THE NORTHWEST TERRITORIES SMALL MAMMAL SURVEY: 1990 - 1992

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ABSTRACT

This paper reports results from the first 3 years of a program designed to monitor small mammal population abundance throughout the Northwest Territories. Protocols were designed to provide enough precision to establish major between-year trends in small mammal abundance at minimal effort and expense. Fifteen study areas were monitored by a large number of cooperators; largely biologists and Renewable Resources Officers.

In the boreal forest zone, small mammals declined in 1991 from an apparent peak in 1990 and partially recovered in 1992. The central arctic mainland showed a similar trend to the boreal forest. Numbers were low throughout the three years in Keewatin communities and at Pond Inlet.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

In the Northwest Territories, fluctuations in small mammal abundance are often regular in occurrence (3-4 years) and large in magnitude (10-50 times). This has profound effects on many aspects of the northern ecosystems.

Arctic fox (Alopex lagopus) cycles and migrations are driven by lemming numbers (MacPherson 1969). It has been suspected that disease in domestic and wild canids is related to the fox cycle. Nomadic avian predators such as Rough-legged Hawks (Buteo lagopus) (Galushin 1974) and Snowy Owls (Pitelka et al. 1955) choose areas of high microtine numbers in which to breed. Prey switching by generalized predators affects waterfowl breeding success (Sutherland 1988). Krebs (1964) found lemmings to have utilized approximately 15% of vegetative standing crop in a peak year which might be expected to have an effect on the availability of food for other arctic herbivores.

The purpose of this study is to establish a record of small mammal population fluctuations over a broad area which will ultimately allow prediction of relative abundance and the geographic extent of synchrony in fluctuations.

This report presents the first three years of data collected and recommendations for the study's continuation. It does not make reference to data collected by other researchers working on populations of small mammals in the Northwest Territories.

STUDY AREAS

Small mammals were trapped at 15 different locations in 4 major regions of the Northwest Territories: the boreal forest (Yellowknife, Fort Smith, Fort Simpson, Norman Wells, and Inuvik), the central tundra (Coppermine, Walker Bay, Hope Bay, and One-eyed Jack Lake), the eastern tundra (Arviat, Baker Lake, Repulse Bay, Coral Harbour, and Rankin Inlet), and Baffin Island (Pond Inlet) (Fig 1). Some of the trapping locations are associated with continuing research projects on other species, while other areas are conveniently close to the co-operators work locations.

Yellowknife

The study area is near the Kam Lake radio tower (62°24.7'N, 114°26.1'W). The habitat consists of spruce forest, dry jackpine, sedge-covered swamp edges, *Ledum*/moss bog, and willow thickets.

Fort Smith

The study area is on airport property near Highway #5 (60°01'N, 111°54'W) and consists largely of white spruce habitat with moss understory with some openings containing willows and aspen.

ERRATUM: PLEASE REPLACE FIGURE 1 WITH THIS CORRECTED COPY

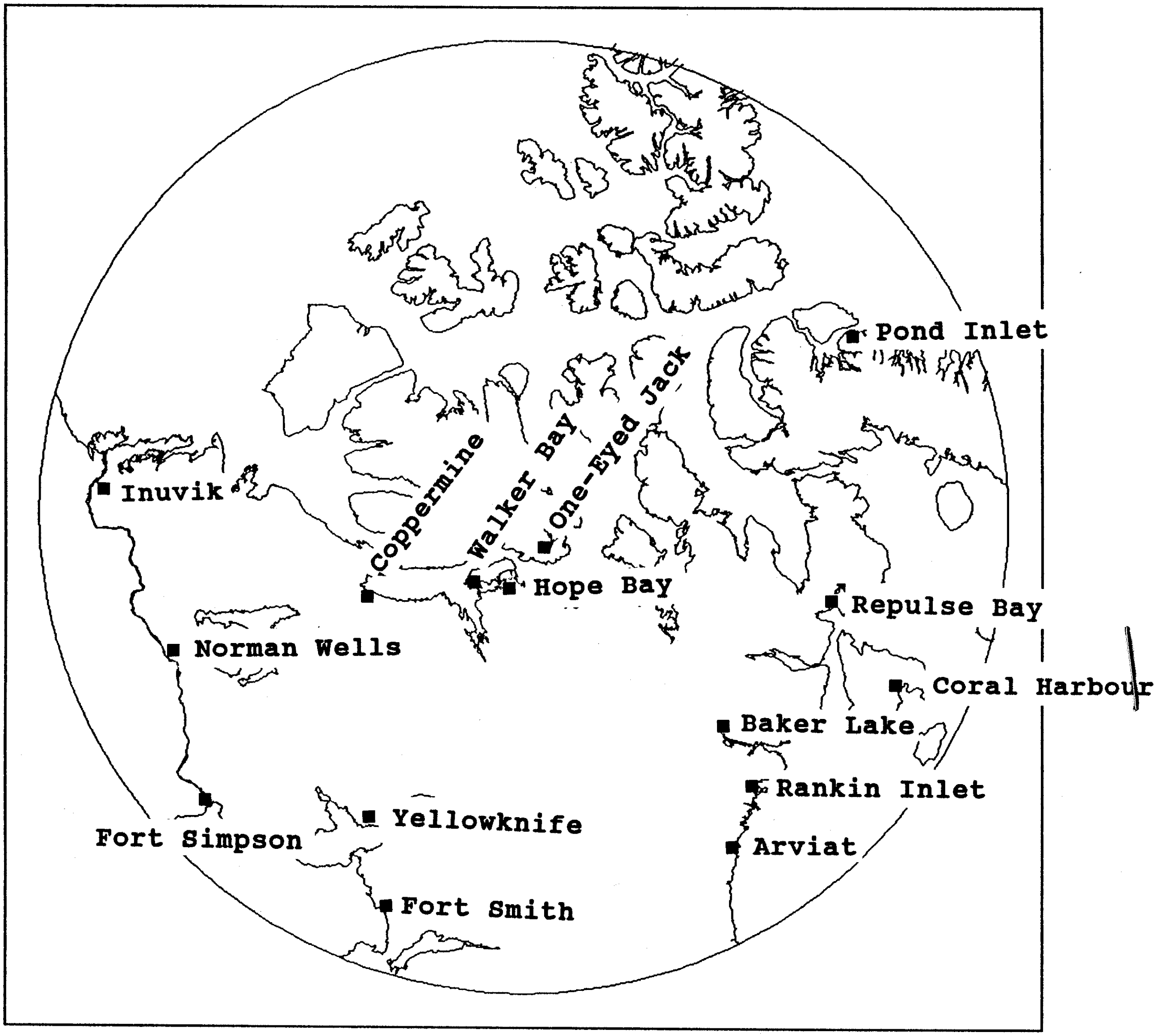

Figure 1. Study areas for the Northwest Territories Small Mammal Survey.

Fort Simpson

The study area is at the student winter camp about 34 km from Fort Simpson towards Wrigley (ca. 62°00'N, 122°00'W). The habitat is mixed woodland of black and white spruce with patches of aspen, poplar, willow, and tamarack.

Norman Wells

Trapping was done at the marten study area 30 km west of Norman Wells and 3-4 km from the Mackenzie River (65°18'N, 127°20'W). Line A is in mature black spruce forest whereas Line B is in a 10-year old burn with small spruce and willow.

Inuvik

The Inuvik study area is located at 68°18'51"N, 133°32'02"W in an open black spruce forest with stream stringers of willow and bog birch. Spruce cover is 0-5% and shrub cover is 20-25%. The ground cover is moss and lichen.

Coppermine

Trapping was undertaken only in 1990. Because of interference by ravens, the data were not reliable and no work was done in subsequent years.

Hope Bay

Trapping was done in the Department's Hope Bay Gyrfalcon study area located 120 km southwest of Cambridge Bay (68°07'N, 106° 40'W). Five traplines were set up in 1990, two of which were abandoned because of interference by arctic ground squirrels. The remaining 3 lines (Lines 1,2, and 5) are located on a wet-mesic tussock tundra slope with willow dominant in the lower, wetter areas and sparse willow, crowberry, *Equisetum*, and sedges at the upper ends.

Walker Bay

The study area is at the Walker Bay waterfowl research camp on the Kent Peninsula 150 km WSW of Cambridge Bay (68°21'N, 108°10'W). The general area is dominated by lowland tundra ponds and mudflats. The traplines were located on the flat slope of a ridge in habitat characterized by low willow and sedge hummocks.

One-Eyed Jack Lake

This study area is located approximately 85 km NE of Cambridge Bay near Albert Edward Bay (69°43N, 103°39'W) on Victoria Island. Two 500 m transects were established 80 m apart across a low, dry ridge. Vegetation is mostly graminoid tussocks interspersed with sparse moss and lichen. Three of the four transect ends are in moist areas. Ends were marked with rock cairns and 1 m wooden slats.

Arviat

The study area is just outside the town at 61°06'N, 94°05'W. The lines go though flat hummock tundra varying from moist to dry and characterized by moss, lichens, graminoids, sedges, and low birch.

Baker Lake

The study location is at 64°19'N, 96°02'W on flat tundra. Line 1 goes through dry tussock tundra dominated by graminoids, lichens and low shrubs while Line 2 goes through a wetter area dominated by grasses.

Repulse Bay

The study location is at 66°32'N, 86°15'W on flat tundra. The area is located near a small lake with one line along a rocky outcrop.

Coral Harbour

The study location is at 64°08'N, 83°10'W on flat tundra with rock outcrops and tundra ponds. The habitats traversed were tundra tussocks, grassy areas, lichen uplands, some water, and boggy areas.

Rankin Inlet

The study location is 62°49'N, 92°05'W on flat tundra. The habitats traversed were tussock tundra, bog, and a small (3m high) lichen covered esker.

Pond Inlet

The initial area established in 1990 was just west of the Renewable Resources office at 72°42'30"N, 78°00'00"W. Transect 1 was at the base of a north-facing slope and Transect 2 was on a poorly vegetated hilltop. This area was apparently too close to town as half the traps were stolen. In 1991, a new area was set up 2 km south of the town on the water lake road (72°42'N, 77°58'W). Two 250 m east-west transects were established 70 - 95 m apart on a gentle south-facing slope. The vegetation varies from wet to xeric low-shrub-lichen tundra. It is suspected that this area is better microtine habitat than the area trapped in 1990. No traps were stolen or vandalized.

METHODS

Ecological research on small mammals is not a priority of the Department of Renewable Resources. Accordingly, emphasis was placed on obtaining within-site indices of broad, temporal trend in small mammal abundance at low cost. Research protocols were designed to incorporate little effort and expense, minimal training, great flexibility, and adaptability to local conditions while providing broadly consistent results. Consistency and minimal effort is achieved at the expense of accuracy which can only be obtained by complex, costly, and expert techniques.

Trapping was done by local employees of the NWT Department of Renewable Resources; biologists, biological technicians, Renewable Resources Officers, and summer employees (Appendix I). Each cooperator was provided with a sheet of instructions making the following recommendations:

1) Trapping is to be done solely with "Museum Special" snap traps.
2) Traplines are to be two parallel lines ca. 100 m apart running 250 m through typical habitat. They should be close enough to the investigators' work station as to be convenient.
3) Traplines are to be marked and consistent between years.
4) Trapping stations are to be at 10 m intervals and consist of one or two traps placed at the best location within 2 m of the station.
5) Bait is to consist of peanut butter mixed with rolled oats. Lines should not be pre-baited.
6) Traps should be checked once per day before 10 AM. If the line cannot be checked, the traps should be sprung the night before.
7) Data sheets should be filled out daily. Captures are to be recorded by species.
8) The goal is to achieve 500 trap-nights (TN) each year.
9) The trapping period should be consistent between years. August is the recommended month.

Live-trapping is not a feasible option because of the much greater investment of money and effort and its dependence upon the experience and skill of the trapper.

Data were presented as number of captures per 100 trap-nights ($\cdot$ 100 TN^{-1}). The number of trap-nights was defined as number of traps set times the number of nights less "misfires" and non-target species caught (i.e., birds). Misfires are traps found to be sprung but capturing nothing. They are considered to have been unavailable to capture small mammals. Known causes of mis-fires were vandalism, rain, trap malfunction, bait raiding by ravens, geese, arctic ground squirrels, red squirrels, and escaped small mammals.

Included in captures were all mice, voles, and lemmings as well as shrews. Identification of species was done by researchers with differing degrees of experience and certainty. Accordingly, species identification should not be considered as definitive. Species referred to are red-backed vole (*Clethrionomys rutilus*), chestnut cheeked vole (*Microtus xanthognathus*), several poorly differentiated voles (*Microtus* spp., mostly *pennsylvanicus*), white footed deer mouse (*Peromyscus maniculatus*), brown lemming (*Lemmus sibiricus*), collared lemming (*Dicrostonyx torquatus*), and shrews (*Sorex* spp.). Data on sex, age reproductive condition and weight were not requested.

Table 1 shows the dates at which the study areas were trapped. In total, there were 31 different data sets generated from the 15 study areas. Dates of trapping were, for the most part, quite consistent from one year to the next.

Table 1. Dates at which study areas were trapped for small mammals.

AREA	1990	1991	1992
Yellowknife	--	08.13 - 08.18	08.11 - 08.15
Fort Smith	08.20 - 08.24	08.02 - 08.06	08.21 - 08.25
Norman Wells	09.09 - 09.13	10.01 - 10.04	--
Fort Simpson	--	--	08.11 - 08.15
Inuvik	08.26 - 08.30	09.09 - 09.16	--
Coppermine	08.29 - 09.03	--	--
Walker Bay	07.13 - 07.21	07.11 - 07.20	07.09 - 07.18
Hope Bay	08.04 - 08.09	07.25 - 07.29	--
One-eyed Jack	--	07.17 - 07.21	07.16 - 07.20
Arviat	08.15 - 08.25	08.13 - 08.18	08.22 - 08.27
Baker Lake	--	08.22 - 08.31	08.26 - 08.30
Repulse Bay	--	08.13 - 08.22	08.14 - 08.19
Coral Harbour	--	08.12 - 08.22	08.16 - 08.20
Rankin Inlet	--	08.13 - 08.18	08.13 - 08.17
Pond Inlet	08.11 - 08.16 09.03 - 09.08	08.23 - 09.01	08.19 - 09.01

RESULTS

Table 2 presents the number of each species captured at each study area while Figure 2 shows trends in captures of all species per unit effort.

At Yellowknife, red-backed voles and white-footed deer mice were the most common species caught with meadow voles being rarer. All three species increased in 1992. Total captures increased from 4.2 · 100 TN^{-1} in 1991 to 10.0 · 100 TN^{-1} in 1992.

At Fort Smith, the most common species captured was the red-backed vole with meadow voles and deer mice being rare. Red-backed voles captures dropped sharply in 1991 and recovered slightly in 1992. Shrews increased sharply in 1992. The general picture seems to be one of a peak in 1990 (16.2 · 100 TN^{-1}), a trough in 1991 (5.2 · 100 TN^{-1}), and partial recovery in 1992 (10.6 · 100 TN^{-1}). The results from this area were compromised by the large number of misfired traps (33% in 1990, 27% in 1991, and 43% in 1992). In 1990 this was thought to be largely a result of heavy rain whereas red squirrels were apparently the culprits in 1991 and 1992. The study area will be moved in 1993.

At Fort Simpson, the one year of data suggest that deer mice are the most common species followed by red-backed voles. At 4.2 captures · 100 TN^{-1}, Fort Simpson was well below the 1992 capture rate for other forest study areas. One would expect primarily red-backed voles in

Table 2. Summary of trap-nights, number of each species caught, misfires, and abundance indices for each study area.

AREA	TN	RBV	VOLE	DM	BL	CL	S	O	B	MIS	ΣTN	INDX
YELLOWKNIFE												
1991	600	7	2	7	0	0	4	-	6	119	481	4.2
1992	488	21	4	17	0	0	3	-	2	36	450	10.0
FORT SMITH												
1990	500	46	1	3	0	0	2	0	1	165	334	16.2
1991	500	7	0	4	0	0	5	3^	1	137	363	5.2
1992	500	13	3	3	0	0	11	1*	1	216	282	10.6
FORT SIMPSON												
1992	500	3	0	16	0	0	1	0	0	24	476	4.2
NORMAN WELLS												
1990	500	43	11	0	0	0	10	4++	7	41	452	15.0
1991	500	20	1	0	0	0	0	0	1	14	485	4.3
INUVIK	-	-			-	-		-	-	-	-	-
1990	200	17	5	0	0	0	1	2	0	13	185	12.4
1991	375	42	1	0	0	0	2	1	0	31	343	13.1
WALKER BAY												
1990	450	0	0	0	2	27	0	0	2	24	424	6.8
1991	926	0	0	0	7	8	3	0	8	20	898	2.0
1992	979	0	0	0	5	22	2	2	3	108	868	3.6
HOPE BAY												
1990	600	42	0	0	8	0	0	0	0	93	507	9.9
1991	500	6	1	0	3	3	2	0	0	45	455	3.3
1-EYED J.L.												
1991	497	0	0	0	0	7	0	0	1	13	483	1.4
1992	488	0	0	0	0	9	0	0	2	23	463	1.9
ARVIAT												
1990	1100	2	0	0	0	8	0	0	15	51	1034	1.0
1991	600	0	0	0	1	0	0	0	6	1	593	0.2
1992	597	0	2	0	0	4	0	0	9	23	565	1.0
BAKER LAKE												
1991	500	0	0	0	2	1	0	0	1	102	397	0.8
1992	500	0	13	0	0	0	0	0	10	29	461	2.8
REPULSE BAY												
1991	500	0	0	0	0	1	0	0	1	56	443	0.2
1992	500	0	0	0	0	0	0	0	0	13	487	0.0
CORAL H.												
1991	500	0	0	0	0	1	0	0	0	11	489	0.2
1992	485	0	0	0	0	0	0	0	0	13	472	0.0
RANKIN INLET												
1991	600	0	0	0	0	0	0	0	0	65	535	0.0
1992	500	0	0	0	0	2	0	0	0	39	461	0.4
POND INLET												
1990	440	0	0	0	0	0	0	0	0	3	437	0.0
1991	506	0	0	0	0	2	0	2+	0	3	502	0.8
1992	505	0	0	0	2	3	0	0	1	11	508	1.0

* 1 flying squirrel
^ 3 flying squirrels
+ 2 unknowns; counted as captures
++ unknown voles;
TN = trap nights
RBV= red-backed vole
VOLE= *Microtus* sp.

DM = white-footed deer mouse
BL = Brown lemming
CL = Collared lemming
S = Shrews
O = Others/Unknown
B = Birds
MIS= Misfires

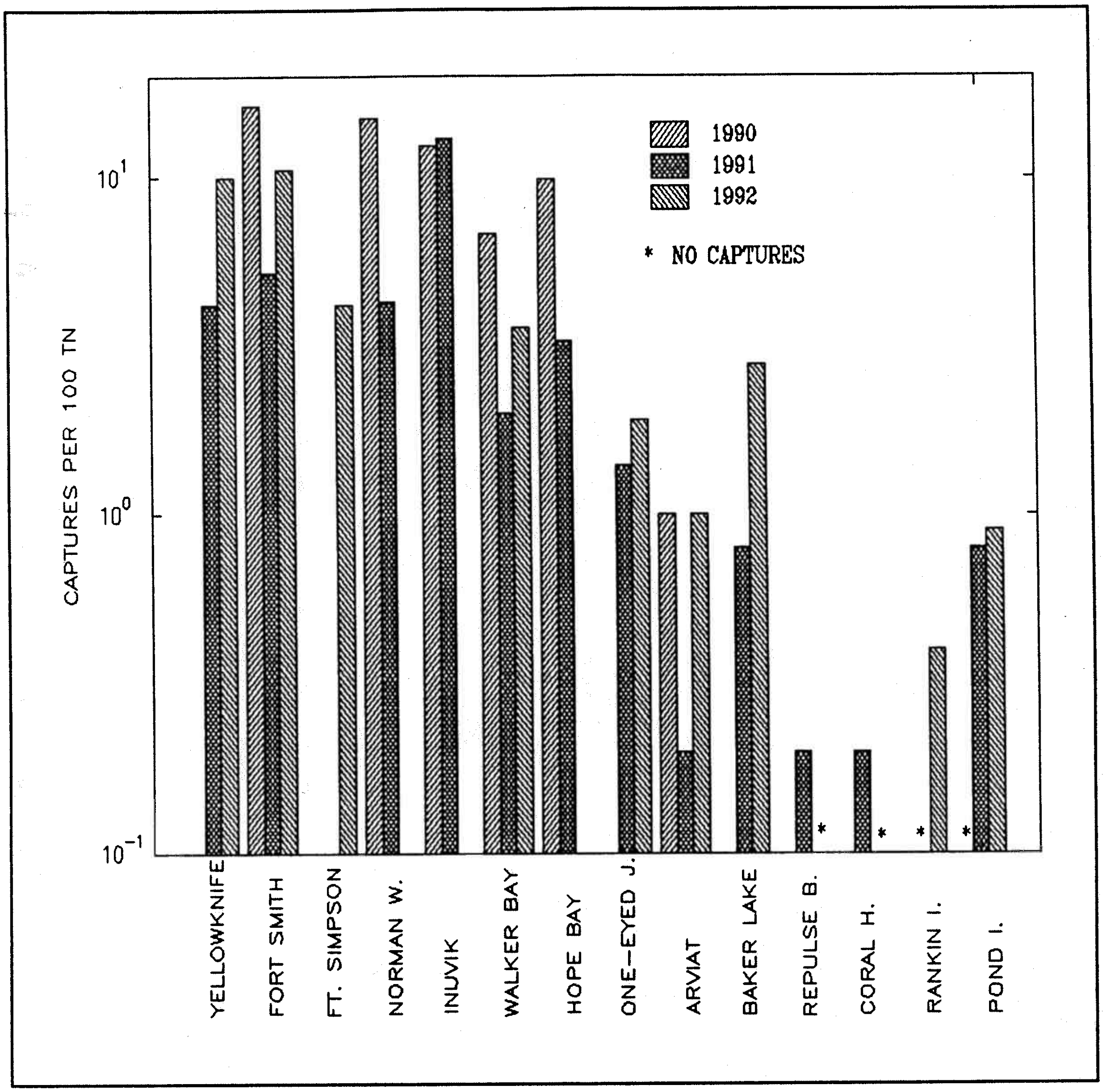

Figure 2. Captures per 100 trap-nights (common log scale) at the 14 study areas for the years 1990, 1991, 1992.

the habitat being trapped. At Norman Wells, the red-backed vole was most common with chestnut-cheeked voles being rarer. This was the only study area at which rare chestnut-cheeked voles were captured. Captures of both species dropped dramatically from 15.0 captures · 100 TN^{-1} in 1990 to 4.3 in 1991. Trapping was done later at Norman Wells than at other areas (Table 1) because of the timing of marten field work. Early snow in late September 1992 caused cancellation of the 1992 work.

Inuvik was the only area in the west showing little change between 1990 and 1991. Red-backed voles were the most common capture in both years.

At Walker Bay, the most common species was the collared lemming with the brown lemming being rarer. Collared lemming numbers dropped in 1991 and recovered in 1992. There is no trend in the rarer brown lemming.

At Hope Bay, the most common species captured was the red-backed vole with meadow voles, brown lemmings, and collared lemmings being less common. Red-backed voles and brown lemmings declined dramatically in 1991. Heavy rain on one day in 1991 and ground squirrels in 1990 caused a large number of misfires.

At One-Eyed Jack Lake, the only species captured was the collared lemming and there was little difference in numbers caught in 1991 and 1992.

At Arviat, the most common species was the collared lemming with a very few brown lemmings, red-backed voles, and Microtus caught. Small mammal abundance has remained low at Arviat over the three years of this study. It is still unclear whether the decline in collared lemmings from 8 in 1990 to none in 1991 indicates a real fluctuation or not. This question should become clear with subsequent years of data.

At Baker Lake, the only species caught in 1991 were brown and collared lemmings whereas only Microtus were captured in 1992. Further data will be required to determine the relationships between fluctuations in numbers of these species.

At both Repulse Bay and Coral Harbour, small mammal numbers were so low in 1991 and 1992 that only one collared lemming was captured in the two years.

The situation was similar at Rankin Inlet where the only animals captured were two collared lemmings in 1992.

At Pond Inlet, both collared lemmings and brown lemmings were captured. It is unclear whether the increase in captures from none in 1990 to 0.8 and 1.0 $\cdot$ 100 TN^{-1} in 1991 and 1992 respectively represents an increase although local residents indicate there were "lots of lemmings" in 1991 and 1992.

DISCUSSION

Geographic Correlation of Trends

Figure 2 indicates that the boreal forest region and the central arctic mainland exhibited similar between-year patterns of decline from 1990 to 1991 and partial recovery in 1992 despite different species being involved. In the boreal forest and at Hope Bay, this trend is largely the result of changes in numbers of red-backed voles. Walker Bay is closely synchronized but red-back voles were not captured there and changes in the capture index resulted largely from changes in collared lemming abundance. Walker Bay is at the end of Kent Peninsula which is connected to the mainland by a narrow neck and separated throughout its length by Melville Sound and Elu Inlet. The insularity of the Kent Peninsula may explain why the small mammal fauna is more similar to Victoria Island than the mainland. However, collared lemmings at One-Eyed Jack Lake, on Victoria Island, did not increase dramatically from 1991 to 1992.

Corroboratory evidence for synchronization of the microtine cycle between Hope Bay, Walker Bay and Coppermine is provided by counts of Rough-legged Hawk nests. Rough-legged Hawks are nomadic breeders moving to areas in which small mammal populations are high to build their nests and raise their young. In any particular area, Rough-legged Hawk numbers are closely related to small mammal abundance. Figure 3 shows Rough-legged Hawk nests at Coppermine and Hope Bay together with indices of small mammal abundance for Hope Bay and Walker Bay. At both Hope Bay and Coppermine, Rough-legged Hawk numbers were high in 1990, declined in 1991, and build up most of the way to previous levels in 1992. The same pattern is evident in the small mammal trapping data from Walker Bay and Hope Bay.

Data from the Keewatin District and Baffin Island indicate uniformly low microtine abundance and no apparent trend. Evidence from Peregrine Falcon breeding at Rankin Inlet suggest that the last microtine peak was in 1985.

The most extensive summary of small mammal population trends in the Northwest Territories seems to be that of Chitty (1950). Hudson's Bay post managers were sent questionnaires every year from 1935-1948 as part of the "Canadian Arctic Wildlife Enquiry". Information was obtained on trends in fox, lemming, and snowy owl. The results are difficult to interpret for a variety of reasons. The observation period is over-winter and it is not clear from the paper when the observations were made. If the small mammals peaked and crashed over-winter, it is not clear whether this is reported as "abundant" or as a "decline". These data seem to indicate the following:

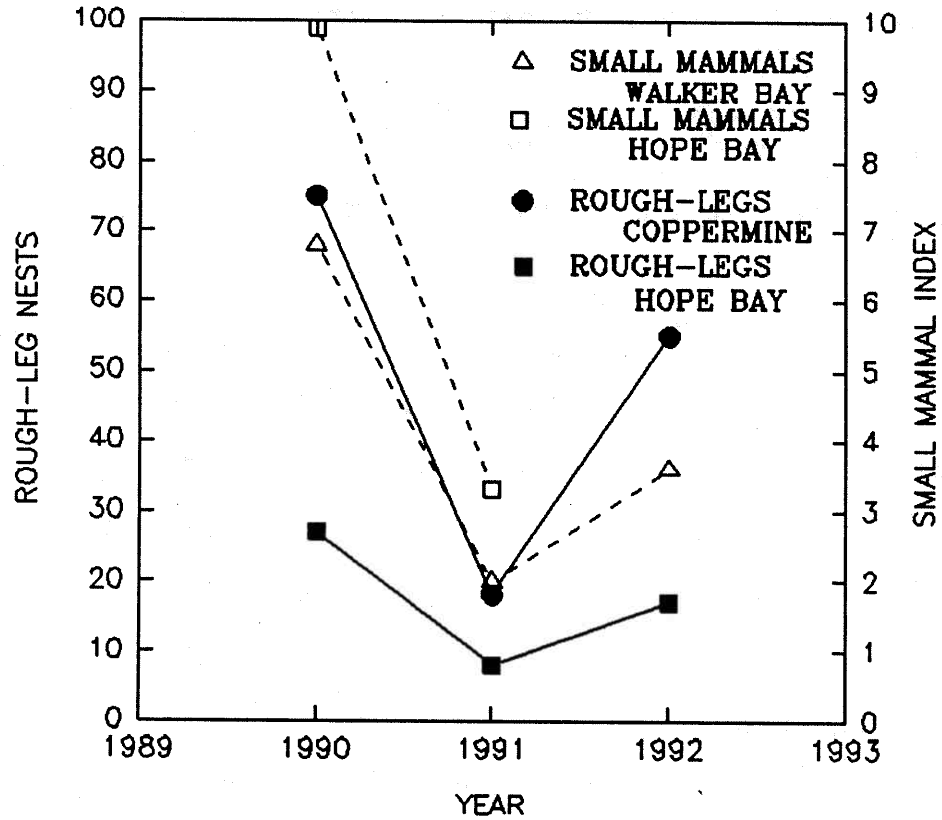

Figure 3. Relationship between Rough-legged Hawk numbers at Coppermine and Hope Bay and microtine abundance at Hope Bay and Walker Bay.

1) Geographic correlation of trend along the west coast of Hudson's Bay was very complex. At Repulse Bay, the trend appeared to follow that of northern Baffin while on Southhampton Island the trend appears closer to that of southern Baffin. Further south the trend became increasingly similar to the central interior Barrens.

2) South Baffin seems to vary independently of north Baffin.

3) Victoria Island does not seem to correspond to the eastern Arctic or the mainland.

4) Bathurst Inlet and Coppermine appear to be mid-way between Victoria Island and the interior.

5) The Mackenzie Delta appears closer to north Baffin than anywhere else.

Techniques

Xia and Boonstra (1992) have recently questioned the use of captures per unit effort as an indicator of small mammal density. The problem arises because each capture results in one less trap being available to capture another animal. The probability of an individual being captured therefore declines with increasing population density and trap success. The higher the population density, the more it will be underestimated by the "captures · 100 TN^{-1}" index.

While recognizing the potential for serious error from this source, it is not considered to be of practical importance thus far. The highest index recorded is 16.2 captures · 100 TN^{-1} (0.162 per trap night) at Fort Smith in 1990. Assuming a negative binomial spatial distribution, the estimated density per trap is 0.179. This difference of 1.8 captures · 100 TN^{-1} is a finer scale than resolved by our techniques. Caughley (1977 p. 23) states that frequencies below 0.2 are almost linear on density and no transformation is required. If, in the future, our capture frequency exceeds 20 captures · 100 TN^{-1} or so, we should consider correcting the data.

There is another potential problem. If trapping were very efficient, local populations could be wiped out or severely reduced. This would result in fewer animals being available for capture later in the trapping period. We would then expect captures · 100 TN^{-1} to decline with cumulative trap nights. However, cumulative number of captures typically rose linearly with cumulative trap nights (Fig. 3) indicating that the capture index is not dependent upon effort. This conclusion is reinforced by the observation that a significant negative correlation between proportion of traps making a capture and night number occurred in only one case out of the 16 analyzed (Table 3). There is unlikely to be an effect on local density lasting from one year to the next (Krebs 1964).

Co-operators at Walker Bay, Coral Harbour, and Repulse Bay felt from observations that lemming numbers were high in spring 1991. However, few were caught in late summer. Fuller et al. (1975) comment on the decline of collared lemmings on Devon Island over the summer and their subsequent build-up during winter. In Fennoscandia, vole numbers decline in summer in northern areas but not in southern populations (review in Pimm 1992). This phenomenon would bear closer scrutiny. Trapping in August should be maintained as the standard but interested co-operators should be encouraged to undertake a May-June trapping session as well.

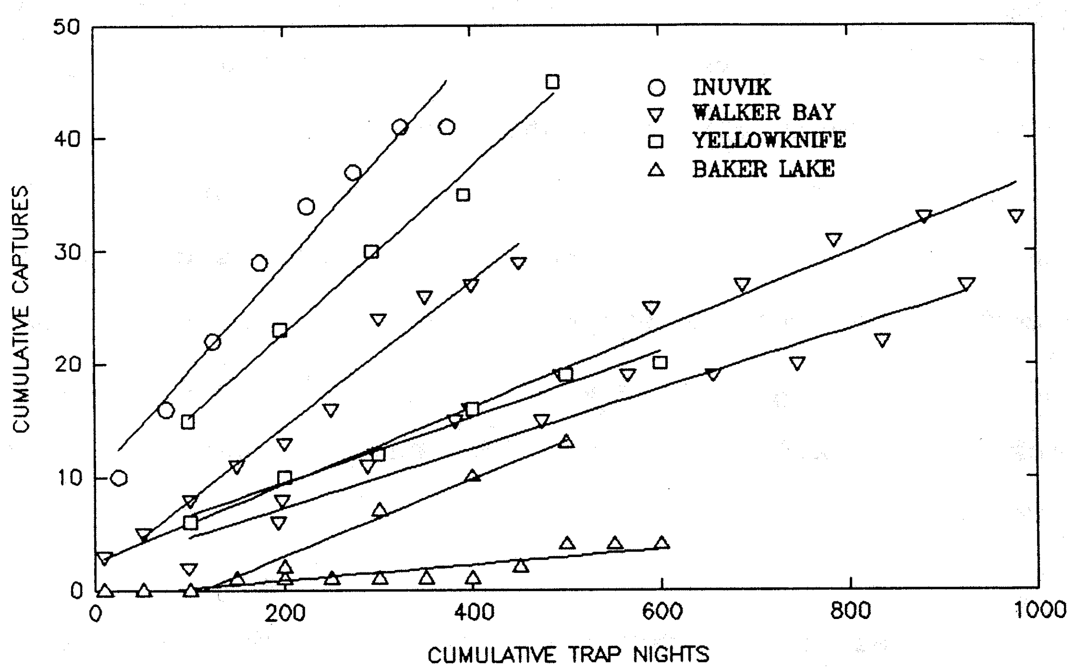

Figure 4. Cumulative number of captures graphed against cumulative number of trap-nights for 4 study areas and several years.

Table 3. Proportion of available traps (not mis-fired) capturing a small mammal correlated with day number of trapping program (Pearson Product Moment Correlation). Data from area/years reporting more than 10 captures.

STUDY AREA	CORRELATION	P VALUE	DAYS TRAPPED	CAPTURES
FORT SMITH-- 1990	-0.601	0.283	5	54
NORMAN WELLS-- 1990	-0.615	0.269	5	67
INUVIK-- 1990	+0.089	0.911	4	23
WALKER BAY-- 1990	-0.316	0.408	9	27
HOPE BAY-- 1990	-0.278	0.594	6	50
FORT SMITH-- 1991	+0.371	0.539	5	19
YELLOWKNIFE-- 1991	-0.576	0.232	6	19
NORMAN WELLS-- 1991	-0.429	0.471	5	21
INUVIK-- 1991	-0.921	0.001*	8	45
HOPE BAY-- 1991	+0.045	0.943	5	15
FORT SMITH-- 1992	-0.657	0.229	5	31
FORT SIMPSON-- 1992	+0.436	0.463	5	19
YELLOWKNIFE-- 1992	-0.579	0.306	5	30
WALKER BAY #1-- 1992	-0.221	0.539	10	12
WALKER BAY #2-- 1992	-0.617	0.057	10	16
BAKER LAKE-- 1992	+0.617	0.268	5	13

* = statistically significant

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APPENDIX I. Cooperators in the Northwest Territories Small Mammal Survey.

Yellowknife
- Dean Robertson; 1991
- Leslie Wakelyn; 1991,1992
- Chris Shank; 1992

Fort Smith
- Ron Graf; 1990,1991,1992
- Tom Lockhart; 1990
- Tom Duncan; 1991
- Leroy Bloomstrand; 1992
- Colin More; 1992

Fort Simpson
- Ken Davidge; 1992
- Ron Graf; 1992
- Leroy Bloomstrand; 1992
- George Tsetsoe; 1992

Norman Wells
- Kim Poole; 1990,1991
- Paul Latour; 1990,1991
- Norm MacLean; 1990,1991

Inuvik
- John Nagy; 1990,1991

Coppermine
- Anne Gunn; 1990

Walker Bay
- Bruno Croft; 1990,1991,1992
- Dean Robertson; 1991,1992

Hope Bay
- Leslie Wakelyn; 1990, 1991
- Richard Cotter; 1990
- Kathy Martin; 1990
- Mika Sutherland; 1991

One-Eyed Jack Lake
- Chris O'Brien; 1991,1992
- Wayne Brode; 1991
- Brenda McNair; 1992

Arviat
- Mark Bradley; 1990,1991,1992
- Paul Mikiyurgiok; 1990
- Johanne Tungilik; 1992

Baker Lake
- Joe Tiggularaq; 1991,1992

Repulse Bay
- Joe LaRose; 1991,1992

Coral Harbour
- Tim DeVine; 1991,1992

Rankin Inlet
- Robin Johnstone; 1991,1992
- Mark Bradley; 1991,1992
- Damian Panayi; 1992

Pond Inlet
- Line Gauthier; 1991,1992
- Mike Ferguson; 1990,1991, 1992
- Terry Audla; 1990