PREDATOR SCENT POST SURVEY

AND

WINTER TRACK INDICES

NOTE: This survey is organized and coordinated by the Forest Wildlife Populations and Research Group.
Results are presented at this location in the book because of the statewide nature of the data.

FURBEARER WINTER TRACK SURVEY SUMMARY, 2004

John Erb, Forest Wildlife Populations & 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 (Hochachka et al. 2000, Wilson and Delahay 2001, Conn et al. 2004).

In winter, tracks of carnivores are readily observable following snowfall. Starting in 1991, Minnesota initiated a carnivore snow track survey in the northern portion of the State. The survey's primary objective is to use a harvest-independent method to monitor distribution and population trends of fisher and marten, 2 species for which no other survey data was available. Because sign of other carnivores is readily detectable in snow, participants also record tracks for other selected species. After 3 years of evaluating survey logistics, the survey became operational in 1994.

METHODS

Presently, 51 track survey routes are distributed across the northern portion of the state (Figure 1). Each route is 10 miles long, and follows secondary roads or trails. Route locations were subjectively determined based on availability of suitable roads/trails, but were chosen, where possible, to represent the varying forest habitat conditions in northern Minnesota. For data recording, each 10-mile route is divided into 20 0.5-mile segments.

Each route is surveyed once following a fresh snow from late November through January, and track counts are recorded for each 0.5-mile segment. When it is obvious the same animal crossed the road multiple times within a 0.5-mile segment, the animal is only recorded once. If it is obvious that an animal ran along the road and entered multiple 0.5 mile segments (which often occurs with canids), its' tracks are recorded in all segments, but circled to denote it was the same animal. While such duplicate tracks are not included in calculation of track indices (see below), recording data in this manner allows for future analysis of animal activity in relation to survey 'plot' size and habitat. Snowshoe hare are recorded only as present or absent in the first 0.1 miles of each 0.5-mile segment. While most routes are surveyed 1 day after the conclusion of a snowfall (ending by 6:00 pm), thereby allowing 1 night for track 'registry', a few routes are completed 2 or more nights following snowfall. In such cases, track counts on those routes are divided by the number of days post-snowfall.

Currently, 3 summary statistics (2 graphs) are presented for each species. First, I compute the percentage of 0.5-mile segments with species presence after removing any duplicates (e.g., if the same fox clearly traverses 2 adjacent 0.5-mile segments along the road, and it was the only 'new' fox in the second segment, only 1 of the 2 segments is considered independently occupied). In addition to this metric, but on the same graph, the average number of tracks per 10-mile route is presented after removing any obvious duplicate tracks across segments. For wolves traveling through adjacent segments, the maximum number of pack members recorded in any 1 of those segments is used as the track total for that particular group, though this is likely an underestimate of true pack size. Because individuals from many of the species surveyed tend to be solitary, these 2 indices will often yield mathematically equivalent results (i.e., on average, one tends to differ from the other by a constant factor). In the case of wolf packs, and to a lesser extent fox and coyotes which may start traveling as breeding pairs in winter, the approximate equivalence of these 2 indices will still be true if average (detected) group sizes are similar across years. However, the solitary tendencies in some species are not absolute, potential density (in relation to survey plot size) varies across species, and for wolves, pack size may vary annually. For these reasons, as well as to provide an intuitive count metric, both indices are currently presented. Because snowshoe hares are tallied only as present/absent, the 2 indices will by definition be equivalent, though trends lines may deviate slightly in years when some routes are not fully surveyed.

In the second graph, I illustrate the percentage of <u>routes</u> where each species was detected (hereafter, the 'distribution index'). This measure is computed to help assess whether changes in the above track indices are a result of larger-scale changes in distribution (more/less routes with presence) and/or finer-scale changes in density along routes.

RESULTS

Forty of the 51 routes were completed this year (Figure 2). Total snow depths averaged 8" for completed routes, with surveys taking an average of 2.3 hours to complete. Survey routes were completed between Nov. 29 and Jan. 11 this year.

Following a recent peak, fisher track indices declined to their lowest point since the survey began (Figure 3). Given a lack of significant change in the percentage of routes occupied by fisher (Figure 3), the decline in track indices appears largely due to a decline in track density along occupied routes. For marten, little change was observed in this year's track indices (Figure 3). While there is some indication of a slow decline in marten indices from 1994-2002, recent results are within the bounds of previously observed values. It is possible that the decline (1994-2002) in the percentage of routes occupied by marten (Figure 3), particularly from 1995-2000, may be a result of a disproportionate number of new routes being added that were outside current marten range. A more detailed analysis of this possibility has yet to be completed.

Bobcat indices have undergone the most notable change since the survey began. While there was little change from last year, track indices remain well above those observed prior to 1999 (Figure 3). Wolf track indices also exhibited little change from last year (Figure 3). Overall, there has been no significant trend in wolf indices since 1994, though there is some indication that density around occupied routes has, on average, increased (Figure 3). Following an upswing through 1999, track indices for red fox have subsequently declined (Figure 3). Nevertheless, they remain one of the most ubiquitous species recorded on the survey. Coyote track indices have fluctuated, with some indication that coyote distribution has slowly declined since 1994 (Figure 3). Weasel track indices are best characterized as stable, with occasional 'irruptions' in density on occupied routes (Figure 3). Based on known cyclic patterns, snowshoe hare indices have been expected to decline. Following a 'prolonged' peak, hare winter track indices declined for the first time in 6 years (Figure 3).

DISCUSSION

Reliable interpretation of changes in track survey results is dependent on the assumption that the probability of detecting animals remains relatively constant across years (Gibbs 2000). Because this remains an untested assumption, caution is warranted when interpreting changes, particularly annual changes of low to moderate magnitude, or short-term trends.

While little change was noted in the broad-scale distribution of fisher across their range, track indices suggest that fisher density may have notably declined since last year. No significant changes were noted for marten. Bobcat populations appear to remain at high levels in spite of record harvests in recent years. While trends are apparent for some of the remaining species, track indices this winter were generally within the bounds of those previously recorded.

We recently completed the process of digitizing all survey routes and electronically entering all previous data. In the near future, I will be reviewing several aspects of survey design and analysis, including computation of confidence intervals around indices, adequacy of survey route sample size and distribution, and possible approaches for estimating, and hence correcting for, any differences in the probability of detecting animals across years (e.g., MacKenzie et al. 2004).

ACKNOWLEDGEMENTS

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LITERATURE CITED

Conn, P. B., L. L. Bailey, and J. R. Sauer. 2004. Indexes as surrogates to abundance for low-abundance species. Pages 59-76 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

Gibbs, J. P. 2000. Monitoring populations. Pages 213-252 *in* L. Boitani and T. K. Fuller, editors. Research Techniques in Animal Ecology. Columbia University Press, New York, USA.

Hochachka, W. M., K. Martin, F. Doyle, and C. J. Krebs. 2000. Monitoring vertebrate populations using observational data. Canadian Journal of Zoology 78:521-529.

MacKenzie, D. I., J. A. Royle, J. A. Brown, and J. D. Nichols. 2004. Occupancy estimation and modeling for rare and elusive populations. Pages 149-172 *in* W. L. Thompson, editor. Sampling rare or elusive species: Concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C., USA.

Wilson, G. J., and R. J. Delahay. 2001. A review of methods to estimate the abundance of terrestrial carnivores using field signs and observation. Wildlife Research 28:151-164.

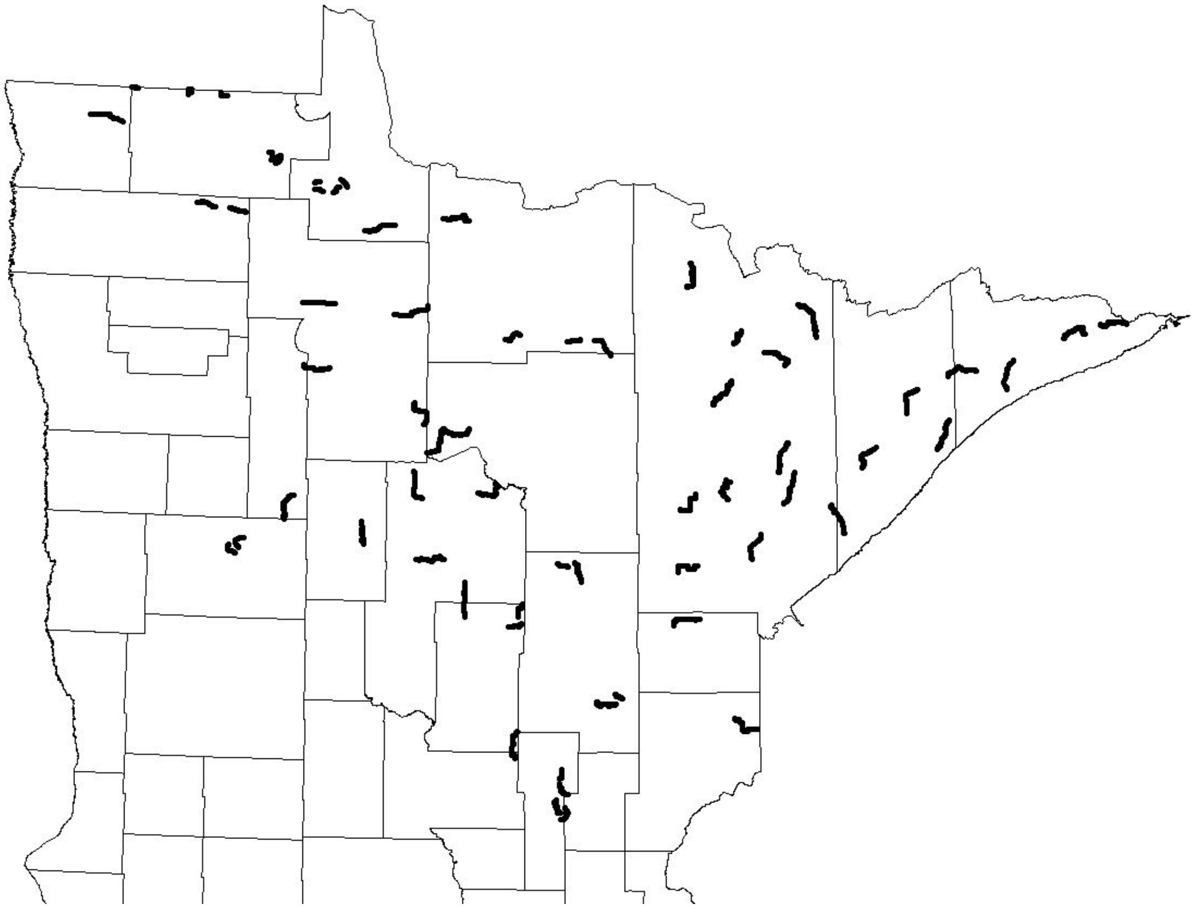

Figure. 1. Locations of established furbearer winter track survey routes.

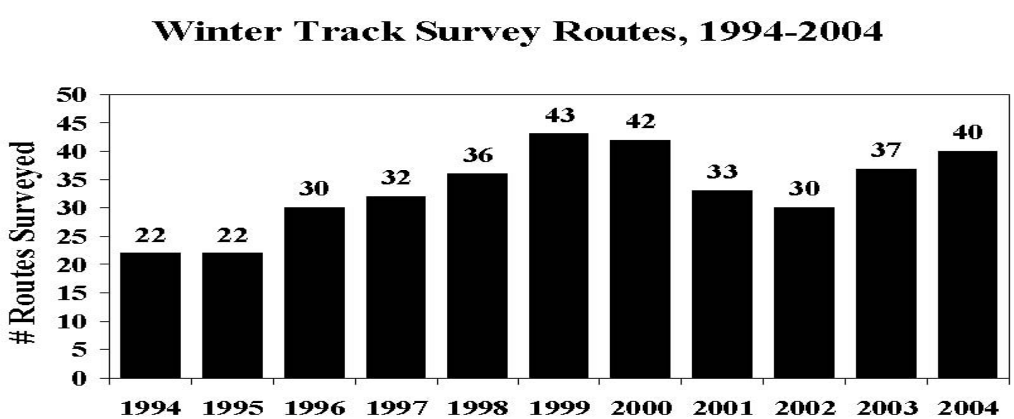

Figure. 2. Number of winter track routes surveyed, 1994-2004.

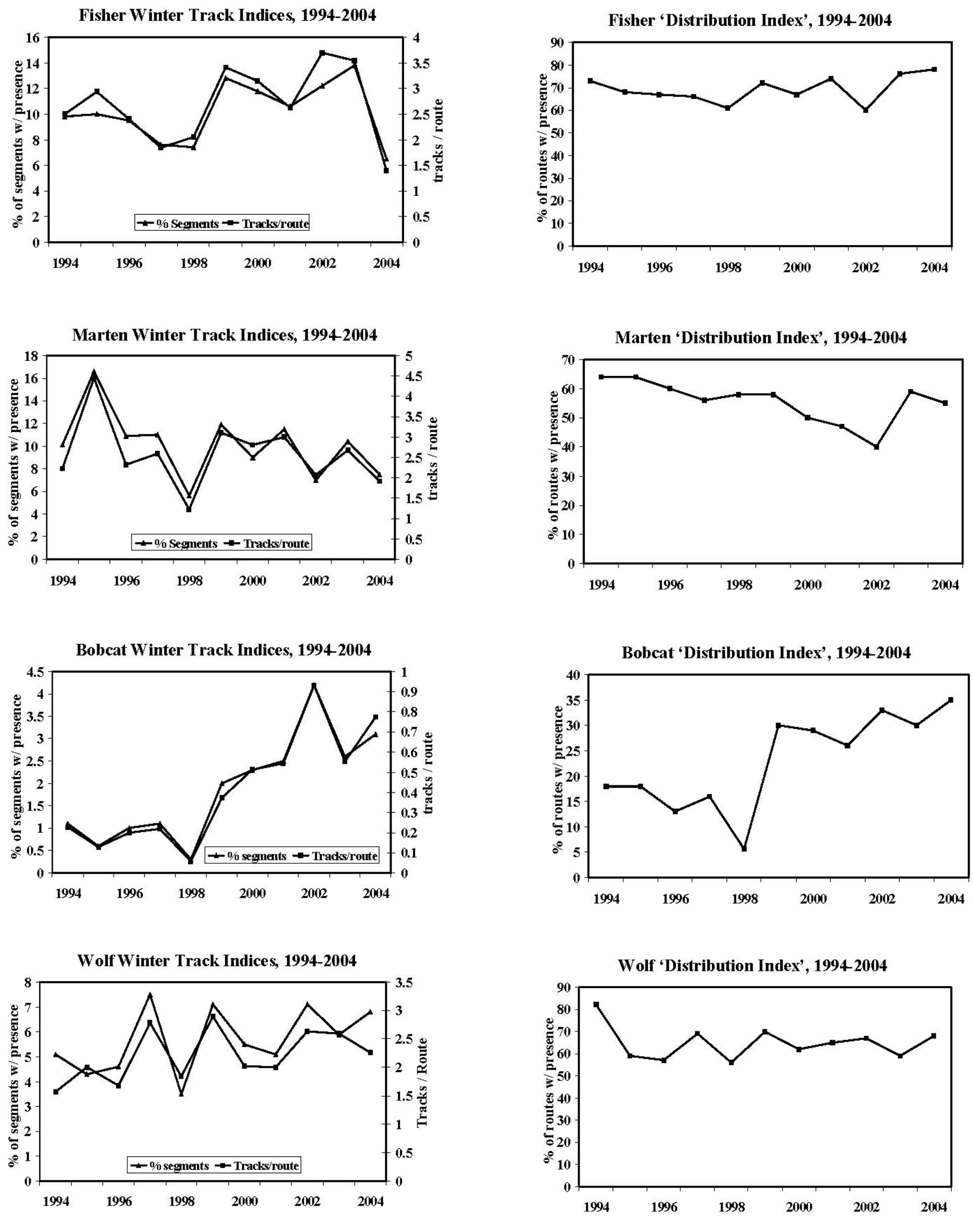

Figure. 3. Winter Track Indices for selected species in Minnesota

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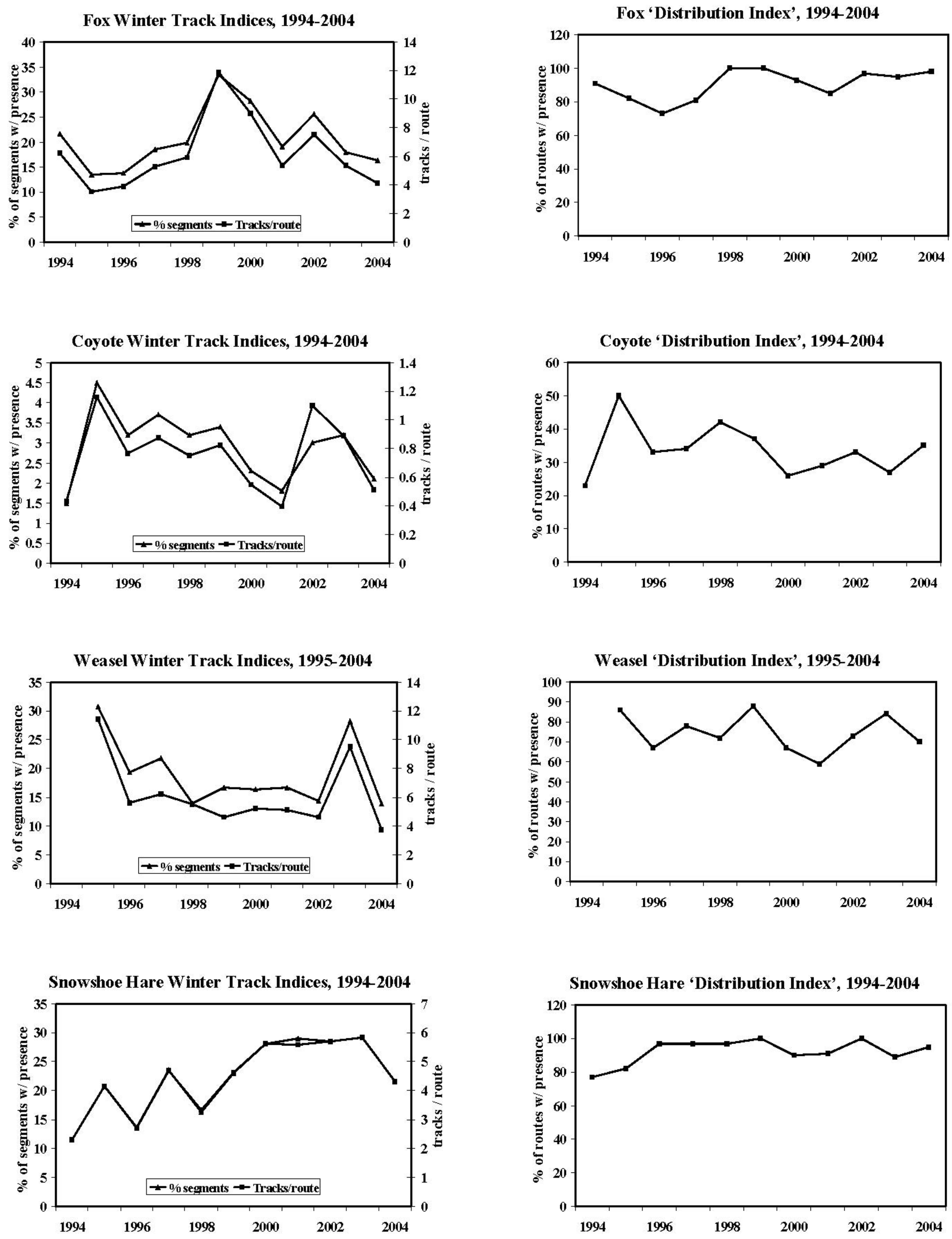

Figure 3. (continued).

PREDATOR/FURBEARER SCENT STATION SURVEY SUMMARY, 2004

John Erb, Forest Wildlife Populations & Research Group

The 29th annual Interagency Cooperative Scent Station Survey was conducted in autumn, 2004. The objective of the survey is to track population trends of many predator species in Minnesota. Cooperators in 2004 were: DNR Division of Wildlife; Superior National Forest; Agassiz, Big Stone, Rydell, Sherburne, Tamarac, and Rice Lake National Wildlife Refuges; all USFWS Wetland Management Districts; White Earth, Red Lake, and Leech Lake Reservations; 1854 Authority; Vermillion Community College; Beltrami and Cass County Land Departments; Marshall County Central High School; Richard Nelles and Tom Stuber; and the Boulder Lake Environmental Center.

A total of 381 routes were completed this year (Figure 1). There were 3,605 operable scent stations examined on the 381 2.7 mile routes. Route density varied from 1/176mi^2 in the Forest Zone to 1/309 mi^2 in the Farmland (Figure 1).

Statewide, route visitation rates were highest for red fox (39% of all routes), followed by domestic cat (37%), skunk (35%), raccoon (25%), dog (23%), and coyote (19%). Regionally, route visitation rates (% of routes with detection) were as follows: red fox – Farmland (FA) 41%, Transition (TR) 31%, Forest (FO) 43%; coyote – FA 33%, TR 17%, FO 13%; skunk – FA 52%, TR 41%, FO 23%; raccoon – FA 38%, TR 41%, FO 16%; domestic cat – FA 60%, TR 50%, FO 19%; and dog – FA 36%, TR 38%, FO 12%. Figures 2-5 show station visitation indices from the survey's inception through the current year. These index values are computed by multiplying the proportion of stations visited by 1000.

Although the survey is largely intended to document long-term trends in populations, I have included 95% bootstrap confidence intervals (percentile method) around recent indices to facilitate interpretation of annual changes. Based on these intervals, the only significant change from last year was a decline in raccoon indices in the farmland zone. Confidence intervals are not yet available for historic data.

Red fox indices in the farmland and transition zones have steadily declined over the past 15 years (Figure 2 and 3), and may be attributable to mange and changing agricultural practices. In the farmland zone, the decline may also be exacerbated by the apparent increase in coyotes over the past 10 years (Figure 2). After increasing for 15 years, raccoon indices in the farmland zone have now declined over the past 10 years (Figure 2). Indices for most other species/zones have fluctuated but have not exhibited any notable long-term trends.

Sincere thanks for your continued assistance with this survey.

JE

2004 Scent Station Specifics

Zone	Routes Completed	Route Density	Station Nights
Farmland	85	1/309mi^2	806
Transition	112	1/227mi^2	1061
Forest	184	1/176mi^2	1738
Totals	381	1/221mi^2	3605

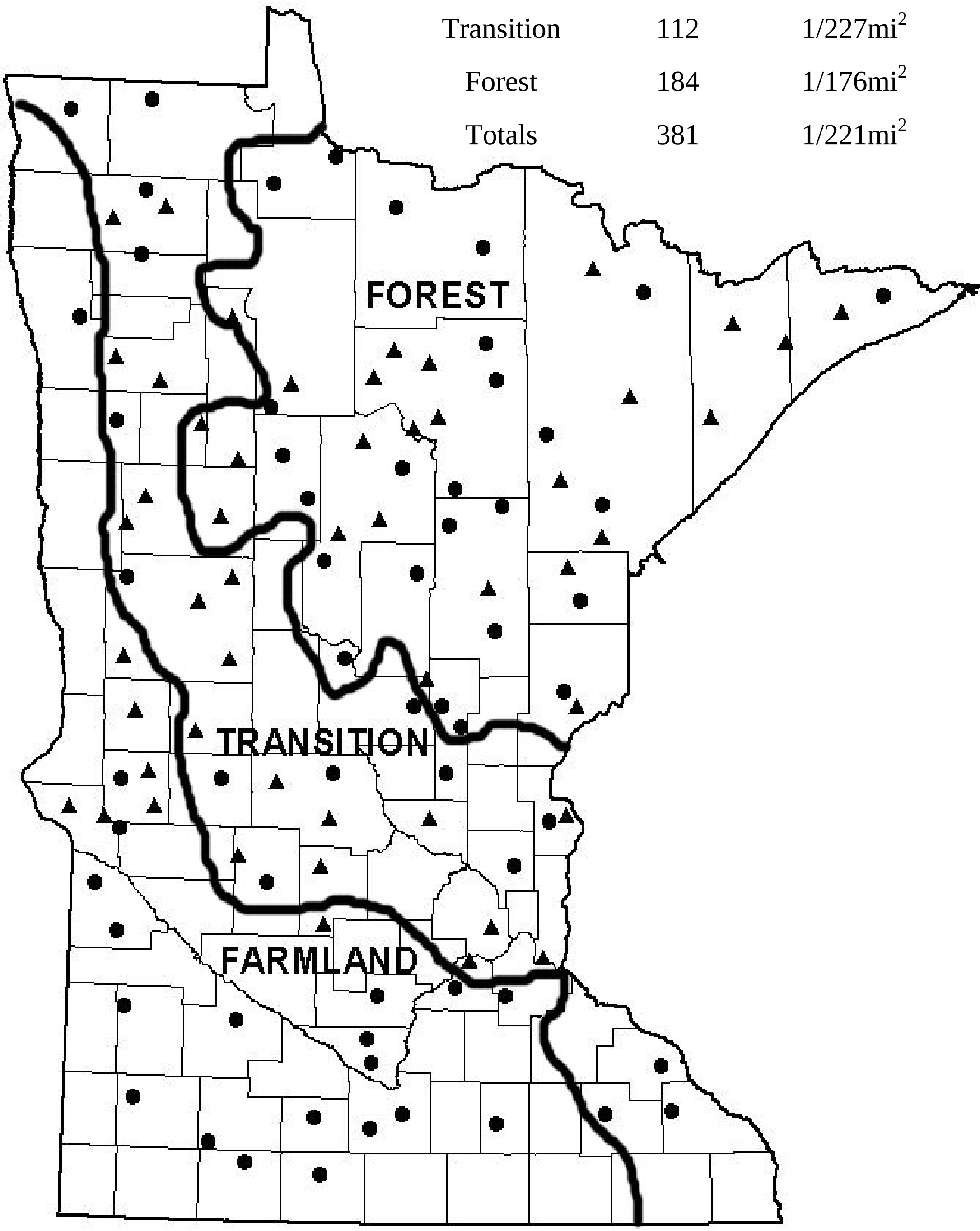

Figure 1. Approximate central locations of scent station routes conducted by Division of Wildlife (●) and interagency cooperators (▲). Each marked location may represent from 1-6 actual routes. Inset shows 2004 route specifics.

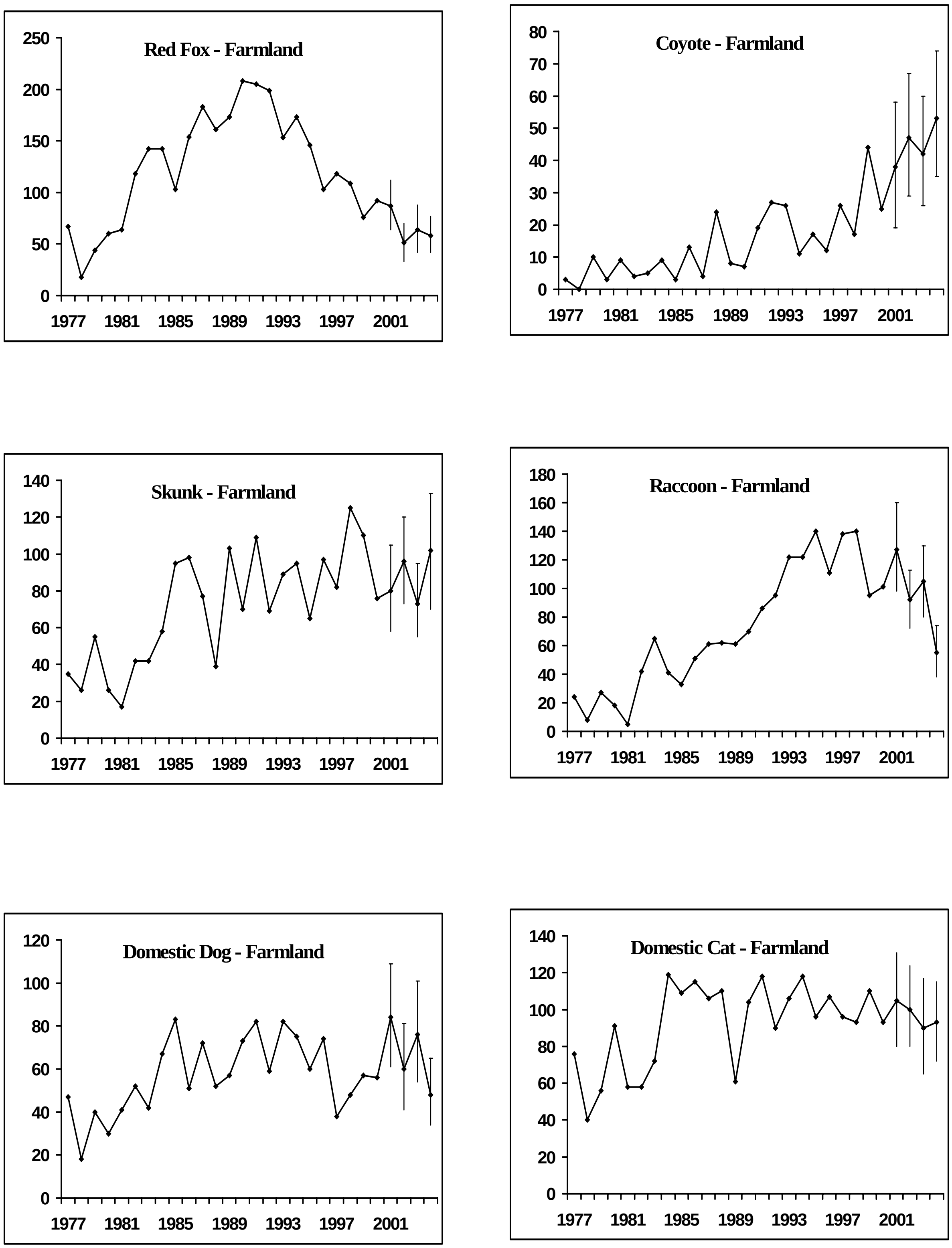

Figure 2. Scent station indices for selected species in the Farmland Zone of Minnesota, 1977-2004.

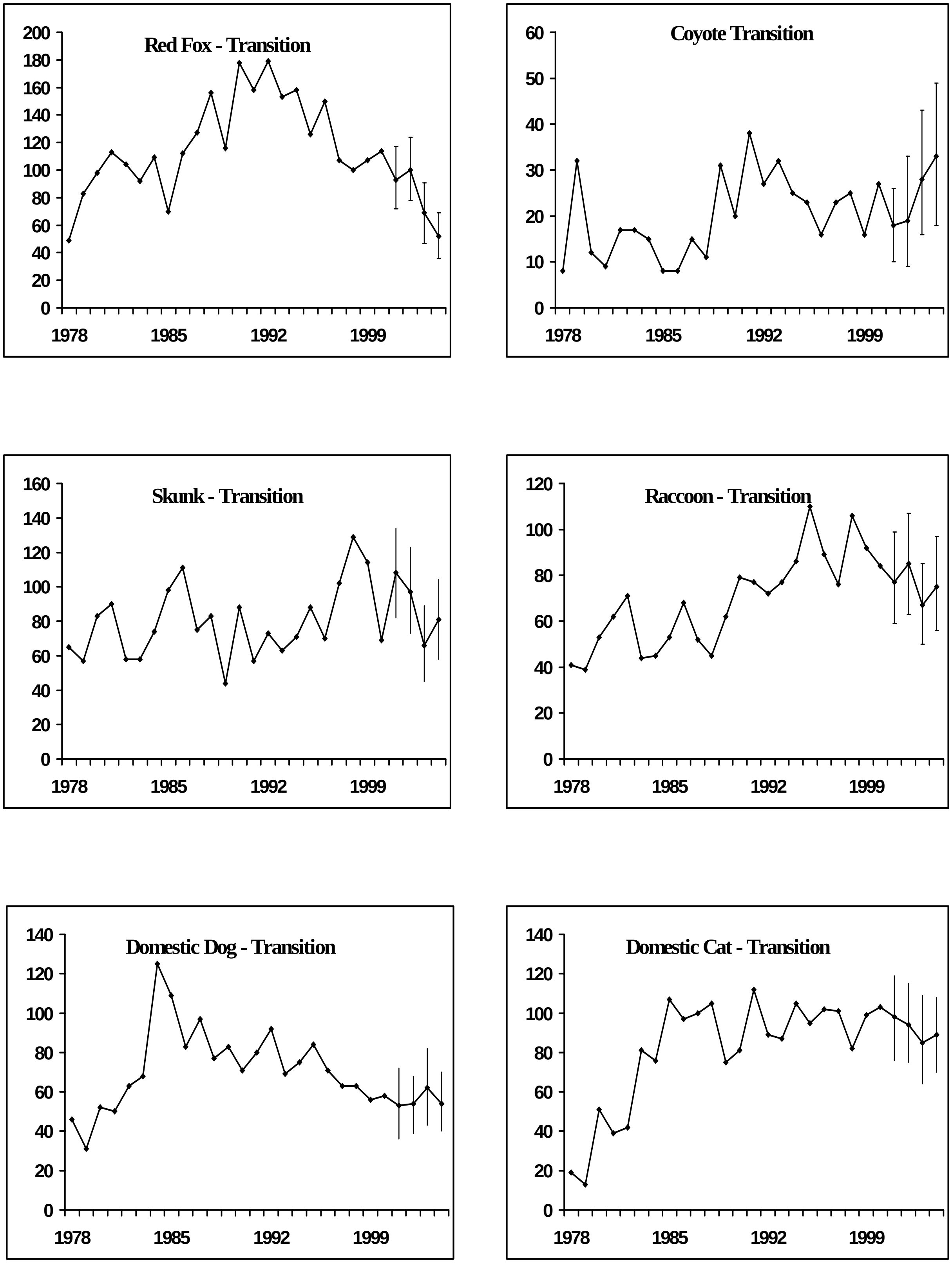

Figure 3. Scent station indices for selected species in the Transition Zone of Minnesota, 1978-2004.

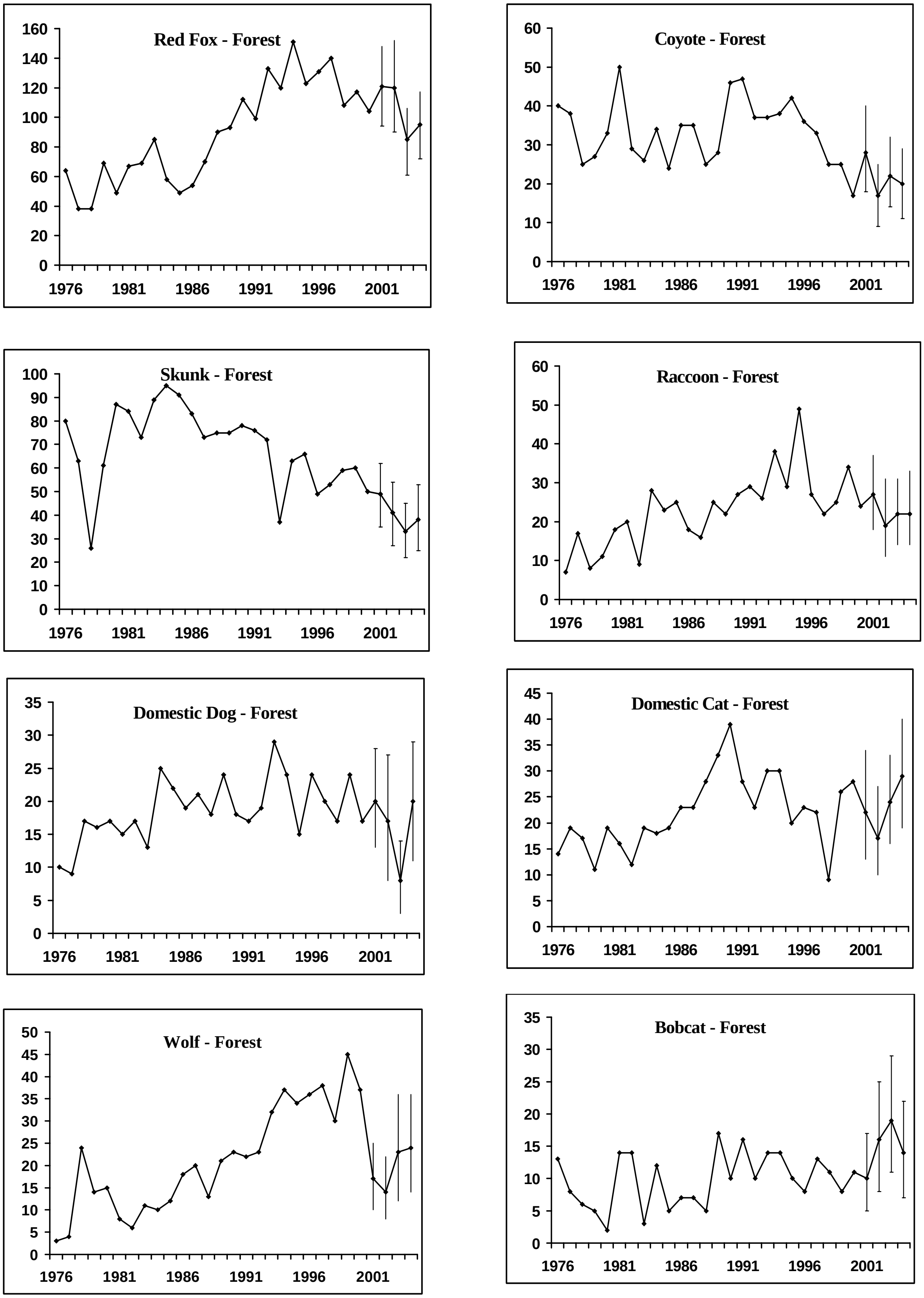

Figure 4. Scent station indices for selected species in the Forest Zone of Minnesota, 1976-2004.