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Furbearer Winter Track Count Survey of 2000[1]

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Introduction

Predatory furbearers are intelligent, secretive, dispersed, less abundant than herbivores, and often among the least understood of all wildlife species. The Upper Peninsula (UP) of Michigan supports numerous furbearer species, and the Department of Natural Resources is charged with managing the "Endangered" but rapidly recovering gray wolf (*Canis lupus*), the reintroduced fisher (*Martes pennanti*) and marten (*M. americana*), the Federally regulated bobcat (*Lynx rufus*) and river otter (*Lutra canadensis*), and a number of other furbearers of varying status. The diversity of life requisites and behaviors shown by furbearers in the UP complicates any effort to monitor their populations. Reliable and efficient methods to census these furbearers currently do not exist. Therefore, it is necessary to use one or more indices of abundance to monitor changes in the populations of each species of interest.

Harvest information and physical data have been collected as part of the registration process for fisher (Cooley et al. 2001a), bobcat (Cooley et al. 2000), river otter (Cooley et al. 2001b), badger (Karasek et al. 1996), and incidental marten captures (Friedrich, unpubl. data). Mail surveys have been conducted periodically to estimate fur harvester effort and furbearer harvest by species. Results have been summarized most recently by Karasek (1998). While these data are valuable as part of the mix of information available for managing furbearer populations, data from these surveys are affected by harvest related biases that can be independent of population status. The

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removal of the marten from the State list of "Threatened" mammals provided additional impetus for developing an appropriate field survey technique.

Furbearer Winter Track Count Surveys have been attempted in the UP since 1996, and formal summaries of the results of the surveys conducted in 1998 and 1999 were reported by Earle (1999a and 1999b, respectively). A winter track count approach was selected, because many of the species of greatest concern are active on the surface of the snow during winter, and suitable snow tracking conditions in the UP normally extend from late January until early April. The methods used in this experimental survey have been reexamined annually and revised to improve accuracy, precision, and efficiency. This survey continues to be developed, and when implemented fully, will permit data to be compared across multiple years. The objectives of this survey are to use a structured winter track count to determine the distribution and relative abundance of the marten in the UP, and to assess the potential of using this approach to monitor the status of several of furbearer AND selected prey species, simultaneously.

Methods

Forty-nine survey routes were assigned to two Wildlife Management Units and the Research/Technology Section based on the amount of area to be surveyed and available personnel. Survey assistance was requested and received from the DNR Parks and Recreation Bureau and from the Hiawatha Sportsman's Club, a large block of privately owned land in west Mackinac County. Additional assistance was offered from other agencies, but they were unable to complete any of their assigned routes. Each route was comprised of 4 segments, approximately 8.0 km in length, and separated by distances of 4.0 to 8.0 km. Routes followed unpaved roads or trails with minimal right-of-way improvement. Survey participants selected the locations where route segments would be placed based on biological, geographical, and logistical considerations. Criteria included prior anecdotal knowledge of marten populations, an evaluation of habitat suitability (Allen 1982 as amended by Earle, R.D. 1997. Winter habitat preferences of marten. Mich. Dept. Nat. Resour., Fed. Aid Wildl. Restor. Proj. W-127-R-15, Job Final Rep. 20.5), availability of lightly traveled roads with minimal right-of-way improvements, access across private lands, minimal interference from active logging operations, and distance from the work station. The landscape ecology of the UP was considered when routes were located. Route segments were placed entirely within ecological "Subsection" or "District" boundaries, identified by Albert (1995), in an effort to minimize variance within surveyed segments.

Track count routes were surveyed once between the "mid-winter thaw", when the accumulated snow compacts (usually late January), and the end of winter (usually early April). Routes were traversed using snowmobiles or 4-WD vehicles. The locations of route segments, ambient weather conditions, tracking conditions, and time elapsed since the last marker snowfall were recorded. Each track crossing of a furbearer or selected prey was identified by location and species. The depth to which the animal sank in the snow was estimated, and the surrounding habitat was typed by visual estimation of species, size, and stocking of dominate tree species. Surrounding cover type information was collected at 15 randomly selected sites along each route segment using the same

species, size, and stocking criteria as was used at the locations of track crossings. Tracks of martens and fishers were separated by sex whenever they were distinct enough to measure the pronounced difference in size.

Forest Inventory and Analysis (FIA, Schmidt 1993 and Leatherberry 1994) aerial photo plot data were used to estimate the acreage of various cover types in the UP. FIA aerial photo plot data were collected by interpreting the dominant species, size, and stocking density present at each of approximately 121 one-acre sites per surveyed township (36 mi^2). Data from 56,362 aerial photo plots were classified into ten forested and two nonforested species groups (Schmidt 1993 and Leatherberry 1994). Minimum sample size considerations were addressed during analysis of survey data by combining ecologically similar species into six forested and two nonforested cover type groups.

The route located in the Porcupine Mountains Wilderness State Park, Ontonagon and Gogebic Counties, was scheduled to be sampled multiple times to assess site specific sampling variance within the winter survey period. All four segments of this route were to be surveyed on the same day, several times during the winter. Replicates were to meet all survey criteria and be separated by at least 7 nights. Surrounding cover type information was collected at 15 randomly selected sites along each segment during the initial survey replicate.

Results and Discussion

Unusually mild winter weather minimized survey opportunities during February and March for the third consecutive year. Fifteen of the 49 routes assigned were surveyed, and 14 of the 15 routes attempted were completed (Fig. 1). The route in the Porcupine Mountains Wilderness State Park was surveyed twice during the winter. Only one (6.7%) of the routes surveyed in 1999 was among the 15 routes surveyed in 2000. Comparison of species abundance and habitat preferences between these years would not be valid and was not attempted. However, 11 (73.3%) of the routes surveyed in 1998 were among the 15 routes surveyed in 2000. Comparison of species abundance and habitat preferences between these years would be more likely to detect changes if they exist. Therefore, general comparisons between survey results from 1998 and 2000 are presented, while acknowledging a 2-year gap in sampling and a 73.3% replication of routes is not optimal.

Routes were surveyed 1-3 days after a marker snow, and data from 11 furbearers and 5 other species of interest were collected (Table 1). The 466.1 km surveyed in 2000 exceeded the distance surveyed in 1998 and 1999 by 1.2X and 3.2X, respectively. Marten tracks were found along 48% of the segments surveyed in 2000. The coyote (*Canis latrans*) was the most widely distributed furbearer, leaving tracks along 78% of the segments surveyed. The Lagomorphs (snowshoe hare, *Lepus americanus* and cottontail rabbit, *Sylvilagus floridanus*) were the most widely distributed species group, being detected along 79% of the segments surveyed.

Relative abundance estimates were calculated by weighting the number of track crossings per species by distance surveyed and time elapsed since the last marker

snowfall. This standardized the data among survey segments, and allowed comparison of relative abundance between years. Marten tracks were encountered at a time-adjusted rate of 0.79 crossings per 10 km surveyed (Table 1). This was a marginal decrease from 1998 when 0.92 crossings per 10 km were detected. Many of the marten track crossings were identified by sex, based on differences in track size. Application of marten home range size and spacing (Strickland et al. 1982, Katnik et al. 1994, Powell 1994, and Thomasma 1996) to the distribution of marten tracks along survey segments allowed a minimum population estimate to be determined. Interpretation of sex and spacing between track crossings suggests at least 34 martens left the 59 track crossings found during the survey in 2000.

Fisher and bobcat tracks were encountered in 2000 at time adjusted rates of 1.17 and 0.70 crossings per 10 km, respectively. This suggests a moderate decrease in abundance in these two species compared to 1998 when fisher and bobcat tracks were observed at 1.42 and 1.14 crossings per 10 km, respectively. The average harvest of both these species has doubled since 1996, compared to the preceding 7 years (Friedrich, unpubl. data). Therefore, declines in fisher and bobcat abundance may be related to this recent elevation in harvest. The gray wolf is the only species in this survey for which an independent annual estimate of population size exists. Intensive winter tracking of wolves throughout the mainland of the UP and Drummond Island generated estimates of 140 and 216 wolves during the Furbearer Winter Track Count Survey periods in 1998 and 2000, respectively. Wolf tracks were encountered at 0.18 and 0.27 crossings per 10 km across the same time period. Both of these techniques suggest a 50% increase in the wolf population from 1998 to 2000.

Mild winter weather limited to two the number of times the route located in the Porcupine Mountains Wilderness State Park, Ontonagon and Gogebic Counties, could be sampled. This route was surveyed on 2/14/00, one dusk and one dawn period after a marker snow, and replicated on 3/11/00, two dusk and two dawn activity periods after a marker snow. Unfortunately, there was very limited animal movement prior to the sampling in February and the 12 track crossings observed were too few to compare to the March replicate. Weather permitting, the site specific sampling of variance across a winter survey period will be assessed in 2001.

Interspecific comparisons of relative abundance are not valid, because differences in daily movements among diverse species can be profound. Species specific differences in seasonal habitat use can also affect the ability of a partially implemented survey to detect less common species. However, the complete absence of track crossings of three species highlights rarity (moose, *Alces alces*), or probable absence (lynx, *Lynx canadensis* and cougar, *Felis concolor*). No evidence of lynx or cougar has been found on this survey since its initiation in 1996 despite 1,220.8 km of formal survey effort.

The placement of survey route segments was influenced by the general habitat preferences of martens in the UP and the physiographic differences among landscape patterns identified by Albert (1995). This approach was designed to minimize the effort devoted to surveying unsuitable marten habitat, and reduce the amount of habitat related variance within survey segments. Cover types adjacent to 15 randomly selected points

along each survey segment were classified by species, size, and stocking. The types present along the survey routes were compared to the types available within the UP, and to the types present at the track crossings of each species being monitored.

The effect of considering the general habitat preferences of martens on route placement was assessed by comparing cover type groupings between FIA cover type estimates for the UP and randomly selected points along survey routes (RAN, Fig. 2). Route segments were located in areas dominated by shade-tolerant upland deciduous cover types (northern hardwoods: sugar maple, *Acer saccharum,* basswood *Tilia americana,* eastern hemlock, *Tsuga canadensis*, beech, *Fagus grandifolia*, yellow birch *Betula alleghaniensis*, and white ash *Fraxinus americana*, and oak: *Quercus* spp.) and an interspersion of mesic (eastern hemlock, balsam fir, *Abies balsamea*, white spruce, *Picea glauca*, and white pine, *Pinus strobus*) and upland conifers (jack pine, *P. banksiana* and red pine *P. resinosa*). Routes were rarely located in lowland deciduous types (American elm, *Ulmus americana,* red maple, *A. rubrum*, green ash, *F. pennsylvanica*, black ash, *F. nigra*, and balsam poplar, *Populus balsamifera*), and avoided open, clear-cut, or wetland areas. The RAN distribution of cover type groups showed the effect of directional route placement by differing significantly from the FIA estimates for the UP (Chi-square, $P < 0.001$). Therefore, more sampling effort was directed to areas where the target species of this survey was likely to exist.

Cover types present at the sites where track crossings occurred (TCS) were compared to the RAN cover type groupings to check the efficiency of sampling the species of interest and to compare habitat use to availability. These comparisons were analyzed separately for each species with a sufficient number of track crossings to infer winter habitat preferences. The selection of cover types in which marten track crossings were found differed marginally from the array of RAN cover type groupings (Chi-square, $P \approx 0.074$, Fig. 3). Most of the difference in habitat use was shown by martens selecting shade-tolerant upland deciduous cover types (primarily northern hardwoods mixed with hemlock) more frequently than expected by its availability. Forty-two of 59 marten track crossings were found in this cover type group, making the Tolerant Upland Deciduous both the most available and the most selected category. This generated expected frequencies in the remaining cover type groups of insufficient size to meet the assumptions of the Chi-square Test. Therefore, 8 cover type groups were collapsed to 2 to compare habitat use to availability between the Tolerant Upland Deciduous and the remaining 7 cover type groups. The preference of martens in this survey for the Tolerant Upland Deciduous cover types was strongly significant when considered separately (Chi-square, $P < 0.001$). Therefore, martens were selecting this cover type more frequently than expected by its availability along the survey route segments.

Fisher, and coyote activity showed patterns of habitat use that were not significantly different from the RAN cover type groupings (Each species: Chi-square, $P < 0.50$), which suggests the placement of survey segments was adequate to sample these species (Figs. 4-5). Bobcat, hare/rabbit, and grouse spp. movements showed patterns of habitat use that differed significantly from the RAN cover type groupings (Bobcat: Chi-square. $P < 0.01$, hare/rabbit and grouse spp.: Chi-square, $P < 0.001$), which suggests the placement of survey segments would have to be changed to optimize a winter track count survey for these species (Figs.6-8).

The habitat preferences of wolves were not analyzed quantitatively because of insufficient sample size. However the preferences suggested by the 25 track crossings parallel the concurrent distribution of white-tailed deer (*Odocoileus virginianus*) during a mild winter (Fig. 9).

Summary

A furbearer winter track count survey was conducted in 2000 across the UP. The frequency of track crossings encountered produced relative abundance estimates for the marten and several other species of interest. The precision and accuracy of this measure of abundance will improve as sample sizes increase, and the sampling effort and area surveyed become more consistent between years. This will also permit a more quantitative analysis of survey results.

Acknowledgments

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Table 1. Relative abundance of track crossings between years by species. Furbearer winter track count survey, 1998 and 2000 [a].

Species	% of Segments Present		Track Crossings[b]		Adj. Track Crossings/10km[c]	
	1998	2000	1998	2000	1998	2000
Marten	42	48	66	59	0.92	0.79
Fisher	65	55	96	92	1.42	1.17
Mink	22	33	24	38	0.31	0.43
Otter	11	9	9	8	0.11	0.14
R/G Fox	30	26	26	25	0.34	0.27
Coyote	74	78	213	263	3.11	3.18
Wolf	10	17	14	25	0.18	0.27
Bobcat	51	36	94	55	1.14	0.70
Lynx	0	0	0	0	0	0
Cougar	0	0	0	0	0	0
Raccoon	9	3	6	2	0.09	0.03
Black Bear	0	2	0	1	0	0.01
Hare, Rabbit	70	79	416	532	5.37	6.65
Porcupine	2	7	1	6	0.02	0.07
Moose	0	0	0	0	0	0
R/S/S Grouse	32	19	51	38	0.62	0.37
Unk. Furbearer	16	10	9	7	0.10	0.08

[a] Total Routes Attempted: 13, Total Segments Surveyed: 50.6, Total Distance Surveyed: 402.2 km in 1998.
Total Routes Attempted: 15, Total Segments Surveyed: 57.8, Total Distance Surveyed: 466.1 km in 2000.

[b] N = 1,025 in 1998 and N = 1,151 in 2000.

[c] Adjusted to standardize track searching at 24 hours after a marker snowfall

Fig. 1. Furbearer Winter Track Count Survey, 2000. Marten activity along survey route segments.

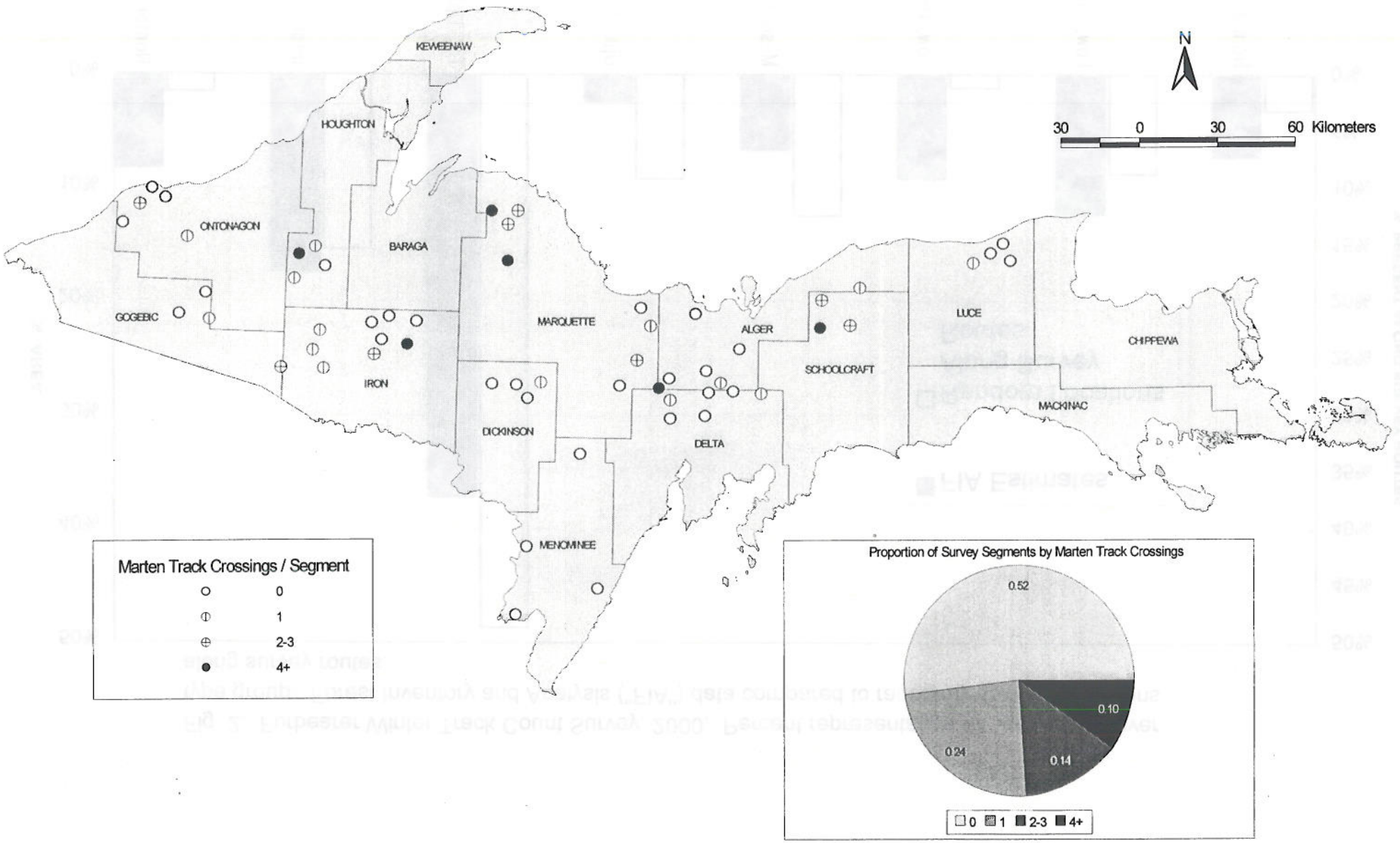

Fig. 2. Furbearer Winter Track Count Survey, 2000. Percent representation for the UP by cover type group. Forest Inventory and Analysis ("FIA") data compared to randomly selected locations along survey routes.

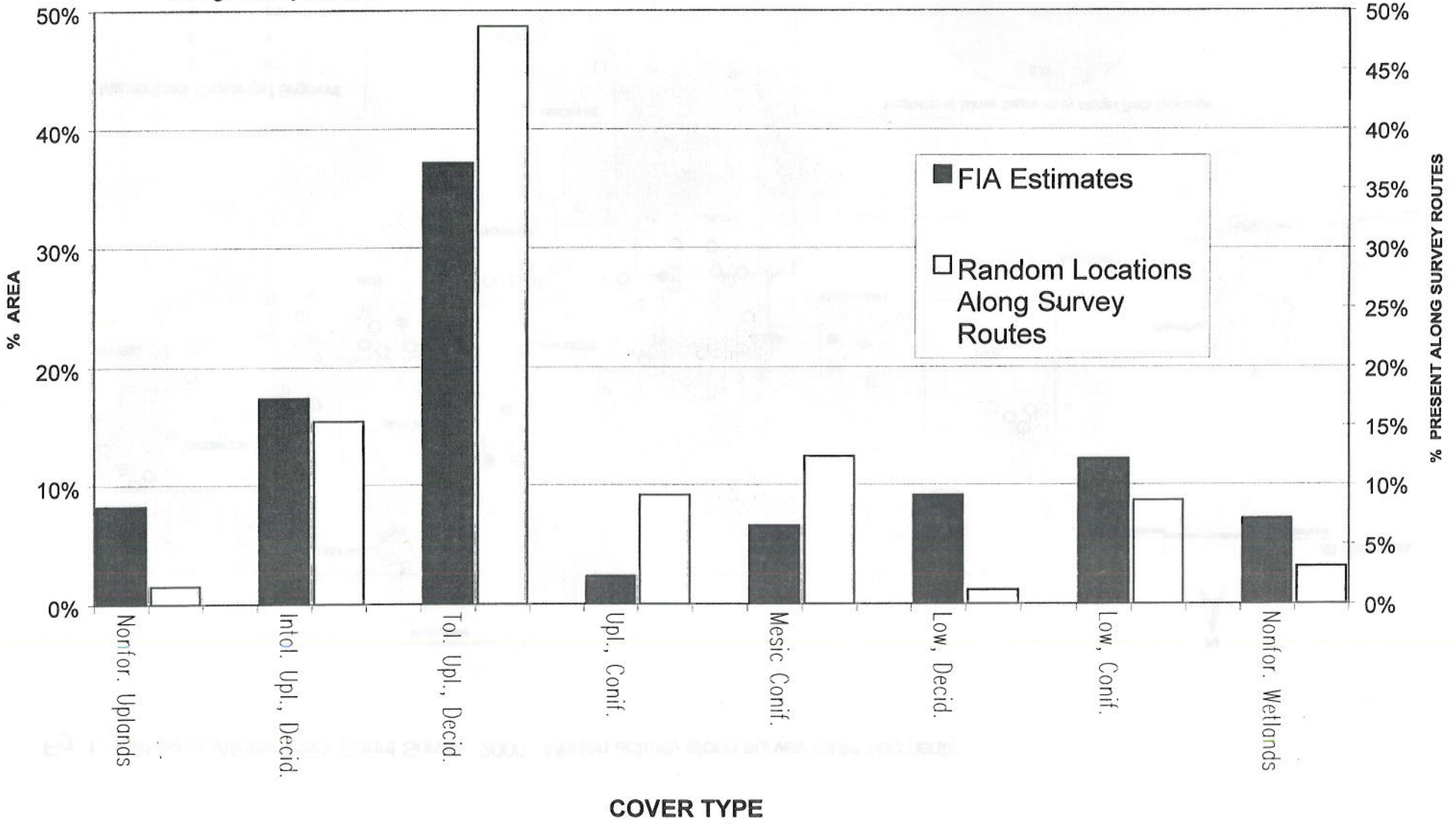

Fig. 3. Furbearer winter track count survey, 2000. Marten track crossings ("TCS", N=59) by cover type group compared to randomly selected locations ("RAN", N=865) along each survey route.

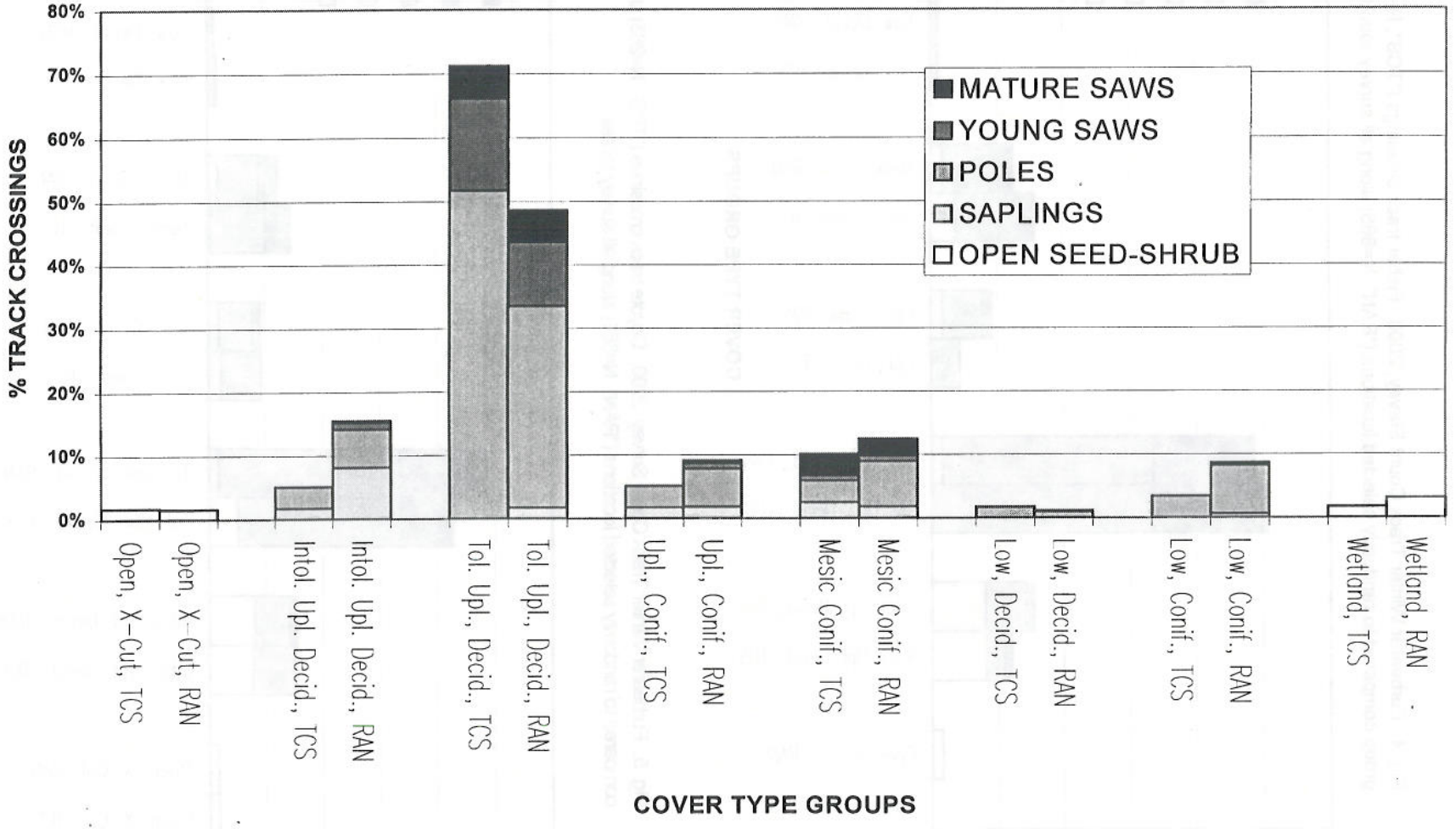

Fig. 4. Furbearer Winter Track Count Survey, 2000. Fisher track crossings ("TCS", N=92) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.

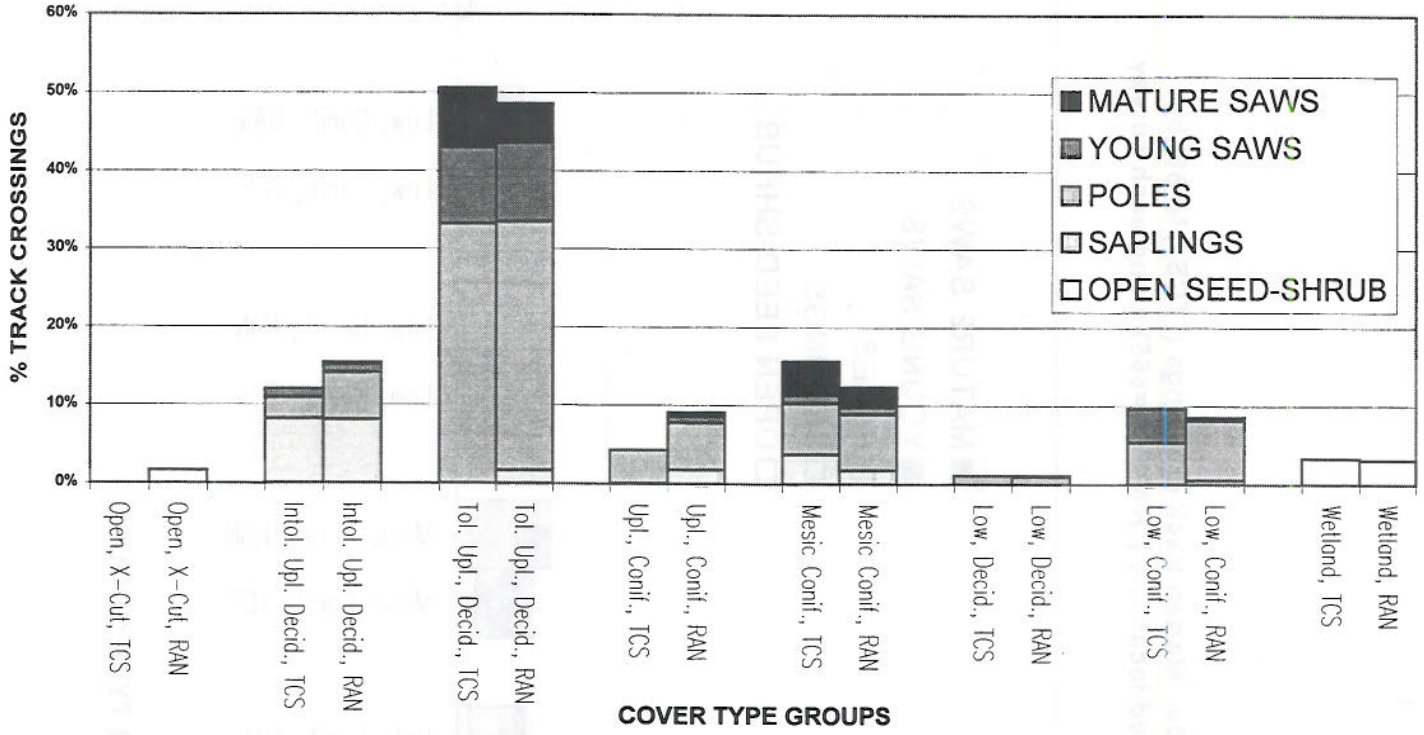

Fig. 5. Furbearer Winter Track Count Survey, 2000. Coyote track crossings ("TCS", N=263) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.

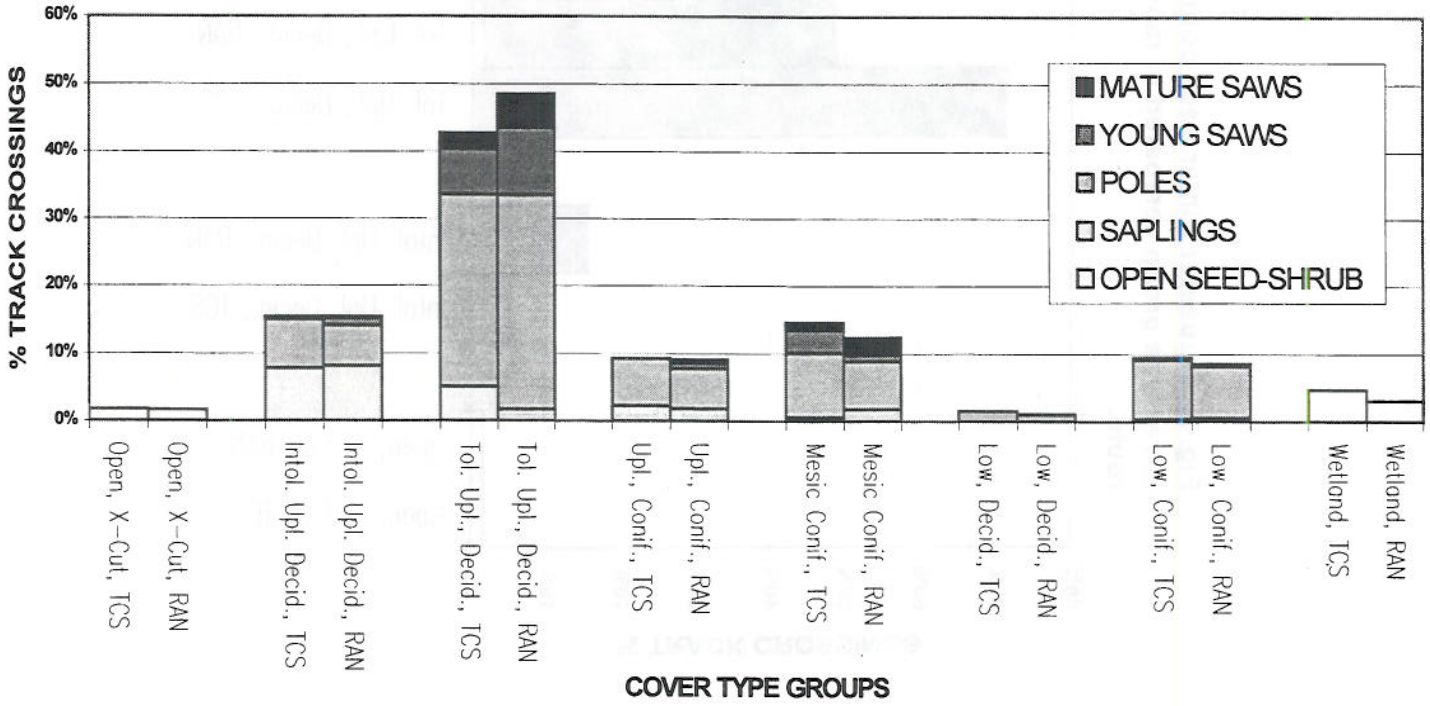

Fig. 6. Furbearer Winter Track Count Survey, 2000. Bobcat track crossings ("TCS", N=55) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.

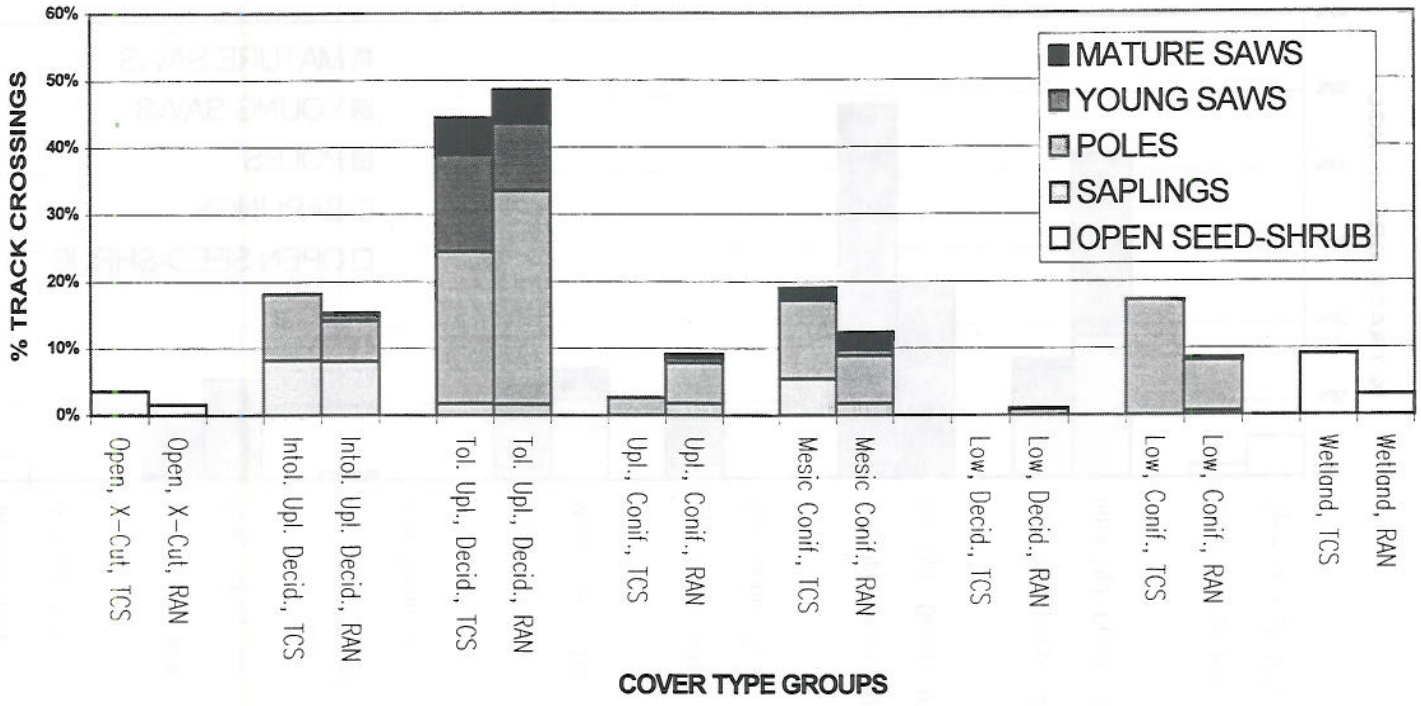

Fig. 7. Furbearer Winter Track Count Survey, 2000. Hare, Rabbit track crossings ("TCS", N=532) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.

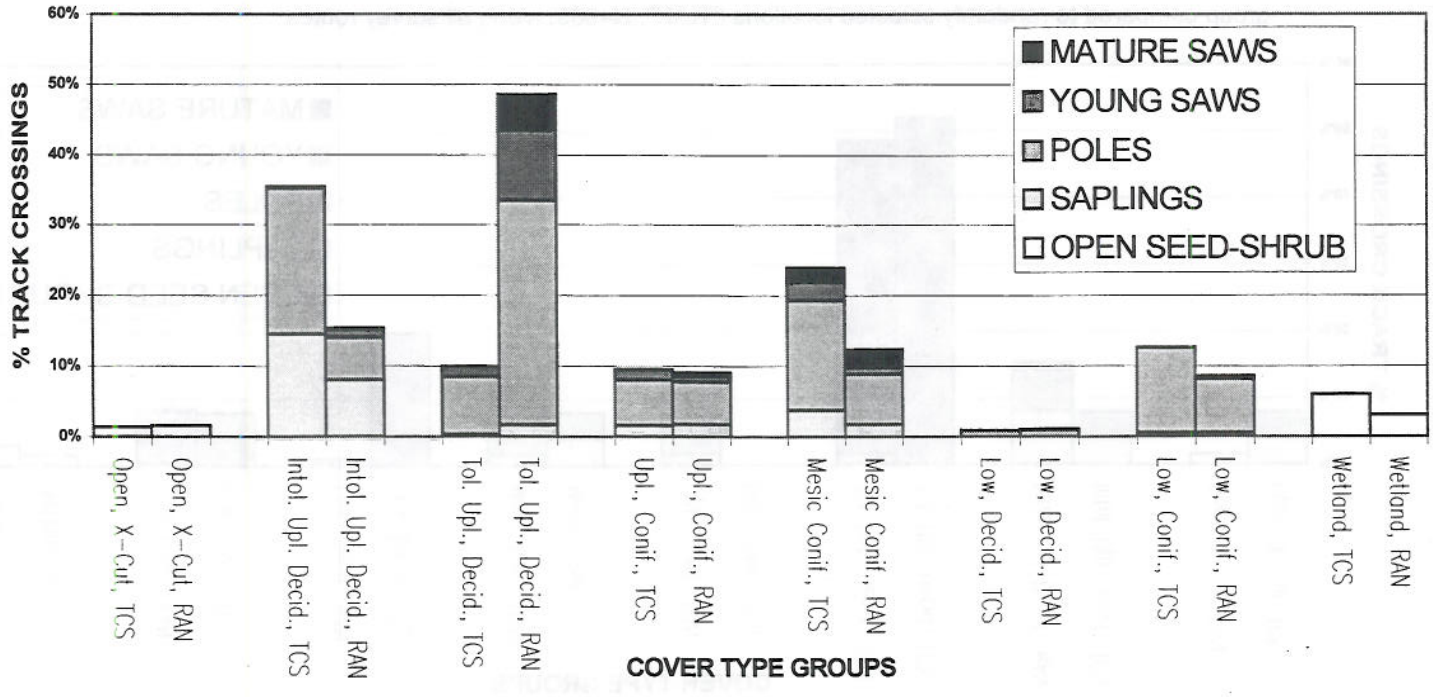

Fig. 8. Furbearer Winter Track Count Survey, 2000. Grouse track crossings ("TCS", N=38) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.

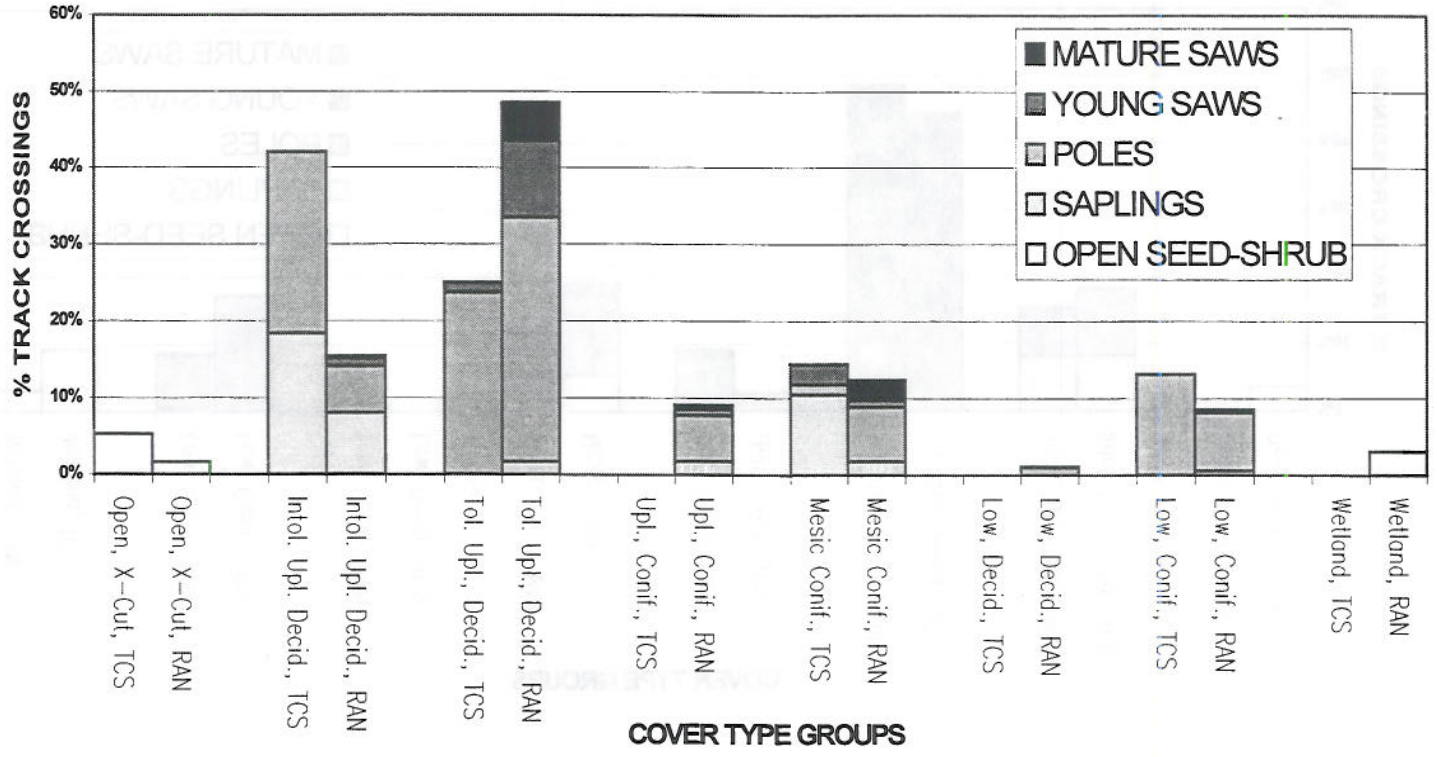

Fig. 9. Furbearer Winter Track Count Survey, 2000. Wolf track crossings ("TCS", N=25) by cover type group compared to randomly selected locations ("RAN", N=865) along all survey routes.