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Historical review of elk–agriculture conflicts in and around Riding Mountain National Park, Manitoba, Canada

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Abstract: Conflicts between elk (*Cervus elaphus*) and farmers have been occurring since the 1880s when agriculture began around what is now Riding Mountain National Park (RMNP). Initially, the conflicts were related to low elk numbers caused primarily by unregulated harvest of elk. The creation of RMNP in 1930 and the associated ban on hunting allowed elk numbers to reach critically high levels. Since farming began, elk have been associated with considerable damage to fences and crops around RMNP, with annual damage often >$240,000. Hunting on agricultural lands has been the most common approach to mitigating elk impacts, despite its limited success. Additionally, a damage compensation program was created in 1997. Beginning in 1991, elk–agriculture conflicts accelerated to a new level with the detection of bovine tuberculosis (TB) in local elk. Despite the concerns and economic hardship caused by TB, attitudes toward elk remain largely positive, and farmers obtain important economic and noneconomic benefits from the elk population. Conflicts between farmers and government about elk management often have been characterized by heated debates, poor or nonexistent communication, and, until recently, limited attempts to mitigate the impacts of elk. Future programs to address these conflicts should focus on collaboration and communication to develop mutually acceptable long-term solutions that are regularly evaluated using both local knowledge and scientific study.

Key words: agriculture, bovine tuberculosis, *Cervus elaphus*, disease, elk, farming, human–wildlife conflict, protected areas

"You hear locals say that if the Park was used again it would be the place it used to be. You also hear the naturalists say to leave it in the natural state. I disagree with both, for no one will reuse it the way it was before." (Farmer, Rural Municipality of Park South, personal communication)

Conflicts between wildlife and agriculture are commonplace globally and have important implications for conservation in and around protected areas, influencing the sustainability of agriculture (Schonewald-Cox et al. 1992, Western et al. 1994, McShea et al. 2007, Devault et al. 2007, Retamosa et al. 2008). Protected areas are largely focused on conservation of wildlife and native habitats, while agricultural lands are working landscapes that have been transformed into crop monocultures and grazing lands interspersed with fragments of native vegetation (Herkert 1994). Farmers living along the borders of protected areas must balance the economic decisions of agricultural production with conservation priorities, and, thus, they have a primary influence on conservation near protected areas.

Support from farmers for conservation initiatives ultimately will be influenced not only by the economic costs and benefits to farmers living near protected areas, but also by the nature of the emotional connection that they have formed with wildlife and protected areas (Badola 1998, Jacobson et al. 2003). While considerable research has focused both on documenting the direct costs of wildlife impacts on agriculture and developing economic incentives for wildlife conservation (e.g., Western et al. 1994, Nyhus et al. 2003, Bissonette et al. 2008, DeVault et al. 2008, Messmer and Messmer 2008, Retamosa et al. 2008), less work has examined the broader social impacts. Such impacts are complex because of the effects of diverse attitudes, socioeconomic status of individual farmers, and the characteristically high levels of spatial and temporal variability of those impacts (Storm et al. 2007).

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Elk (*Cervus elaphus*) conflicts with agriculture around Riding Mountain National Park (RMNP) in southern Manitoba, Canada, provide a valuable case study for human–wildlife conflicts that have been occurring there since before the park was created in the 1930s. RMNP is a core area of deciduous and coniferous native forest and grassland within an agricultural matrix. The park often is referred to as an island in a sea of agriculture. Indeed, the park boundary, which is clearly visible in satellite imagery, contrasts sharply with surrounding agricultural lands (Noss 1995). The wilderness and the surrounding agricultural lands support a large population of elk that frequently move across the boundary. The objective of this study was to characterize conflicts between farmers and elk around RMNP over the last 127 years to better understand the social and biophysical context of current conflicts. This study also provides important insights into the complex relationship between farmers and the national park.

Methods

The study area is situated in southern Manitoba, Canada, and includes the agriculture-dominated area within 50 km of RMNP. The park is a large block of relatively undisturbed forest and grassland. The land around the park has been largely converted to oilseed, cereal crops, pasture, and hay production, interspersed with small, isolated patches of deciduous and mixed forest. Over 50,000 beef cattle are currently being raised in the region (Brook and McLachlan 2006).

I conducted a longitudinal analysis of elk–agriculture conflicts using information from published and unpublished sources, provincial hunter questionnaires, provincial and federal letter files, and field reports collected in federal and provincial libraries. From 2002 to 2004, I participated in 11 town hall meetings in the farming towns of Rossburn, Inglis, Grandview, McCreary, and Erickson that are located near RMNP where I recorded comments from a total of 500 attendees. I also attended 7 smaller town hall meetings in the First Nation (aboriginal) communities of Valley River, Waywayseecappo, Keeseekoowenin, and Rolling River.

In the spring of 2002, I sent a mail questionnaire to all 4,220 households identified by Canada Post (the federal mail delivery service) as farms, based on their existing list of farm operators. The overall adjusted response rate was 25%. I telephoned 75 nonrespondents and asked 5 questions selected from the original questionnaire to check for nonresponse bias. The results were compared with data from the 2001 Agriculture Census of Canada and were considered representative of the regional population of farmers, and no significant differences were identified (Brook and McLachlan 2006, Brook 2007).

I conducted semidirected interviews with 102 residents living within 50 km of RMNP, including 88 farmers, 14 aboriginal people, and 9 government agency staff members. A purpose of these interviews was to document as important context and drivers of conflict, both long-term changes in regional and farm-scale management strategies, and changes in protected areas of the park. Direct quotes from all data sources were included to illustrate the context and tone of the conflicts (Kreswell 1998). All aspects of community participation occurred under the authorization of the Joint Faculty–Human Subject Research Ethics Board Protocol #J2002:043 at the University of Manitoba.

Results

I identified diverse types of conflicts within the study area (Figure 1) over the entire 127-year-period of agriculture in the Riding Mountain region (Figure 2). These conflicts were present in distinct periods of the area's development (pre-agricultural, early agricultural, protected area with resource use and extraction, and protected area with conservation status).

Pre-agriculture

Prior to the arrival of European settlers in the 1880s, elk were common on the mixed aspen grasslands in and around what is now RMNP (Green 1933, Jamieson 1974, Peckett 1999). Elk were culturally important to Cree, Nakota, and Anishinabe aboriginal groups living in the region, providing them with an important source of meat and hides (Green 1933). Local aboriginal people made regular trips into the Riding Mountain region to hunt (Peckett 1999). Throughout this pre-agricultural period, no conflicts with humans were documented

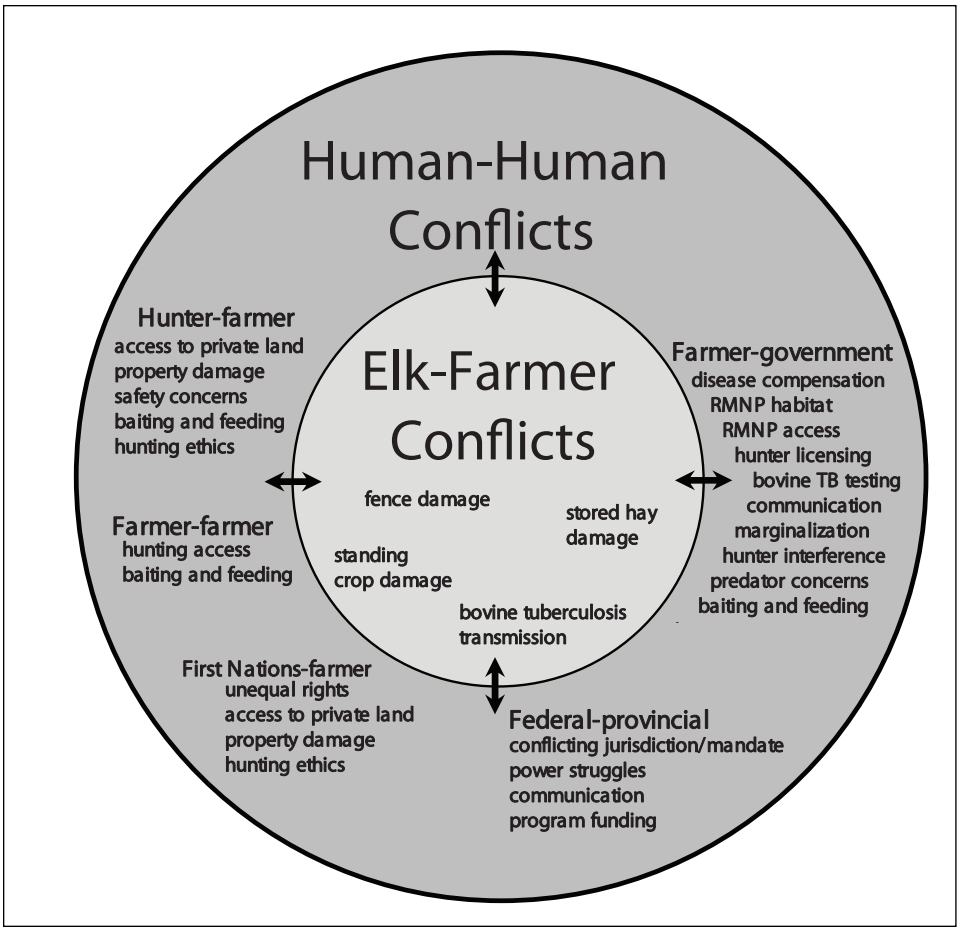

Figure 1. Elk–agriculture conflicts in the Riding Mountain National Park (RMNP) region over the last 127 years have been characterized by diverse impacts that drive additional, complex human–human conflicts. The most severe of these have been farmer–government conflicts related to managing elk–farmer conflicts.

between elk and people (Tabulenas 1983). The entire system changed dramatically with the advent of agriculture.

Agricultural development and the decline of the elk population

The flat plains surrounding what is now RMNP were settled extensively beginning in the late nineteenth century, and large areas of native grasslands were converted to farmland (Carlyle 1996). By 1904, much of the available grasslands had been purchased by private entities, though the forest cover was largely intact until 1925 (Goldrup 1992).

As agriculture began to develop in the latter part of the nineteenth century, the elevated escarpment that is now RMNP was used extensively by elk, particularly during the summer months (Green 1933). Local farmers widely believed that when snow accumulated to high levels large numbers of elk moved out of the area that became RMNP (Green 1933, Trottier and Hutchinson 1982). Early farmers around Riding Mountain reported that elk were "plentiful" (Green 1933), but the elk population soon declined in response to unregulated harvest (deVos 1965).

The Riding Mountain Timber Reserve was established in 1895, and in 1906 it was designated as a Dominion Forest Reserve to conserve the remaining forests and wildlife in the region from human settlement (Dickson 1909). Forest management and fire protection services, along with protection from development, were provided (Evans 1923). Forestry service staff could not interfere with hunting except to report abuses (Tabulenas 1983). Although elk harvest was banned in 1895 with the creation

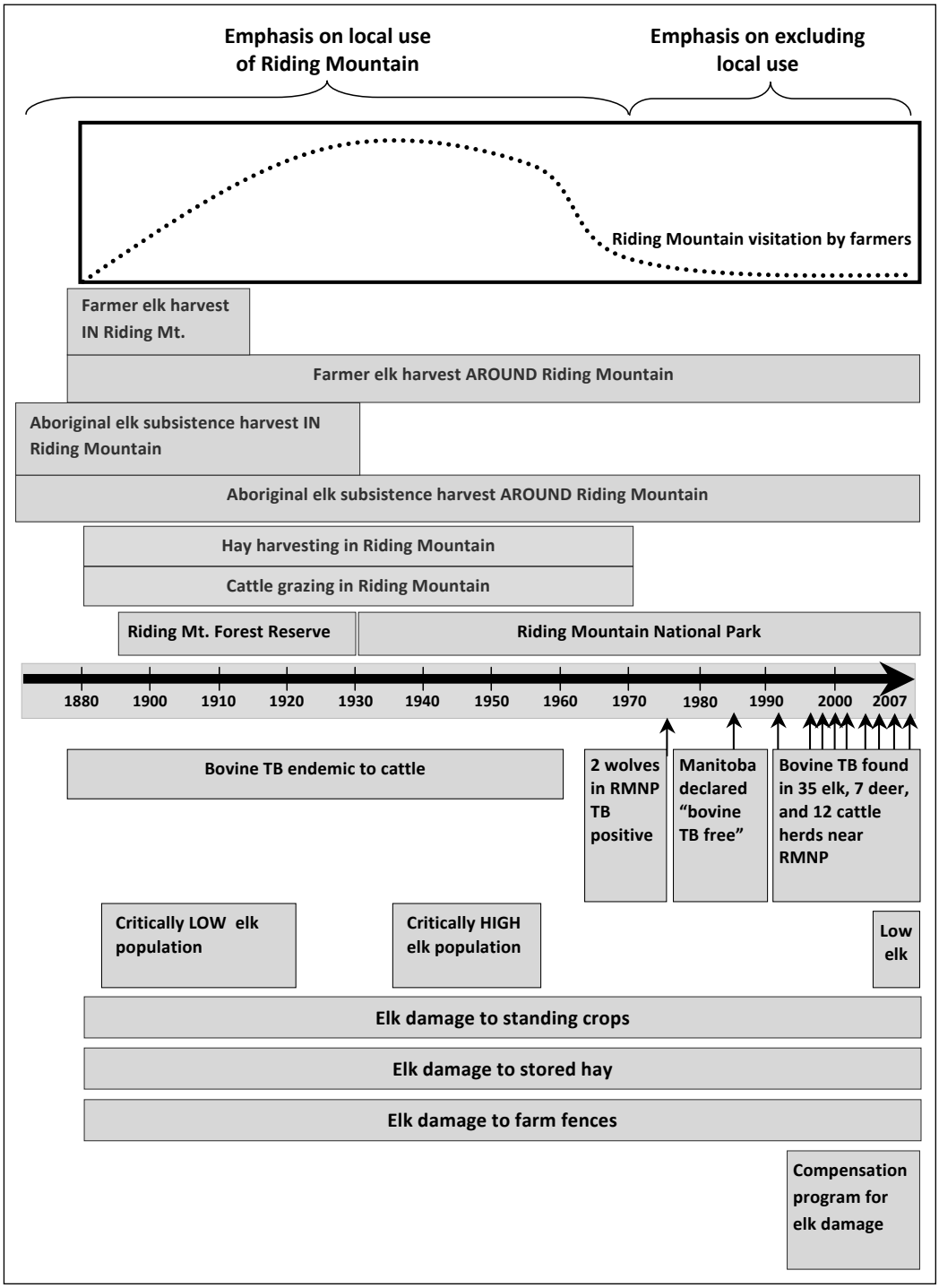

Figure 2. Timeline for the evolution of protected area status and use that form the context and primary drivers of elk–agriculture conflicts in and around what is now Riding Mountain National Park, Manitoba, Canada.

of the timber reserve, this did not result in a substantive reduction in hunting until 1900, when it became evident that elk numbers were declining (Tabulenas 1983). In 1906, J. P. Turner, a prominent historian for the Royal Canadian Mounted Police made an urgent call to save what was left of the elk population:

> [The elk population] was plentiful in southern Manitoba, but with the exception of an occasional straggler, it is seldom seen there now. Each year its range shrinks before the advance of settlement, and the constantly increasing number of hunters who pursue it.... In its wilder and more inaccessible range of the Riding and Duck Mountains it is reported to be still fairly plentiful, but I have recently been informed that it is steadily decreasing in numbers.... In the Riding Mountains district lies an extensive tract of wild country splendidly adapted for the wapiti [elk]. It is practically useless for settlement, and barring some lumbering, it will never be of value to the province except as a large and magnificent game and timber preserve. (Turner 1906)

Creation of a protected area

Establishment of a game reserve in the Riding Mountain escarpment after 1907 provided some protection for the elk from over-harvest. The reserve covered approximately 840 km^2 in the south-central portion of the forest reserve, and hunting was prohibited. The remaining portion of the forest reserve, however, was open to provincially regulated elk harvest (Tabulenas 1983). As a result of sport hunting, subsistence hunting, illegal harvest, and natural winter mortalities, by 1914 the Riding Mountain elk population was reduced from thousands to an estimated 500 animals.

The provincial government prohibited elk hunting throughout Manitoba between 1917 and 1933, when only 1 very limited season was allowed (Green 1933). During this time, it was an offense to be in possession of elk meat anywhere in Manitoba. Despite these regulations, however, poaching remained a common practice (Hewitt 1921). Conflicts between farmers and government enforcement personnel occurred frequently over elk-hunting issues. Nevertheless, by 1925 the elk population had risen to approximately 2,000 animals (Rounds 1977). Farmers who were interviewed as part of this study often observed that many men left the region to fight in World War I and World War II, resulting in an associated sharp decline in elk hunting. This decline in elk hunting was partially responsible for the elk recovery.

Further protection for the elk was provided by the establishment of RMNP in 1930, though the park was 26% smaller than the original forest reserve (Figure 3). The elk population continued to increase to around 3,500 animals by 1933 (Rounds 1977) and then rose sharply to approximately 6,000 animals in early 1941, 12,000 in 1946, and reached an estimated record high of 16,800 animals in the fall of 1946 (Banfield 1949).

Conditions around the park also were changing. The human population more than tripled from approximately 15,000 at the turn of the century to 47,000 by the late 1940s (Stadel 1996). Farming gradually became increasingly mechanized; the introduction of the bulldozer drastically increased the rate of forest clearing (Bird 1961). The elk population appears to have peaked in the 1940s and by 1949 decreased to 4,700 animals in response to declining habitat quality within the park (Colls 1950). More than half of all farmers interviewed in this study indicated that it was common practice to illegally harvest an elk within RMNP during the late 1940s. Many park wardens condoned this practice, provided that hunters took only a single animal and used the meat for personal consumption. After 1963, the elk population fluctuated between 2,000 and 6,000 animals (Parks Canada, unpublished data).

Agricultural activities within RMNP

From 1895 until 1970, cattle grazing was allowed within what is now RMNP. During the 1950s and 1960s, 15% of the park was grazed by up to 4,600 permitted cattle (Figure 3; Blood 1966, Dushinsky 1981). Interviews for this study indicated, however, that many hundreds of cattle were grazed annually in the park without permit. Cattle grazing was strongly encouraged to reduce the fire hazard (Dushinsky 1981) but led to the deterioration of many of the native

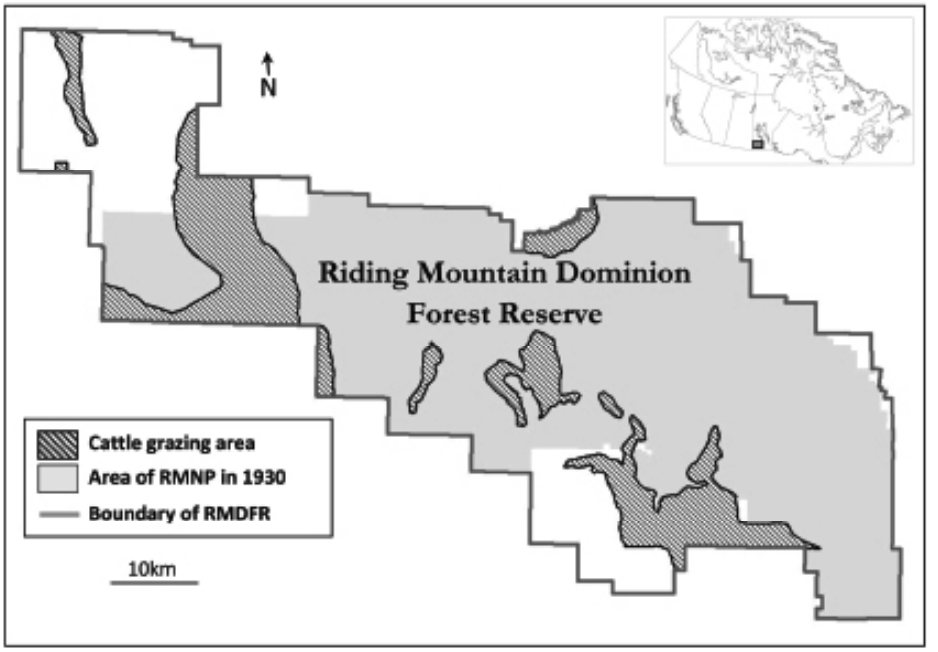

Figure 3. Cattle-grazing distribution within Riding Mountain Dominion Forest Reserve (RMDFR) in 1916. (Parks Canada, unpublished data).

prairies within the park (Trottier 1986). Blood (1966) felt that overlap in diet or range-use by cattle and elk was limited and that neither species had an impact on the other. Still, some concerns were raised within RMNP regarding the level of hay harvest. A RMNP warden reported in 1951:

> I am still surprised to learn that there is a considerable amount of hay cut in areas which are the finest elk range in the Park…. This amount would support a fair number of elk throughout the critical period, and it would relieve a great deal of pressure on browse species. (Reeve 1951)

Reeve (1951) estimated that 1,361 metric tons of hay was cut in RMNP each summer, but he cautioned that "the park wardens state that they are afraid of intentionally set fires if grazing and haying permits were to be cancelled" (Reeve 1951). One farmer interviewed in this study indicated that he set fires intentionally to rejuvenate meadows for hay production and cattle grazing. Another interviewee noted that occasionally he started fires to generate paid employment to help put out the fires. Logging within RMNP also was allowed until 1964, and farmers relied heavily on Riding Mountain during this entire period as a source of wood for building materials; most fence posts in the region also were derived from the park.

Elimination of cattle grazing, haying, and logging within RMNP by 1970 generated considerable farmer frustration that is still very much present. A participant at a town hall meeting in Erickson during 2003 stated that "the government sold us out by kicking us out of the park." Indeed, discussions with farmers about any resource issue typically implicated, either directly or indirectly, the loss of access to RMNP as a cause of other diverse problems, as the following remarks by a cattle producer show:

> Before RMNP was established, my father logged, cut firewood, hunted every winter, as well as all those surrounding the park were doing the same. Now we see millions of dollars worth of timber and firewood rotting. No fires or cutting. So no grass will grow to feed the animals. The tree

> huggers call this natural, but it's a long way from that. (Cattle producer, personal communication)

Once farmers stopped using RMNP to extract resources, most of them never returned at all to the park. Only 6% of the farmers interviewed for this study made use of the park for any purpose over the last decade.

Potential disease transmission

Elk–cattle contact has occurred within and around RMNP since European settlement, raising concerns about disease transmission. Green (1933) did not identify any epizootic diseases in the elk, but he warned that monitoring for anthrax, hemorrhagic septicaemia, brucellosis, and necrobacillosis would be necessary. At the time of Green's study (1933), an outbreak of hemorrhagic septicaemia that occurred in sheep herds along the edge of RMNP may have infected the nearby elk. Green observed that actions needed to prevent livestock diseases from infecting wild elk were obvious and worth the effort required to prevent domestic stock from invading the range.

An outbreak of blackleg disease in cattle herds in RMNP in 1956 supported Green's concerns about disease and the risks of transmission to free-ranging elk. Others expressed similar concerns. Most notably, D. R. Flook, the Canadian Wildlife Service biologist working in RMNP, repeatedly raised concerns regarding disease transmission from cattle to wild ungulates:

> I reported last December on the livestock grazing situation as it affected wildlife from a standpoint of competition for forage and wildlife with contagious diseases. The situation still exists. I believe that foot rot and lump jaw are more prevalent, indicating that the range is becoming more contaminated with the organisms causing these diseases. Wild ungulates are susceptible to these diseases which can be disastrous in their effects on wild populations... I recommend again that all livestock grazing in the park be discontinued. (Flook 1956)

From the establishment of RMNP in 1930 until cattle grazing in the park was discontinued in 1970, very few elk were tested for disease, so it is not clear if any disease transmission occurred between cattle and elk in RMNP. During the winter of 1946–1947, Banfield (1949) noted large numbers of sick elk infected with "verminous pneumonia," but that infection was attributed to the extreme population size of the elk at the time.

Bovine tuberculosis (TB) was endemic to cattle in Manitoba until at least the 1960s, but these outbreaks were never formally associated with a wildlife host, and bovine TB was generally considered a disease primarily of cattle that could also infect humans. However, some local residents viewed wildlife as a potential source of disease for many decades, as one cattle producer I interviewed in 2002 indicated:

> TB was always a factor and concern since day one. In the early 1920s and through to the mid-1950s, TB played a role in the lives of almost every family. Pretty well everyone including our past generations here ate elk, moose, and deer on a regular basis. The cattle were exposed to these animals in a far greater extent in the past years than they are today. Wild game carried TB at that time as did domestic animals. The percentage of people with TB was also high in consideration of the sparse population. From the mid-1920s to 1955, several families had members sent to sanatoriums to be treated. The TB at that time was contracted in 3 major ways: eating contaminated meat (wild and domestic), drinking milk (and cream butter) and water, or from person to person. The spread from person to person was solved by x-ray and early diagnosis. Any positive test was sent to a sanatorium. The spread from domestic animals to humans was solved by having herds tested every 3 years regularly. No one has ever figured out why the TB dropped in the wildlife, other than a lot of animals died off of their own accord when populations became too high and we had a rough winter. Roughly this has occurred

Elk gathered at Riding Mountain National Park.

> 4 times since my grandparents and parents and myself have resided in the area from 1912 to present. (Cattle producer, personal communication)

In 1986, Manitoba was declared TB-free, but 7 beef cattle herds tested positive in 1991. The suspected source of the contagion was RMNP. In 1992, the first elk in the region was confirmed TB positive; however, there was little wildlife testing before that, despite an incidental finding of 2 infected wolves in RMNP. Six local farmers that I interviewed during this study believed that several elk that had been shot around RMNP over the last 100 years were infected with bovine TB, but none of these farmers turned in samples for testing:

> As long ago as 1959, I can remember a hunt with 2 long-time local elk hunters (both now deceased), who had hunted elk for more than 20 years before me, leaving an elk in the field because of the lumps on the rib cage and in the lungs. "That elk has TB... [and] we will leave [it] in the bush." What really sticks in my memory is how emphatic he was that the elk had TB because of other similar experiences in his past. (R. Usick, cattle producer, Rural Municipality of Park South, unpublished report)

In all of the town hall meetings I attended, participants expressed a very high level of concern about the presence of TB within the region and the risks of transmission to livestock (Brook and McLachlan 2006). It has been largely assumed that TB transmission between elk and cattle was facilitated by elk use of hay bales in and around farms. In all town meetings, at least 1 participant, and often several, suggested that the elk herd should be destroyed. One town hall meeting participant remarked: "You need to kill off the wild elk herd. TB is a real problem and something drastic needs to be done" (2003). When government officials suggested that eradication of the elk was not feasible, participants typically became frustrated. One meeting participant, for example, remarked bluntly: "We have given you the solution, but you don't have the guts to use it. Kill the elk." (2003).

Historical elk damage to crops

Crop damage by elk and damage to fences around RMNP has been a recurring problem since farming began (Lundy 1955). Observations from farmers interviewed in this study and government records indicated that damage by elk to agricultural crops has occurred every year over the last century, and most of the damage was close to the park. From 1997 to 2006, >90% of all elk damage occurred <3 km from RMNP. The Manitoba minister of mines and natural resources, C. H. Whitney, indicated that farmers were reporting considerable damage that

> Elk have been doing to agricultural products, such as hay in the farming districts close to the border of the Park. They attribute the exodus of elk from the Park to two main reasons, one being a reported lack of feed for the elk in the Park itself, and the second being an over-abundance of timber wolves and coyotes in the protected area of the Park. (Whitney 1950)

An issue paper that was produced by the Manitoba Department of Game and Fisheries in response to minister Whitney further explains the conflict:

> An RCMP [Royal Canadian Mounted Police] report has also been received

> wherein it states that a farmer of the Makinak district reported to them he had killed an elk and that they could come pick it up. He further stated that he and other farmers of the area intended shooting all elk they found on their property in the future. All the farmers signed a petition and sent it in to the M.P. [members of Federal Canadian Parliament] for Dauphin, and he took the petition to Ottawa in an attempt to have something done either to prevent the elk doing damage, or to arrange to have farmers paid for damages done by the elk. The petition brought no results. Nothing was done. (Colls 1950)

However, Malaher (1952) noted that not all farmers supported such extreme actions. The provincial director of game and fisheries noted a response from one farmer:

> His neighbours have suffered material damage from elk. Heavy bush comes right up to the farm fence lines.... The open hunting season is inadequate in preventing damage. Elk coming out to feeding at night. Farmers cannot protect fields at night in period of intense cold.... He and neighbours have tried every means to keep elk away. He feels that nothing can stop all his crop going before spring. Anticipates elk will reach his fields soon. Suggests the Government buy the crop of himself and neighbours and then let the elk feed on it. If no compensation is granted he is considering suing the Government for damages on behalf of all the group. He thinks the problem is increased by the cutting and removing of hay from the Park by farmers, under permit. This hay should be feed for the elk. Elk seem to have formed the habit of grain eating. Each generation of young now learn habit from the adults. He would not like to see all the elk shot. In normal years there is not much problem as the crops are all off the fields. This year it is critical—only threshed 20 acres. Has no remedy to suggest except perhaps organized feeding in the Park. Insists he and neighbours cannot stand loss. (Malaher 1952)

The Federal Department of Resources and Development responded:

> The park warden in district opposite the lands of these farmers does not think that the farmers have made any effort to keep elk off their fields. Under the circumstances, it is suggested that any action to be taken should be restricted to areas outside of the park and that, with provincial co-operation, the farmers concerned should endeavour to take effective action to protect their interests. (Smart 1952)

A compensation program was initiated by the Manitoba provincial government in 1997 that provided 100% loss coverage to farmers for crop damage caused by elk. This was then reduced to 80% of the value of the loss in 2004. In all years and all seasons, there is considerable elk damage to fences, standing crops, and stored hay bales on agricultural lands, with annual damage often >$240,000 in the region.

Intergovernmental conflicts

Differences of opinion among federal and provincial agencies regarding options to manage elk damage have occurred regularly due to differences in mandate and jurisdiction. An internal provincial memo stated:

> Our main object is to eliminate the elk outside of the Park, as elk and agriculture are not compatible.... The root of the trouble lies within the RMNP which is under Federal jurisdiction. (Davey and Reeve 1950)

The internal conflict is evident in correspondence from the Manitoba provincial senior game manager, E. F. Bossenmaier, regarding a conversation he had with the federal director of national parks, J. R. B. Coleman:

> We asked him for his viewpoint on the proposal that some system be devised whereby sport hunters could shoot elk inside the Park boundary. Again

> he was sympathetic but dismissed the idea on the basis that it would be a dangerous precedent. When it was mentioned that possibly a mile to three mile wide strip of the Park periphery could be removed from the Park and designated a game management area, he countered by proposing that the province buy up a one to three mile wide strip adjoining the Park boundary and designate this as a game management area. (Bossenmaier 1960)

Interviews with local farmers elicited many stories regarding conflicting mandates and objectives between federal and provincial agencies. Government employees from both levels stated that communication among the federal and provincial employees often was rare. One RMNP warden noted that his staff typically learned about the number of elk tags to be provided to hunters in the upcoming season by obtaining a Manitoba hunting guide, a publication by the provincial government given to all hunters, and that no consultations were held with federal staff before setting seasons. In 2001, the establishment of a bovine TB management task group with representatives from the government agencies and key stakeholders facilitated increased dialogue, though considerable conflict remains regarding elk use of farms and the associated damage done to fields and crops.

Mitigating elk damage to crops

Attempts to reduce elk damage on farmland have largely focused on liberalizing hunting seasons (*Winnipeg Free Press* 1950*b*, Davies 1968, Schroeder 1981), and the province has been reluctant to provide farmers with kill permits for problem animals. In many years when crop damage was high, the provincial government set open elk-hunting seasons around RMNP. The maximum number of elk harvested by hunters in 1 season was estimated at 2,298 during 1959–1960 (Carbyn and Flook 1969), though farmers indicated in personal interviews for this study that the actual number was much higher due to poaching and unreported kills by landowners. Elk were frequently killed inside RMNP by park wardens, and a reduction program was carried out inside RMNP during 1959–1960 when 319 elk were killed (Carbyn and Flook 1969).

Both the federal and provincial governments are regularly accused of herding elk back into the park before the start of the hunting season (*Winnipeg Tribune* 1952*b*, *Dauphin Herald* 2004). On one occasion, the provincial government did conduct a herding trial using a helicopter (*Winnipeg Free Press* 1950*a*). However, G. W. Malaher, the provincial director of game and fisheries, noted that not all farmers supported such extreme actions.

Some discussion has occurred regarding holding meetings with farmers about crop damage, as was noted by the federal senior game manager:

> As a means of easing tension among the farmers in the vicinity of the Park, Mr. Coleman speculated about the value of public meetings. It was his thought that if the disturbed landowners had an opportunity to air their grievances, there might be less grumbling in the future. (Bossenmaier 1960)

However, there were very few records of meetings being held with farmers to discuss crop damage or mitigation options, and few farmers interviewed in this study recalled attending meetings. One meeting held to discuss elk management with local stakeholders and government officials in 1991, however, was identified by 11 interviewees as the most intense conflict in which they have ever been involved. Their ill-feelings stemmed from the RMNP superintendent's opening remarks:

> I prefer a buffer concept. Additional lands surrounding the park could be set aside and used on a sustainable yield basis…. The land could be designated under new special provincial legislation that would promote sustainable management, including wood cutting, hunting and trapping. (M. H. Estabrooks, Parks Canada, unpublished report)

Farmer interviewees in this study 15 years later frequently cite this statement as evidence that a primary goal of RMNP was to expand beyond its boundaries. All RMNP staff that I interviewed, however, strongly argued that park expansion is not their objective.

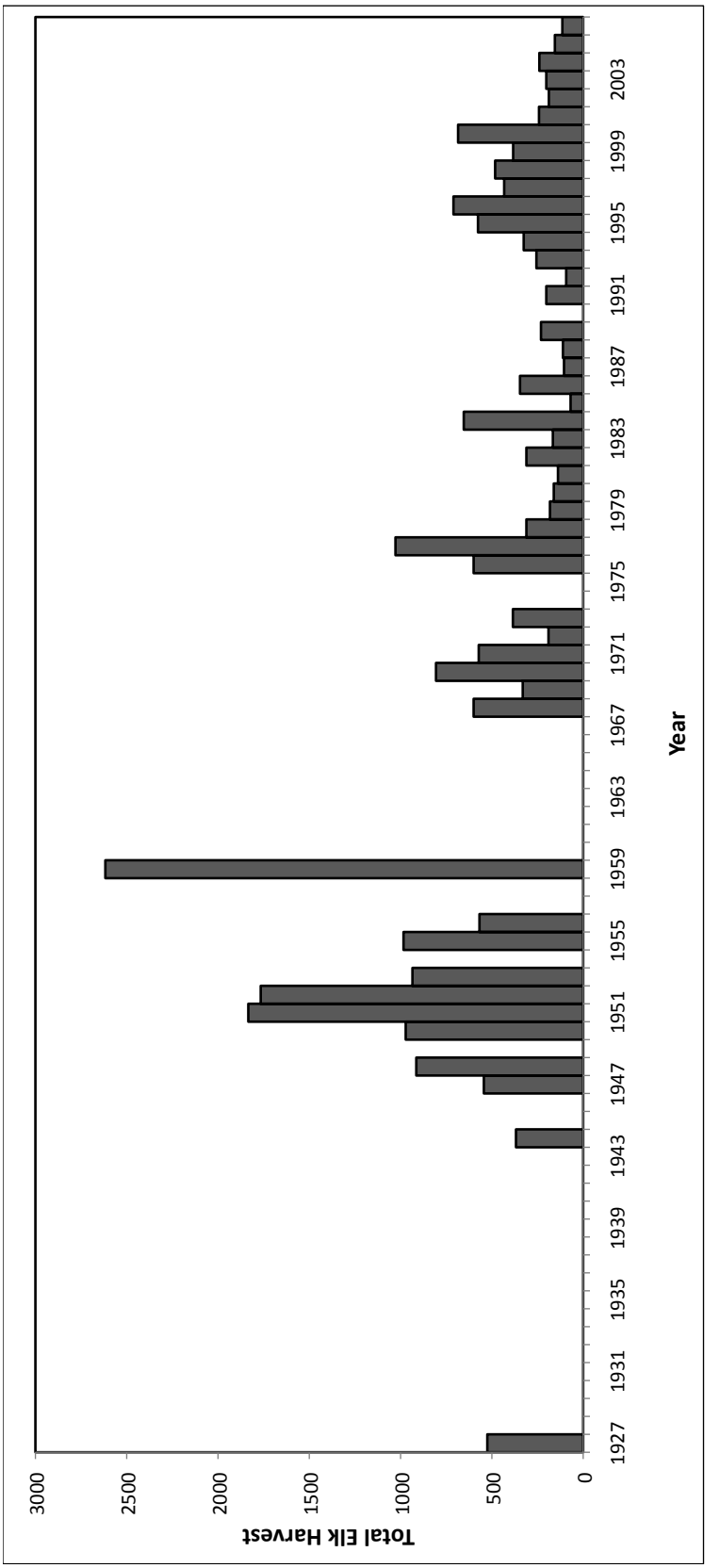

Figure 4. Estimates of elk harvest by licensed hunters on the agricultural lands around Riding Mountain National Park. Hunting seasons have been variable in timing, duration, and number of available hunting permits. All elk-hunting occurred during the winter months and thus, provide a minimum estimate for the number of elk moving outside of the RMNP boundary. Data were compiled from diverse sources (Manitoba Conservation, unpublished hunter questionnaires, Malaher 1950, Parsons 1952, Blood 1966, Carbyn and Flook 1969, and Richards 1997). No data are currently available on First Nations subsistence harvest of elk.

Elk hunting

While farmers have regularly raised concerns about elk damage, hunters (who often are also farmers) around RMNP frequently have been frustrated by the total ban on elk hunting in the park (Winnipeg Tribune 1952*a*, 1952*b*). Indeed, the season length, number of available hunting permits and the number of elk killed each year on farmalnd around RMNP have varied greatly (Figure 4). In the winter of 1951, a group of 133 hunters signed a petition, stating:

> We find that after two days hunting that no elk venture outside of the park area after the first shot is fired. We have paid our $10 and we want a gambler's chance to get an elk. We strongly recommend that the game and fisheries branch give us at least six days hunting within the boundaries of the Riding Mountain National Park, as the lands bordering on the park are privately owned, we do not wish to enter upon same. These elk come out into the open at night and do damage to the farmers crops when it is illegal to shoot them. (Hunters of Manitoba 1951)

In 1981, the provincial government established a special landowner hunting season in the early fall of each year specifically for farmers and other landowners. In an interview, D. Chranowski, the regional biologist for Manitoba Conservation (the provincial agency responsible for hunting seasons), explained the value of the landowner season:

> Landowners were experiencing depredation from elk, and this special season was the government's way of saying "thanks" for putting up with the elk. Second, it was a way of encouraging landowners to retain habitat on their own land that helped retain elk in the general area. (D. Chranowski, Manitoba Conservation, personal communication)

The value of the landowner hunting season was referred to extensively by local residents, and it often is viewed as a positive contribution to offset elk impacts, as indicated by the words of 1 cattle farmer:

> My wife and I go for the landowner season every year since it started, and we usually get an elk for the freezer. If it weren't for this program, we probably wouldn't do nearly as well. (Cattle producer, personal communication)

While hundreds of farmers participate in the landowner season, there remains conflict over the nature and timing of the program. One cattle producer said:

> The landowner elk season should remain open at any time another elk season is open in that area. Many landowners are unsuccessful during their hunting season, which usually occurs during their busy harvest season in the fall. Then they have to put up with the hordes of city slickers that don't have a clue about hunting etiquette and coming out roaring around and sometimes asking permission, then wanting all kinds of assistance when they accidently harvest an animal. All this when the landowner goes without an animal after trying to be sympathetic towards elk and moose—doing damage all year long. (Cattle producer, personal communication)

For many local residents, including farmers and Anishinabe hunters, the greatest frustration expressed with regard to hunting is the total ban on hunting within RMNP where the vast majority of the elk population resides.

Habitat change

Farmers view many areas of the park as overgrown with forest and shrubs resulting from intensive fire control and the discontinuation of haying, forestry, and cattle grazing. These changes in habitat often are considered to be primary factors associated with elk–agriculture conflicts. One cattle producer described the situation in this way:

> Many years ago when farmers were permitted to cut hay in the park,

> large meadows were kept treeless and provided good feeding areas for elk.... When cutting hay was no longer permitted, these areas became treed-in and also because of the explosion in the beaver population, these feeding areas are either grown in or flooded. So I feel the government must improve the habitat for elk in the park and also make sure that the grazing areas are large enough to support the current elk populations. (Cattle producer, personal communication)

Changes in farming practices also have influenced elk conflicts. One cattle producer commented:

> I've gone from more of a grain crop base—from what my dad had—to a cattle-based operation here since a lot of the land is better suited for cattle. So I've been sowing it down, and now I tend to see more elk because of the alfalfa out there. I'll see more during the day than you would if it was summer fallow or anything else. (Cattle producer, personal communication)

The initiation of controlled burns within RMNP in the 1990s is seen by most farmers as important for reducing conflicts with elk. One grain farmer said: "The controlled burning in the park over the past few years has benefited the elk habitat; therefore, the elk are staying in the park more. They had nothing to eat before, and now they do" (Grain farmer, personal communication). However, this success has then resulted in conflicts with hunters who have complained that the habitat improvement has reduced their success.

Declining elk habitat caused by beaver (*Castor canadensis*) activity within RMNP also is frequently identified as a primary source of elk–agriculture conflict (Brook 2007). The concern about the impact of beavers on habitat is exacerbated by the long-standing resentment over Parks Canada's reintroduction of beavers after the animals were almost completely extirpated from RMNP during the fur trade (Green 1933). The reintroduced beavers dispersed in large numbers onto surrounding farmland and caused considerable flooding in some years (Menzies 1998).

The way forward

The basis of conflicts that are currently occurring around what is now RMNP are the result of a wide range of cumulative factors that have been operating since farming began in the 1880s. All resource management decisions must reflect and accommodate these past issues in addressing existing and emerging conflicts. Despite the on-going challenges that farmers and other stakeholders have with elk, local attitudes toward elk are largely positive and considerable economic and social benefits are derived from hunting and observing them. However, there are considerable ongoing challenges with regard to human–human conflicts associated with elk damage and disease management.

Efforts by management agencies to mitigate elk impacts historically have been minimal and have relied almost solely on hunting to reduce elk populations and deter elk from farms and compensation to offset these impacts. Hunting is an important component of long-term management of the elk population and has contributed to a reduction in elk impacts in some cases. As such, hunting opportunities both for local people and other residents of Manitoba should be maintained throughout the fall and early winter. Hay-yard barrier fences that are comprised of 3-m-high paige wire and are provided free by the federal and provincial governments are the most effective and widely-accepted management tool in use to mitigate elk–agriculture conflict (Brook 2005). This program should be continued and expanded to other areas of Manitoba and encouraged for all farmers with any problems with elk damage.

The current Manitoba crop insurance program, which provides compensation to farmers for wildlife damage, is an effective short-term strategy to help farmers deal with impacts from elk. However, it largely removes the incentive for farmers to examine ways of eliminating the damage and the associated risks of disease transmission that exist whenever wildlife and livestock come into direct or indirect contact. As a result, over the long term, the existing program can be a disservice to farmers with chronic wildlife problems and may play an indirect role in facilitating disease

transmission. I recommend that Manitoba Crop Insurance Corporation (MCIC) begin exercising the option that they have to provide fences to be used toward preventing wildlife damage in lieu of, or in partial replacement of, cash payments for damages and to deny payments in areas with chronic issues where no mitigation attempts have been made.

Communication and cooperation between farmers and the agencies involved in wildlife–agriculture interactions are essential components of successful management of conflicts associated with elk. Much greater efforts are needed to include farmers in the wildlife management process and keep them informed of government actions. I recommend establishing an on-farm program that provides an opportunity for agriculture extension experts, veterinarians, biologists, and farmers to work together to develop individualized farm management plans to eliminate or reduce wildlife contact with hay bales and cattle and facilitate meaningful discussion regarding these issues.

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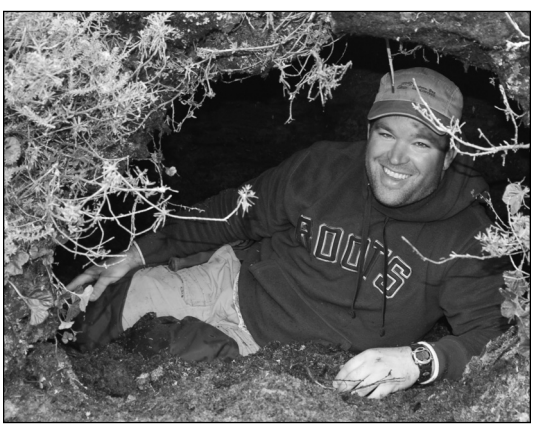

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