The Continuing Role of Research in Canada's Mountain National Parks

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Introduction

The place and roles of research in Canada's mountain national parks continue to evolve. The topic was described and discussed at the first Parks For Tomorrow Conference in 1968 (Cragg, 1969; Gardner, 1969). At that time, the research permit system had been in place only seven years. It required scientists and others to make application for permission to collect specimens and samples from national park areas for scientific and/or educational purposes and it resulted in the first data set whereby the types of research and the affiliations of researchers could be systematically described. Prior to this 1961 initiative, assessment of prior research activity in national park areas required an exhaustive search and analysis of published and unpublished documents reports, papers and books. The permit system remains in place today and is more inclusive of all types of research and scholarly work that requires a presence in the national park areas. While flaws and inconsistencies in the system continue, it does provide a good and only systematic window on research activities in the park areas. It provides the data base for this paper, the objectives of which are:

- To describe the continuing role of research activity in the mountain national parks, with the primary emphasis being on Banff National Park.
- To describe the evolution of research types/topics and the research affiliations by updating previous analyses of permit data (Gardner, 1969, 1979; Campbell, 1996; and Gardner and Campbell, 2002).
- To provide an assessment of emerging and future research needs.

As noted above, the data used to support this analysis come largely from the research and collection permit system of Parks Canada, supplemented by review of published and unpublished reports, papers and books that have accumulated over the past 125 years. The review has by no means been exhaustive and this remains a much-needed task to supplement that produced in 1973 by Scace (1973). The permit data are themselves incomplete in several ways: they date only from 1961, not all research and scholarly activities required or require a permit, initially permits were issued only when material was removed from the park areas but this changed, administration of the permits has varied between being warden-based, park-based, region-based and Ottawa-based and some records for some parks have disappeared. Thus the data sets are full of inconsistencies and gaps. Nonetheless, the research permit system does provide the most comprehensive description of research activity over the past 50 years.

Background

A comprehensive historical assessment of scientific and social science research activity in Banff National Park over an approximate 100-year period is provided by Gardner and Campbell (2002). Three phases of activity were identified in the assessment. The first was a "laissez-faire" phase from the 1880s to 1960 during which research activity was largely unregulated and the park areas were treated as laboratories for basic scientific research and as museums displaying unique and largely static biogeophysical features and characteristics and described through interpretive science. Most of the work was done by university or museum-based researchers, well-informed and persistent amateur natural historians and some government scientists (e.g. Geological Survey, Water Survey, Canadian Wildlife Service, etc.). This phase produced a rich and varied body of literature on the mountain national park areas.

The second was a more highly regulated phase beginning in 1961 with the introduction of the research and collection permit system. It ended in the late-1970s. During this phase and particularly in the 1970s, basic scientific research was de-emphasized and, in some cases, discouraged entirely. Research and data collection specifically for park planning and management purposes was emphasized and research that could be conducted outside of the park areas was largely prohibited. During this phase in the 1970s, parks management undertook the first systematic resource inventories and mapping exercises of the mountain park areas utilizing government scientists and consulting scientists (McTaggart-Cowan, 1977). This resulted in a significant increase in the number of research permits issued as shown in Figure 1, a significant number of permits for inventory work as shown in Figure 2 and the involvement of a number of government scientists and consultants as shown in Figure 5. These inventories provided a rich data base describing the biogeophysical aspects of the park areas and were seen to provide a good basis for "evidence-based" park management and planning. They also provided a baseline against which monitoring programs could be conducted in the future. This second phase also marked the beginnings of an understanding of the long human presence and its impacts in the park areas as a result of archeological surveys and cultural-historical research (e.g. Nelson and Byrne, 1966). In addition, an ongoing interest in the mountain park areas among scholars who did not require research permits for their work continued (e.g. Fraser, 1969). "Citizen science" and public participation saw its beginnings in this phase as exemplified by the opposition to the late-1960s Calgary-based bid for the Winter Olympic Games (Gardner, 1992).

The third phase commenced in about 1980 and it continues to the present. In this phase we see a much more balanced approach to research activities and a very clear recognition on the part of Parks Canada of the value of all forms of research activity, so long as it does not impair the park landscape or ecosystems. All forms and types of research and researchers (Figures 3, 4, 6 and 7) were actively encouraged and supported in various ways through policy, practice and necessity. While most institutions and government departments and agencies came under increasingly severe fiscal constraints and this may have encouraged more cooperative efforts to understand the park environments, the compelling factors in shaping this third phase took the form of a number of key issues, many of which had management implications for the mountain parks. Examples include: the management of bears and people, the urban elk problem at Banff townsite, the role of fire in forest ecology and its management implications, Bow River water quality and waste management, control of the mountain pine bark beetle infestation and a range of related public safety issues ranging from bear, cougar and elk attacks, to snow avalanche and wildfire hazards, among others. Larger scale issues such as global climatic warming and the growth of various forms of tourism and outdoor recreation in society came to be seen as contributing factors. It

became very clear that to address such cross-scale issues, data and information pertaining to the biogeophysical and human/social factors and processes in the park environments and beyond was essential and remains so.

Analysis

The primary objective of this paper is to update previous analyses of research activities in the mountain parks utilizing the permit data and any other sources of information, short of contacting and interviewing the researchers themselves. Essentially, this update focuses on the period since 1999. In that period, there have been marked fluctuations in the numbers of permits issued but this variability may reflect missing data as much as actual fluctuations in research activity (Figure 1). On average, however, in the recent period permit numbers are roughly the same as those throughout the 47-year history of the system, apart from the anomalously high number of permits issued during the resource inventories in the early to mid-1970s. It would appear that there is no more nor less research and scientific activity than in the 1960s (see Gardner, 1969) but it clearly is much more focused and directed to management issues and to the larger scale issues related to global environmental change.

In the 1960s, the research activity was carried out almost entirely by university and government scientists and most of this work involved biological and geo-science data collection, sampling and examination of specimens for basic and interpretive science. Figures 4 and 7 show a much more varied set of research topics and emphases and researchers in the most recent period. While most still address topics in the bio- and geo-sciences, many of these and others have an emphasis on management and monitoring issues. The affiliations of researchers are a mix of educational/research institutions, government personnel including Parks Canada staff and private consultants. Our detailed reading of the permit material suggests that research which may have a clear intent to address basic science questions is often packaged in such a way as to address management issues and/or larger environmental change and management issues.

The data from the 1970s show a small component of archeological research (Figure 2). Earlier analyses suggested that this reflected, in part, the growth of a vibrant Department of Archeology at the nearby University of Calgary. Some was related to the resource inventories. The component has grown since then (Figures 3 and 4) and this may be attributed to the general recognition that the pre-historic human presence in the park areas was much more significant than previously supposed and important in understanding the aboriginal heritage and rights. Research in the social-cultural areas has increased since the 1960s but it remains a weak component in the research agenda.

The early to mid-1970s saw a significant growth in the inventory and monitoring research sector. The data from 2000 to present show an equal amount of activity in this sector. However, we believe that there has been a qualitative shift within this sector from an emphasis on resource inventories in the 1970s to an emphasis on monitoring activities in the past decade. This represents a significant shift from representation of seemingly static environmental characteristics to an attempt to understand environmental dynamics and change, as well as impacts arising from change. These types of data are absolutely essential for modern evidence-based planning and management in park areas and the current trend is very promising. Nonetheless, the information base describing environmental change and variability in the park and surrounding areas remains a weak link. There continues to be much discussion about establishing bio- and geo-indicators for long term environmental monitoring (e.g. Berger and Liverman, 2001) but much remains to be

done in any of the mountain parks to bring this to fruition. There is great need for "backcasting" or "postdiction" research and scholarship of the type done by Nelson and Byrne(1966), Luckman(1998) and Rhematullah et al.(2002) to systematically characterize past environmental variability and change. In addition, some long-term basic science and monitoring studies (e.g. Demuth, M.N. et al., 2006) are beginning to bear fruit, though they are too few in number.

Other trends noted by Gardner and Campbell (2002) continue in this decade. These include contributions by independent researchers and scholars in the form of general interest books, articles and visual presentations in the popular and specialty media, by interest groups such as the Bow Valley Naturalists in organizing forums for presentation and discussion and participating in public involvement processes related to park management and by organizations such as the Banff Centre and the Whyte Museum that provide venues and materials that support research activity.

Conclusions

Research by scientists and scholars continues to be an important activity in the mountain national parks, particularly in Banff National Park. It continues to be directed to some basic scientific and cultural-historical issues but the greater effort today is directed to providing information and knowledge that can be directed to park management and planning problems. Indeed, it plays an important role in helping to identify and define those problems. An example, is the evolution of knowledge about fire in forest ecology and its implications for interface wildfire hazard and the widespread mountain pine bark beetle infestation. No longer is research the exclusive domain of university and museum based and government scientists and scholars, though these groups still dominate. It has become a more public process with widespread individual, interest group and organizational involvement and input. In addition, the need for highly focused, goal-directed and time-limited studies on specific problems has required the involvement of consultants, some of whom come from the institutional sector but many of whom come from the private sector. The data from the permit system provide some verification of these trends.

The emerging and future research needs are clear. McTaggart-Cowen (1977) made a strong point in noting that national parks must recognize that they are parts of much larger systems and that their research agendas and their management of local problems must reflect this. Parks are not isolated islands. This has been recognized in the mountain parks in some areas including wildlife management and protection and beetle infestations. In other ways, park areas are isolated islands and they can serve as sentinel indicators in the assessment of environmental change and variation for areas much larger than those encompassed within their boundaries. They remain among the least altered by human activities of all landscapes. Because of this, a serious and systematic attempt to monitor key bio- and geo-indicators is essential. This has been evident for some time and, unfortunately, it has not come to pass in Canada's mountain parks as it has in parts of Europe and Asia. In going forward, there is ever more reason to look backward. There is a need to collate and make sense of the vast store of data and information that resides in archives, files and reports scattered in park offices, museums and archives.

Banff National Park contains the headwaters of the rivers that flow eastwards from the Rockies through the southern and central prairie region. Rainfall, snow and glacier melt in this headwaters region is of critical importance to the prairie economy. With the exception of the long-term mass balance studies on the Peyto Glacier, we know very little about the hydrology of these headwaters. We do know from climate modeling that the wider prairie region will experience warming and reduced precipitation in the future. We know as well that annual snowpack and

glacier ice volume in BNP is reducing. The fact that the national park area serves not only itself but a much wider region and population in the water supply sense, as it does in terms of tourism and outdoor recreation, must be recognized and serious research on this topic must be encouraged.

Figure 1.

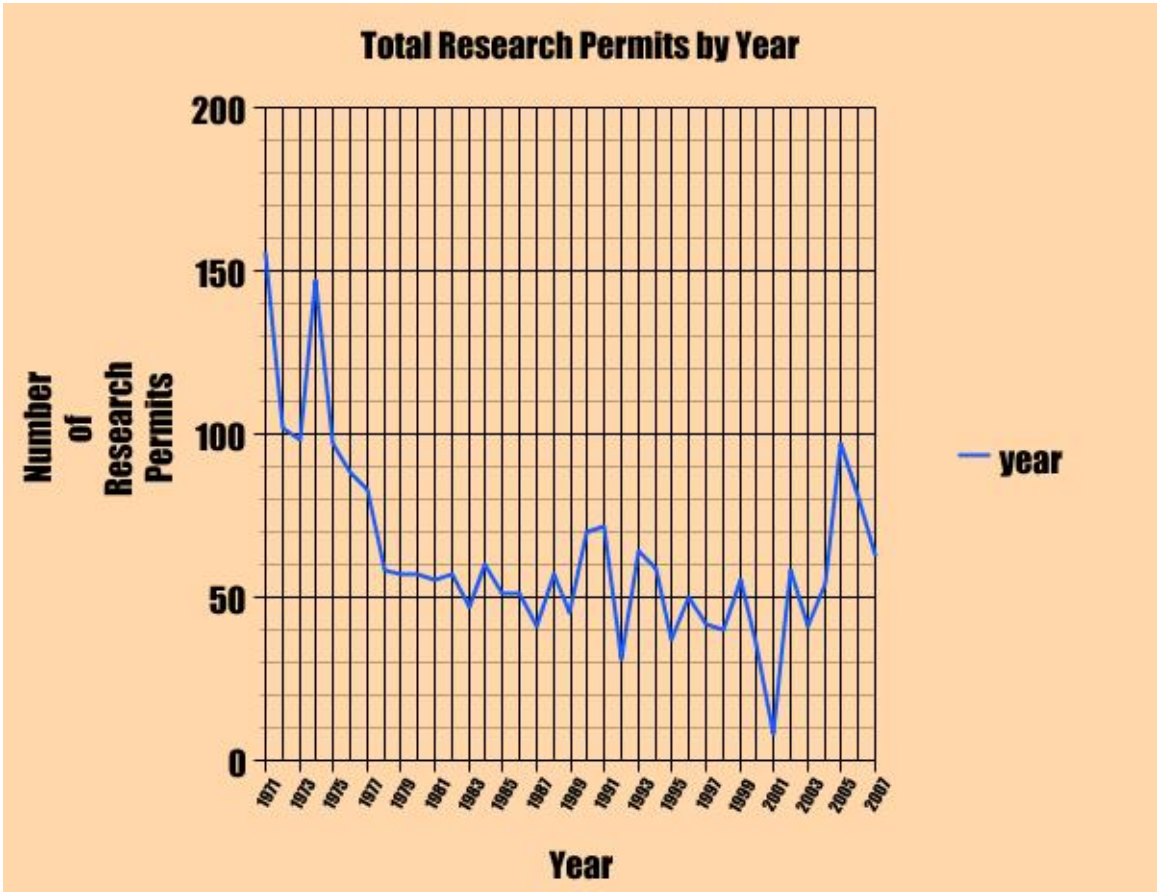


Figure 2.

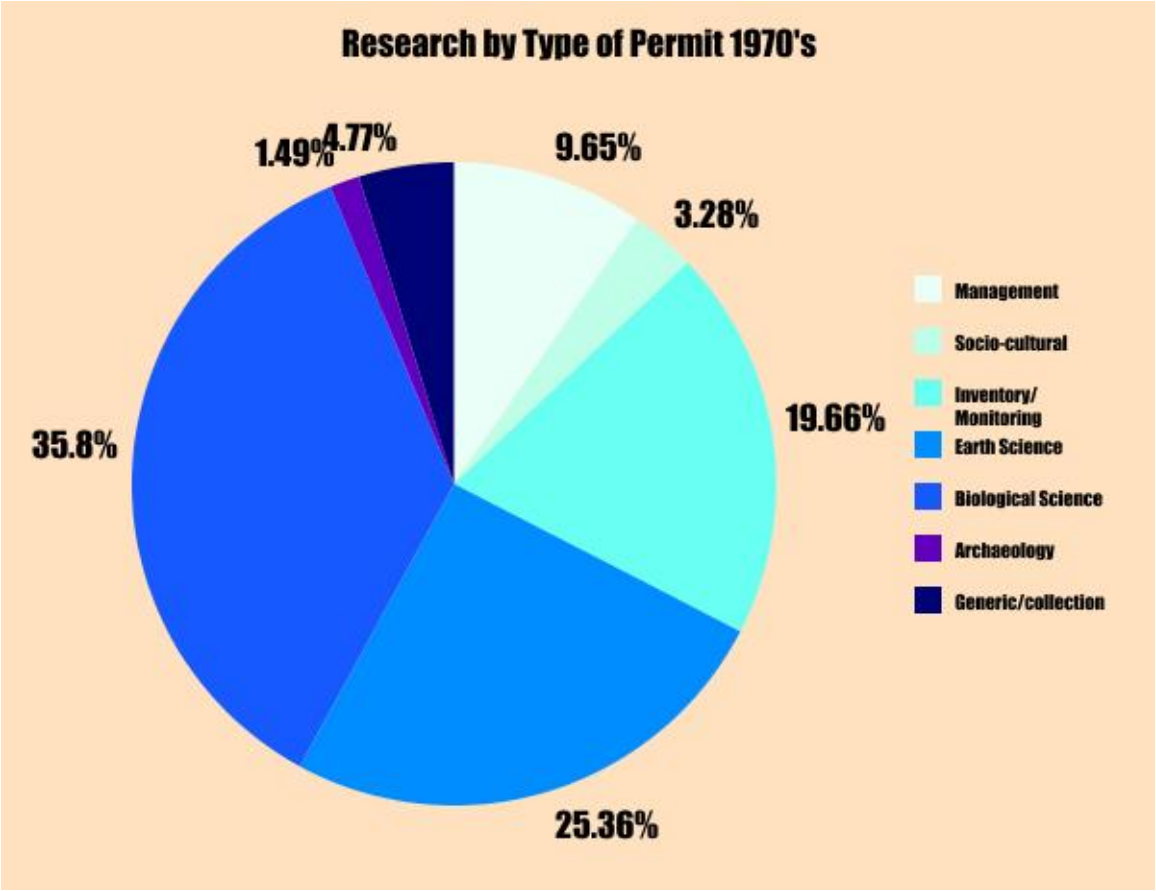

Research by Type of Permit 1970's
1.49%
4.77%
9.65%
3.28%
19.66%
35.8%
25.36%
Management
Socio-cultural
Inventory/ Monitoring
Earth Science
Biological Science
Archaeology
Generic/collection

Figure 3.

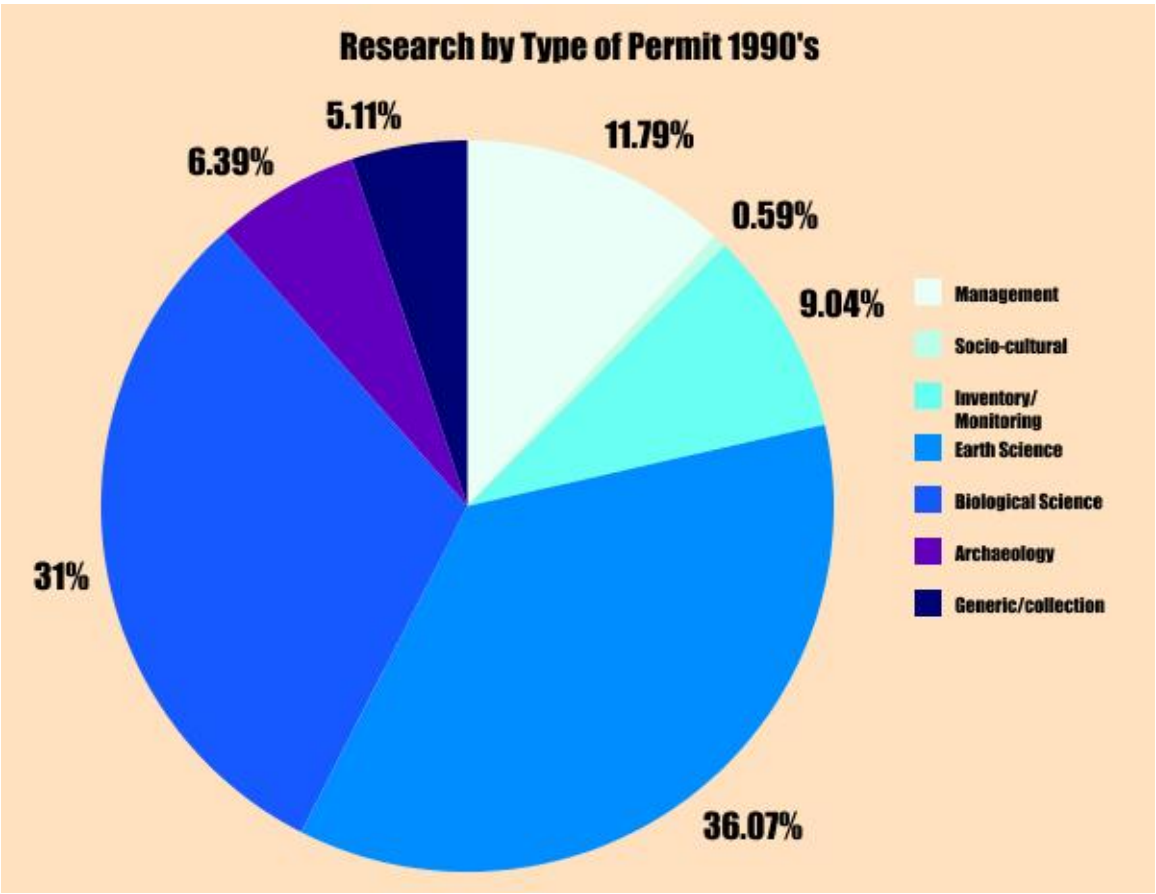

Research by Type of Permit 1990's
11.79%
0.59%
9.04%
36.07%
31%
6.39%
5.11%
Management
Socio-cultural
Inventory/ Monitoring
Earth Science
Biological Science
Archaeology
Generic/collection

Figure 4.

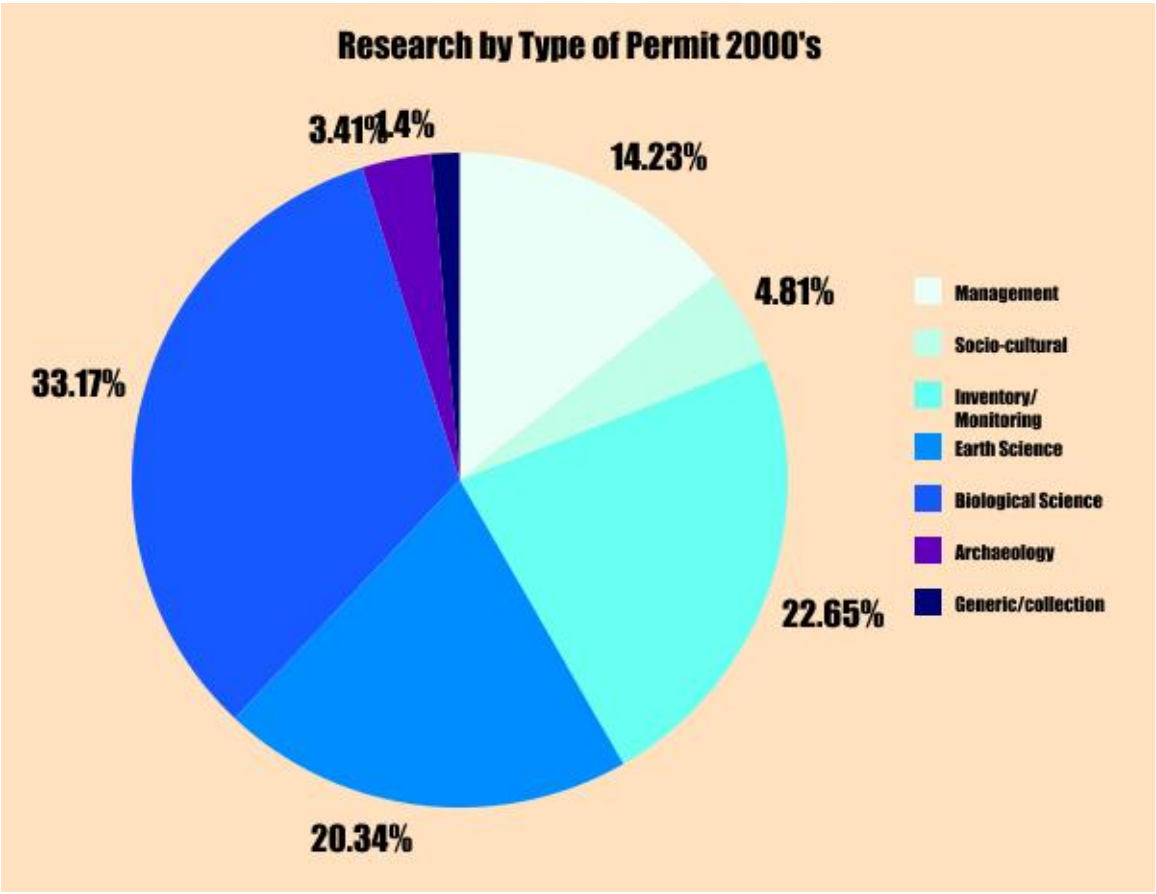

Research by Type of Permit 2000's
3.41%
1.4%
14.23%
4.81%
33.17%
22.65%
20.34%
Management
Socio-cultural
Inventory/ Monitoring
Earth Science
Biological Science
Archaeology
Generic/collection

Figure 5.

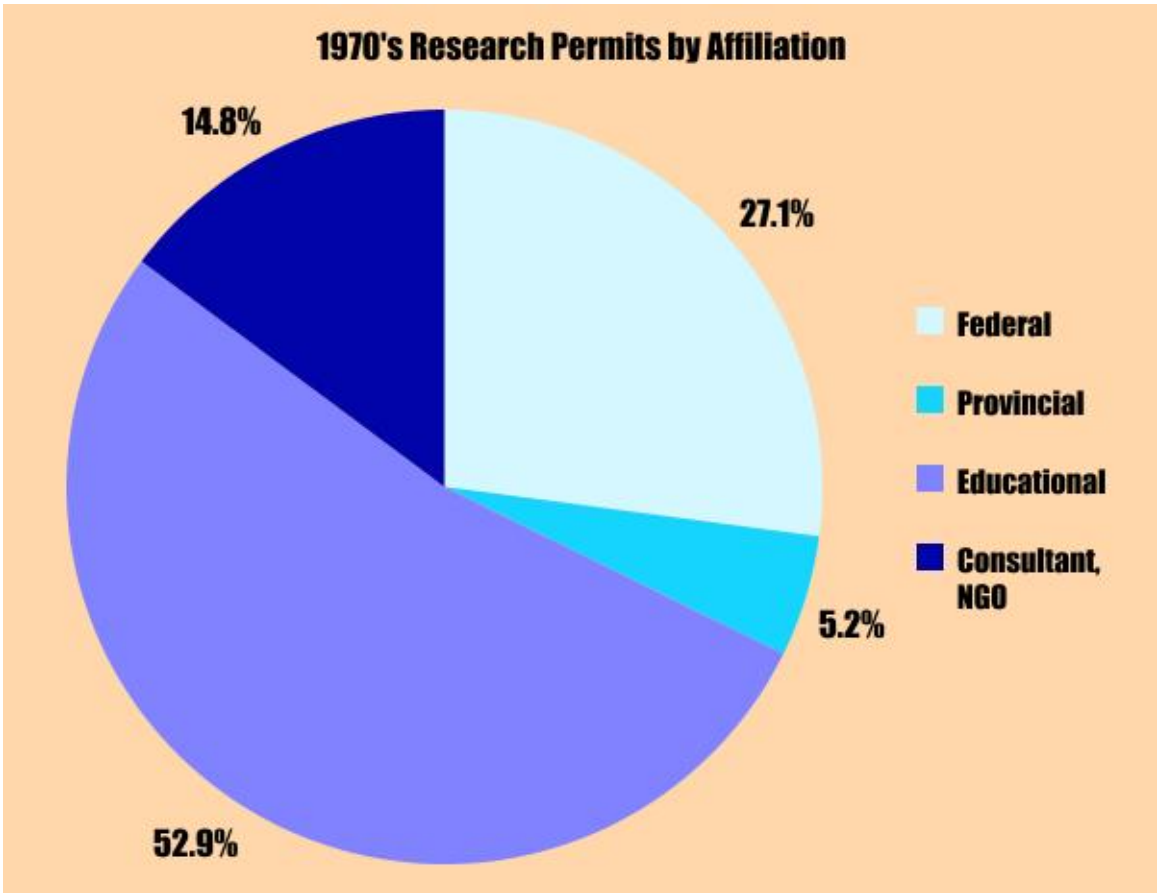
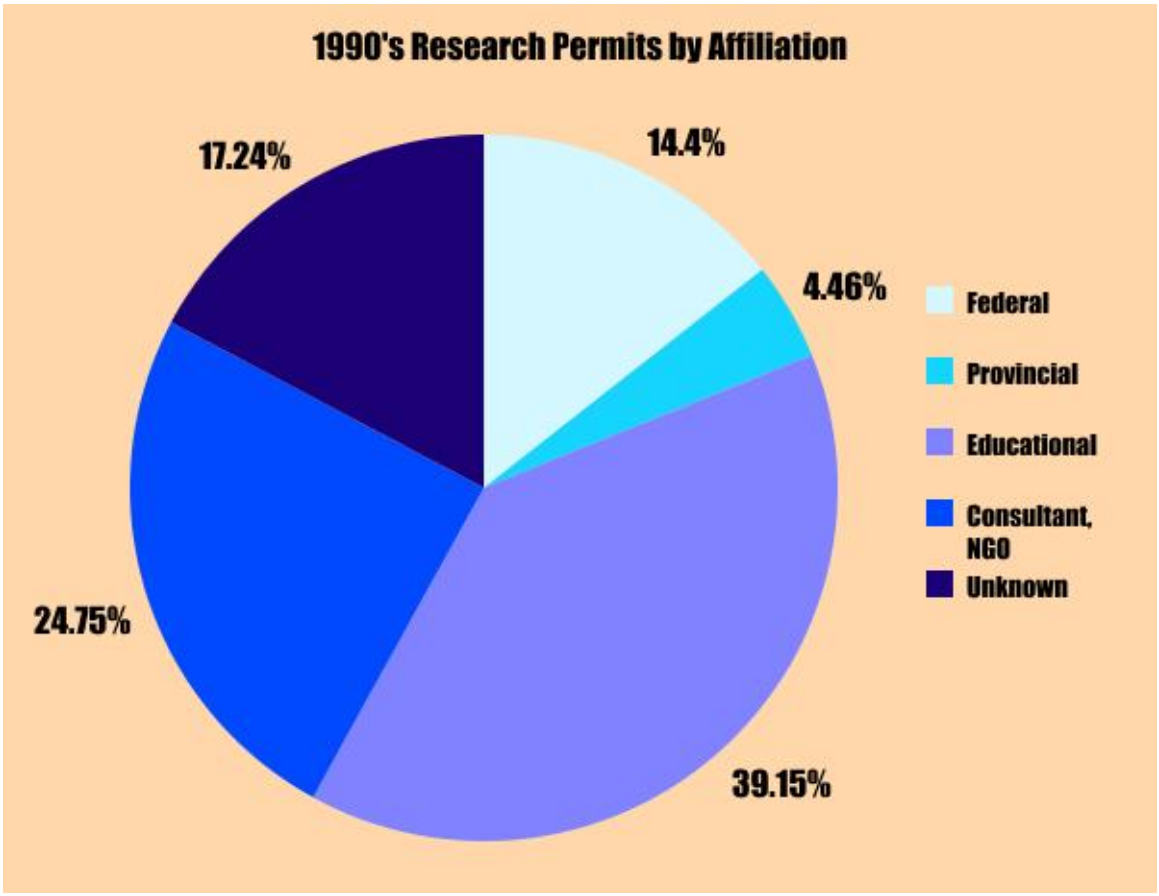

1970's Research Permits by Affiliation
14.8%
27.1%
5.2%
52.9%
Federal
Provincial
Educational
Consultant, NGO

Figure 6.


1990's Research Permits by Affiliation
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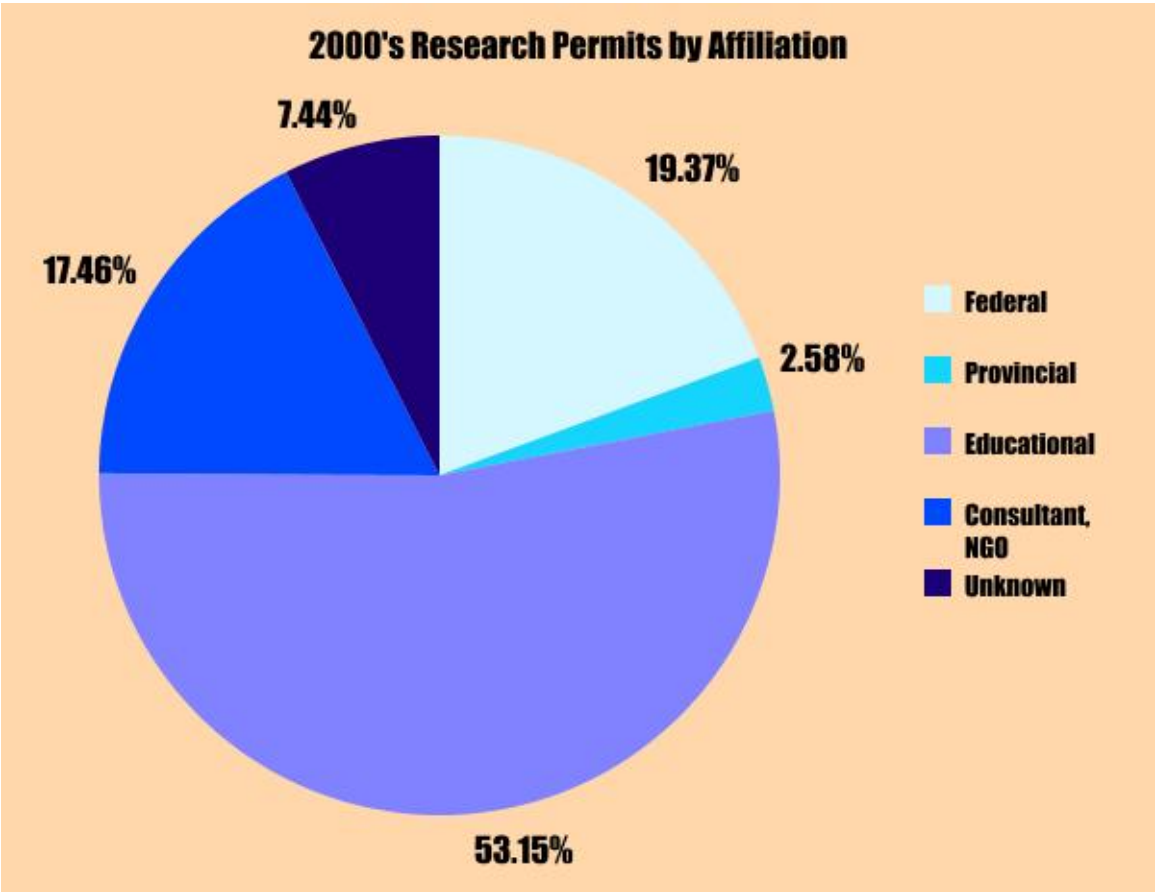
4.46%
24.75%
39.15%
Federal
Provincial
Educational
Consultant, NGO
Unknown

Figure 7.



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