Research on Canadian Mammals

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Abstract. Fourteen well-known refereed journals or series over the past 40 years were searched for articles on Canadian mammals. Of the 639 published, 74% had appeared in one of four journals. Of the total, 262 dealt with big game species. The most researched mammal, the caribou, was studied in 57 papers but many species had had no work done on them. Of the five research categories studied, the universities have done the most research, especially recently, probably because of the recent increase in scientific grant money. Most researchers have written only one paper, but 12 men have been much more prolific. Most work has been done in the Canadian north and west of Quebec. Research fields of increasing importance include pollution, populations, techniques, ecology and habitat, behaviour, reproduction and anatomy and physiology.

Introduction

Canada is a vast country and there are few zoologists in it, so relatively little is known about our native mammals. Virtually no research at all has been done on some species, and the work on other groups has not been integrated. In an attempt to document the research that has been done, and to provide a base which may guide future research, the present literature review has been undertaken. The study points out the increase in mammal research recently; in 1915, only ten research articles on Canadian mammals appeared in print (Walker, 1917), while in 1970, 51 were published in the journals searched.

Method

Eleven refereed zoological and wildlife journals and the scientific publications of the Canadian Wildlife Service and of the two important research museums were checked over the past forty years and notes made on every article about wild mammals in Canada that appeared in them. For each article the following information was coded: the date of publication; the authors and their location and employers; the region where the studies were done; what grant

TABLE 1

Numbers of papers on Canadian mammals published in 14 major journals and series

	Date of First Volume	1931–40	1941–50	1951–60	1961–70	Total
Canadian Field-Naturalist & predecessors	1884	30	45	23	46	144
Journal of Mammalogy	1919	28	29	31	40	128
Canadian Journal of Zoology and precursor	1929	3	8	23	86	120
Journal of Wildlife Management	1937	0	5	27	47	79
National Museum of Canada publications	1913	3	7	15	7	32
Transactions of the North American Wildlife Conference and successor	1936	2	11	11	4	28
Canadian Wildlife Service	1950	–	1	14	12	27
Arctic	1948	–	0	7	11	18
Royal Ontario Museum publications	1928	2	6	6	2	16
American Midland Naturalist	1909	3	1	2	9	15
Naturaliste Canadien	1869	2	2	2	7	13
Ecology	1920	1	1	1	8	11
American Zoologist	1961	–	–	–	4	4
Ecological Monographs	1931	0	2	0	2	4
		74	118	162	285	639

TABLE 2
Canadian mammal articles published by the five research groups during the past four decades.

	1931–40	1941–50	1951–60	1961–70	Total
Universities	8	26	42	148	224
National government	14	46	52	82	194
Provincial government	12	13	44	53	122
Non-Canadians	27	19	21	30	97
Unaffiliated Canadians	6	14	6	4	30
	67	118	165	317	667[1]

[1]The values are sometimes higher than in Table 1 because if several authors of different institutions co-authored one paper, this paper was included under each institution category.

TABLE 3
Number of authors who published the articles appearing in the last four decades

	Single author	Two authors	More than two authors	Total number of papers
1931–40	95%	5%	0	74
1941–50	82%	17%	1%	118
1951–60	69%	23%	8%	162
1961–70	62%	27%	11%	285
				639

TABLE 4
Number of authors writing a given number of papers.

Number of Papers	Number of Authors	Number of Papers	Number of Authors
1	246	14	0
2	48	15	3
3	24	16	0
4	18	17	1
5	7	18	0
6	12	19	0
7	4	20	0
8	2	21	1
9	1	22	0
10	0	23	1
11	2		
12	3		
13	0	49	1

money was used in the work; whether it was practical or theoretical; and the species and subject matter of the research. A species or mammal group was coded if at least two pages were devoted to it. The subject matter was sometimes varied in one paper, but usually the main subject and at most the two most representative subjects were coded for each article.

Several limitations were placed on the material tabulated. No papers of less than one and a half pages were coded, as these usually dealt with casual observations rather than with major research efforts. As well, articles emphasizing parasites rather than the host mammals were also omitted, as were those dealing with individuals that had been bred in captivity.

Results and Discussion

Of the 639 articles tabulated, 74% appeared in four journals — the Canadian Field-Naturalist, the Journal of Mammalogy, the Canadian Journal of Zoology and the Journal of Wildlife Management (Table 1). (Hein, 1967) also noted preferential grouping in his literature review.) The Canadian Field-Naturalist published the most mammalian articles. Although the Canadian Journal of Zoology published almost twice as many articles as any other journal during the last decade, it printed very few during its early years.

Table 2, which like Table 1 notes the great increase in research in mammals during the last decade, groups the zoologists who did the work into five categories. The Federal government employees increased their output noticeably during the last decade, while the Provincial workers did so during the past 20 years. The non-Canadians were much more prolific than any other group during the thirties, but their research has remained fairly constant over the years since then. These workers mostly came either from the United States or from Great Britain. The output of non-affiliated Canadians has also not increased recently and has generally been low. The research at the Canadian universities has grown more dramatically than that of any of the other groups, especially during the last decade.

TABLE 5. — Number of papers from each type of institution and from each region where the author(s) lived.

	Universities	Federal Government (where stationed)	Provincial Government	Non-affiliated Canadian
Maritime Provinces	14	4	23	1
Quebec	36	11	8	1
Ontario	56	72	54	10
Prairie Provinces	43	42	14	11
British Columbia	84	7	28	6
North*	0	14	0	0

*In this paper "north" refers to areas in Canada north of 58° N Latitude.

TABLE 6. — Number of papers from each type of institution and the region where the work was done.

	Universities	Federal Government	Provincial Government	Non-Canadian	Unaffiliated Canadian	Total
Maritime Provinces	19	18	21	24	1	83
Quebec	14	6	8	5	1	34
Ontario	48	3	49	14	8	122
Prairie Provinces	48	58	17	14	11	148
British Columbia	54	14	24	18	6	116
North	43	88	2	18	1	152

The dramatic upsurge of mammalian research at the universities is probably correlated with the increased number of research grants available. In all, ten commercial grants and 117 government grants (mostly federal) were acknowledged in the papers. Of the government grants one was acknowledged in the thirties, two in the forties, 27 in the fifties and 87 in the last decade. All of the commercial grants were available only in the last decade.

The need to attract grant money may have stimulated the increase in multi-author research projects (Table 3). Papers written by a single author decreased from 95% to 62% between the first and last decades of this study and those

TABLE 7. — Types of mammals studied by institutions or groups.

	Universities	Federal Government	Provincial Government	Non-Canadian	Unaffiliated Canadian	Total	Number of Papers
Game species	30%	40%	47%	16%	18%	34%	262
Fur-bearers	18%	22%	23%	34%	36%	22%	182
Lagomorphs	7%	5%	8%	10%	10%	6%	55
Marine species	14%	9%	4%	6%	0	10%	71
Small species	31%	24%	18%	34%	36%	28%	214
	100%	100%	100%	100%	100%	100%	
Number of papers	243	265	127	110	39		784[1]

[1]This value is greater than that of the total number of papers because many research efforts have two or more papers dealing with different types of mammals.

written by three or more authors increased from 0 to 11%.

The vast majority of the authors worked on only one paper and only a few authors have written a large number (Table 4). These include I. McT. Cowan who authored or co-authored 49 of the papers in this study, and R. M. Anderson, B. E. Baker, A. W. F. Banfield, A. W. Cameron, A. De Vos, R. Y. Edwards, W. A. Fuller, R. L. Peterson, A. L. Rand, J. D. Soper and A. J. Wood who wrote between 11 and 24 of them. Almost all of the papers dealt with field or lab work; only 35 were in large part or entirely theoretical in nature.

The regions from which the workers came varied considerably (Table 5). The University of British Columbia has produced far more research than have other universities, including those of far longer standing. This is largely because of the impetus of I. McT. Cowan. Federal employees from Ontario have been most productive, but this is somewhat misleading as many work out of Ottawa, the national capital. Provincial workers from Ontario have published the most papers, followed by the less populated regions of British Columbia and the Maritime Provinces. Provincial employees of Quebec have published little.

The provincial employees and the unaffiliated Canadians usually did their research in the region in which they lived. The other workers were more likely to go farther afield and especially into northern Canada. The research done on northern mammals is greater than that done on any other group (Table 6). Least is known about mammals living in Quebec.

The National and Provincial Parks, where animals are protected from human interference, would seem to be ideal regions for research to be carried out. However, of the work reported in these papers only 63 projects were done in the Federal Parks and only 31 in the Provincial Parks.

The game animals, defined as ungulates and bears, have a greater economic and aesthetic value than the other types and the government employees have tended to concentrate on them (Table 7). The smaller species, all squirrel-size or smaller and uneconomic, have received less than average government attention. This was also true for marine species (cetaceans and pinnipeds) which were studied only on the three coastal areas of Canada. Together these two latter groups include many times the species included in the game category, so that very little work has been done on most mammals of Canada. The fur-bearing species (all carnivores but bears, plus beaver and muskrat) have economic value to trappers and to predator control workers but relatively less research has been done on them by the governments than by non-Canadians and unaffiliated Canadians. The lagomorph research has dealt primarily not with these species as animals for recreational hunting but with the phenomenon of cyclic numbers in the varying hare.

The types of research undertaken on mammals were similar throughout the time of this study with the exception of pollution research, which was only begun very recently (Table 8). Papers on distribution, behaviour and general

TABLE 8

Numbers of papers dealing with a particular subject matter during the four decades

	1931–40	1941–50	1951–60	1961–70	Total
Distribution	26	36	43	39	144
Behaviour (movements, food, activity etc.)	6	13	23	73	115
General biology	20	29	35	26	110
Anatomy, physiology, weights and growth	6	6	20	64	96
Populations	6	10	21	28	65
Techniques (aging, trapping etc.)	3	2	12	45	62
Taxonomy	11	21	13	9	54
Productivity and management	2	12	19	10	43
Reproduction, litters and genetics	3	5	10	23	41
Ecology and habitat	1	5	10	18	34
Disease, accidents and parasites	3	5	8	10	26
Pollution	0	0	0	3	3

TABLE 9

Canadian species on which four or more papers have been published in the journals and series considered.

		Number of papers (or 2+ pages per paper)
Insectivora		
Blarina brevicauda	shorttail shrew	6
Chiroptera		
Myotis lucifugus	little brown bat	7
Lagomorpha		
Lepus americanus	snowshoe hare	27
Lepus europaeus	European hare	4
Rodentia		
Castor canadensis	beaver	25
Peromyscus maniculatus	deer mouse	19
Ondatra zibethicus	muskrat	16
Peromyscus leucopus	white-footed mouse	14
Microtus pennsylvanicus	meadow vole	14
Tamiasciurus hudsonicus	red squirrel	8
Clethrionomys gapperi	redback vole	6
Eutamias minimus	least chipmunk	4
Carnivora		
Canis lupus	timber wolf	18
Vulpes vulpes	red fox	10
Martes americana	marten	9
Ursus maritimus	polar bear	8
Ursus arctos	brown bear	7
Lynx canadensis	lynx	7
Ursus americanus	black bear	5
Martes pennanti	fisher	5
Pinnipedia		
Pagophilus groenlandicus	harp seal	6
Odobenus rosmarus	walrus	6
Artiodactyla		
Rangifer tarandus	caribou	57
Alces alces	moose	40
Odocoileus hemionus	mule deer	16
Odocoileus virginianus	whitetail deer	14
Cervus canadensis	elk	11
Bison bison	bison	11
Ovis canadensis	bighorn sheep	9
Ovibos moschatus	muskox	7
Oreamnos americanus	mountain goat	6
Antilocapra americana	pronghorn	6

biology have been most numerous. Despite the recent increases in numbers of papers published, work on distribution, taxonomy, general biology and productivity and management has not increased to any extent. Thus the importance of these fields has decreased relative to other fields. These other fields, in which papers have been appearing in increasing numbers recently, include studies on populations, techniques, ecology and habitat, behaviour, reproduction and anatomy and physiology.

Table 9 shows that although some Canadian species have been studied in depth (57 papers on the caribou), others have received scant attention and others virtually none at all. For example, there are 28 other species of rodents, 9 of carnivores and 7 of cetaceans that have had only one, two or three papers devoted to them in the publications considered. These include the wolverine, a largely Canadian species, and the gray squirrel, a very common one, with one paper each. Nothing has been published there on most bats or on Canadian moles. There are, of course, short nature notes, good articles scattered in other journals, and a few books about various wildlife species in Canada, but these few additions do not invalidate the general impression given by Table 9 that little research has been done on most Canadian mammals.

Literature Cited

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