

**COOPERATIVE BEAVER MANAGEMENT IN THE  
RIDING MOUNTAIN BIOSPHERE RESERVE, MANITOBA**

By

**CONSTANCE ELAINE LYNN MENZIES**

A Practicum  
Submitted to the Faculty of Graduate Studies  
in Partial Fulfillment of the Requirements for the Degree of

**MASTER OF NATURAL RESOURCES MANAGEMENT**

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of Manitoba in partial fulfillment of the requirements of the degree  
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## ABSTRACT

This study dealt with the level of responsibility surrounding beaver-associated damages in the Riding Mountain Biosphere Reserve (RMBR) area. This study specifically involved identifying the beaver-associated concerns of the major partners, delineating the costs and responsibilities for addressing these concerns, and evaluating relevant management strategies and techniques. The methods used for this study involved surveying the major partners using a mail-out questionnaire. Pelt prices were the most significant factor influencing beaver population trends, and flooding was the most significant beaver-associated problem experienced in the RMBR. Generally, the cost-estimates indicated were consistent with the topography of the area and with results from other studies. The Rural Municipalities (RMs) of Rosburn, Park and Clanwilliam generally spent more on control techniques than did other RMs. Department of Natural Resources (DNR) Shoal Lake District expended more on beaver control than did other DNR districts. Generally, the RMs bear most of the responsibility (time and dollars spent) compared to DNR and RMNP (particularly without the Manitoba Beaver Control Program involvement). The RMs, DNR and Riding Mountain National Park (RMNP) all indicated similar control techniques (dynamiting dams, trapping and shooting) to be the most used and perceived to be the most useful in the RMBR. Future cost-share programs ought to consider the suggested recommendations particularly in light of ecosystem-based management approaches.

## ACKNOWLEDGMENTS

We create our own reality... What was just a thought years ago has now (finally) become real. This whole process however, could not have been done without the generous support and advice from many individuals.

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## CHAPTER 1: INTRODUCTION

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### 1.0 PREAMBLE

The beaver (*Castor canadensis*) is an integral part of the Riding Mountain area of Manitoba (Shaw, 1993). Its importance to people in Western Canada is primarily based on its utility to society and as such, the beaver is considered to be either an asset or a liability (Morgan, 1991). There are also concerns regarding the compatibility of beaver activity with human interests and activities on the landscape (Rounds, 1980).

These concerns specifically involve damages caused by beaver. However, there is also appreciation of the ecological benefits resulting from beaver activity (Clements, 1996). These benefits are linked to the effects of beaver activity on the structure and dynamics of ecosystems and on other species (Naiman et al. 1986; Devine and Simmons 1994). As beaver significantly influence their surroundings, beaver management approaches in Canada and the United States have come to involve a balance between the utilization of effective control techniques and habitat protection (Hill, 1982; Olson and Hubert, 1994; D'Eon, 1995; Clements, 1996).

This study was conducted under the assumption that such approaches must be applied to the Riding Mountain Biosphere Reserve (RMBR), in order to balance the role of the beaver in the ecosystem and the economic and social impacts of beaver activity. These approaches must also be guided by Riding Mountain National Park's (RMNP) ecosystem-based management<sup>1</sup> policies so that future management activities within the Park do not interfere with ecosystem processes (Parks Canada, 1997).

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<sup>1</sup> Ecosystem-based management is an approach to management that ensures that the integrity or health of an ecosystem is the guiding principle in management decisions and practices (Parks Canada, 1996).

## 1.1 BACKGROUND

The RMBR occupies 22,556 km<sup>2</sup> along the Manitoba escarpment in south-western Manitoba (Parks Canada, 1984) (Figure 1). The RMBR includes both the mixedwood forest and prairies of RMNP and adjacent agricultural land of the Biosphere Reserve (BR) (Department of Rural Development, 1990-95). The BR consists of 19 Rural Municipalities<sup>2</sup> (RMs) and together with RMNP, constituted the study area (Figure 2).

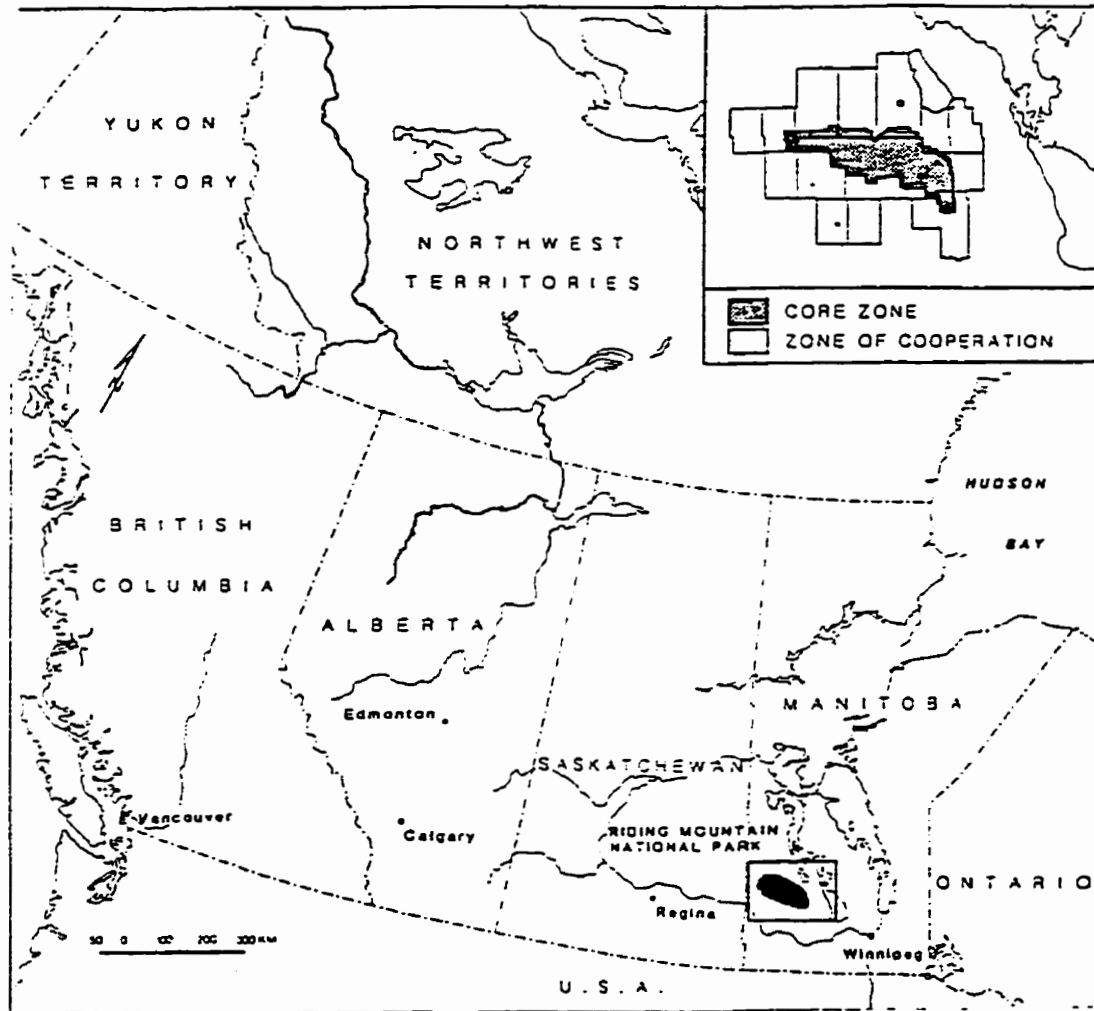
RMNP, established in 1930, lies predominantly in the Boreal Forest region of Canada (Parks Canada, 1979). This area consists of hardwoods and softwoods with trembling aspen (*Populus tremuloides*) communities dominating most of the upland regions of RMNP (Parks Canada, 1979; Shaw, 1993). This abundance of aspen is a significant component of the habitat that is favourable to beaver (Carbyn, 1980; Doucet and Ball, 1994).

The geographical landform of the RMBR area is characterized by gently rolling prairies on the western portion, a rapid break of slope (about 365 metres) on the northeastern portion, and rolling morainic topography along the southern boundary (Parks Canada, 1979; Rounds, 1980). The hummocky terrain of the RMBR area consists of many small lakes and deeply incised streams, which are conducive to floodplain inundation and can serve as immigration corridors for beaver (Rounds, 1980; Parks Canada, 1997).

The RMBR was designated in 1986 by the United Nations Educational, Scientific and Cultural Organization/Man and Biosphere (UNESCO/MAB) Program as an area representative of the Canadian Taiga and Grasslands ecozones (Canada/MAB, 1990;

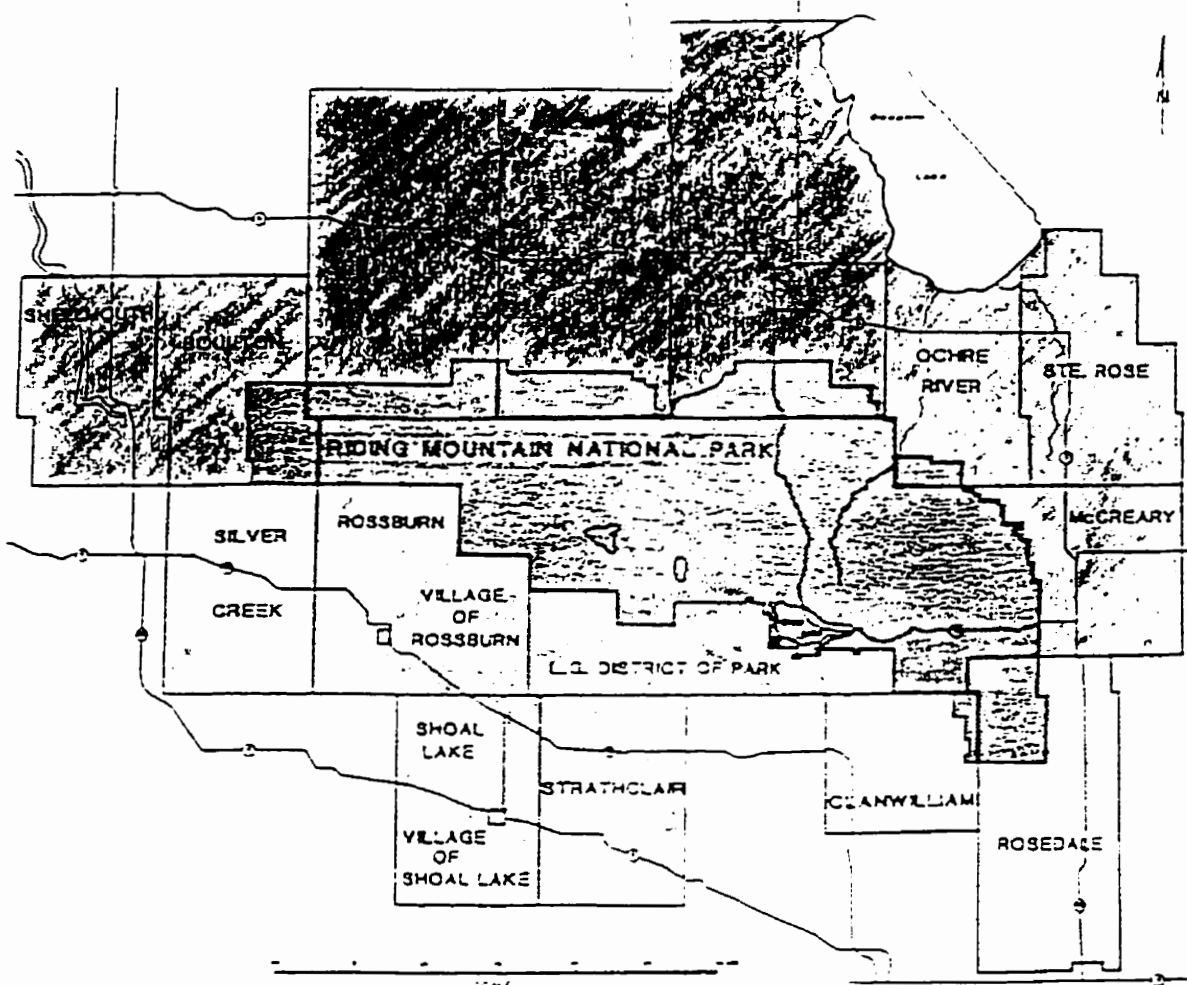
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<sup>2</sup> The RMs surrounding RMNP on the Riding Mountain Regional Liaison Committee include: the RMs of Boulton, McCreary, Rosedale, Shellmouth, Silver Creek, Clanwilliam, Gilbert Plains, Orche River, Rossburn, Strathclair, Shoal Lake, Ste. Rose, Dauphin, Grandview, Harrison, and Park; the Village of Rossburn, Shoal Lake and the Town of Dauphin.



**FIGURE 1. *Riding Mountain Biosphere Reserve in Relation to Canada***

Source: Krawchuk, 1990



**Key:**

Grandview District - Orange

Dauphin District - Blue

Neepawa District - Yellow

Shoal Lake District - Green

Roblin District - Purple

**FIGURE 2. Riding Mountain Biosphere Reserve (19RMs and RMNP)  
and DNR Districts**

Source: Krawchuk, 1990

Krawchuk, 1990; Beeusaert, 1995). The RMBR is an initiative of Parks Canada, the Department of Natural Resources (DNR) and the surrounding RMs. Riding Mountain Regional Liason Committee (RMRLC) formed in 1980, primarily in response to beaver-associated problems, played a coordinating role in this initiative (Krawchuk, 1990). The RMRLC is composed of municipal Councilors & Reeves and provincial & park employees whose jurisdictional authority borders in and around RMNP (Krawchuk, 1990).

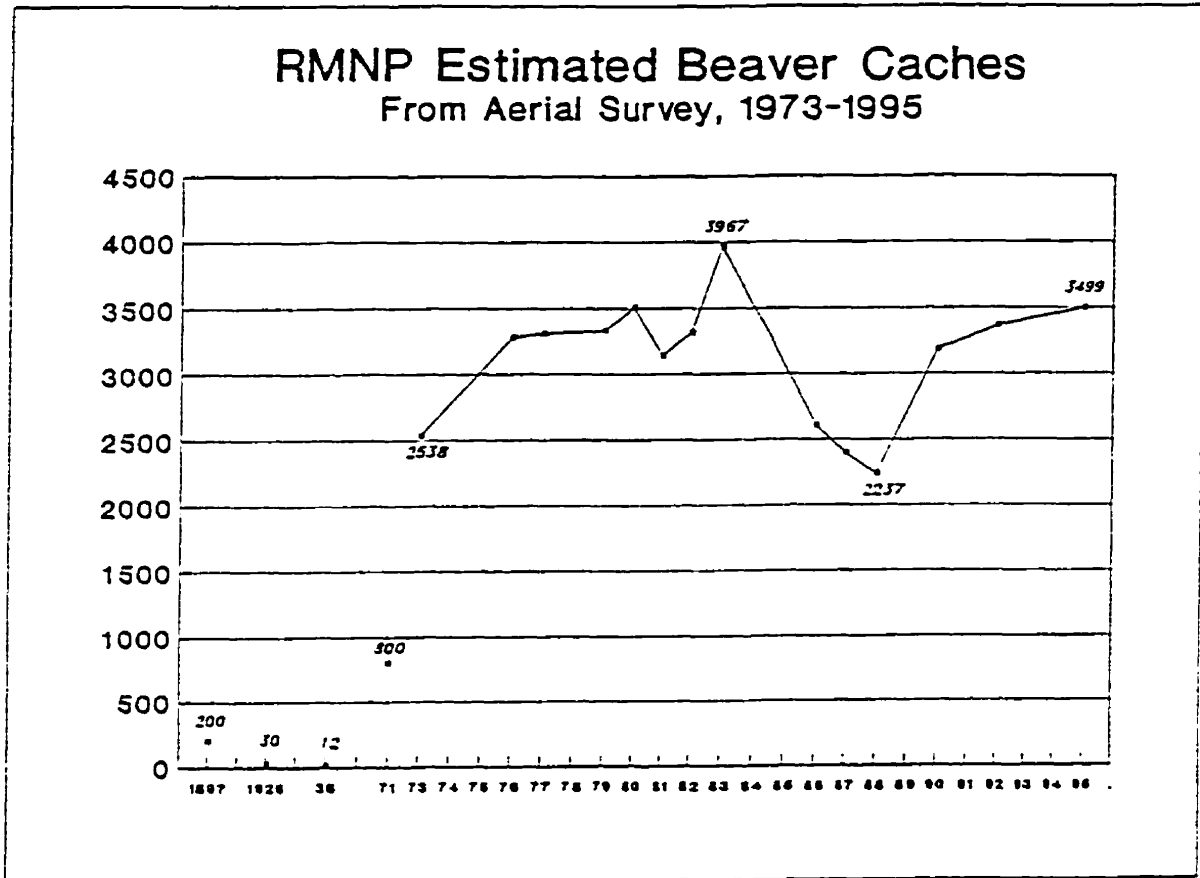
### ***1.1.1 Challenges***

#### ***Beaver Population***

Recently, representatives of the RMBR have been experiencing various challenges primarily due to damages caused by beaver-associated activities (Rounds, 1980; Parks Canada, 1995). These challenges partially relate to the fluctuating population of the indigenous beaver (Parks Canada, 1979; Rounds, 1980; Carbyn, 1980). Beaver populations in RMNP have generally fluctuated. However, the trend has largely been upward in the last decade (Green, 1936; Carbyn, 1980; Pylipuk, pers. com., 1995) (Figure 3). Studies of beaver population have indicated such trends.

Beaver populations have been recorded as early as the late 1800's in the Riding Mountain area. Green (1936) suggests that the beaver population exceeded 200 colonies in this area. Due to changes in habitat and the onset of disease, the beaver population decreased to approximately 30 colonies by 1926 (Green, 1936; Rounds, 1980). The decline was also attributed to the fur trade (Green, 1936; Rounds, 1980). The population decreased further as by 1936, Green (1936) had estimated only 12 active colonies in the Riding Mountain area. He concluded that the continued decline in the beaver population was a result of poaching in the newly established RMNP.

In an attempt to increase the population, 14 beaver were live-trapped in Prince Albert National Park (PANP) and released into RMNP in 1947 with an additional 14 beaver



**FIGURE 3. RMNP Estimated Beaver Caches**

Source: Parks Canada, 1995

released in 1949 (Goldsmith and Rounds, 1979; Trottier, 1980). Another justification for these transplants was to increase efforts to control flooding of private lands in the eastern portion of RMNP (Goldsmith and Rounds, 1979; Parks Canada, 1979).

A further 19 beaver from PANP were released in streams flowing off the escarpment in 1958 (Parks Canada, 1979). The justification for this third release was the hypothesis that beaver damming on escarpment watersheds would alleviate the problem of shale deposition on adjacent agricultural land during periods of high precipitation and runoff (Snyder, 1962). However, during wet years, beaver impoundments were usually full of water and sudden precipitation levels occasionally resulted in breach of dams, which added to the runoff and therefore increased shale deposition on the flood plain (Parks Canada, 1979).

By the 1960's, the beaver population was considered very high, as every available habitat was occupied (Parks Canada, 1979; Goldsmith and Rounds, 1979). This increase in population is thought to have been coincident with a wet cycle, which lasted from 1963 to 1970 (Parks Canada, 1979; Goldsmith and Rounds, 1979; Trottier, 1980). Another contributing factor was the effectiveness of fire control in RMNP, which enabled the growth of aspen forests, providing abundant food for beaver (Trottier, 1980).

As considerable costs were incurred due to beaver flooding both in the Park and in areas adjacent to the Park, RMNP initiated various studies of the beaver population within Park boundaries (Parks Canada, 1979; Trottier, 1980). In 1971, a preliminary survey found a minimum estimate of 800 colonies within the Park (Goldsmith and Rounds, 1979; Trottier, 1980).

A further study was conducted by Trottier in 1974 to determine the status of the beaver population and to describe the influence of beaver activity on other wildlife species and on



infrastructures inside and adjacent to the Park (Trottier, 1974). One of the results of this initiative was the establishment of a systematic aerial block survey of beaver lodges and feedpiles (caches) conducted to monitor beaver populations in RMNP (Trottier, 1974).

There have been 14 aerial surveys conducted to date, with the first carried out in 1973 (indicating 2,538 caches) and the most recent in 1995 (3,499 caches)(Parks Canada, 1995). A typical beaver colony (one colony per cache) can have anywhere between four to seven individuals with an average of five beaver per colony (Gunson, 1970; Woodward, 1977; Hodgdon, 1978). This suggests that the 1995 cache count of 3,499 means a beaver population ranging from 13,996 to 24,493 individuals.

The aerial survey results provide a trend of beaver numbers by watershed and land district (Parks Canada, 1995). Since the surveys have been conducted, populations have increased, then stabilized with fluctuations postulated to have resulted from various influences such as weather and predator conditions (Parks Canada, 1995).

### *Differing Mandates*

The challenges the partners of the RMBR experience involve the close proximity of RMNP to the surrounding area. RMNP, the core of the RMBR, is not a discrete ecological unit, as wildlife movement, air circulation, drainage patterns and human activity closely link the Park with the surrounding agricultural land (Tarleton, 1992). This challenge also relates to the differing mandates of RMNP, the surrounding municipalities and the provincial government. For instance, the Canadian Parks Service is mandated to protect for all time naturally evolving ecosystems (Parks Canada, 1994). The mandate of the municipalities, which is similar to the provincial government's mandate, essentially involves the development and maintenance of safe and viable communities (Municipal Act, 1997).

Specifically relating to beaver management, the responsibility of RMNP is to maintain the highest degree of ecological integrity or preservation, which includes the beaver population, while at the same time ensuring park facilities are protected and/or maintained to a safe standard for people (Parks Canada, 1996 and 1997). Similar to the municipalities, the provincial government's responsibility is to ensure minimal damage to property and to ensure that humans are not endangered as a result of beaver activity. Regarding municipal roads and drainage, the responsibility of the RM under the "spheres of jurisdiction", is to maintain the road (gravel, asphalt or concrete) at the discretion of each municipal council (Municipal Act, 1997).

DNR is specifically mandated, under the *Wildlife Act*, to manage wildlife species for the benefit of present and future generations in Manitoba. Under the *Act*, beaver are defined as furbearing animals and are afforded certain protection due to their value to the fur industry. The *Act* considers such aspects as seasons (when beaver may be taken), requirements of qualifications for licenses and permits, type of equipment that may be used (and how it must be used) and royalties payable to the Province of Manitoba. Provincial policy on problem beaver is expressed in the administration and funding of the Beaver Control Program (BCP)(Appendix 1).

### *Cooperation*

Other challenges the partners in the RMBR are confronted with involve the level of coordination of beaver management activities *between* the partners in the RMBR. There has been some cooperation between the partners in the RMBR through the current BCP and the (former) Federal/Provincial agreement. This form of cooperation is an important feature of beaver control in the RMBR as it provides funding. The following is a description of these funding programs.

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*The Provincial Beaver Control Program*

The BCP, implemented in 1993, involves the provincial government cooperating with the Manitoba Trappers Association, the Department of Highways and the Union of Manitoba Municipalities. The BCP assists municipal corporations throughout southern Manitoba with the hiring of trappers to remove beaver from problem sites. DNR makes an annual maximum of \$125,000 available to trappers under this program (Boyle, pers. comm., 1997). These trappers, who are designated by the RM, are paid \$15 per front/hind feet. During 1993-1997, a total of 24,730 beaver were claimed through the program and \$370,957.25 was reimbursed (DNR, Wildlife, 1997).

DNR province-wide is divided into six regions including the regional headquarters in Winnipeg. The BCP concerns itself only with the Western, Central and Eastern Regions. The highest concentrations of beaver removed are found in those RMs located in the Western Region -- where RMBR is located (McKay, pers. com., 1997). The top three RM claims (1995-97) were submitted by those RMs located within the RMBR (Appendix 2) (McKay, pers. com, 1998). The RM of Ethelbert was the exception, as it is not located in the RMBR but between RMNP and Duck Mountain Provincial Park. This RM reported the highest claim in 1996 of \$18,120.

*The Riding Mountain Beaver Damage Control Program*

The Riding Mountain Beaver Damage Control Program, also known as the Federal/Provincial agreement or the 50/50 program, was the initiative of the RMRLC (Estabrooks, pers. comm. 1997). Beginning in 1982, this program preceded the BCP. The initial agreement expired on November 1, 1984. The second of four agreements was renewed on November 1, 1984 and expired on March 31, 1994. The third agreement was renewed on April 1, 1990 and expired on March 31, 1994. The final agreement was renewed on April 1, 1993 and expired on March 31, 1994.

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The successive agreements were different with respect to the terms and conditions. However, the changes over time involved the length of the agreement and the financial contribution by each of the funding parties. This agreement was a cost-share arrangement where each party contributed 50% of the program costs to a set maximum. The set maximum varied with contributions of \$30,000 by each senior government annually in the first two agreements to \$15,000 (then \$10,000 in the second year) in the latter two agreements.

This program was meant to be a temporary solution for those RMs bordering RMNP as there was a need to fund beaver control activities (labour, mileage, explosives, equipment purchases, repairs and maintenance and ATV's) (Estabrooks, pers.comm., 1997). However, as stated in the Canada-Manitoba Agreement (1993), the premise of this undertaking was in the federal and provincial government's interest to participate in joint programs "in order to reduce beaver losses to farmers and municipalities who have no legal recourse or means to recover or mitigate such losses".

Parks Canada drafted the agreements primarily between RMNP and DNR. The final agreement (1993/94) was not renewed, as there was a lack of response from the provincial government and, as well, Parks Canada funding was not available for the program (Estabrooks, pers. comm., 1997). There was not another agreement drafted to replace this as it was thought that it might be addressed in the move towards ecosystem-based management (e.g. RMNP's Management Plan and Ecosystem Conservation Plan) in RMNP (Estabrooks, per. comm., 1997).

In almost every year of the agreement, the provincial government exceeded their budget (Appendix 3). Although the federal government was unable to contribute to further agreements, the need for beaver control still existed. Based on the program's past expenditures and the initiatives of the Union of Manitoba Municipalities, the provincial

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government decided in 1993 to set aside up to \$125,000 annually for the BCP.

All of the above challenges produce a situation in the RMBR where the natural tendency of beaver to migrate among jurisdictions exacerbates the differences of mandates between the jurisdictions involved.

## **1.2 PROBLEM STATEMENT**

The Riding Mountain area is managed by individuals and governments representing different interests and having different mandates. The challenge lies in bringing these differing mandates to a workable compromise on any issue involving beaver. Although beaver management activities take place in all of the jurisdictions, these activities may be costly and not well co-ordinated. As a result, the various forms of beaver management practiced in the Riding Mountain area by the federal, provincial and municipal governments generally take place independently of one another. A more co-operative approach among the jurisdictions involved, therefore, would seem to be beneficial in order to establish more efficient and effective beaver management strategies in the RMBR.

## **1.3 RESEARCH OBJECTIVES**

The primary objective of this study was to contribute to an ecosystem-based management strategy to address beaver-associated problems in the RMBR. Specific objectives were:

- 1) to identify the major partners' beaver-associated concerns;
- 2) to delineate the costs of, and responsibilities for, addressing beaver-related concerns;
- 3) to evaluate relevant strategies and techniques used to address beaver problems as

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within the context of ecosystem-based management and the regional ecosystem;  
and,

- 4) to provide recommendations for the jurisdictions involved in the RMBR, in keeping with ecosystem-based management principles.

### 1.3.1 Assumptions

The management strategy (a general approach to management that provides tools that satisfy both societal and beaver requirements) is based on the following assumptions:

- it would be most effective if it were cooperative (sharing of various resources as determined by the partners), as beaver impact an extensive area within the RMBR which is covered by several jurisdictions;
- it would be most effective and equitable if it were cost-shared, as federal, provincial and municipal governments each have jurisdictions that lie within the RMBR; and,
- it would be most effective if it could be compatible with the ecology of the beaver throughout the RMBR area, as working against nature can be more costly than working with it.

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## **CHAPTER 2: METHODS**

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### **2.0 INTRODUCTION**

This chapter provides a description of the methods used to address the objectives of this study. First, supporting information regarding beaver management was compiled from RMNP, DNR, and RM records. A literature review was done at the University of Manitoba libraries in order to glean information regarding beaver ecology. Information was also obtained through personal communication with government representatives particularly regarding beaver control strategies and techniques. Finally, representatives of the major partners involved in the RMBR were surveyed with a questionnaire in order to obtain their reflections on beaver management within their respective jurisdictions.

### **2.1 QUESTIONNAIRE BACKGROUND**

Three distinct groups received similar versions of the questionnaire (Appendix 4). The first group consisted of 25 municipal Councilors and Reeves that belong to the RMRLC. The second group consisted of five DNR District Supervisors whose jurisdictions lie within the RMBR. The final group of questionnaires targeted four section heads in RMNP.

Landowners were not surveyed since they generally rely on municipal and provincial governments for managing beaver. Surveying Councilors and Reeves associated with the RMRLC and DNR staff was more practical as all pertinent information is kept within their respective offices. Surveying RMNP staff provided information that was compared and contrasted with the other levels of government.

The questionnaire was divided into four subject areas: beaver population; beaver control; administration and budget; and alternative actions. In each of these subject areas, both actual (e.g., types of control devices used; finances incurred due to beaver-associated damages etc.) and speculative information (e.g., estimated numbers of beaver in their area;

reasons for population trends and other jurisdictional responsibilities) were collected. Response analysis considered the nature of this information collected.

The four subject areas in the questionnaire reflected the objectives of this study. Throughout the questionnaire, questions were asked in order to determine the concerns and responsibilities of the major partners involved regarding beaver-associated problems in the RMBR. The questions were devised to specifically find out the respective concerns and responsibilities of the major partners involved, as actions and views of each type of respondent are largely unique. Once all the responses were gathered and analyzed, recommendations for a management framework were developed.

### *2.1.1 Councilors and Reeves in the RMBR*

Twenty-five Councilors and Reeves whose jurisdictions lie within the RMBR were surveyed during fall 1996 (more questionnaires were sent out than there are RMs within the RMRLC as many RMs are broken down into wards). The researcher telephoned each member to inform them of the study, then mailed out a questionnaire with a cover letter (Appendix 5).

The respondents were given a few weeks to complete the survey. A follow-up letter was then sent to those who had not returned completed questionnaires (Appendix 6). As well, throughout this study, the researcher attended four of the RMRLC meetings where she encouraged the completion of surveys. Follow-up phone calls helped clarify aspects of the questionnaire and further encouraged respondents to complete the questionnaire.

Initial results indicated that incomplete information was provided regarding the costs incurred due to beaver-associated damages from each of the RMs. Each of the Chief Administrative Officers in the RMBR was then contacted in order to obtain, to the degree possible, actual incurred costs.



Nineteen completed questionnaires were received. However, three RMs sent two in from their offices, representing different Wards. No information was obtained from the Village of Rossburn and only limited information was obtained from the RM of St. Rose (through channels other than the survey).

### ***2.1.2 DNR District Supervisors in the RMBR***

The same methodology used for the Councilors and Reeves was used for the DNR District Supervisors. Five DNR districts lie within the RMBR: Neepawa; Dauphin; Roblin; Shoal Lake and Grandview. A questionnaire was sent to each District Supervisor. All five questionnaires were returned completed.

### ***2.1.3 RMNP Staff***

Each section within RMNP manages beaver under the discretion of its manager. Four questionnaires were sent out in fall 1996. One questionnaire was sent to each manager of Townsite Operations, Ecosystem Protection, Roads and Bridges and the Trail Crew. However, for the purposes of this study, the respondents combined their information into one completed survey.

## **2.2 QUESTIONNAIRE ANALYSIS**

The municipal responses were segregated from the DNR responses. Jurisdictional boundaries, annual budgets and responsibilities differ between the RMs and DNR, so direct comparisons could not be made. However, those areas not relating to specific governmental procedures were compared to each other. Within the municipal responses, as with the DNR responses, all answers were compiled for each question. Such grouping allowed the researcher to discover both trends and anomalies for each question.

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## CHAPTER 3: RESULTS

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### 3.0 INTRODUCTION

The following chapter summarizes the questionnaire results. These results are categorized by the first three objectives of this study. Although information was requested for the period between 1970-1995, most respondents provided detailed information only for 1995/96. All results are therefore, restricted to the 1995/96 fiscal year.

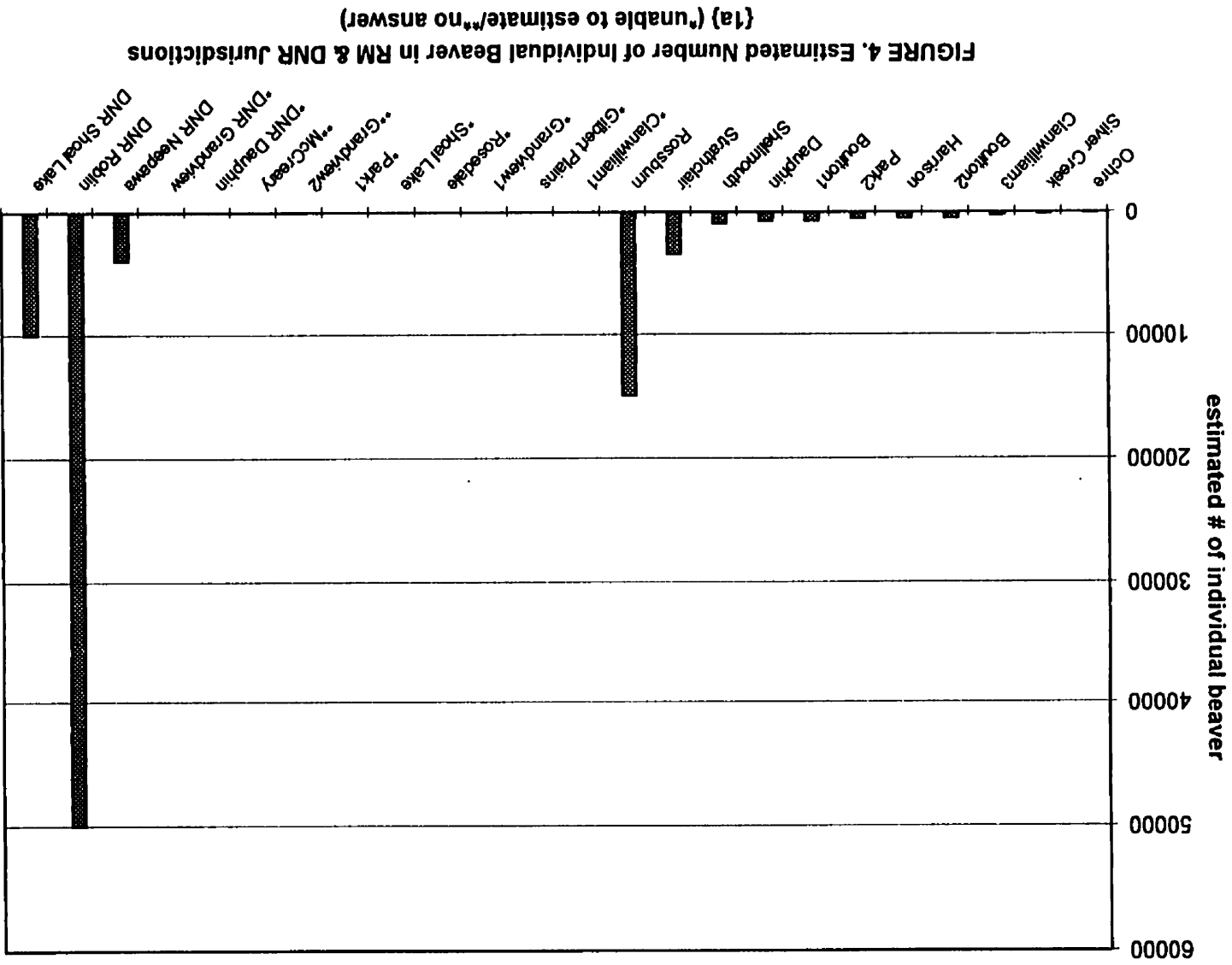
#### *3.1 OBJECTIVE #1 - to identify concerns of major partners about beaver-associated problems in the RMBR*

##### *3.1.1 Beaver Population [Questions 1a, bi, bii, ci, cii in Appendix 1]*

Respondents were asked to estimate the beaver population in their respective jurisdictions (Figure 4). Many of the RM respondents (58%) answered this question. These estimations were comparable to each other, with the exception of the RM of Rosburn's response (they estimated 15,000 individual beaver in their jurisdiction compared to an average estimate of 809 individual beaver by the other respondents). Some RM respondents (32%) were unable to provide an estimate, and a few RM respondents (11%) did not respond to the question.

Many of the DNR respondents (60%) answered this question. DNR Roblin estimated the greatest number of individual beaver (50,000). The remainder of the DNR respondents (40%) were unable to provide an estimate. RMNP provided a figure of 3,499 caches (a possibility of 13,996-24,493 individuals) based upon their aerial beaver survey conducted in the fall of 1995.

When asked whether the beaver population increased or decreased over time (1970-1995) almost all RM respondents (95%) indicated an increase. All DNR respondents indicated



an increase. Only one RM respondent indicated that they thought that the beaver population stabilized during this period. RMNP indicated that according to their surveys the beaver population had stabilized over time, with “somewhat of a decrease from 1986-88”.

When asked to describe possible causes of the population trends over time, many of the RM respondents (74%) indicated changes that occurred. These typical descriptions included (comments in parenthesis are examples of some respondents answers and are generally representative):

- increase due to decrease in beaver trapping (“partially due to destruction of trapping industry due to Green Peace”);
- increase due to RM borders RMNP -- therefore beavers migrating from RMNP (“where beavers come from”);
- increase due to termination of logging and haying in RMNP -- therefore contributing to a more suitable habitat for beaver;
- increase due to poor pelt prices;
- increase due to more intensive agricultural practices (“larger farms means farmers have less time to control beaver problems”);
- increase due to high cost of dynamite, traps, labour etc.;
- increase due to RM situated between two parks; no trapping allowed within RMNP (“which would help control populations”);
- increase due to BCP contributing to beaver population control -- therefore providing more incentive to trap beavers; and,
- decrease due to dry summers of ‘89 & ‘90 left beaver open to predators.

Some RM respondents (26%) did not respond to the question.

All of the DNR respondents described causes of population trends that occurred over

time. These typical descriptions included:

- increase due to decrease in trapping effort caused by low fur prices in the 80's ("due to anti-harvest groups");
- increase due to reduced market opportunities;
- increase due to decrease in predators;
- decrease due to low water levels and high pelt prices in '80's; and
- increase due to high water levels and low pelt prices in the '90's.

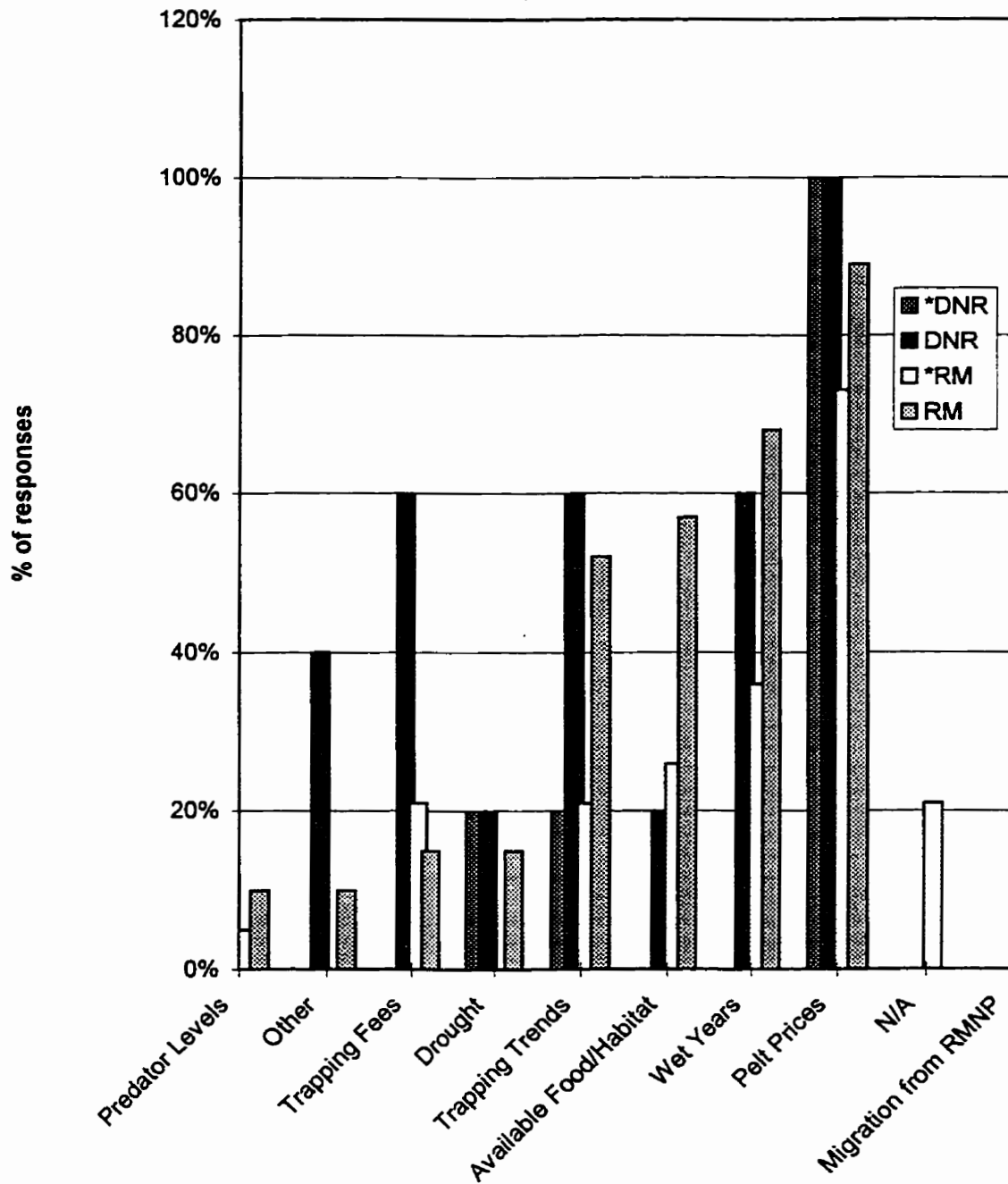
RMNP did not provide any opinions on potential causes.

Respondents were asked to indicate factors that they felt would influence beaver population trends (Figure 5). All RM respondents answered this question. They indicated the following factors (in order of priority):

- pelt prices (17 out of the 19 respondents checked off this factor);
- wet years (13/19);
- available/food habitat (11/19);
- trapping trends (10/19);
- trapping fees (3/19);
- drought (3/19);
- predator levels (2/19); and
- other - overpopulation from RMNP (2/19).

All DNR respondents also answered this question. They indicated these following factors:

- pelt prices (5 out of the 5 respondents checked of this factor);
- wet years (3/5);
- trapping trends (3/5);
- trapping fees (3/5);
- other - disease/youth not involved in trapping (2/5);



**FIGURE 5. Perceived Factors Influencing Beaver Population Trends - RM & DNR Responses {1ci & 1cii} (\*most important perceived factors)**

- available food/habitat (1/5); and
- drought (1/5).

RMNP indicated drought, wet years, predator levels and available food/habitat as the factors that influence these population trends.

When asked to describe the *most* important factors, RM respondents indicated that pelt prices (14/19), wet years (7/19) and migration from RMNP (7/19) as the top three factors influencing beaver population trends. DNR respondents indicated that pelt prices (5/5); trapping trends (1/5); drought (1/5) as the only most important factors. RMNP indicated drought and predator levels as the most important factors influencing beaver population trends.

### ***3.1.2 Beaver-associated Problems Experienced [Questions 2ai & aii]***

Respondents were asked to indicate the types of beaver-associated problems experienced in their respective jurisdictions (Figure 6). All of the RM respondents answered this question. They indicated the following types of problems (in order of priority):

- flooding of agricultural land (18/19);
- holding back water (17/19);
- flooding of roads (16/19);
- damage to trees - flooding (14/19);
- damage to trees - cutting (14/19); and
- damage to dikes, ditches or dams (9/19).

All of the DNR respondents answered this question. They indicated the following types of problems:

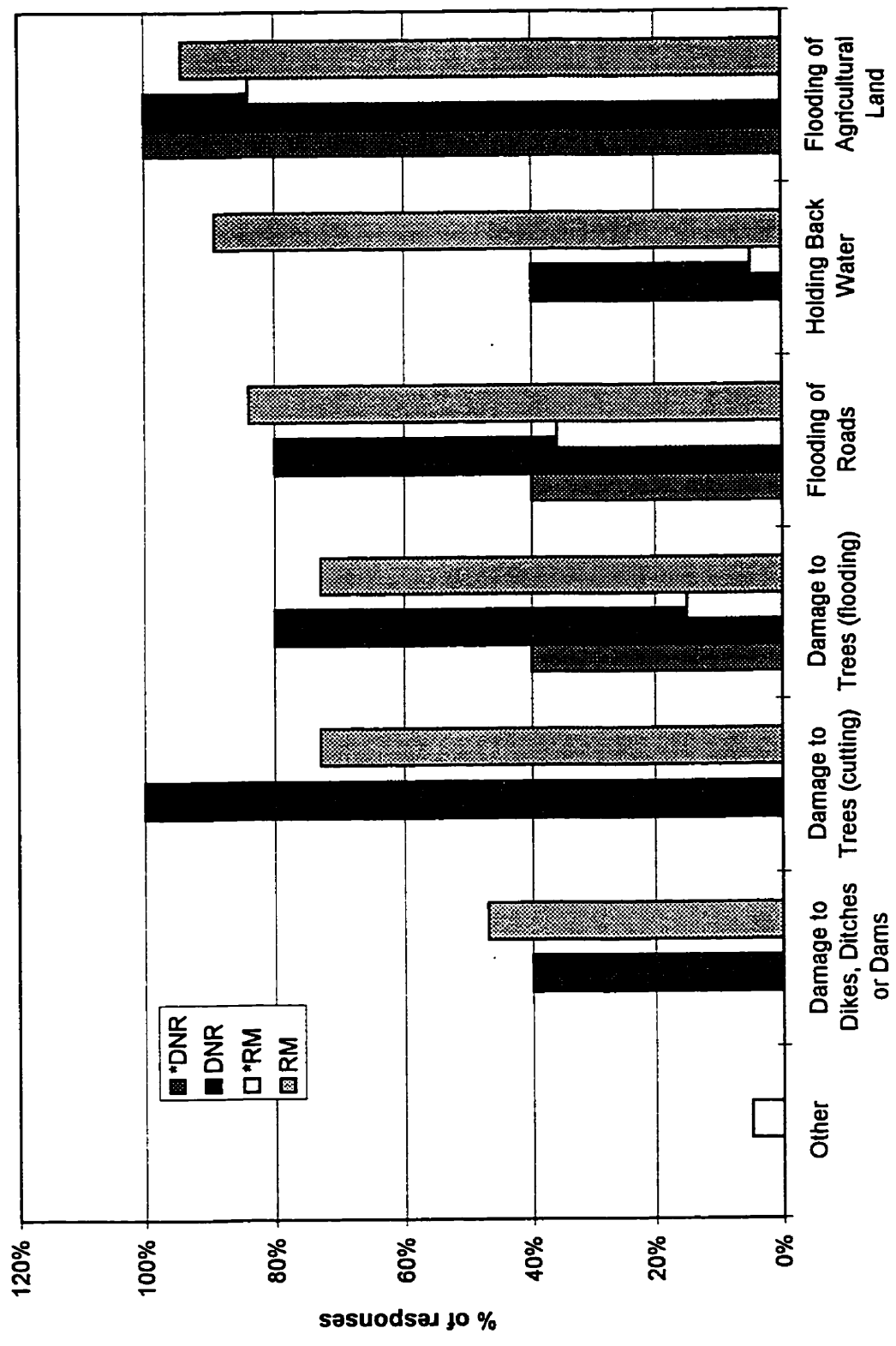


FIGURE 6. Perceived Types of Beaver-associated Problems - DNR & RM Responses (2a1 & 2a11)  
 (\*most important perceived problems)



- flooding of agriculture land (5/5);
- damage to trees - cutting (5/5);
- flooding of roads (4/5);
- damage to trees - flooding (4/5);
- holding back water (2/5); and
- damage to dikes, ditches or dams (2/5).

RMNP indicated that flooding of agricultural land, flooding of roads, holding water back and damage to dikes, ditches and dams as the types of beaver-associated problems experienced in their jurisdiction.

When asked to describe the types of problems that cause the *most* public concern (Figure 6), RM respondents indicated flooding of agriculture land (16/19), flooding of roads (7/19) and damage to trees - flooding (3/19) as their top three choices. DNR respondents indicated that flooding of agricultural land (5/5), flooding of roads and damage to trees - flooding (2/5) as their choice to the same question. RMNP indicated that flooding problems and contamination of drinking water as their answer.

### ***3.2 OBJECTIVE #2 - to delineate the costs of, and responsibilities for, addressing beaver-related concerns***

#### ***3.2.1 Costs and Responsibilities for Beaver-related Concerns [Ques. 2c, d, ei & eii ] Control Techniques***

Respondents were asked for the total expenditures for those control techniques that are used (equipment and labour) in their jurisdictions (Figure 7). Many of the RM respondents (63%) provided an estimate. Few of the RM respondents (21%) did not provide an answer, and even fewer (16%) indicated that they do not keep track of these figures. The estimated answers ranged from \$0-15,000. Some of the respondents indicated that the



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costs were higher in the past when the RM performed beaver control on private land.

Many of the DNR respondents (60%) provided an estimate that ranged from \$300-35,000. Few of the DNR respondents (40%) do not keep track of these figures. It was indicated by one DNR District that they do not become "that involved" in installing these devices as this responsibility lies primarily on the RMs and/or landowner. RMNP responded by indicating an actual figure of \$3,558.30 for 1995. They also indicated that this tends to be an average figure for the Park.

#### *Person-hours*

Respondents were asked to indicate the number of person-hours that were devoted to installing and maintaining the control techniques (Figure 8). Less than half of the RM respondents (42%) provided estimated answers for this question. The person-hours spent ranged from 15-1,250 hours. Some respondents (31%) did not provide an answer and a few of the respondents (26%) do not keep track of these figures. Some RMs indicated that these hours were spent primarily on clearing culverts and ditches.

Many of the DNR respondents (80%) indicated person-hours spent which ranged from 50-570 hours. RMNP indicated an actual figure of 804 hours devoted to maintaining and installing control techniques.

#### *Responsibility of Work*

It was indicated by all RM respondents that the responsibility of carrying-out the installation and maintenance of control techniques lies primarily with the RM staff, and Councilor (although it is the hired trapper that traps beaver under the BCP). All DNR staff indicated that this responsibility lies with the Natural Resource Officers, RM staff and the landowners (depending on the nature and the locality of the problem). RMNP indicated that all the Park Wardens and maintenance crews were responsible for such activities.

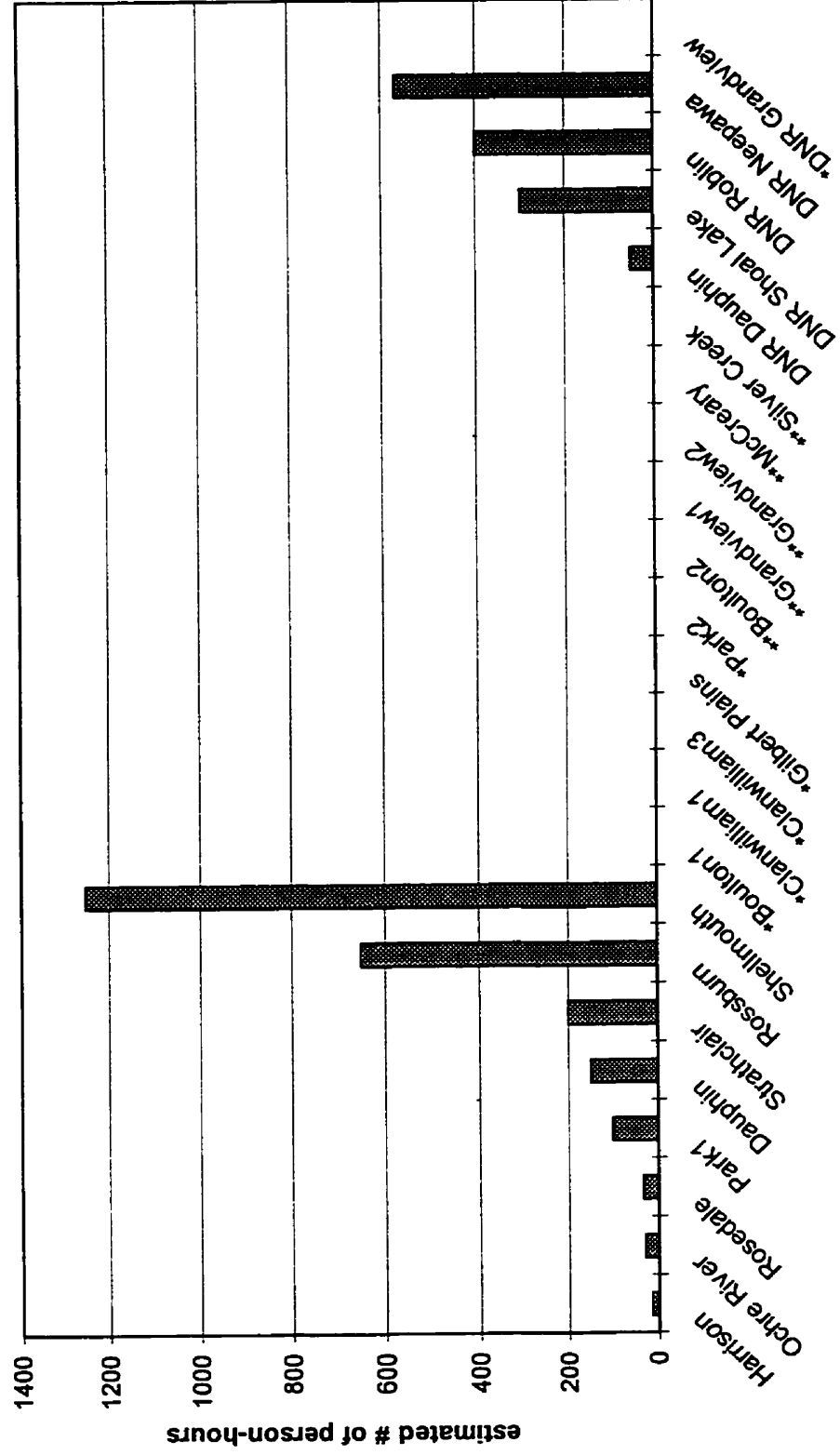


FIGURE 8. Estimated Number of Person-hours Devoted to Control Devices - RM & DNR Response {2d}  
 (\*don't keep track/no answer)

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*Source of Budget*

When asked what budget source this work comes from, RM respondents (59%) indicated that it comes primarily from the RM budget. However, some respondents (32%) indicated that the budget source comes from both the RM budget and the BCP (only for trapping beaver). One respondent indicated that the budget source comes primarily from the BCP, and 11% of the respondents did not answer the question. The respondents indicated that the source of budget for trapping beaver came from the BCP and that all other beaver control activities came from the RM budget. DNR and RMNP were not asked this question.

**3.2.2 Trapping Beaver [Questions 2fi & fii]***Responsibility*

When asked who is responsible for trapping beaver in the RMs RM respondents (68%) indicated that registered trappers are primarily responsible (on RM property). RM respondents (26%) indicated that ratepayers are responsible for trapping beaver in RMs (particularly on landowner property) and one RM respondent did not provide an answer. DNR and RMNP were not asked this question.

*Source of Budget*

The budget source for trapping beaver was indicated by some RM respondents (42%) to come primarily from the BCP. However 21% of the RM respondents indicated that the budget source comes from both the BCP and the RM budget. RM respondents (16%) indicated that the RM budget was their only source for trapping beaver, and 21% of the respondents did not provide an answer. DNR and RMNP were not asked this question.

**3.2.3 Total Budget Allocated for Beaver Management [Question 5a]** Respondents indicated the total budget allocated towards beaver management for their respective jurisdictions. Largely, the RM respondents do not have a specific budget set aside for

beaver management. These costs come from the overall operating budget and/or from the public works and/or from the road maintenance budget. However, the RM respondents did indicate estimates spent on beaver management activities in their RMs (Figure 9). Some RM respondents (42%) provided an estimate that ranged from \$450-15,000. Some RM respondents (42%) indicated that no budget was allocated and did not provide an estimate, and few of the respondents (16%) did not provide an answer at all.

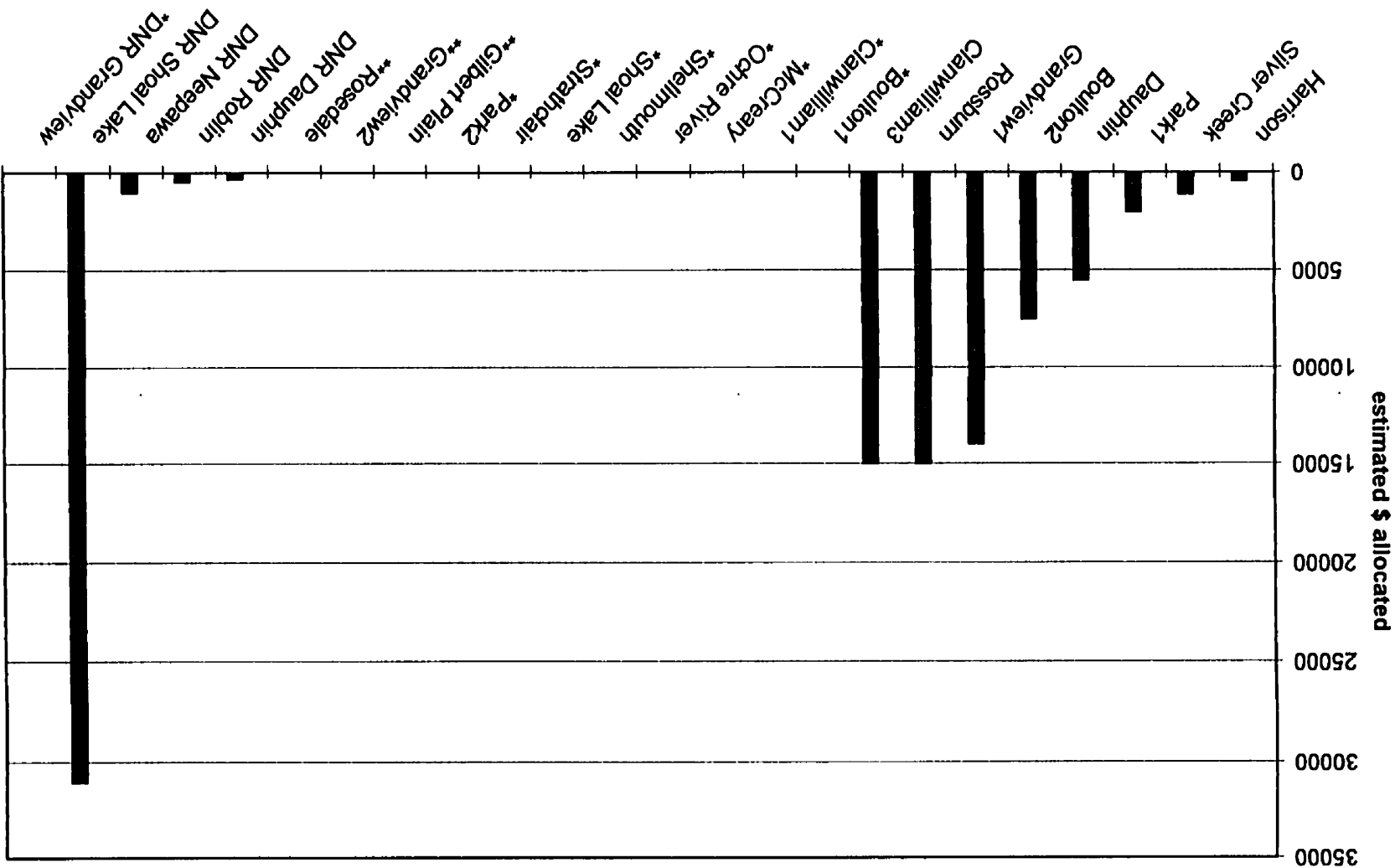
As this information (provided by the RM respondents) was estimated and sparse, information from the RM Offices was obtained (Figure 10). The information received was the actual expenditures on beaver control (1995). These expenditures ranged from \$0 to \$37,305 (Rosburn), and are largely based on annual costs of repairing washouts in and around culverts & culvert replacement and of municipal workers & equipment.

Many of the DNR respondents (80%) provided an estimate that reflected the total budget allocated towards beaver control. These estimates ranged from \$350-31,000. However, the DNR respondents indicated that there is no set budget allocated towards beaver control with the exception of DNR Dauphin, as they have a set amount for problem wildlife control. These estimates do not include the BCP contributions (with exception to DNR Shoal Lake). These estimates are strictly those costs expended on beaver control within each district. One DNR respondent and RMNP indicated that they do not have a budget allocated, and, as well, they did not provide an estimate.

#### ***3.2.4 Budget Source and Sufficiency [Questions 5b & c]***

Some RM respondents (32%) indicated that the source of this budget (total budget allocated towards beaver management) is the RM (general) budget. A similar number of respondents (32%) indicated that their source came from both the RM budget and DNR (e.g. trapping receipts under the BCP). A few respondents (16%) indicated that their source is DNR only (e.g. BCP). The question was not answered by 21% of the respondents. DNR respondents (60%) indicated that the source of this budget is the

FIGURE 9. Estimated Total Budget Allocated Towards Beaver Management - RM & DNR Response (6a)  
(\*no budget allocated/\*\*no answer)



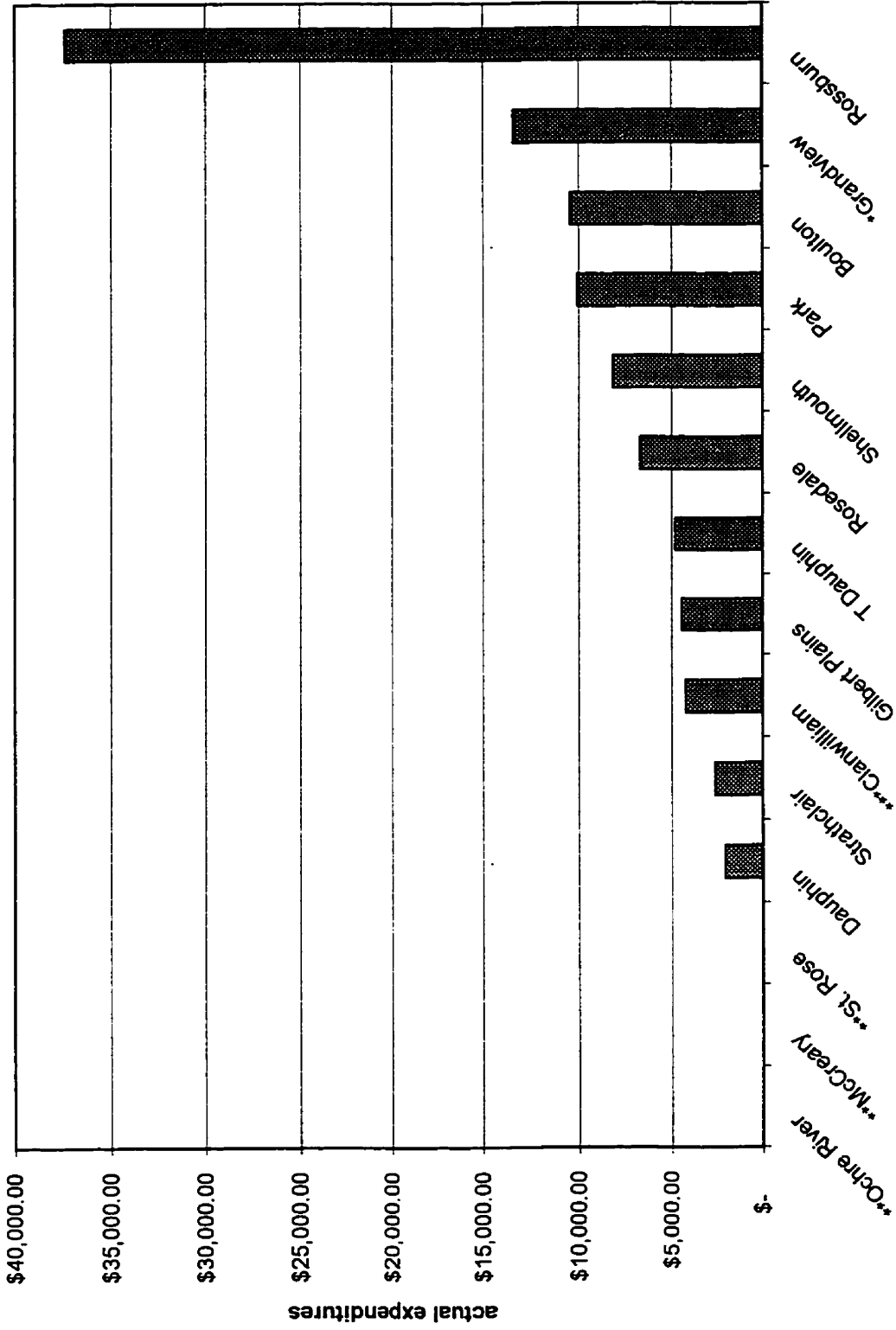


FIGURE 10. Beaver Management Expenditures - 1995(\*average/cost/year/\*\*no costs expended/\*\*approx.costs)  
Source: RM Chief Administrative Officers



provincial government's central budget, whereas the remainder of the respondents (40%) indicated that their source is DNR funds. RMNP did not provide an answer to this question.

When asked whether this budget was currently sufficient for beaver-associated problems experienced in their respective jurisdictions, many of the RM respondents (58%) indicated that it was not sufficient. Some of the reasons given for this insufficiency included: time/wages spent on cleaning and repairing culverts and dynamiting dams; problems experienced on private property; and damage to roads and land. Some of the RM respondents (26%) indicated that this budget was currently sufficient, and 16% of the respondents did not provide an answer.

Many of the DNR respondents (60%) indicated that this budget is sufficient and the remainder of the respondents (40%) indicated that it does not suffice to meet their needs ("as it does not cover mileage costs"). RMNP indicated that they "would like to set aside a specific budget for beaver management" as they do not currently have sufficient funds (funding beaver management activities generally come from other revenue e.g. roads and bridges).

### *3.2.5 Satisfaction with BCP and "top-up" [Questions 7i & ii]*

Respondents were asked if they were more, less or equally satisfied with the BCP than with the previous Federal/Provincial agreement. Many of the RM respondents (47%) indicated that they are more satisfied ("as problem beavers are directly removed") and some of the respondents (26%) indicated that they are equally satisfied ("any support is good support"). A few of the respondents (16%) are less satisfied ("more federal support is desired") and few respondents (11%) did not provide an answer. An equal number of DNR respondents (40%) indicated that they are more satisfied (as there is less input by DNR) as well as less satisfied. One DNR respondent did not answer. RMNP did not answer the question.

When asked whether or not the RMs “topped-up” the \$15 DNR pays per beaver, many of the RM respondents (89%) answered no (administration costs/road repairs/maintaining culverts are absorbed by the RM). However, one respondent (Rosedale) indicated that they do supplement DNR funding with an additional \$10 (Total: \$25). One respondent did not answer the question. DNR and RMNP were not asked this question.

### ***3.3 OBJECTIVE #3 - to evaluate relevant strategies and techniques used to address beaver problems as related to beaver ecology and the regional ecosystem***

#### ***3.3.1 Control Devices Used in the RMBR [Question 2b]***

Respondents were asked to indicate those types of control devices that were used in their respective jurisdictions (Table 1). Although it was asked that information be provided from 1970-1995, most respondents only checked off those control devices that were used during 1990-1995/6 (years were grouped into 5-year periods). RM respondents indicated the log-pull method (for clearing road culverts), dynamiting dams (to lower water), and trapping and shooting beaver as the techniques most used and successful for controlling beaver-associated problems.

DNR respondents indicated dynamiting dams (to lower water), trapping, kill trapping and shooting beaver as the techniques found to be the most used and successful for controlling beaver-associated problems. RMNP indicated the log-pull method and explosives (for clearing plugged culverts), dynamiting and manually taking apart dams, Beaver Baffler, tree fencing, tree-wrapping, kill trapping and shooting beaver as the techniques most used and successful for controlling beaver-associated problems.

#### ***3.3.2 Alternative Action [Questions 6, 8, 9]***

The respondents were asked to list and describe any alternative management techniques or control devices that they would like to try in their respective jurisdictions. Many of the

TABLE 1. Types of control technique used in RMBR &amp; rate of success '95-96 (2b)

Name of Control Technique	RMLGD		DNR	
	Mean Score	# of Responses	Mean Score	# of Responses
<b>Road Culvert Protection</b>				
Floating Electric Fence	4.7	8	5	3
Perforated Culverts	4.7	8	4.7	4
Wire Mesh Cylinders	3.2	12	5.3	3
Culvert Protector-cleaner	3.6	10	2.7	4
Other (elbow culvert)	2	1		0
<b>Road Culvert Clearing</b>				
Log-pull Method	2	13	4.7	3
Water Pumps	3.1	7	4.3	3
Detonator Explosives	2.3	9	4.7	3
Other (manual work)	1.3	3	3.5	2
<b>Lowering of Water -destroy</b>				
Dynamite	1.5	17	1.4	5
Manually	2.5	15	2.2	4
<b>Lowering of Water Levels</b>				
Perforated Culverts	4.2	7	4.3	3
Three-log Drain System	4.8	7	5.7	3
Beaver Stop Limiters	4.4	7	5.7	3
Beaver Baffle	4.8	7	5.7	3
Clemson Leveler	4.7	7	5.7	3
Other (type not listed)	5	1	/	/
<b>Tree Protector</b>				
Tree Fencing	3.8	9	2.6	5
Paint-on Beaver Repellent	4.7	7	5.2	4
Tree-wrap	4.7	7	3.5	4
<b>Animal Control Methods</b>				
Trapping	1.6	16	1.5	4
Live Trapping	3.4	7	4	4
Kill Trapping	2.2	12	1.3	3
Shooting	1.5	15	2	5

**Key**

1 = most used and most successful

5 = least used and least successful

RM respondents (58%) indicated that they would like to try some kind of technique or device. Some suggestions included: water levelers as listed in Table 1; beaver eradication program; beaver management strategies implemented in the fringe areas of RMNP; more culvert protectors; and control/contain animals in RMNP (population control or by putting a fence around the Park). Some respondents (26%) did not answer the question. A few respondents (16%) indicated that there are no techniques or devices that they would like to try in their area as current methods are sufficient.

Many of the DNR respondents (60%) indicated that they would like to try some kind of device or technique. Their suggestions included: not leasing flood prone lowlands; vegetation management at or near culverts/ bridges; remove beaver from protected status under the *Wildlife Act* (on private and municipal land); and a trapping course for the local farm operators. Some of the respondents (40%) did not answer the question. RMNP indicated that they would be “more than willing” to try new techniques and devices, particularly if it would save the Park time and money.

Respondents were asked to suggest a more efficient beaver control strategy. They were also asked to provide any further comments that they might have regarding beaver control. Both of these responses were similar in type as they provided a full range of beaver management strategies (Table 2 & 3). RMNP suggested looking at new water control devices (type not mentioned) that would reduce or prevent flooding of trails and roads. Some answers from the questionnaire [Questions 3a, 3b, 5cii] were not summarized as the results of those questions were unusable.

**TABLE 2. Suggestions for more efficient beaver control strategies Question 8.**

SUGGESTIONS	# of RESPONSES	
	RM	DNR
Traplines in RMNP	1	/
Demonstration Projects (control dev.)	1	/
Pop. Control in RM and Duck Mt. Parks	3	/
Longer Trapping Seasons	1	/
Work Program (for UI recipients)	1	/
Dev. Markets for other Beaver Parts	1	/
Install More Water Control Devices	1	/
Increase Beaver Trapping (promote trap)	3	/
Increase Trapper Fee (from DNR)	1	/
Subsidize Market Value for Beaver Pelts	/	1
Habitat Mgmt near problem drainages across/along roadways	/	1
Agricultural assessment on marginal hayland/lowlands	/	1
Remove beaver from protection status	/	1
RMs designate a few trappers to remove all beaver	/	1
N/A	8	/

**TABLE 3. Other comments provided on beaver control. Question 9.**

COMMENTS	# of RESPONSES	
	RM	DNR
Exterminating All Beaver in RMNP	2	/
Allow Trapping on Park Border/in RMNP	3	/
Continuation of Beaver Control Program	2	/
Organize Trapping –spread trappers over RMBR	1	/
Increase \$ Paid out to Trappers	1	/
Attract New Trappers	1	/
Biological Controls	1	/
No Transplanting of Beaver into RMNP	1	/
Increase Beaver Pelt Price	1	/
Greater \$ Support from Federal Government	1	/
Increase trapping in concentrated areas	/	1
N/A	/	4

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## CHAPTER 4: DISCUSSION

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### 4.0 INTRODUCTION

The following chapter discusses the results of the questionnaire in view of other studies reported in the literature and personal observations. Based on this discussion, contributions towards an ecosystem-based management strategy will be developed in order to serve as a management tool for the partners in the RMBR (Objective 4).

#### *4.1 OBJECTIVE #1 - to identify the concerns of the major partners involved about beaver-associated problems in the RMBR*

##### *4.1.1 Beaver Population*

All the survey respondents indicated that the population of beaver was a concern particularly when the population increases. It was perceived by all respondents that the greater the population of beaver in an area, the greater the likelihood that beaver-associated problems will occur. The RM<sup>3</sup> and DNR respondents were not able to provide a numerical population estimate, as this information is not available (unlike RMNP, the RMs and DNR do not conduct aerial beaver surveys). However, DNR has stated in their Report on Wildlife (1997) that beaver is “now considered to be at an all-time high population”. This perception is based upon the increase in trapping returns e.g., number of pelts marketed each year (DNR bases beaver population trends upon trapping returns).

Survey responses provide a glimpse of perceptions held by partners involved in the RMBR. Generally, the RMs under-estimated the beaver population in comparison to DNR. For instance, DNR Roblin estimated the beaver population at 50,000, yet the RM

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<sup>3</sup> Geographical area for each of the RMs differ from each other: Dauphin (1,467km<sup>2</sup>); Grandview (1,126); Gilbert Plains (1,009); Rosedale (858); Park (792); Rossburn (701); St. Rose (606); Shellmouth (559); Boulton (556); Shoal Lake (548); Strathclair (525); Silver Creek (521); Ochre River (518); McCreary (508); Harrison (484); Clanwilliam (343).

of Boulton and Shellmouth whose jurisdiction lies within this district (Figure 12) estimated a total far less (2,240 beaver). However, DNR Roblin's estimation may be more reasonable, as DNR believes that there are currently 1 million beaver within Manitoba, with most found in the northern and central areas of the province (McKay, pers. comm., 1997).

Largely, the respondents believe that the population is increasing in their jurisdictions. The questionnaire did not ask *why* they believed the population is increasing, yet in describing the population trends over time, respondents indicated a wide range of reasons (perceived or actual). When asked about factors influencing beaver population trends, RM respondents largely indicated pelt prices, wet years, and migration from RMNP. As many RM respondents were critical of RMNPs role in beaver management in the RMBR (Rounds, 1980 and questionnaire comments), it is interesting that they view migration from RMNP as the third most important reason.

In some US jurisdictions, it was found that beaver population growth has continued due to low trapping effort (primarily linked to low pelt prices) and absence of natural predators (Clements, 1996). Very few RM respondents indicated predator levels as an important factor influencing beaver population trends, whereas, RMNP indicated they felt predator levels to be one of the most important factors. Previous studies have determined that predation is a significant mortality factor and that beaver are generally most vulnerable to predation by wolf (*Canis lupus*) and coyote (*Canis latrans*) particularly when they are away from water (Fuller and Keith, 1980; Payne 1984; Potvin et al, 1992)).

In RMNP, wolves are found largely to prey on ungulates (Carbyn, 1980; Richards, 1997). As well, the wolf population has been steadily decreasing since 1975 in the Park (Richards, 1997). These two factors may account for the recent low predation on beaver by wolves, as historically the wolf has been the primary predator of the beaver in the Riding Mountain area (Green, 1936; Carbyn, 1980; Young, 1994).



Currently, there is a wolf education and compensation program in the RMBR whose primary mandate is to promote the understanding of the wolf and its place in the Riding Mountain ecosystem (Goulet, pers. comm., 1997). As well, research is currently being conducted into the home ranges and population of wolves in the RMBR. The results of this research will provide some insight on the relationship between the wolf and the beaver. However, it will not determine the extent of the predator/prey relationship between the wolf and the beaver particularly within the current ecosystem context.

The coyote population, alternatively, increased throughout its range in Manitoba between 1992-1997 (DNR, 1997). However, the coyote population was influenced by an outbreak of sarcoptic mange that killed thousands of animals (Manitoba Environment, 1997). Despite this setback, the population continued to flourish throughout Manitoba. In RMNP, the coyote was found to prey on beaver (Green, 1936; Carbyn, 1980). However, because there are other food sources available such as mice (*Peromyscus* spp.) and pocket gophers (*Thomomys talpoides*), the coyote is not a primary predator of the beaver (Gese et. al, 1996).

RM respondents also indicated wet years and migration from RMNP as factors influencing beaver population trends. Carbyn (1980) suggested that the abundance of aspen and the lack of trapping (or beaver control) are primarily responsible for the high beaver population in RMNP. However, predation and fluctuating water levels were also found to be important factors in beaver population dynamics (Goldsmith and Rounds, 1979; Trotter, 1980). Generally, when water levels are high beaver populations flourish alternatively, when water levels are low, beaver populations are also low.

DNR respondents also listed pelt prices and trapping trends as factors influencing beaver population trends. They, like RMNP, indicated that drought was also an influencing factor. Carbyn (1980) suggested that low water levels (or drought) influence beaver

populations since marginal ponds disappear (therefore increasing number of migrant beaver), beavers are then more exposed to predation by wolves, coyotes and bears, and as well, smaller ponds increase chances of dispersal (as intra-colony strife and competition are greater).

#### **4.1.2 Beaver-associated Problems**

Another concern for the partners in the RMBR are the beaver-associated problems experienced in their jurisdictions. These problems are a result of beaver activity either upstream or downstream from an area of concern. The questionnaire asked the respondents to indicate the *types* of problems experienced by their constituents. Both RM respondents and DNR respondents indicated the same problems that cause the most public concern (flooding of agricultural land, flooding of roads and damage to trees due to flooding). As these two partners agree on these problems, it may facilitate cooperative problem-solving efforts. RMNP had a similar response (flooding problems) but listed contamination of drinking water as the other problem that caused the most public concern.

The results from this study are similar to the types of beaver-associated problems other resource managers and field staff experienced in jurisdictions across North America. In a survey conducted by D'Eon (1995), 505 respondents indicated culvert blockage/damage (82%), road flooding/damage (71%), flooding of land (57%), and damage to standing timber (48%), as the types of problems most experienced (D'Eon, 1995). As these problems are similar to those experienced in the RMBR, a collaborative effort between these jurisdictions may facilitate in finding workable solutions.

In a study conducted in the RM of Rosssburn, landowner respondents indicated that beaver-associated problems primarily involved flooding of agricultural land and the obstruction and flooding of roads (Goldsmith and Rounds, 1979). The greatest losses were found to occur on hay land and pasture land and minor losses occurred on cropland and wooded acreage. In this same study, beaver-associated problems on RM property

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primarily involved maintaining and rebuilding of roads and bridges due to flooding.

In a further study, which involved the remaining RMs surrounding RMNP, it was determined that beaver-associated problems primarily involved flooding of agricultural land and the obstruction and flooding of roads (Rounds, 1980). It seems apparent then, that the most significant and longstanding beaver-associated problem occurring in the RMBR involves flooding of agricultural land and roads.

## ***4.2 OBJECTIVE #2 - to delineate the costs of, and responsibilities for addressing beaver-related concerns***

### ***4.2.1 Costs for Beaver-related Concerns***

#### ***Control Techniques***

Although many of the RM respondents provided an estimate in the form of total expenditures on control techniques and road and culvert repairs (equipment and labour), these estimates are too general (Figure 7). The formal records at many RM offices do not separate beaver-caused repairs from general road repairs/maintenance or the estimates are so low that they are listed under a different heading (e.g. “pest control” or “road damage”). Largely, beaver damage is not frequent enough for those RM respondents who did not provide answers, do not keep separate track of such records or whose estimations were at or near \$100. Exceptions were Clanwilliam1, Harrison, McCreary and Shoal Lake possibly because they are all located in floodplain areas.

Generally, the estimates given by RM respondents are consistent with the variation of topography throughout the RMBR. The likelihood of flooding is greatest along the southern boundary of RMNP where the RMs of Park, Rosssburn and Clanwilliam are located. It is also these RMs, (Park1 and Park2, Rosssburn and Clanwilliam3) that indicated the highest control expenditures.

This trend is comparable to the results obtained from the landowner study conducted by Rounds (1980). He determined that hayland flooding was most prevalent along the southern boundary. However, he also determined that individual economic losses were greater along the northeastern boundary (two streams are located in this area). The RM of Ochre River (located along the northeastern boundary) was the only respondent that provided an answer (\$500) that was not consistent with Round's findings (landowners lost an average of \$780/year between 1970-1978 in alleviating beaver problems).

It was difficult to determine whether or not the RM respondents separated the total costs spent on control techniques (Figure 7) from the estimated total budget allocated towards beaver management (Figure 9), as generally these results are similar. The RMs of Clanwilliam (Clanwilliam3) and Rossburn again indicated the highest estimates (total expenditures on beaver management) yet these estimates are exactly the same as they reported for total expenditures on control techniques. Also, the RM of Grandview (Grandview1) indicated a total budget (spent towards beaver management) of \$14,000. Grandview1 did not indicate anywhere in the questionnaire what exactly this budget was spent on. A more specific line of questioning may have clarified this confusion.

DNR Shoal Lake estimated the highest expenditures (\$35,000) out of the answers provided by all of the respondents (Figure 7). However, the expenditures listed by one DNR respondent (Shoal Lake) are not for control techniques used within this district, but for BCP expenditures (unlike the information provided by the other districts). This estimation is consistent with the estimates from RMs of Rossburn and Park, as these RMs lie within the district of Shoal Lake. Since this district is located in a floodplain area, it is not unexpected that this cost estimate is the highest. However, what is notable is that this cost estimate is the highest estimate indicated by far by any respondent. This significance is due to more beaver removed (1,946 beaver removed x \$15 = \$29,190) in the District of Shoal Lake than any other district in 1995 (Ripley, pers. comm., 1998).

Under the BCP, the RM of Rosburn removed the most beaver in 1995 (1,074) than any other municipality in Manitoba. It is estimated that approximately 300-350 beaver were removed from the Birdtail River in the RM of Rosburn (DNR Shoal Lake records). In 1995, a total of 3,953 beaver were removed from those RMs within the RMBR. This translates into \$59,295 that these RMs were reimbursed for or 57% of the BCP total amounts for 1995.

DNR Roblin indicated the second highest estimated total expenditures (on control techniques) and is consistent with the estimation provided by the RM of Shellmouth (RM of Boulton did not keep track), as this RM lies within the district of Roblin. However, DNR Roblin is inconsistent as they indicated greater estimated total expenditures on control techniques (Figure 7) than that indicated for total budget (Figure 9). A possible reason for this difference lies in the wording of the question. The DNR districts do not have a budget allocated specifically towards beaver management, although money is spent on various aspects of beaver control (mileage, control devices etc.). These funds are listed under a number of expenditure listings (e.g. ditches and road drainage).

It would seem that DNR Neepawa should have indicated greater costs for beaver control, as the RMs of Clanwilliam and Rosedale (which lie within the district of Neepawa) indicated higher estimations. However, as one DNR respondent indicated, DNR does not install control techniques on RM and landowner property. Since DNR staff does a combination of trapping/shooting and dam removal, further investigation of responsibilities *between* DNR districts may provide insight regarding beaver management cost discrepancies.

#### *Person-hours*

All respondents generally perceive that many person-hours are devoted to installing and maintaining control techniques used in the RMBR area (Figure 8). However, there are more respondents who either did not keep track of person-hours incurred or did not

provide an answer than those respondents who did provide an estimate. Of those that provided an estimate, the RM of Rossburn is the only respondent whose estimate is consistent with the total expenditures on control techniques (Figure 7).

The RM of Shellmouth indicated the highest estimate of all respondents, yet their estimated expenditure (on control techniques) is lower than the estimates provided by the RMs of Rossburn, Park and Clanwilliam. This high estimate may be due to the type of technique (manually clearing culverts) used in this RM, as it is very labour-intensive. The respondent for the RM of Shellmouth may have under-estimated the total expenditures on control techniques, as the actual beaver management expenditures (Figure 10) provided by the RM office, was slightly greater than the estimated costs provided.

The highest estimate indicated by DNR was Neepawa (Figure 8). The RM of Clanwilliam is located in this district so this information is consistent with the geography of the area. DNR Shoal Lake provided almost the lowest estimate. This was unexpected, as the RMs of Rossburn, Park and part of Clanwilliam are located in this district. However, in other years, DNR Shoal Lake indicated directing about 500 person-hours towards control techniques. DNR Neepawa may have taken on more responsibility (for installing and maintaining techniques) than DNR Shoal Lake in 1995.

In the study conducted by Rounds (1980), the most time spent by landowners in alleviating beaver-associated problems was by landowners located in the RM of Rossburn (853 person-hours), the RM of Clanwilliam (821 person-hours) and the RM of Park (501 person-hours). These numbers are based on the average hours spent between 1970 and 1978. These landowner results are not directly comparable with the RM and DNR results. However, both landowner and RM staff hours show that these RMs generally experience the most beaver-associated problems in the RMBR.

Less than half of all respondents provided an answer to the question: "how many person-

hours spent on installing and maintaining control techniques?”. It would be beneficial to obtain more specific information regarding the actual hours spent on installing and maintaining control techniques in order to effectively evaluate the total costs expended on beaver control. For instance, it would be beneficial to know if the RM of Clanwilliam devotes a significant amount of time on control devices. It is suspected that they do, as their estimated expenditures on beaver control is higher than the other RM expenditures.

#### *Responsibility for Work*

The responsibility for carrying out the installation and maintenance of control techniques lies with staff at each government level. However, depending on the nature, urgency, locality, and program in place (e.g. BCP), trappers and landowners also participate in beaver control. However, other than the trappers hired through the BCP, the trappers, along with the landowner, generally trap independent of governmental support. The trappers are motivated to trap beaver by reason of pelt prices and landowners tend to take matters into their own hands.

For 1995/96, the RMs (based on the information provided in the questionnaire) spent more time (estimated 2,430 person-hours) and more dollars (estimated \$72,096) on beaver control (damage repairs) than DNR (estimated 1,320 person-hours and estimated \$45,300 dollars spent) and RMNP (804 person-hours and \$3,558) on the installation and the maintenance of control techniques and damage repairs. This would suggest that the RMs bear most of the costs regarding beaver control in the RMBR.

#### *Source of Budget*

The budget source for beaver control (shooting, and dynamiting) for the RMs comes primarily from their (general) budget. These activities include all beaver damage control/repairs (e.g. culvert clearing etc.). However, trapping and shooting beaver are funded through the Beaver Control Program. The following section will discuss the trapping of beaver in more detail.

### **4.2.2 Trapping Beaver**

#### ***Responsibility***

Registered trappers carry out beaver trapping in the RMs. Each RM has a list of trappers that they contact. Once contacted, the trapper goes out to the designated site, traps the beaver and returns with the hind/front feet of the beaver for the BCP reimbursement (Table 4). However, some landowners obtain a kill permit (as issued by either RM or DNR officials) and trap beaver on their property. The landowners may or may not request BCP reimbursement.

#### ***Source of Budget***

Both the RM budget and the BCP were indicated as sources of funding for trapping beaver. However, slightly more RMs indicated that the BCP was their primary source of funds for trapping than was their own from RM budget. Some RM staff, trappers and landowners do not claim costs from the BCP. There may have been some confusion in those answering this question (does trapping come out of the RM budget or from the control program?), as RMs do not pay any amount for trapping beaver (with the exception to Rosedale), particularly since the BCP has been in effect. Otherwise, the RM may contact a trapper to remove a beaver from a particular problem site then reimburse the trapper through the BCP.

Many RM respondents indicated that trapping would not be used as often if it were not for the BCP. This is the case because much of the RM budget (related to beaver control) goes towards other beaver-related activities (e.g. manually clearing culverts, shooting, dynamiting and installing and maintaining water control devices). The BCP, therefore, is considered an important feature of beaver control in the RMBR, particularly when pelt prices are low, as it provides some funding incentive to the trapper.



**TABLE 4. Administrative steps taken by RM survey respondents. (Question 4)**

RM's	ADMINISTRATIVE STEPS						
	1	2	3	4	5	6	7
Boulton1	X	X					
Boulton2	X						
Clanwm1	X		X	X			
Clanwm3		X		X			
Dauphin	X	X			X		
G.Plains		X				X	
Grandvw1					X		
Grandvw2	N/A						
Harrison		X					X
McCreary				X			
Ochre Rr	N/A						
Rosedale			X	X			
Rosburn		X		X			
Shellmth		X		X			
Silver Crk		X		X			
Shoal Lke							
Strathclair		X		X			
LGD-Pk1	X	X					
LGD-Pk2				X			

**KEY****Administrative Steps:**

1. Check out the problem; determine if the problem is landowner responsibility or RM responsibility.
2. If RM responsibility then open the beaver dam or culvert manually; bills submitted to RM office then authorized and paid by council.
3. Apply to have site designated under the Provincial Beaver Control Program. Councillor signs a kill permit, faxes it over to DNR who in turn faxes it back signed by Resource Officer. Once forms done then the trapper or landowner is notified to proceed.
4. Inform trapper to dispose of beaver (DNR gives a grant of \$15/beaver to RM for each confirmed kill).
5. If not RM responsibility but landowner responsibility then provide advice to landowners regarding how to perform corrective action (list of available trappers or some who dynamites).
6. Paper work involved for RM: trapper/landowner gets forms from office and fills out (date, legal description, # of beavers); Councillor counts legs and signs form; office staff stamps form and checks it then makes out a cheque (\$ from RM budget); cheque is passed at next council meeting; form filled out and sent to DNR for reimbursement.
7. RM holds beaver depots and arranges DNR staff to attend in order to confirm # of beaver feet.

### 4.2.3 Total Budget Allocated for Beaver-related Activities

Many respondents indicated an estimated total budget allocated towards beaver management for their jurisdictions (Figure 9). It is difficult to derive overall costs associated with beaver-related activities as the information received was estimated and incomplete (most RM respondents either indicated that they do not keep track or did not provide an answer). Since the concern about assignment of financial responsibility is important in the RMBR, complete records would be highly beneficial for future programs and cost-share agreements.

Another challenge with the information received was with the inconsistency between the beaver control estimates (Figure 7) and total budget estimates (Figure 9). It was expected that beaver control estimates would be a portion of the total budget estimates. Instead, these estimates were generally similar. It was difficult to discern in what way the respondents understood these questions.

Those answers provided showed that the RMs together spent more (\$60,550) on beaver control than DNR<sup>4</sup> (\$32,850). However, if the actual BCP costs (\$59,295) for 1995 were included (Appendix 2) then the total amount spent on beaver control for DNR would result in a slightly greater amount (\$61,145<sup>5</sup>) than the RMs total amount. The RMs of Rosburn and Clanwilliam estimation was the highest, which is consistent with the study conducted by Rounds (1980). Also, DNR Shoal Lake indicated a higher estimate than indicated by the other respondents, which is consistent with the information provided by the RMs of Rosburn and Clanwilliam (situated in this district).

However, it would be beneficial to know what the exact *beaver control* costs for DNR Shoal Lake and for the RMs of Rosburn and Clanwilliam were, as the combined total estimate was relatively high (\$61,000). Although these jurisdictions are located along the

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<sup>4</sup> DNR Shoal Lake indicated BCP costs only and not costs on other internal beaver control costs.

southern boundary of the RMBR, it would seem that one level of government (particularly the RMs) bear more costs than the other levels (as the other trends in this study have indicated).

Although it was asked for the “total budget allocated”, many respondents indicated that their offices do not have a separate budget allocated for beaver management but they provided an estimate regardless. In the study conducted by Rounds (1980), it was determined that the RMs of Rossburn and Park had set up a separate account for beaver-related costs. The information provided by the RM offices for 1995/96 were specific beaver-related costs (Figure 10). However, these costs are currently not formally separated in each of the RMs annual “General Operating Fund Balance Sheet”.

The actual total budget provided by the Chief Administrative Officers (CAOs) depicts a similar trend as those estimated costs provided by RM respondents. Since actual data is minimal (or incomplete) it is reassuring that the information provided by the CAOs is generally consistent with the RM respondent’s estimations. The RM of Rossburn, spent substantially more on beaver-related activities (1995) than the other RMs. However, the respondent for the RM of Rossburn under-estimated the total budget allocated towards beaver management (\$15,000) when compared to the CAO’s figure (\$37,305). The RM of Rossburn consistently appears among those RMs that spend the most time and money on beaver management activities. However, the RM of Rossburn covers a larger geographical area than the other RMs (228m<sup>2</sup> as compared to Clanwilliam: 36m<sup>2</sup>).

#### *4.2.4 Budget Source and Sufficiency*

Most of the RM respondents indicated that the source of this budget (total budget) is either the RM budget (direct taxation) or a combination of the RM and DNR budgets (e.g. BCP). This question (requesting the source of total budget) may not have been clear to the

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<sup>5</sup> This figure excludes DNR Shoal Lake from the \$32,850 figure:  $32,850 - 31,000 = 1,850 + 59,295 = \$61,145$ .

RM respondents as they may not have separated BCP trapping costs from road and culvert maintenance costs. The objective of this question was to find out if beaver management activities are specifically funded out of a designated fund (e.g. BCP). If so, perhaps such funding could be redirected towards a specific problem area.

The sufficiency of budget is generally related to the magnitude of the problem experienced by each jurisdiction. Those respondents (the RMs of Rosburn, Grandview, Boulton, Dauphin and DNR Shoal Lake and Neepawa) who indicated that the budget was not sufficient are largely among those respondents whose expenditures are the greatest. The exception is the RM of Clanwilliam<sup>3</sup> where they indicated that the budget is sufficient (“it may not be the best solution, but it certainly helps resolve the problem and does give a little employment”).

#### ***4.2.5 Satisfaction with BCP and “top-up”***

Generally, the RM and DNR respondents indicated that they are more satisfied with the BCP than with the previous Federal/Provincial agreement. The overall justification is that the BCP is viewed as effective and specific (it funds the trapping of problem beaver throughout Manitoba particularly when pelt prices are low). Although many respondents would like more federal and/or provincial support, they seem to appreciate any support at all. Based on the response received on the BCP, specifically targeted programs would probably gain much support in the RMBR.

Most RMs do not “top-up” or supplement the \$15 DNR pays per beaver (with exception to the RM of Rosedale). This is a function of the funds available within each RM. The RMs require the BCP support particularly as the RMs already fund all other beaver control activities within their RMs, therefore, additional funding is not possible.

### ***4.3 OBJECTIVE #3 - to evaluate relevant strategies and techniques used to address beaver problems within the context of ecosystem-based management and the regional***

### ***4.3.1 Control Techniques Used***

#### ***RMBR***

RM respondents indicated dynamiting dams (to lower the water level), trapping and shooting as those techniques that are most used and perceived to be the most useful in their respective jurisdictions (Table 1). The log-pull method and kill-trapping (similar to “trapping”) were indicated to be the next most used and successful techniques utilized for controlling beaver-associated problems.

DNR respondents indicated very similar techniques as RM respondents (dynamiting dams, trapping, kill-trapping and shooting beaver). RMNP also indicated similar techniques, yet they also indicated using less-traditional methods such as the Beaver Baffler and less invasive techniques such as tree fencing and wrapping.

Generally, those techniques most commonly utilized in the RMBR are used for the following perceived reasons: they are techniques that have been traditionally used; they “get rid of the beaver”; they are relatively cost-effective; they require minimal amount of time and can be executed by one person.

#### ***Other Areas***

In the survey conducted by D'Eon (1995), respondents indicated that removing beavers by trapping (94%), shooting (75%), manually destroying dams (83%) and mechanically removing dams (75%) as those techniques most used in their jurisdictions. In a rating scale that included “always successful”, “sometimes successful” and “never successful”, the respondents indicated all of these techniques as “sometimes successful” (D'Eon, 1995).

However, controlling water levels by syphons/pipes received the highest success rating (82%) and was rated under “sometimes successful” even though only 40% of the

respondents used this technique (D'Eon, 1995). This may suggest that resource managers and field staff are unaware of the success of this technique, as few respondents have reported using it. As using such water levelers are viewed as "sometimes successful" by some resource managers and field staff in other jurisdictions, the partners in the RMBR may find the same success in the Riding Mountain area. In the RMBR, respondents generally indicated that they are unaware of or do not use such techniques.

A telephone survey was conducted during the summer of 1997 in order to gather information about beaver management activities in Canadian National Parks (Appendix 7). Among those National Parks where beavers exist, flooding of roads, trails and adjacent agricultural land were reported to be the types of beaver-associated problems most experienced (Table 5). The type of control techniques found most effective in alleviating these problems largely involved lowering water levels (either manually clearing the culvert/dislodging the beaver dam or with the use of a control device).

However, those Parks (Prince Albert, Elk Island and Jasper) experiencing persistent problems reported dynamiting dams and/or shooting and trapping beaver as an effective means of alleviating beaver-associated problems. When asked about mortality factors, respondents (biologist and/or warden) largely reported natural factors (primarily predation) as the significant factor. D'Eon (1995) reported that trapping was the most significant mortality factor, particularly in exploited populations.

#### ***4.3.2 Trapping and the Provincial Government***

Among all the control techniques utilized in the RMBR area, trapping has been used the longest as it has an extensive history in Manitoba (Carmichael, 1973; Johnson, 1986; Morgan, 1991). Originally, trapping was a method used for capturing beavers for their pelts, as there was a strong market for them (Johnson, 1986). However, trapping is also a management technique within the provincial government and, as well, a control technique for problem beaver.

TABLE 5. Beaver management activities in Canadian National Parks – Summer 1997

National Park	Est. # beaver	Plan/pro. Manual	Bvr-ass. Problem	Control tec. Used	1° mort. Factors	Budget	Trans-boundary
Gros Morne	100's; no surveys	✓	Fld/rds;picnic	Reloc.;hand; Pvc (3)	Nat. factors (n/f); coyote	no specific budget (nsb)	*
Terra Nova	?; no prob.	✓	Tree cut; fld/rds	Reloc.;pipe w/ scrn (3)	Rd x; n/f; lynx coyote; rapt.	Nsb	*
Cape Breton	12 indiv.	*	Plug culverts	Hand clear	Coyote, lmt habitat	Nsb	*
P.E.I.	20 indiv.	✓	Occ. Fld/trails	Pvc/scrn (1)	N/f; coyote	Nsb	*
Kejimikujik	100 indiv.	✓	*	*	N/f; cyt; bear	Nsb	*
Fundy	<20 indiv.	✓	Fld/trails;rds	Hand	N/f;cyt;bear	Nsb	*
Kouchiboung							
Forillon	300 indiv.	*	Fld/trails; rds	Pvc (1); "L"	Prd/br; rdx	Nsb	*
La Mauricie	<500 indiv.	✓	Fld/trails;rds; erosion; tree	M. sponge; cube;floatrft	Wolves;otter	Nsb	*
Mingan Arc.	<100	*	/	/	Fox;wlvs;br	/	*
Sag.-St Law.	No problems	/	/	/	n/f	Nsb	*
Georg. Bay	33-43 srvy	*	/	/	Nf;coyote	Nsb	*
Point Pelee	No beavers	/	/	/	/	/	/
Pukaskwa	>1000 indiv.	*	/	/	Wolves;br	Nsb	*
St. Law. Is.	30 indiv.	✓	Fld/trails	Pvc pipe; trp	N/f; cyt; trp	Nsb	*
Bruce Pen. Fathom 5	30 indiv.	*	Fld/aglnd;rds	BverB (5); pvc pipes -2	N/f;coyote; trp;rd kill	Nsb	*
Prince Al.	1000's	*	Fld rds	Hand;dyn;M. sponge;pvc	Wlvs;otter; bear; coyote	Nsb	*
Grasslands	<100 indiv.	*	Fld/agland	Prov/priv rsp	N/f; coyotes	Nsb	✓
Aulavik	No beavers	/	/	/	/	/	/
Auyuittuq	No beavers	/	/	/	/	/	/
Ellesmere Is.	No beavers	/	/	/	/	/	/
Nahanni	100's	*	Tree cut; giar	Monitoring	Pred./grizz; Black;wlvs	Nsb	*
Wood Buff.	1000's	*	Fld/roads	Trp; hand	N/f;pred./lnx wolves	Nsb	*
Banff	?	✓	Fld/CPR; trails; rds	Hand	Pred./wlvs Coyotes; n/f	Nsb	*
Elk Island	1,200 indiv.	✓	Fld/rds;aglnd	Scare;sh;trp;pvc;wpg tile	Coyotes	\$10,000	✓
Jasper	?	✓	Fld/CPR;rds;trails;camp	Reloc.;Bstoppvc -7;sh;trp	Wlvs;blkgrizz cyts;rdkll	Nsb	✓
Kootenay	< 100 indiv.	*	None	None	Wlvs;grizz;n/f	Nsb	*
Waterton	100's indiv.	✓	Fld/rds;picnic	Scrns;pvc	Bear	Nsb	*
Yoho	35 indiv.	*	CPR;fld rds	Hand/dam	Wlvs;cougar	Nsb	*
Glacier/MR	100	*	/	/	Coyots/black	/	*
Gwaii Haan	No beavers	/	/	/	/	/	/
Pacific Rim	Very few	/	/	/	n/f	/	/
Kluane	Very few	/	/	/	n/f	/	/
Ivvavik	Very few	/	/	/	n/f	/	/
Vuntut	Very few	*	Fld/rds	Hand;wire mesh tubing	n/f	Nsb	*

**Key**

fld- flooding  
rds- roads  
rd x- road crossing  
scr- screen  
rdkll- road kill  
trp- trap  
giar- giardia  
blk- black bear

hand- hand clearing  
n/f- natural factors  
reloc- relocation  
rapt- raptures  
prd- predator  
dyn- dynamite  
picnc- picnic  
prov/priv rsp- provincial private respons.

pvc- pvc pipe  
nsb- nospecific budget  
CPR- Can. Pacific Railway  
lmt- limited; lyn- lynx; grizz- grizzly  
br- bear; wlvs- wolves; cyt- coyote  
sh- shoot; aglnd- agriculture land  
scare- scare tactics

camp- camp grounds  
M. sponge- Morency Sponge  
Bstop- Beaver Stop;  
BverB- Beaver Bafflers

Trapping throughout Manitoba has been, and continues to be, the only beaver management activity the provincial government participates in (Verbiwski, pers. com., 1997). Trapping in Manitoba is linked to furbearer management within the provincial government (DNR, 1988 and 1995). The provincial government has set out four objectives of fur bearer management which are to: provide for the sustained use of the resource, ensure optimal economic returns to producers, promote and implement humane trapping techniques and promote public awareness of the fur industry (DNR, 1988 and 1995).

To facilitate/organize trapping and furbearer management, Manitoba is divided into Registered (restricting) and Open (non-restricting) Trapping Areas (DNR, 1995). The RMBR is located in an Open Trapping Area (Zone 2) which does not restrict trappers to a specific area. These trapping areas offer exclusive trapping privileges to individuals or groups of trappers for a specific trapline or district. Although, RMNP is located in Zone 2, Park policy does not allow trapping within National Parks.

Furbearer populations in Manitoba are monitored through fur harvest returns. These returns determine the need for special management programs (within the provincial government) and are used to establish subsequent trapping seasons. Generally, if the pelt prices are sufficiently high, trapping activity is also high in Manitoba. For the provincial government's 5-year trapping returns (1992-96) beaver pelts resulted in \$3.2 million in total income to Manitoba trappers (the greatest total income of any furbearer in Manitoba). The percent of pelts harvested (total income in million \$) was the greatest for beaver (29%) in this period. This was greater than the 1987-91 period (20%) yet total income (from beaver) to Manitoba trappers was \$3.9 million (2<sup>nd</sup> to marten at \$4.5 million). In 1995/96, trappers received \$34 (average auction value) for beaver pelts sold (37,500) and a high of \$55 for a well-prepared pelt (DNR, 1997).

Trapping effort can also be relatively high if problem beaver exist. However, unless it is



the landowner trapping problem beaver on his/her land, the average trapper requires a form of subsidization to trap problem beaver. This is so because trapping beaver is considered an expensive activity (mileage costs, time/labour etc.) and as well, subsidization compensates for the low pelt prices outside the trapping season. In 1995, the trapping of problem beaver in the RMBR area was reported higher than any other RM in Manitoba (Scott, pers. com. 1998). This is linked to an increase in beaver population in the Riding and Duck Mountain area and to low pelt prices.

#### *4.3.3 Alternative Action*

Generally, many of the respondents (including RMNP) are willing to try any alternative management techniques or control devices in their respective jurisdictions. Similar answers were provided to questions 6, 8, and 9 of the questionnaire. The alternative action suggestions given most frequently included allowing trapping along RMNP border, increasing beaver trapping and controlling population in both Parks (RMNP and Duck Mountain Provincial Park).

In the study conducted by Rounds (1980), trapping within the Park was also the most commonly suggested solution. Trapping within the Park cannot occur however, as it is against Parks Canada's policy of protecting animals. However, organized trapping outside of the Park, population control (other than trapping) within the Park and compensation for damages were also frequently mentioned in that same study (Rounds, 1980).

Other alternative actions suggested included exterminating all beaver in RMNP and the continuation of the BCP. Those respondents who suggested exterminating all the beaver based this on the idea that beaver were transplanted into RMNP and therefore could also be removed. Removing beaver within RMNP would not necessarily reduce beaver-associated problems on RM and landowner property, as beavers are inclined to emigrate from other areas, and the population is simply too great for a selective removal program (Trottier, 1974; Rounds, 1980).

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## CHAPTER 5: SUMMARY, CONCLUSIONS & RECOMMENDATIONS

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### 1.0 SUMMARY and CONCLUSIONS

This study was initiated in response to Parks Canada's concern regarding the level of responsibility between the RMBR partners as a result of beaver-associated problems. The project began in the fall of 1995 and ended in the spring of 1998. In general, the methodology consisted of a mail-out questionnaire supplemented by submissions of records from various governmental offices and personal communication with many relevant individuals. Four objectives were established and their key findings are summarized below.

#### *Objective 1*

Objective 1 was to identify the concerns of the major partners involved (RMs, DNR districts and RMNP) about beaver-associated problems in the RMBR. The most significant concerns expressed by the respondents were the increase in beaver population and associated problems experienced. Although many factors influence beaver population trends, the majority of respondents indicated low pelt prices as the most significant contributing factor. Most of the respondents indicated that flooding (of agricultural land, roads and trails, damage to trees) was the most significant beaver-associated problem experienced in the RMBR. These particular concerns should be the basis of further study and the focus of future project-specific strategies and cost-share agreements.

#### *Objective 2*

Objective 2 was to delineate the costs of and responsibilities for addressing beaver-related concerns. Generally, the cost-estimates (although somewhat sparse and incomplete) indicated by RM and DNR respondents are consistent with the topography of the RMBR, area and with the results from other findings. The RM's of Rossburn, Park and

Clanwilliam generally spent more funds on control techniques than did other RMs. DNR Shoal Lake (whose jurisdiction includes the RM of Rosssburn, and Park) spent more on beaver control than did other DNR districts. Person-hours spent on control were related to responsibilities for addressing beaver-related concerns. Overall, RM respondents indicated varying hours spent on control techniques as compared to the costs that they indicated. DNR Neepawa indicated the highest estimation which is consistent with the topography of the area (the RM of Clanwilliam is located in this district). Generally, the RMs bear more responsibility (measured in time and dollars spent) as compared to DNR and RMNP (excluding BCP figures). However, if BCP figures are considered, then the RMs and DNR bear approximately the same level of responsibility (with DNR spending slightly more). Future management strategies and cost-share agreements should take this split of costs, and the importance of the BCP, into consideration.

The function of trapping beaver lies primarily with registered trappers. The fund (to pay trappers) comes from both the RM budgets and the BCP. RMs, however, do not hire trappers, they contact and pay them under the BCP. Trapping activity is also dependent on pelt prices during the regular season. As trapping is a significant method of controlling beaver, future programs will always use this technique to some degree. Regarding total budget allocations for beaver management, respondents again provided information that was estimated and incomplete. However, assuming their estimations were reasonable, the RMs together spent more on beaver control than does DNR. When the BCP is factored in, the RMs and DNR spend roughly the same amount on beaver control than RMNP. The RMs of Rosssburn and Clanwilliam consistently indicated the highest estimated spending.

### *Objective 3*

Objective 3 was to evaluate relevant strategies and techniques used to address beaver problems within the context of ecosystem-based management and the regional ecosystem. RM, DNR and RMNP all indicated similar techniques (dynamiting dams, trapping and shooting) to be the most used and perceived to be the most useful in the RMBR. These

findings are consistent with techniques used in other areas. Although these techniques are not in keeping with beaver ecology, these results do indicate the method used most commonly. Trapping is the most traditional control technique used in the RMBR. Management programs within the provincial government (particularly the BCP) center on trapping activities and were viewed as effective strategies within the RMBR.

## 1.1 RECOMMENDATIONS (*objective 4*)

The following recommendations, should be implemented by all partners in the RMBR in order to assist in making more informed beaver management decisions:

- ◆ Most of the information available on costs attributed to beaver-associated damages is estimated and observational. These costs require an implemented system of record keeping. Accurate record-keeping by all the partners (e.g. every RM use a standard accounting sheet indicating beaver control costs, time and dollars spent on road and culvert repairs) would facilitate more transparent cost-sharing and assistance in further management strategies.
- ◆ By their estimates, the RMs spent more on beaver control and damage mitigation than DNR and RMNP. However, when BCP amounts are factored in, DNR spent slightly more on beaver control (in 1995) than RMs. In particular, the RMs of Rossburn and Clanwilliam consistently spent more on beaver management activities than the other RMs. Any future cost-share programs should require clearer financial accounting by all the partners. This in turn would make for better matching of control program dollars to the needs of the RMs.
- ◆ Further studies on the economic and ecological effects of control techniques are needed. Partial funding from any future cost-share program could be used towards these studies. Although some control techniques, particularly control devices (i.e.

water control devices), have been used in the RMBR there are many others, used in other jurisdictions, that could also be tried. Recently, RMNP has begun utilizing the Clemson Leveler and the Morency Sponge (water control devices) in various sites throughout the Park. RMNP should hold a "Device Demonstration Day" in order to demonstrate how the device works and its effectiveness. Ultimately, partial funding from any future cost-share program could be used towards the purchase, installation and maintenance of successful control techniques determined.

- ◆ As there are many person-hours devoted to control techniques in the RMBR, the time/funding allocated should be put towards hiring a full-time staff person(s). Partial funding from any future cost-share programs could also be used to fund this staff person(s). The primary responsibility of this staff person(s) would be to install and maintain control techniques in the RMBR. This staff person(s) should be managed under the newly established beaver management sub-committee.
- ◆ Further studies on the wolf and its relationship to the beaver in the RMBR, within the current ecosystem context, are needed (can the wolf once again be a significant predator of the beaver?). Since wolves are a natural biological control in the RMBR, encouraging an increase in the wolf population would be in keeping with the principles of ecosystem-based management practices. The results of this study would be useful to the partners and managers in the RMBR.
- ◆ It is recommended that the Beaver Control Program continue as generally, the partners in the RMBR, view it as an effective program. However, funding from any future cost-share programs should also be put towards other activities (as recommended above).
- ◆ In order to carry out the following recommendations, a sub-committee of the Riding Mountain Regional Liaison Committee, whose specific focus is on beaver-management in the RMBR, should to be established by December 1, 1998. The sub-committee

should be given until December 1, 1999 to develop a regional beaver management plan.

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## APPENDICES

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### APPENDIX 1

#### Provincial Policy Directive: Problem Beaver Control

1. The department shall stress the prevention of beaver damage through the encouragement of commercial beaver harvest and by providing technical training and advice to municipalities, private citizens and others respecting problem beaver control.
2.
  - a) The private citizen is expected to remove problem beaver and problem beaver dams on his own land on waterways not under the jurisdiction of another agency.
  - b) On waterways not under the jurisdiction of another agency, field staff shall assist the private citizen in removing problem beaver and problem beaver dams if the complainant has made a reasonable effort to deal with the problem, but has been ineffective.
  - c) On waterways under the jurisdiction of another agency, field staff shall direct the problem beaver complaints from the private citizen to the appropriate agency.
3.
  - a) On waterways and/or rights-of-ways over which they have responsibility, the following agencies, companies or corporations are expected to remove problem beaver dams: cities, towns, villages, rural municipalities, local government districts and conservation districts; private companies (including railways); provincial departments (including Highways); Crown corporations (including Manitoba Hydro).
  - b) Field staff shall not remove problem beaver dams on waterways under the jurisdiction of agencies, companies or corporations noted in 3a. Field staff shall cooperate with these agencies, companies or corporations by assisting in the removal of problem beaver on a priority and workload-permitting basis.

The following chart summarizes the action required or delivered for the various levels of government, crown corporations, private companies and the individual landowner.

<b>Agencies Involved with Beaver Control in Manitoba</b>	
Dept. of Natural Resources	Control of beaver problems occurring on crown land, provincial waterways and waterways under the jurisdiction of Conservations Districts. Problems attended to by department staff and costs covered by Department.
Dept. of Highways	Control of problem beaver along all major highways and secondary roads outside the jurisdiction of municipalities and local government districts. Costs incurred by Highways. Currently have a contract with Manitoba Trappers Association (MTA) to remove nuisance beaver, but also use their own staff, especially in northern areas.
Railways (CNR, CPR)	Control of problem beaver along railbeds throughout the province. Either hire trappers or have their own staff handle problems. Costs covered by railways.
RMs and LGDs	Control of beaver within areas under their jurisdiction, including private land. The UMM presently has a contract (BCP) with MTA and DNR to remove beaver by trapping.
MTS and Hydro	Experience a few problems and use their own staff to handle problems.
Towns, Villages etc.	Generally use own staff, but will hire a trapper if determined to be necessary.
Landowners	May use a trapper if they do not have to pay. In cases where the problem is large of reoccurring, they resort to assistance from RMs or LGDs. Also utilize BCP.
Riding Mountain National Park	Entered into an agreement with the province for control of beaver in a designated area surrounding the Park. The original agreement (which ran from April 1, 1985 to March 31, 1994) cost-shared expenses with the province to a maximum contribution by each party of \$30,000 then \$15,000 in future agreements.
City of Winnipeg	Problems resulting from species protected under the Wildlife Act, such as beaver, are handled by DNR.

Source: Ian McKay, Wildlife Department - DNR, 1995

## APPENDIX 2

<b>*Provincial Beaver Removal Program Results (1995-1997)</b>						
<b>RM/LGD</b>	<b>**Claim 95</b>	<b>Beaver 95</b>	<b>Claim 96</b>	<b>Beaver 96</b>	<b>Claim 97</b>	<b>Beaver 97</b>
Alexander	/	/	/	/	255.00	17
Armstrong	/	/	210.00	14	300.00	20
Bifrost	/	/	135.00	9	225.00	15
Birds Hill	30.00	2	/	/	/	/
Birtle	810.00	54	1,095.00	73	375.00	25
Blanchard	165.00	11	1,575.00	105	315.00	21
Boulton	7,950.00	530	5,550.00	370	480.00	32
Brokenhead	120.00	8	/	/	/	/
Clanwilliam	4,770	318	3,750.00	250	375.00	25
Cooks Creek	180.00	12	/	/	/	/
Clements	435.00	29	/	/	900.00	60
Coldwell	/	/	30.00	2	75.00	5
Cypress	360.00	24	/	/	/	/
Daly	1,020.00	68	/	/	210.00	14
Danphin	420.00	28	/	/	300.00	20
Deloraine	/	/	/	/	/	/
De Salaberry	/	/	165.00	11	/	/
Ethelbert	6,570.00	438	18,120.00	1208	9,360.00	624
Fisher	/	/	/	/	45.00	3
Franklin	/	/	/	/	105.00	7
Gibert Plains	3,075.00	205	11,070.00	738	11,400.00	760
Grahamdale	/	/	60.00	4	/	/
Grandview	7,620.00	508	11,070.00	738	7,650.00	510
Grey	/	/	/	/	30.00	2
Hanover	/	/	45.00	3	90.00	6
Harrison	2,460.00	164	1,935.00	129	225.00	15
Hillsburg	7,020.00	468	3,720.00	248	930.00	62
Hamiota	45.00	3	/	/	/	/
LaBroquerie	540.00	36	60.00	4	/	/
Lac duBonnet	1,305.00	87	780.00	52	1,920.00	128
Langford	315.00	21	555.00	37	60.00	4
Lansdowne	645.00	43	315.00	21	/	/
Louise	195.00	13	/	/	/	/
Lundar	90.00	6	/	/	/	/
McCreary	270.00	18	330.00	22	/	/
Minota	/	/	/	/	405.00	27
Minto	/	/	1,020.00	68	60.00	4
Minnitonas	1,320.00	88	/	/	1,575.00	105
Morris	540.00	36	45.00	3	/	/
Morton	315.00	21	/	/	105.00	7
Mossey River	600.00	40	480.00	32	660.00	44
Mountain	4,350.00	290	1,260.00	84	150.00	10
Northfolk	1,440.00	96	1,185.00	70	870.00	58
Odanah	/	/	/	/	45.00	3

Park	7,200.00	480	9,120.00	608	285.00	19
Pembina	165.00	11	/	/	165.00	11
Piney	480.00	32	/	/	240.00	16
PortagePrairie	/	/	90.00	6	135.00	9
Reynolds	270.00	18	/	/	/	/
Rivers	60.00	4	/	/	/	/
Riverside	45.00	3	30.00	2	/	/
Riverton	240.00	16	/	/	/	/
Roblin	330.00	22	120.00	8	309.00	26
Rockwood	/	/	300.00	20	/	/
Rosedale	1,170.00	78	735.00	49	255.00	17
Rosburn	16,110.00	1074	10,860.00	724	2,790.00	186
Russell	375.00	25	345.00	23	1,215.00	81
Saskatchewan	2,970.00	198	2,550.00	170	390.00	26
Selkirk	300.00	20	/	/	/	/
Shell River	1,965.00	131	60.00	4	/	/
Shelfmouth	2,820.00	188	1,275.00	85	150.00	10
Shoal Lake	1,635.00	109	1,140.00	76	45.00	3
Shoal Lake - vel	180.00	12	/	/	/	/
Sifton	/	/	45.00	3	/	/
Silver Creek	1,830.00	122	1,245.00	83	885.00	59
Springfield	135.00	9	/	/	165.00	11
Strathcona	90.00	6	/	/	/	/
St. Clements	435.00	29	120.00	8	900.00	60
Stanley	180.00	12	/	/	/	/
Ste. Anne	300.00	20	30.00	2	90.00	6
Strathclair	1,785.00	119	795.00	53	495.00	33
Swan River	3,975.00	265	2,460.00	164	1,605.00	107
Unknown	165.00	11	/	/	/	/
Victoria	/	/	210.00	14	525.00	35
VillageofStAnne	90.00	6	15.00	1	/	/
Wallace	450.00	30	735.00	49	/	/
Whitemouth	870.00	58	180.00	12	870.00	58
Whitewater	60.00	4	/	/	/	/
Woodworth	1,425.00	95	/	/	360.00	24
Winnipeg Beach	210.00	14	/	/	/	/
<b>TOTAL</b>	<b>\$103,290.00</b>	<b>6,886</b>	<b>\$97,020.00</b>	<b>6,459</b>	<b>\$51,369.00</b>	<b>3,430</b>

Source: Department of Natural Resources, Wildlife (January 14, 1998)

### Key

The shaded area highlights those RMs within the RMBR.

\* Please note that these official DNR figures are not entirely accurate (they do not sum up correctly).

\*\* DNR has not compiled records for 1993 and 1994.

## APPENDIX 3

<b>RIDING MOUNTAIN BEAVER DAMAGE CONTROL PROGRAM</b>	
<i>Provincial Expenditures</i>	
1984/85 – 1994/95	
<b>Year</b>	<b>\$ Expended</b>
1994/95	29,996.52
1993/94	30,104.61
1992/93	30,808.15
1991/92	29,945.88
1990/91	42,065.88
1989/90	32,673.32
1988/89	27,997.47
1987/88	36,978.26
1986/87	34,911.60
1985/86	30,353.28
1984/85	23,224.86

*Source:* Luc Joubert, Regional Services - DNR, 1997

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**APPENDIX 4**

**Survey of the Administration of Beaver Management in the  
Western Region of Manitoba for Rural Municipalities – Municipal Representatives**

(similar version given to DNR Districts and RMNP)

Name.....Date.....

Position Title.....

RM/District.....

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*The following questions deal specifically with beaver-associated problems in your RM. As each RM follows its own protocol with respect to beaver control, your response is crucial to this research. Please try to answer all the questions in detail and provide any comments that may help to clarify your work or assist with this research. Please use the back of the sheets if you run out of room in the spaces provided. The results for this survey will not identify individuals who have contributed.*

**BEAVER POPULATION**

1a. What is the estimated number of beaver or beaver caches in your area? Please indicate the number below.

b. i. Has this estimate increased or decreased over time (1970-1995)?

Increased

Decreased

Other

ii. Please describe the population trends over time (any significant changes etc.)

c. i. What factors influence these population trends? Please check off those of concern below.

Pelt Prices

Drought

Wet Years

Trapping Trends

Available Food/Habitat

Other (please specify)

ii. Please describe the most important factors from 1970-1995.

**BEAVER CONTROL**

2a. i. What are the types of beaver-associated problems in your RM? Please check off those of concern below.

Flooding of Agricultural Land

Flooding of Roads

Holding Back Water

Damage to Trees (flooding)

Damage to Dikes, Ditches or Dams

Other (please specify)





If possible, please send me a copy of any report that your office produces on beaver control. As well, if there is any other information (past reports, graphs and charts that record current and past trends) that would assist in this research, please attach it and return it with the questionnaire or let me know how I could otherwise obtain them. Again, thank you very much for your time!

CONTROL TECHNIQUES		1990-'95	1989-'85	1984-'80	1979-'75	1974-'70
<b>I. Damage Prevention Methods</b>						
Road Culverts- <i>protection from plugging by beaver</i>						
- floating electric fence						
- perforated culverts						
- wire mesh cylinders						
- culvert protector-cleaner						
- other devices (please specify)						
Road Culverts - <i>clearing plugged culverts</i>						
- log-pull method						
- water pumps						
- deta-prime explosives						
- other (please specify)						
Lowering of Water Levels - <i>destroy dams/lodges</i>						
- dynamite						
- manually						
- other (please specify)						
Lowering of Water Levels - <i>water levelers</i>						
- perforated culverts						
- three-log drain system						
- Beaver Stop limiters						
- Beaver Baffler						
- Clemson Leveler						
- other (please specify)						
Tree Protector - <i>mechanical</i>						
- tree fencing						
- other (please specify)						
Tree Protection - <i>repellents</i>						
- paint-on beaver repellent						
- tree-wrap						
- other (please specify)						
Other (please specify)						
<b>II. Animal Control Methods</b>						
Trapping						
Live Trapping						
Kill Trapping (please specify type of trap)						
Shooting						
Other (please specify)						

## APPENDIX 5

## Questionnaire Cover Letter

&lt;&lt;date&gt;&gt;

NRI Letterhead

&lt;&lt;first name&gt;&gt; &lt;&lt;last name&gt;&gt;

&lt;&lt;department&gt;&gt;

&lt;&lt;address&gt;&gt;

&lt;&lt;pcode&gt;&gt;

Dear &lt;&lt;title&gt;&gt; &lt;&lt;last name&gt;&gt;

I am a graduate student at the Natural Resources Institute, University of Manitoba, conducting research into the administration of beaver management in the western region of Manitoba. This research is carried out as part of my Master of Natural Resources Management degree.

I am writing to you because of your involvement with the [administration of programs to control beaver-associated damages in your district] [Riding Mountain Regional Liaison Committee] [Riding Mountain National Park]. Your information is critical to this research.

I would like to request a few minutes of your time to complete a survey. The objectives of this survey are:

- to identify the full extent of the funds allocated for beaver-associated damages by the [provincial, municipal government] [RMNP]
- to examine beaver management policy within the [provincial, municipal government/RMNP]
- to ask your opinion with respect to improving beaver management within Manitoba.

I am requesting that you provide information regarding beaver management within the [prov./mun./RMNP]. Please be assured that your individual input will be kept confidential and will remain anonymous. Enclosed is a survey questionnaire that will take you approximately 30 minutes to complete. This survey has received University of Manitoba ethics committee approval. A stamped, self-addressed envelope is enclosed for your convenience in returning it to me upon completion.

I appreciate the many demands that are made on your time, but I hope that you will be able to accommodate this request. Your participation will not only contribute to the success of this research, it will contribute to the quality of beaver management in the western region of Manitoba by addressing issues of efficiency and effectiveness.

If you have any questions about this research, please do not hesitate to contact either myself at (204) 269-1305, or my faculty advisor, Dr. Rick Baydack at (204) 474-6776. As well, a summary of results could be made available to you.

Thank you for your assistance!

Sincerely, Constance E.L. Menzies, Project Coordinator

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APPENDIX 6

Questionnaire Follow-up Letter

<<date>>

NRI Letterhead

<<first name>> <<last name>>

<<department>>

<<address>>

<<pcode>>

Dear <<title>> <<last name>>

About two weeks ago, I requested from you to complete a questionnaire survey about the administration of beaver-associated damages in western Manitoba. If you have completed and returned the questionnaire, thank you very much. Your assistance is very much appreciated!

If you have yet to complete the questionnaire, I urge you to give positive consideration to my request. It is crucial to the success of this research to get an accurate sense of beaver management in your area.

I realize that this is a very busy time of year and that you undoubtedly have a number of important matters to which you must attend. However, the questionnaire is fairly brief and should take no longer than 30 minutes to complete. As well, please be reminded that your responses will be kept in strict confidence and will remain anonymous.

In my earlier correspondence, I had enclosed a questionnaire and a stamped, self-addressed envelope. If these documents were miscarried in the mail or otherwise mislaid, please call me and I will send you further copies. If you have any questions about this research, please do not hesitate to contact either myself at (204) 269-1305 or Dr. Baydack at (204) 474-6776.

Thank you very much for your attention to this matter. I hope that you will find the time to complete the questionnaire and drop it in the nearest postal box.

Sincerely,

Constance E.L. Menzies, Project Coordinator

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**APPENDIX 7**

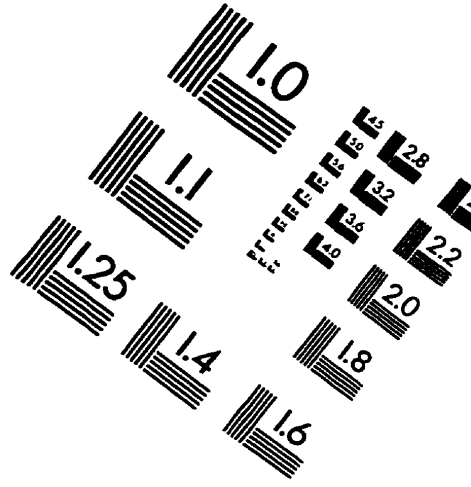
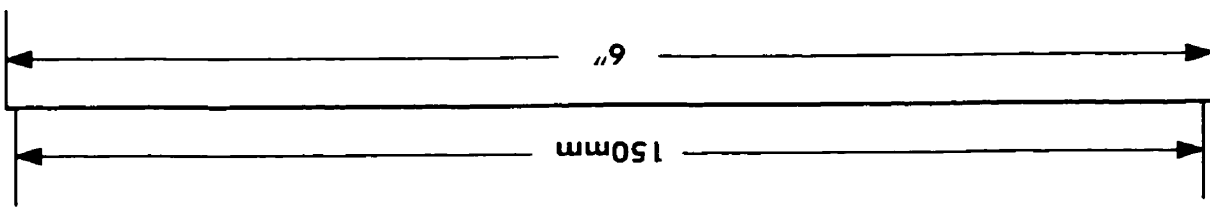
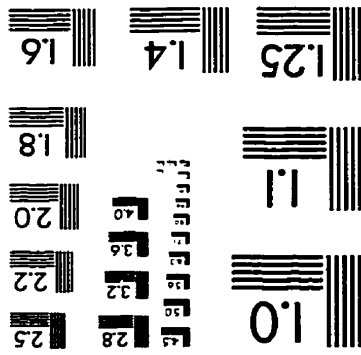
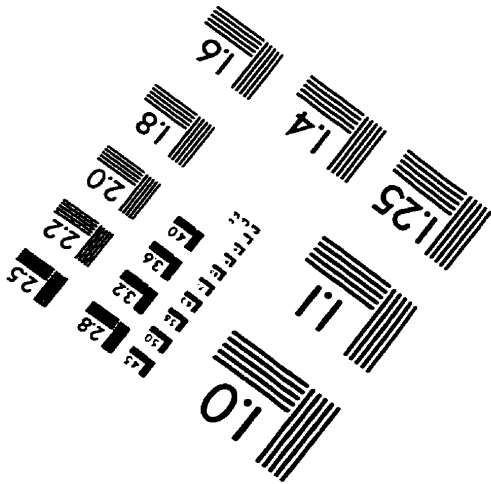
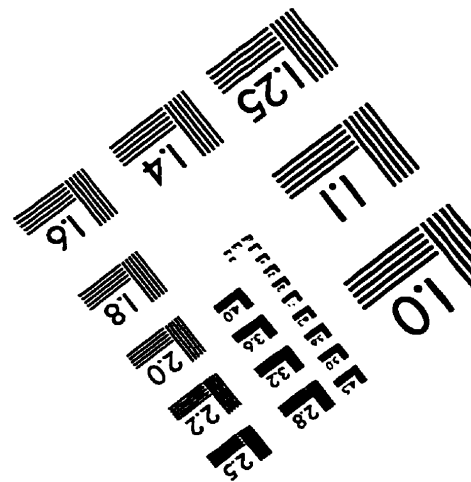
**Telephone Survey of Beaver Control Techniques in  
Canadian National Parks**

Name.....Date.....  
Title.....  
Park.....  
Province/Territory.....

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1. What is the estimated number of beaver in this Park?
2. Are beaver a concern in your area (what types of beaver-associated problems)? If so, in what way?
3. Does your Park have a management plan or procedures manual?
4. How does your Park deal with beaver-associated concerns (what types of control techniques are used)?
5. If there is more than one approach, which is most effective?
6. What makes it effective?
7. What are the primary mortality factors in this Park?
8. Is there a specific budget set-aside for beaver management, if so how much?
9. Does this Park experience any transboundary issues (beaver migrating from the Park onto other jurisdictions)?

IMAGE EVALUATION  
TEST TARGET (QA-3)



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1653 East Main Street  
Rochester, NY 14609 USA  
Phone: 716/482-0300  
Fax: 716/288-5989

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