

Feasibility for the Expansion of Seed Potatoes in Northwest Manitoba (Parkland)



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This report provides the Rural Municipality of Shell River and the Parkland Crop Diversification Foundation with valuable tools and knowledge that will assist them in making informed decisions regarding sustainable agricultural and rural development, protecting the water and soil resource.

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Abstract

The transfer of tuberculosis (TB) from infected elk in the Riding Mountain National Park to cattle herds just outside of the park is a major concern for local producers. Currently, once a disease infected elk is located the Canadian Food Inspection Agency (CFIA) performs test sampling in the cattle herds surrounding the general location of the elk. To assist in the fast and efficient sampling and identification of what herds to sample, cattle over-wintering sites, which are thought to be the most likely sites for potential transfer, were mapped out in the Rural Municipalities of Dauphin, Gilbert Plains and Grandview. 303 cattle overwintering sites were identified and mapped in a Geographical Information System (GIS), with 144 in the RM of Dauphin, 78 in the RM of Gilbert Plains and 81 in the RM of Grandview. Using this location information, cattle herds within a certain proximity to an infected elk, or other illness or disease that need to be tested are easily identified. The RM's of Dauphin and Grandview also have areas of scattered bush and woodlots extending from the Riding Mountain National Park into the RMs, that could be used as corridors and provide cover for elk during winter months which could place the cattle operations around these areas at a significantly higher risk of coming into contact with elk and thus TB transfer from elk. Results of this project demonstrate the usefulness of a GIS system for RM's in their day to day operations and lays a foundation of data collection with these RM's to provide for the development of an intensive livestock siting and RM landuse planning tool.

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1.0 Introduction

The Riding Mountain Biosphere Reserve incorporates Riding Mountain National Park and the RM's that are directly adjacent to the park ([Map1](#)). Over the last two years there has been some concern expressed over the possibility of tuberculosis (TB) transferring from infected elk in the park, to the surrounding cattle herds. TB is caused by the microorganism *Mycobacterium tuberculosis* which manifests in lesions of the lung and bones. The disease is communicable and can quickly spread through a herd of animals, causing them to be unfit for processing. In 2000 there were two elk found with TB in the Riding Mountain Biosphere Reserve, one in the RM of Grandview.

Currently, when an infected elk is found, the Canadian Food Inspection Agency (CFIA) samples cattle herds in the surrounding area. It was recognized through consultation with Rural Municipalities and the Riding Mountain Biosphere Reserve Group (RMBRG), that by mapping the location of cattle herds, it would quickly identify where cattle herds are located in relation to infected elk and could help define sampling areas for CFIA. Land use information could also be incorporated to help identify areas of higher risk of TB transfer from elk, such as treed areas that provide protection for elk and or corridors in which the elk could move in and out of the park. The best method of accomplishing this is through the use of a Geographical Information Systems (GIS).

GIS allows users to spatially display information and create maps in an accurate and timely fashion. It serves as a resource management tool, as well as an educational tool, informing the public as to the scope of the project. GIS is a relatively new tool, that can assist by providing information on cattle herd locations and locations of infected elk to local decision makers (RM's and land owners) and CFIA, in a map format. This would allow the transfer of information to local landowners and assist CFIA in the process of defining sampling locations to test cattle herds for possible TB infection.

2.0 Project Description and Objectives

The main objective of the project was to collect data on the cattle over-winter sites in the RM's of Dauphin, Grandview and Gilbert Plains. The data was collected by the RM councillors and was incorporated into a GIS system. The data could then be used to help future sampling protocols for TB in cattle when infected elk are discovered, and to act as an information tool for local cattle producers when infected elk are found. The project also served as a foundation to introduce to the RM's GIS systems and the possibilities it can provide in helping RM's with day to day operations and the siting of new agricultural operations and a landuse planning tool.

The deliverables at the conclusion of the project will include:

- i.) a methodology that supports resource based decision making by local governments regarding livestock operations including TB testing and land use planning.
- ii.) a demonstrated capacity among participating local governments to utilize advanced decision making tools on their decision making.
- iii.) reports for each participating project partners that includes hard copy (tabular and map form) results of analysis.
- iv.) digital products and data for continued analysis to be used by the Riding Mountain Biosphere Reserve Group and the Rural Municipalities of Grandview, Dauphin, and Gilbert Plains in land use planning for current and future agricultural activities.

3.0 Methodology

3.1 Determine the scope of the project

After discussions with the Riding Mountain Biosphere group and the participating RM's, it was decided to limit the initial project area to only the RM's of Dauphin, Grandview and Gilbert Plains, due to time constraints. After this initial project, the work can be expanded to other RM's in the Biosphere Reserve. It was also decided to collect data on cattle over-winter sites, and not summer pastures, based on the assumption that the greatest risk of TB transfer from elk to cattle would occur at over-winter facilities. Elk are more likely to come into contact with cattle, and have a greater chance of spreading TB, when food in the park is scarce during winter months. Over-winter sites provide an enticing supply of grain and forages for elk, and cattle are more likely to eat from the same food source as the potentially infected elk. However, if in the future pasturing cattle are felt to also be at significant risk, the project can be expanded to include summer pasture sites as well.

3.2 Data Collection

Basemap features

The basemap serves as the foundations upon which all other data will be gathered and corrected to. This information includes the topographic data such as roads, water bodies, aerial photos, etc. The data was obtained from the National Topographic Survey Sheets and the Provincial orthophotos.

Cattle Over-winter Sites

The most essential component of the data is the location of cattle over-winter sites. This data was collected by consultation with RM councillors, and reflects the knowledge base of the councillors. The general locations of over-winter sites, once provided by the councillors were adjusted using the provincial orthophotos.

Landuse

The way land is presently being utilized affects the most likely routes and corridors of elk associated with the park. These corridors occur in areas of trees and bush, with associated grasslands, near rivers, streams and creeks. Over-winter sites located close to these corridors will be at greatest risk of TB transfer from elk. Land use imagery was used to locate these areas. The landuse image was taken in 1999 and has a resolution of 30 m² and was provided by RadarSat International (RSI). The Manitoba Remote Sensing Centre classified the image into seven classes including annual cropland, grassland, forage, trees, wetlands, water bodies and urban/transportation.

4.0 Results and Discussion

Maps 2, 4, and 6 show the base map features (roads, water bodies, etc) for the RM's of Dauphin, Gilbert Plains and Grandview, respectively. Each of these maps also shows the locations of cattle over-wintering sites. The total number of cattle operations (beef and dairy) is shown in Table 1 and the results are broken down by RM. Dauphin has the largest number of cattle operations with 143 beef and 1 dairy, while Gilbert Plains has the smallest number of operations, 78.

Table 1: Summary of Cattle Over-winter Sites by RM

Rural Municipality	Cattle Operations	
	Beef	Dairy
Dauphin	143	1
Gilbert Plains	78	0
Grandview	81	0

Maps 3, 5, and 7 show cattle operations and a 1999 classified landuse coverage for the RM's of Dauphin, Gilbert Plains and Grandview. In all RM's annual cropland dominates the landscapes with 173,819 ha, 150,126 ha, and 128,654 ha in the RM's of Dauphin, Gilbert Plains and Grandview respectively. This is followed up by trees, or treed areas in each RM, with Grandview having the highest concentration at 106,422 ha (Table 2).

Table 2: Summary of 1999 Land Use imagery by RM

Land Use Category	Area of Municipality (ha)		
	Dauphin	Gilbert Plains	Grandview
Annual Cropland	173819	150126	128654
Trees	98668	57126	106422
Water	2363	944	4728
Grassland	67282	33953	33723
Wetland	3745	3239	11581
Forage	20392	8165	6703
Urban/Transportation	12212	7558	6731

Preliminary analysis of the landuse maps show that in the RM's of Dauphin and Grandview there are areas of scattered bush and grasslands extending out from the Riding Mountain National Park. These areas can act as cover and corridors for elk movement during the winter months and cattle herds found nearby are at a higher risk of TB from elk. In the RM of Dauphin this is mostly confined to the east side of Highway 10, in Range 11 and as far north as Highway 20 ([Map 2](#)). There also appears to be a potential corridor following north along the Vermillion River riparian zone.

A large potential corridor that extends from the Riding Mountain Provincial Park to the Duck Mountain Provincial Forest on Range 25 occurs in the RM of Grandview exists. There is also considerable amounts of woodlots and treed areas along the Riding Mountain Park south of PR 366 ([Map 6](#)). Cattle producers in these areas have the highest chance of having their cattle come into contact with elk, during the winter months. The RM of Gilbert Plains on the other hand, has only a hand full of cattle producers near the Riding Mountain National Park and has significantly less areas of scattered bush that could act as elk corridors decreasing the risk of TB transfer.

Over-wintering site information can also be used by CFIA and the respective RM's to help inform producers and set up sampling protocols the next time an infected elk is found. An example of this is found on [Map 8](#), showing a potential case scenario and a resulting sampling area. In the example, a sampling radius of 10 miles around the location of the infected elk was used, identifying 40 locations and anywhere from 925 to 1,100 cattle to be sampled. This same procedure could apply in helping CFIA and RM's determine sample locations for outbreaks of other livestock diseases, such as foot and mouth, or setting up quarantine areas. Since the information can be easily displayed in a map format quickly, RM's and the RMBRG can inform producers and help to educate the rest of the public in an efficient and timely manner.

5.0 Summary and Conclusions

A total of 303 cattle overwintering sites were identified and mapped with 144 in the RM of Dauphin, 78 in the RM of Gilbert Plains and 81 in the RM of Grandview. With the knowledge of locations of over-wintering sites, herds at risk can be easily identified for sampling us GIS. This technique could also be extended to other types of disease outbreaks, and illustrates the importance of having this type of information on hand for fast and efficient identification of sampling areas, or quarantine zones, should the need arise.

Although it is difficult to accurately predict which cattle operations are at significant risk of TB transfer from elk herds, this project has been able to point out some general areas of risk, using landuse imagery. The landuse imagery showed areas of scattered bush and woodlots extending from Riding Mountain National Park in the RM's of Dauphin and Grandview, that could be used as corridors and provide cover for elk during winter months. These potential corridors for elk movements place the cattle operations around these areas at a significantly higher risk of coming into contact with elk and thus TB transfer from elk.

This data will be shared with the Riding Mountain Biosphere Group, who has an initiative to work with RM's in the Biosphere Reserve to finish mapping all cattle over-winter sites.

5.1 Future Direction

This information will prove useful to Riding Mountain Biosphere Reserve Group in continuing their efforts in mapping cattle over-winter sites in the remaining RM's in the Riding Mountain Biosphere Reserve. After all data has been collected, a more detailed analysis of areas at risk of TB transfer from elk within the Biosphere will then be possible. This would involve not only landuse information, but should also involve Parks Canada data on elk herd movements and locations of TB infected elk found in the Biosphere Reserve. With the incorporation of this data, it would be possible to outline areas of risk with greater accuracy, based not only on cover for elk, but based on an indication of the most active corridors used by elk and their potential to have TB.

While this project has illustrated the usefulness of GIS systems to the RM's involved and it has also laid the important foundation for the collection of the initial data needed to provide the RMs with an intensive livestock siting tool. With the development of such a municipal planning tool through the collection and analysis of this and additional data, the tool will further assist the RM's in landuse planning issues, including the siting of new and or expanding livestock operations. The Rural Municipalities of Dauphin, Gilbert Plains and Grandview are collecting data to develop such a planning tool.

6.0 Data Sources

Land Use: Satellite imagery obtained from RSI. Landsat TM (30 m pixel resolution) 1999. Classification from the Manitoba Remote Sensing Centre. Winnipeg, Manitoba.

Livestock Information and Over-winter sites: RM's of Dauphin, Grandview, and Gilbert Plains, Manitoba. Collected and finalized March, 2001

Orthophotos: Linnet Geomatics International Inc., Winnipeg, Manitoba. 1:60,000 (1994 for the northern portion of Grandview and Gilbert Plains/ 1995 for southern Grandview and Gilbert Plains/ 1996 for Dauphin).

Residence Information and sites: RM's of Dauphin, Grandview, and Gilbert Plains, Manitoba. Collected and finalized March, 2001.

Topographic Data: Geomatics Canada, National Topographic Survey sheets (62N01, 62N02, 62N07, 62N08, 62K15, 62K16, 62O04, 62O05, and 62J13) 1:50,000. Sherbrooke, Quebec.