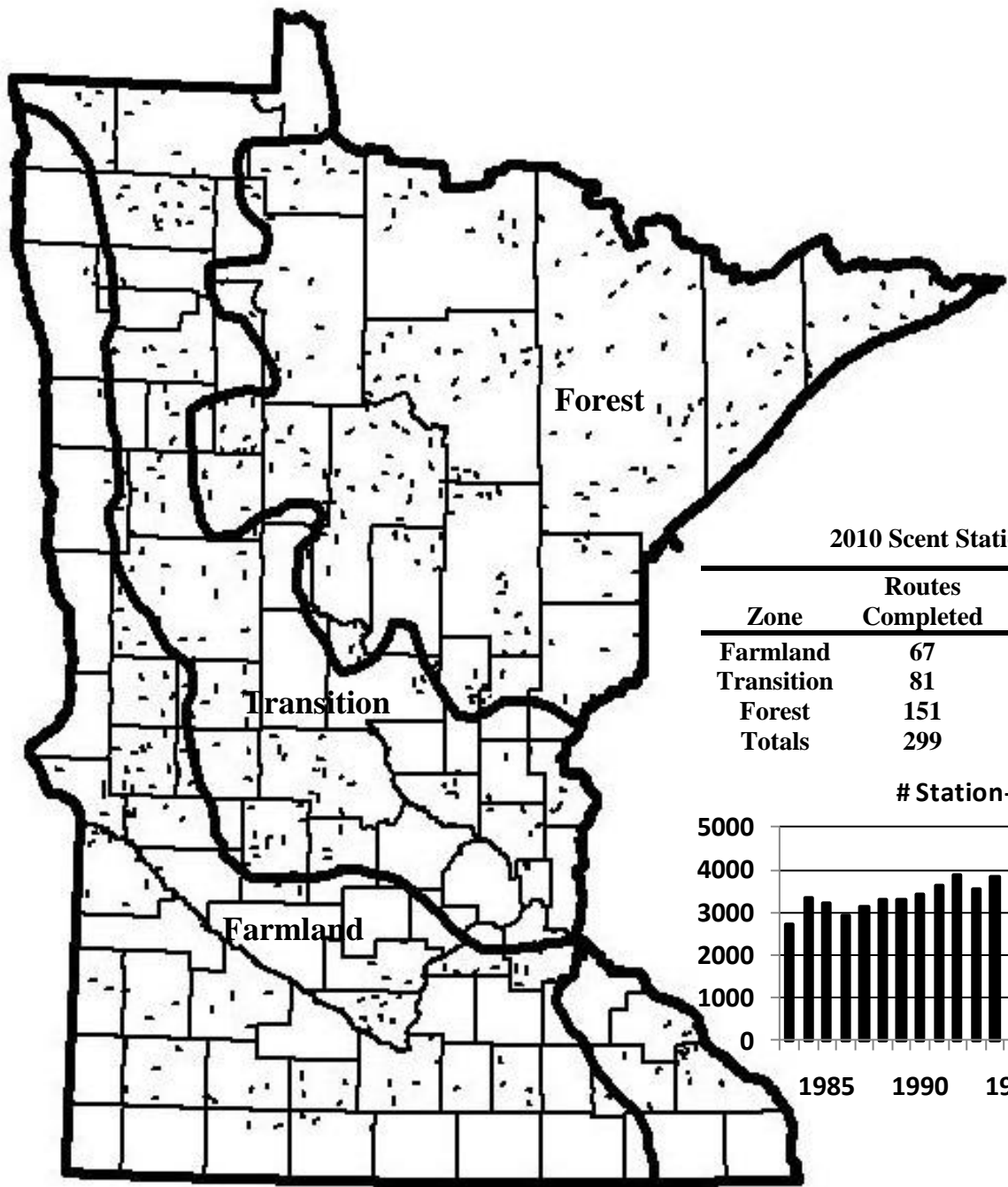
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2010 Scent Station Specifics

Zone	Routes Completed	Route Density	Station Nights
Farmland	67	1/1,016 km ²	578
Transition	81	1/811 km ²	752
Forest	151	1/549 km ²	1,408
Totals	299	1/725 km ²	2,738

Station-Nights

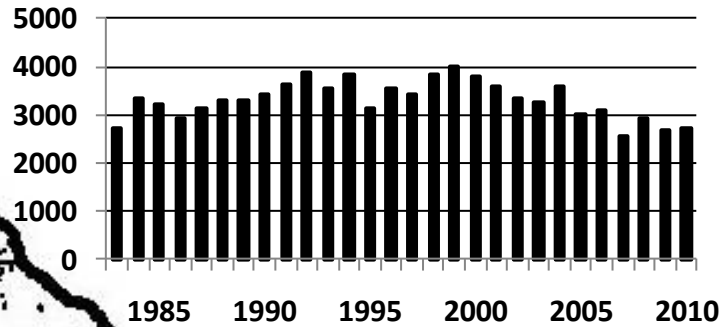


Figure 1. Locations of scent station routes. Insets show 2010 route specifics and the number of station-nights per year since 1983.

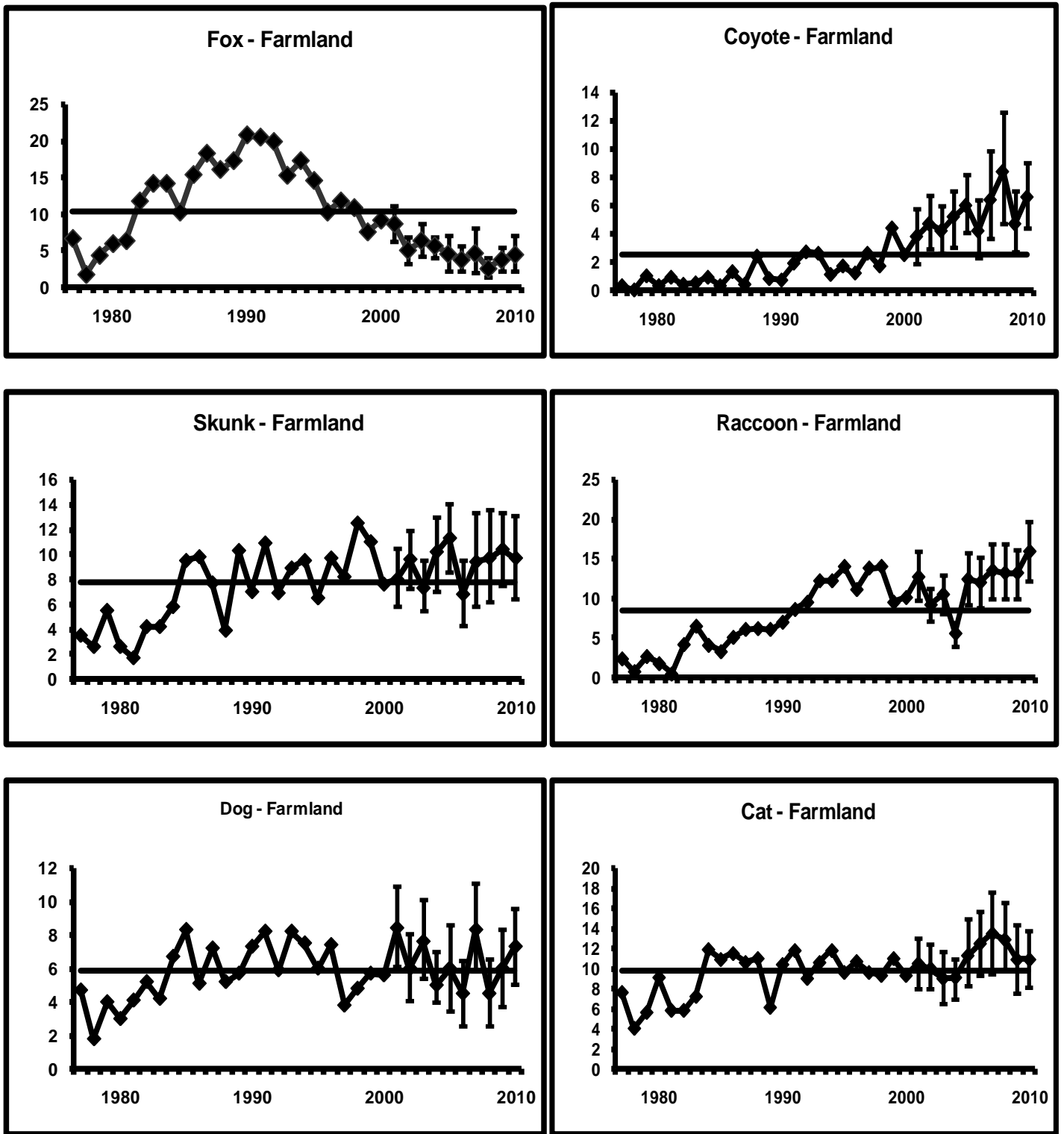


Figure 2. Percentage of scent stations visited by selected species in the Farmland Zone of Minnesota, 1977-2010. Horizontal line represents long-term mean.

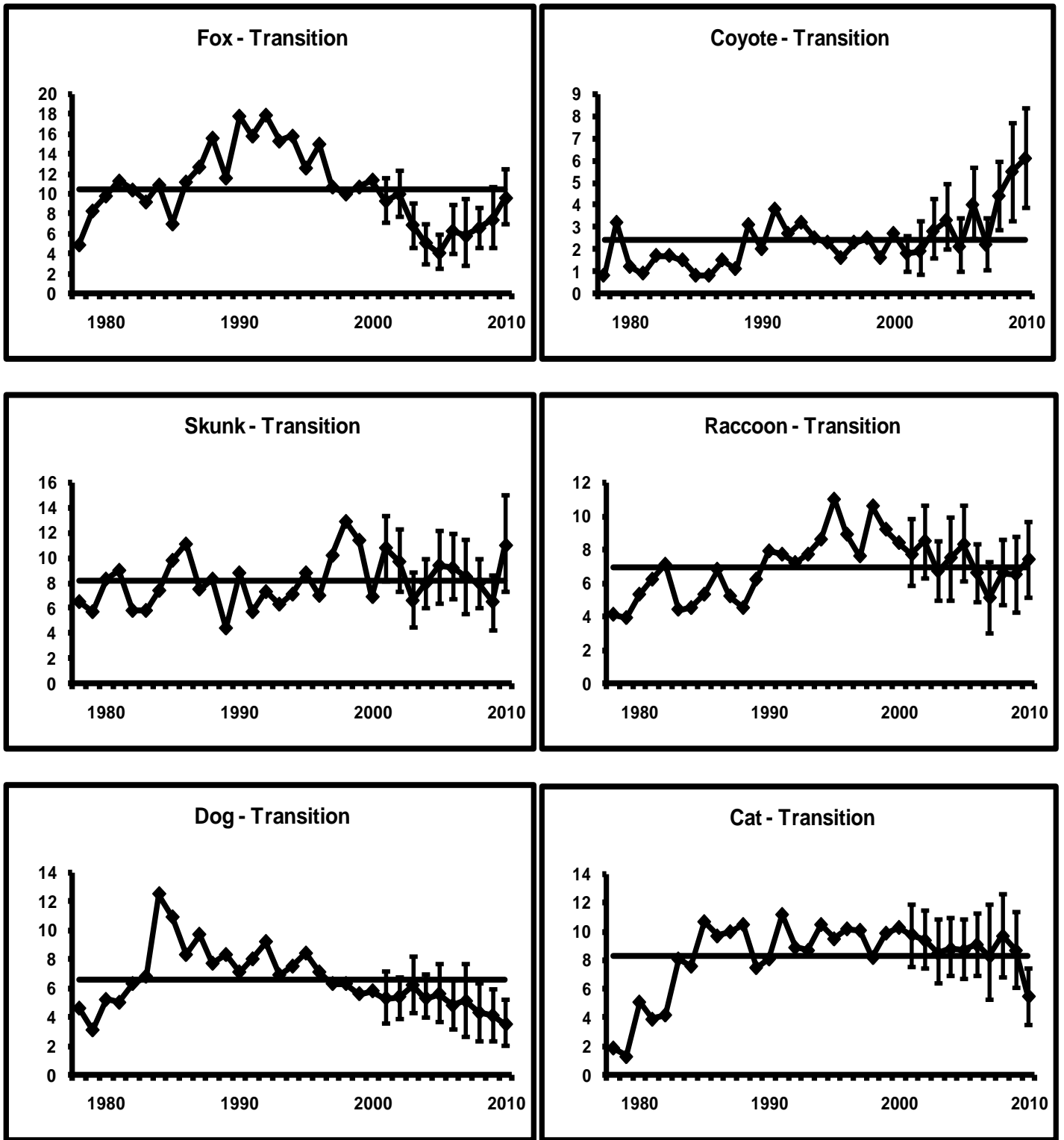


Figure 3. Percentage of scent stations visited by selected species in the Transition Zone of Minnesota, 1978-2010. Horizontal line represents long-term mean.

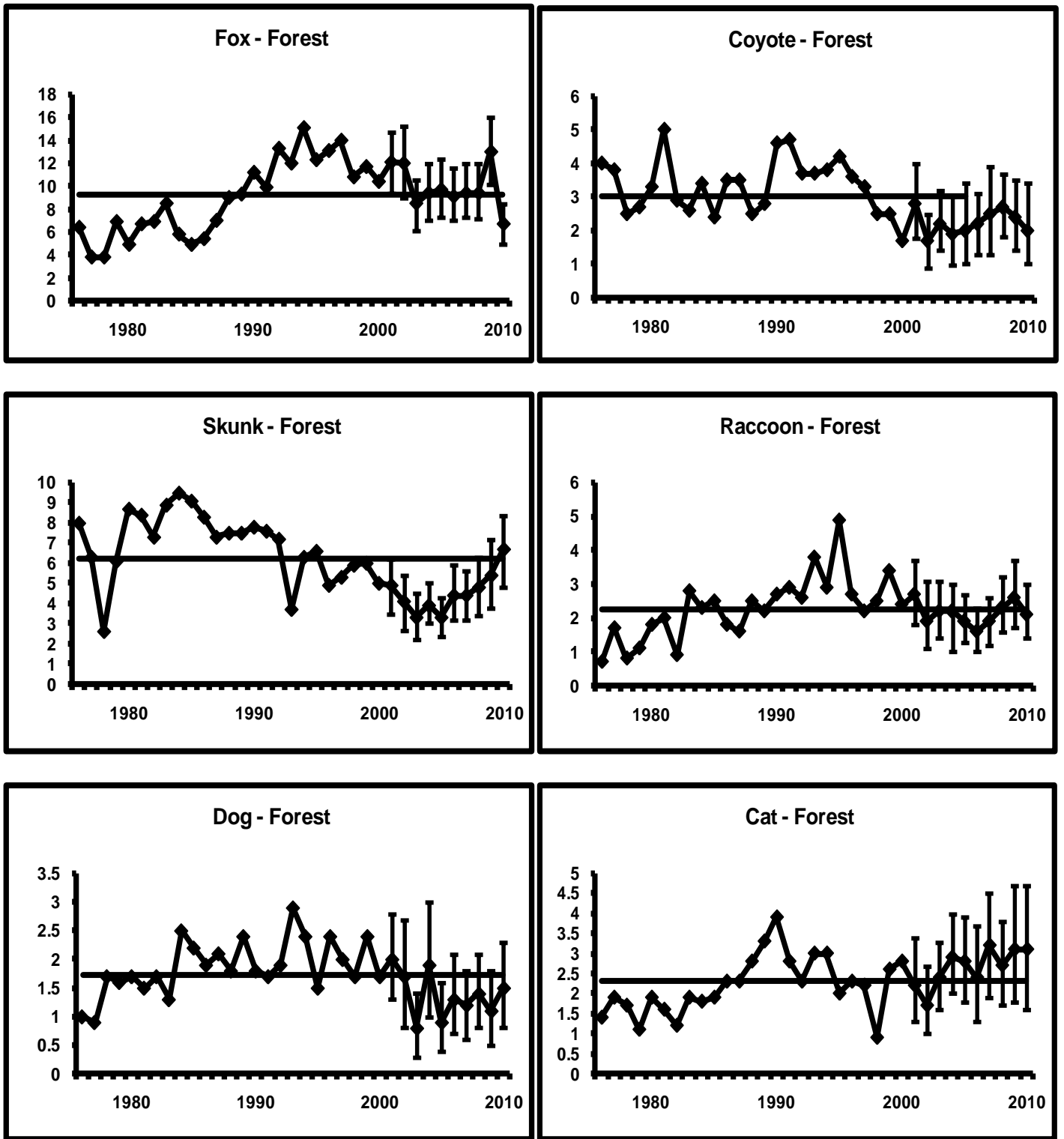


Figure 4. Percentage of scent stations visited by selected species in the Forest Zone of Minnesota, 1976-2010. Horizontal line represents long-term mean.

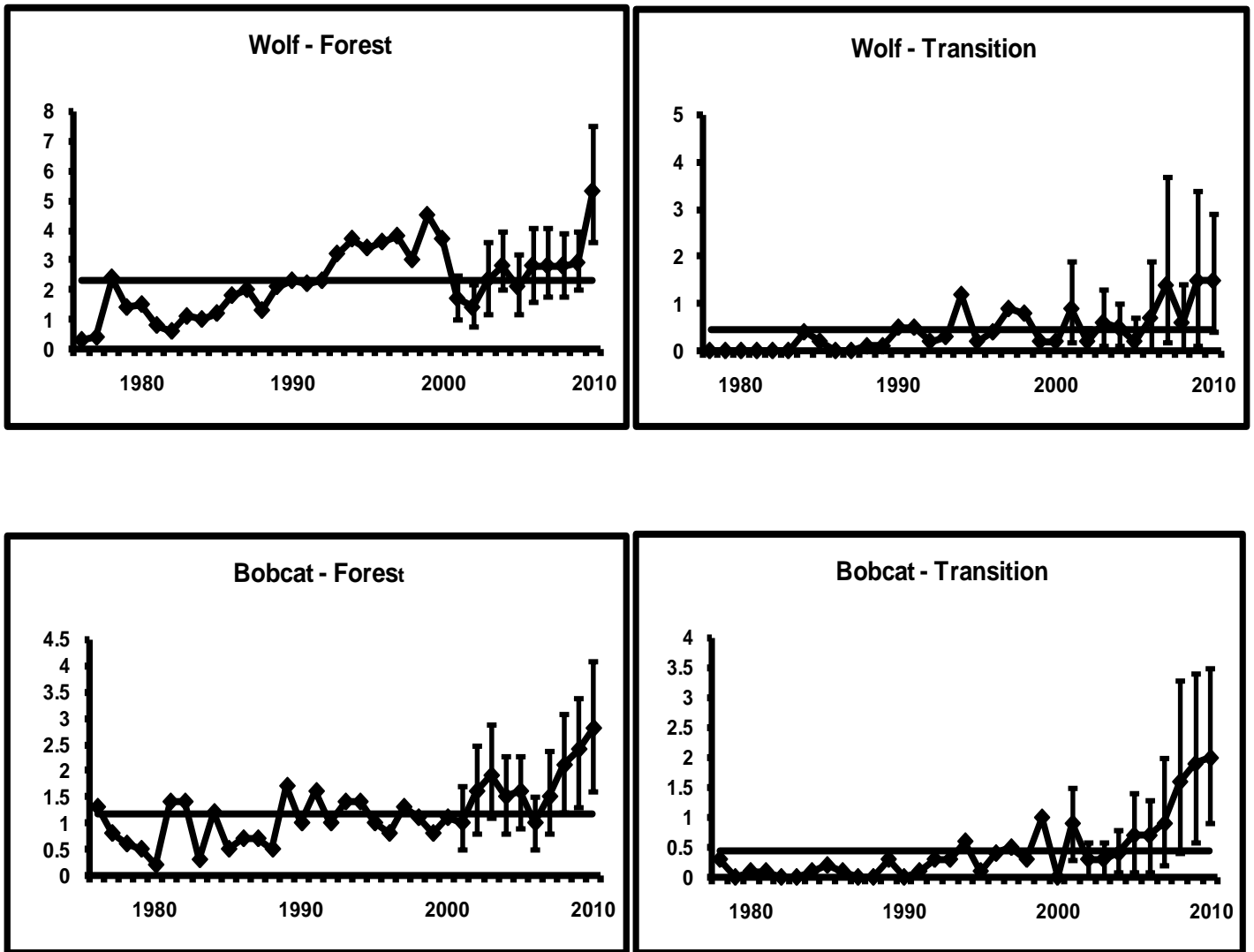


Figure 5. Percentage of scent stations visited by wolves and bobcat in the Forest and Transition Zones of Minnesota, 1976-2010. Horizontal lines represents long-term mean.