

**Managing Disease Risk in
Northern Alberta Wood Bison -
Outside of Wood Buffalo National Park**



**2013 - 2014
Progress Report**

September 2014

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Introduction

Alberta has long recognized that the key issue regarding the management of wild bison is the threat of tuberculosis and brucellosis spreading from infected animals in and around Wood Buffalo National Park to livestock (cattle and domestic bison) and to healthy wild bison.

These introduced cattle diseases represent an ongoing threat to Alberta's livestock industry since they could result in trade restrictions and significant economic losses. In addition, wood bison are listed nationally as "threatened" and by Alberta as "endangered." It will be impossible to fully restore healthy, wild bison populations until these livestock diseases are eradicated, since recovery herds will need to be kept small and relatively confined to reduce their risk of becoming infected. There is also a risk of disease transmission to humans and to other wildlife species. In 1990, a federal Environment Assessment Panel recommended completely eradicating all bison from Wood Buffalo National Park (WBNP), followed by restocking with disease-free animals. This recommendation was not implemented by the federal government.

Alberta's long-term goal is to eliminate the disease risk. This would remove the risk to Alberta's livestock industry and would allow the restoration of wild populations of wood bison across northern Canada. The restoration of wood bison populations would fill a key ecological role and provide substantial cultural and economic benefits to Alberta. Until this long-term goal can be achieved, the interim approach is to prevent the spread of tuberculosis and brucellosis from diseased wild bison to domestic livestock and disease-free wild bison.

Alberta's approach for managing the disease risk to both domestic livestock and free-ranging wood bison is detailed in "Managing Disease Risk in Northern Alberta Wood Bison – Outside of West

of Wood Buffalo National Park." This approach implemented by Environment and Sustainable Resource Development (ESRD) and Agriculture and Rural Development (ARD) with assistance from Mackenzie County and the Alberta and Canadian cattle and bison industry organizations was focused on the area to the west of the park. In 2012/13, the Ronald Lake bison herd, near the south east corner of the park, was added to the program to ensure bison management objectives in Alberta are consistent and within the scope of the National Recovery Strategy for Wood Bison in Canada.

The approach has three broad components:

- Hay-Zama wild bison herd management;
- Disease surveillance and risk reduction east of Highway 35; and
- Monitoring populations of wild bison east of Highway 35 and in the Ronald Lake area.

The objectives for monitoring the Ronald Lake herd are to determine:

- Population size and range distribution;
- Disease status of the herd;
- Movements of the herd relative to bison within Wood Buffalo National Park; and
- Genetic relatedness of the herd to other provincial herds.

The following is the fourth progress report on this approach and includes work undertaken during 2013 and the winter of 2014. The June 2011, May 2012, and June 2013 Progress Reports are available at; <http://esrd.alberta.ca/fish-wildlife/wildlife-diseases/wood-bison-disease-management.aspx>

1.0 Hay-Zama Wild Bison Management

Objective - To maintain the wild Hay-Zama wood bison herd free of bovine tuberculosis and brucellosis by limiting their numbers and distribution, particularly east toward Highway 35, thereby reducing the opportunity for exposure to diseased bison from the vicinity of Wood Buffalo National Park (WBNP).

The Hay-Zama wood bison reintroduction program was started in 1983 to re-establish a healthy population of wood bison in northwestern Alberta. This was a significant element in the

national wood bison management plan, which called for at least one self-sustaining herd in each of Alberta, BC, Yukon, Northwest Territories and WBNP. The Hay-Zama bison herd has grown rapidly in numbers and distribution since 1994. A goal of the 2008 draft recovery strategy for wood bison in Canada was to protect “clean” recovery herds from contact with diseased animals. Hay-Zama bison are disease-free, while bison populations in and around WBNP are known or assumed to be infected.

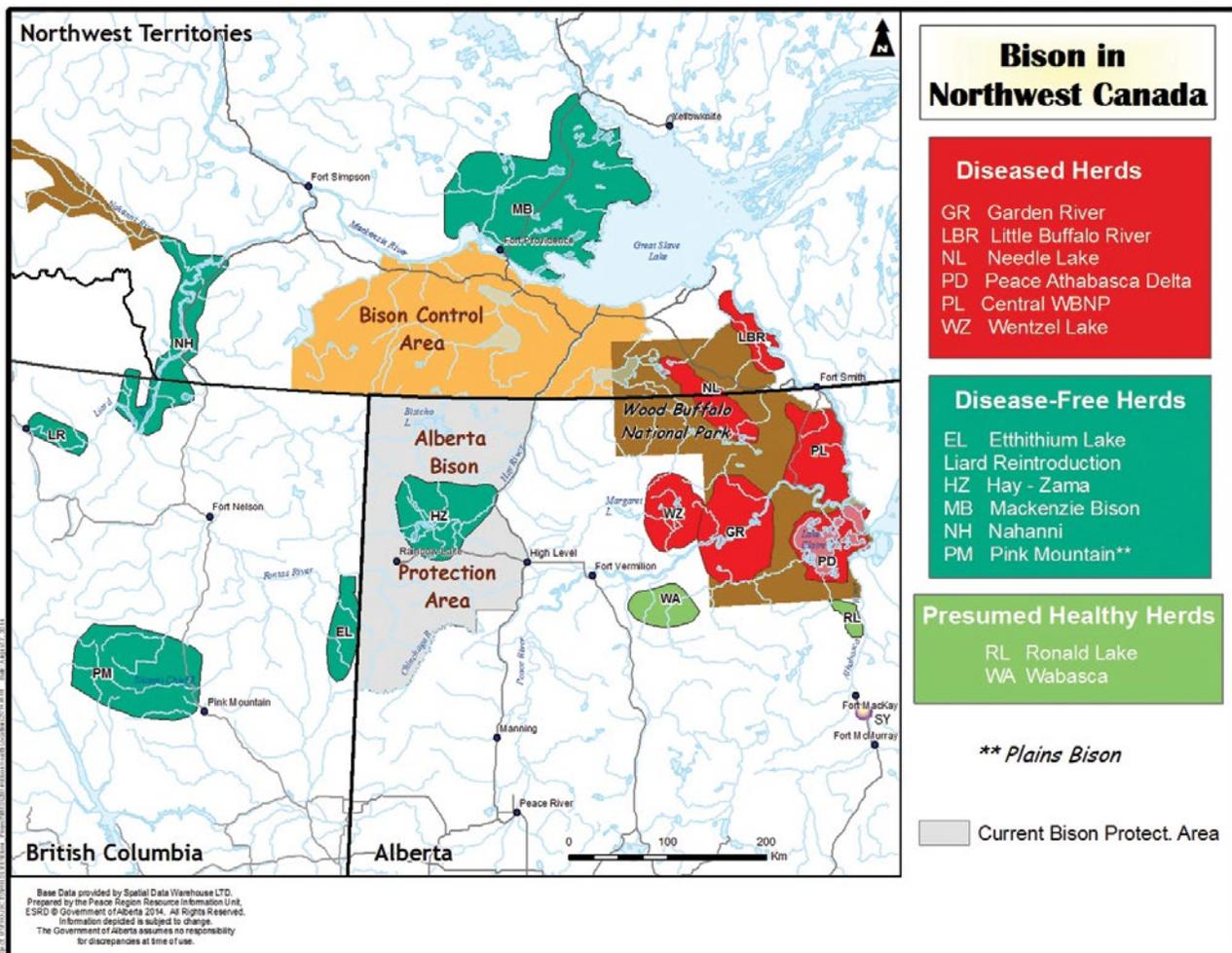


Figure 1. Bison Herds Currently Classified as Diseased or Disease-Free

The Hay-Zama bison herd has been monitored since the original release. The total number of bison peaked in the winter of 2008 when 652 animals were seen in 63 different groups. Observed range expansion raised concerns over bison moving east toward diseased bison from WBNP. In particular, there was specific concern over several instances of bison moving east along the Zama road to and beyond Highway 35. In the spring of 2008, it was determined that a highly regulated hunting season would be instituted and scheduled annually to stop the Hay-Zama herd from continuing to increase in numbers and distribution. The hunt serves two objectives relevant to this strategy:

- It protects the Hay-Zama herd from the near-inevitability of becoming infected as their numbers and distribution increased. **If this happened, there is a strong probability that the whole herd would have to be culled.**
- It allowed for a significant amount of disease testing.

Update

From 2008/09 to the end of the 2012/13 bison hunting season, a total of 521 bison were harvested. A total of 279 samples were collected for disease surveillance of bovine tuberculosis and brucellosis and has been reported on in previous progress reports. The hunting season was suspended for 2013/14 due to bison mortality from severe winter weather of 2012/13. The hunt will resume in 2014/15.

Hay-Zama Bison Population Status

A population survey of the Hay-Zama herd was conducted from February 24 to 27, 2014. A total of 501 bison in 21 groups was found (Figure 2). With the new calf crop in spring/summer of 2014, and an annual average recruitment of 11 per cent, the pre-season population estimate is 556 bison. The Hay-Zama bison hunt will be continued in 2014/15 with 105 licences (70 Aboriginal and 35 non-Aboriginal) and a projected harvest goal of 65 to 70 bison. More information is available at: <http://mywildalberta.com/Hunting/GameSpecies/WoodBisonHuntHayZama.aspx>. 2.0 East of Highway 35 Disease Surveillance and Risk

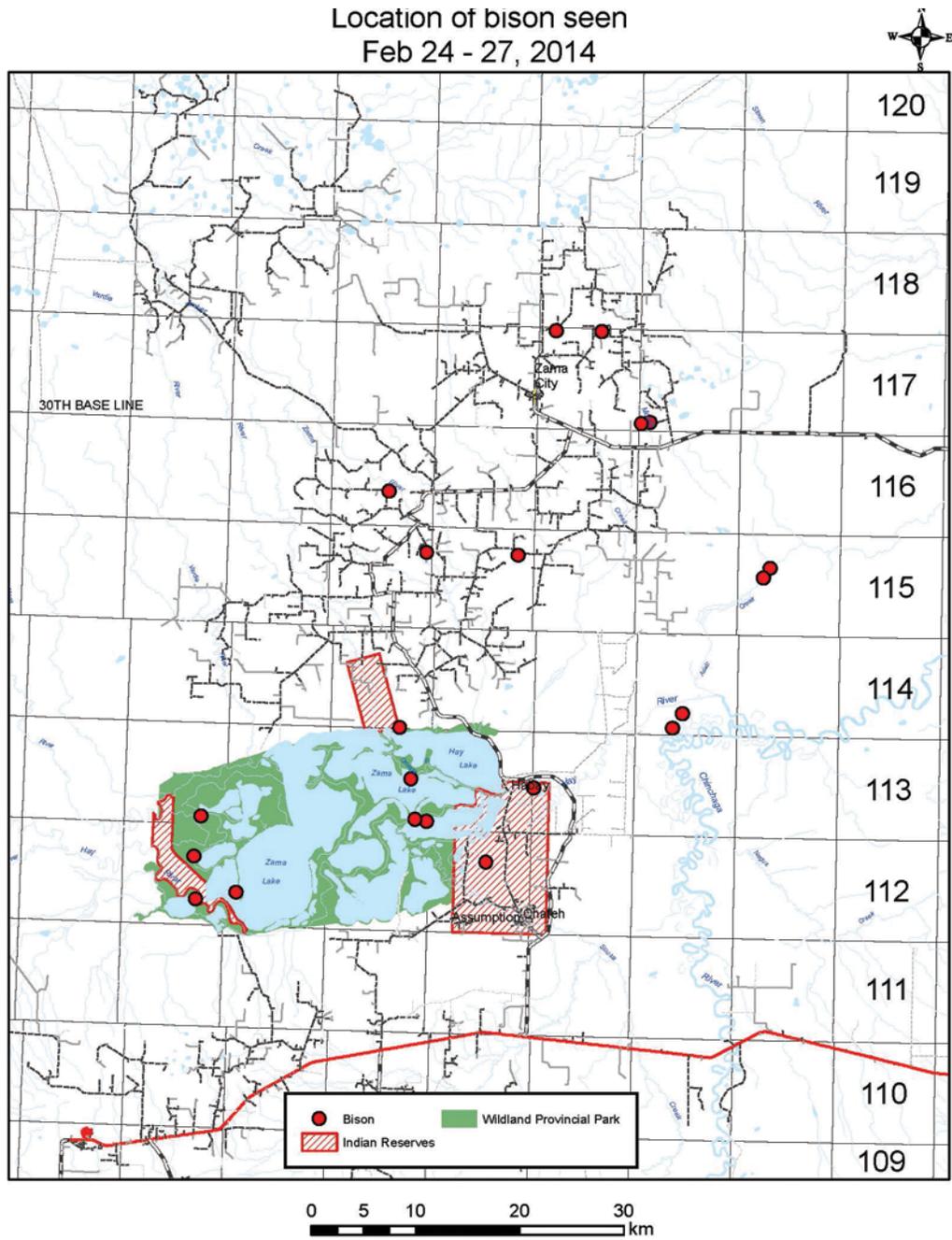


Figure 2. Locations of Hay-Zama Bison observed during survey February 24-27, 2014

2.0 Disease Surveillance and Risk Reduction East of Highway 35

The probability of bison moving west from the Wentzel herd or from the populations in the Wabasca-Mikkwa area is high. Gates et al. (2001) identified several routes that bison would likely use to move west. As well, bison from the Hay-Zama herd would most likely move east along these same routes. Most of the favourable travel routes pass through the agriculture zones in and around Ft. Vermilion and La Crete, and therefore pose the greatest threat to domestic livestock.

2.1 Detection Approach

Objective - To detect any wild bison on private agriculture lands near Ft. Vermilion and La Crete and the Agricultural and Highway 35 Surveillance Zones.

Surveillance areas have been identified along Highway 35 and around the Agricultural Area Zone. The Highway 35 Surveillance Zone stretches 10 km on both sides of Highway 35 from the High Level airport north to the Alberta – N.W.T. boundary. The Agricultural Area Zone contains farmland along Highway 58 from High Level to Fort Vermilion and farmland in the La Crete – Fort Vermilion area. Ongoing surveillance flights also explore associated areas that are potential movement corridors. The purpose of the Highway 35 surveillance zone is to detect animals that:

- (i) may be moving from the east (high risk of infection) toward the Hay-Zama herd, or
- (ii) Hay-Zama animals moving from the west toward the high risk area.

The purpose of the Agricultural Area Surveillance Zone is to detect bison (presumed infected) that may be moving from known population areas

in WBNP, Wabasca-Mikkwa and Wentzel Lake areas. The closest known wild bison herd is in the Harper Creek drainage some 58 kilometres from agricultural lands.

2.1.1 Update on Aerial Surveillance Flights

Highway 35 Surveillance Zone

Surveillance flights were flown by ESRD staff in the Highway 35 Surveillance Zone on January 17, February 5, and March 24 2014. No bison or bison sign was detected during these flights.

Agricultural Area Surveillance Zone

Surveillance flights were flown by ESRD staff in the Agricultural Surveillance Zone on January 16, February 6, and March 24, 2014.

During 2013/14 three bull bison were found in or in proximity to the Agricultural Surveillance Zone.

1. March 2013, bison bull killed by a hunter 20 km south east of South Tall Cree in Township 102 Range 6.
2. February 6, 2014, a bison bull located along the Wabasca River, killed by ESRD and Fish and Wildlife Enforcement staff in Township 106 Range 9.
3. March 3, 2014, a bison bull found killed by wolves 11 kilometres east of South Tall Cree in Township 102 Range 7.

2.1.2. Public Reporting

Objective - To encourage client groups associated with government, as well as the general public, to report wood bison sightings in the surveillance zones.

Update

Public communication through the “Bison Watch” program continued throughout 2013/14 reporting period.

In November 2013, annual Fish and Wildlife District public meetings in High Level and LaCrete were used to encourage stakeholders and the public to report sightings of bison within a 10-kilometre strip along either side of Highway 35.

The Government of Alberta (ARD/ESRD), “*Managing Disease Risk in Northern Alberta Wood Bison – Outside of Wood Buffalo National Park*” June 2013 Progress Report was sent to First Nation, Métis, agricultural, local municipal, hunting and outfitting stakeholders in June 2013.

Posters and advertisements to encourage agriculture producers, to report bison sightings were developed by the Alberta Beef Producers and placed in local newspapers and agriculture notice boards.

Additional posters and public contacts were used to ask the public to report bison sightings east of Highway 35.

2.2 Response Plan

Objective - To remove all wild bison detected on private agricultural lands near Ft. Vermilion and La Crete and in any of the Agricultural and Highway 35 Surveillance Zones. Wherever possible, meat should be salvaged and tissue samples for disease detection should be collected.

2.2.1 Response efforts will involve active removal by shooting and killing of any bison detected through surveillance activities. Tissue sampling and disease testing will be an integral component of these efforts.

2.2.2 Sustainable Resource Development staff

from High Level and Ft. Vermilion Districts will action bison reports. Reports outside normal office hours will be investigated through 1-800-642-3200 RAP line. Government will engage aboriginal and non-aboriginal hunters, outfitters, landowners, etc. to facilitate removal and salvage of meat where feasible and to ensure blood and tissue samples are collected and tested. Remote access by helicopter may be required in some instances.

Update

A total of three response actions were undertaken during 2013/14.

1. October 21, report of 40 -50 bison on the Zama Highway north of High Level in proximity to Highway 35. Approximately 50 bison had moved very close to Highway 35. ESRD and Fish and Wildlife Enforcement staff responded by hazing bison back to the west. One bison bull was killed, samples taken and the meat salvaged during this operation.
2. November 5, report of three bison southeast of Fort Vermilion 20 km. A helicopter search of the area revealed only moose. Subsequent surveillance flights continued to search for these bison.
3. February 6, a bison bull was located along the Wabasca River during a surveillance flight. On February 7, ESRD and Fish and Wildlife Enforcement staff killed the bull and obtained disease samples.

3.0 Population Monitoring East of Highway 35

The number of bison east of Highway 35, their movements and distribution over time is unknown and remains a significant factor in our assessment of disease risk. To our knowledge, most bison reside in two herds, referred to as the Wentzel and Wabasca-Mikkwa herds. This program initiated a survey to estimate the entire bison population in Alberta outside WBNP, and will subsequently survey every three years to assess population changes over time.

As noted earlier with respect to the Hay-Zama population, herd size is an important risk factor. In addition, a program confirming the disease status of these herds will be needed before establishing long term goals and strategies for them. Currently, bison east of Highway 35 are offered no conservation protection with the exception of bison found within Caribou Mountains Wildland Provincial Park.

3.1 Population Estimate and Distribution

Objective - To determine with some precision the numbers and distribution of wild bison in northern Alberta in areas surrounding Wood Buffalo National Park.

3.1.1 Aerial Survey

The area outside of WBNP has been divided into three areas to facilitate and prioritize bison surveys (Figure 6). It is proposed to survey all areas over a three-year period in order of priority, and then conduct monitoring surveys of each herd on a three-year cycle to evaluate size and distribution changes over time.

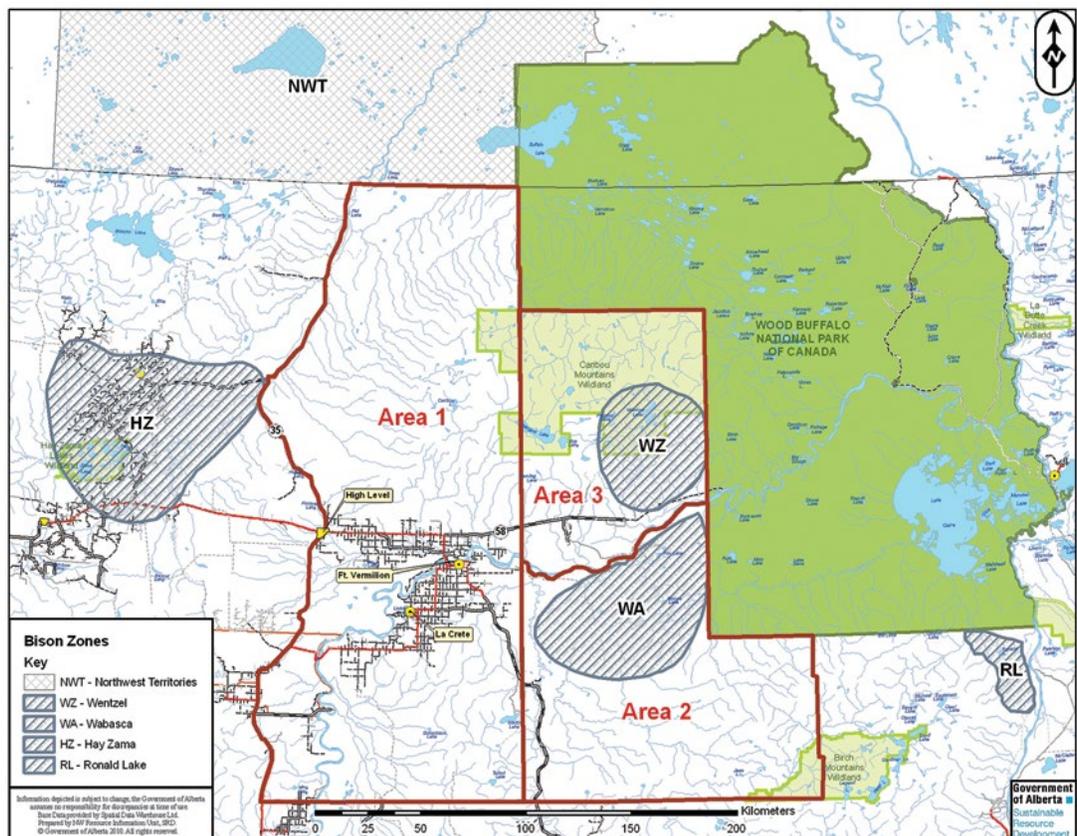


Figure 3.
Aerial Survey Areas for Bison Population Estimates

There are no confirmed sightings of bison in Area 1, and it is assumed there is no resident population of bison in Area 1.

Update

Surveys for bison in each of the three Areas have been reported in previous Progress Reports. A survey of Area 2, Wabasca/Mikkwa herd, was conducted March 3 to 5, 2014. A total of 15 bison and one wolf-killed bull were found within the

interior of the survey area. A further 56 bison were located just west (within 10 kilometres) of WBNP, east of Fox Lake (Figure 4). These bison are considered part of the Garden River herd and move in and out of WBNP seasonally. Other wildlife including 3 caribou, several lynx and wolves were seen on the survey. Moose were recorded, but given the poor to adequate snow conditions no attempt at determining density was calculated.

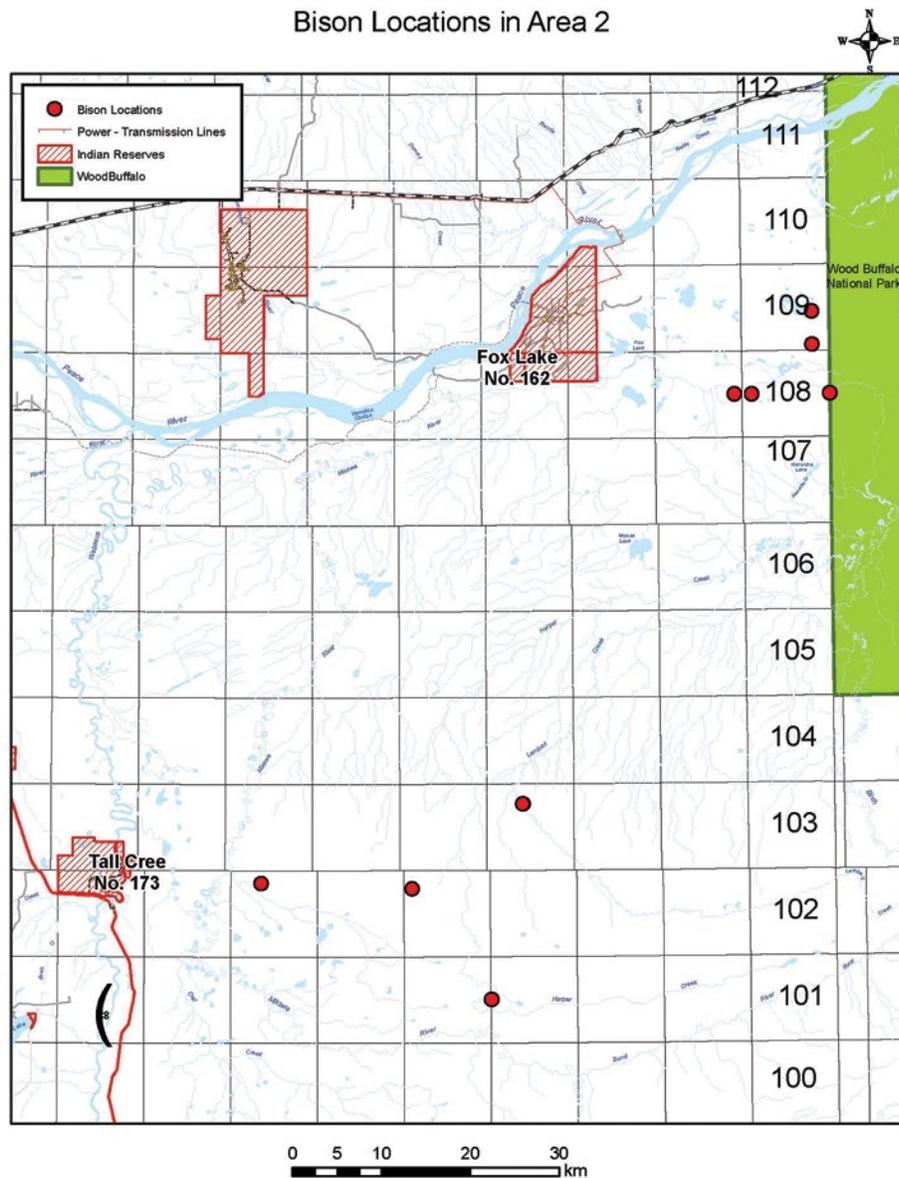


Figure 4. Locations of Bison Area 2 Survey March 3-5 2014

3.1.2 Public Reporting

Encourage the public, bison hunters, trappers and outfitters, First Nation bands and aboriginal harvesters to report bison sightings and local knowledge regarding preferred habitat use and seasonal movements in each of the three areas.

Update

As with public reporting in the surveillance zones, posters and information were provided to the public.

Public reporting of bison or bison sign during 2013/14 included:

1. March 15, report of 1 bull southeast of Fort Vermilion approximately 60km, this animal was subsequently killed by a local hunter.
2. July 29, report of 1 bull approximately 50 km west of WBNP, near Foggy Tower. This bison would be part of the Wentzel Lake or Garden River Boundary herd.
3. October 21, report of 40 -50 bison on the Zama Highway north of High Level in proximity to Highway 35. Approximately 50 Hay-Zama bison had moved very close to Highway 35 and were about to cross. ESRD staff influenced the herd to turn back to the west.
4. November 5, report of three bison southeast of Fort Vermilion 20 km. A search of the area revealed only moose.
5. January 15, report of six bison just outside Wood Buffalo National Park on Highway 58. These bison are believed to be part of the Garden River Boundary herd which move in and out of WBNP.

3.2 Disease Status of Bison Outside of Wood Buffalo National Park

Objective - To determine the disease status of bison in northern Alberta to the west and south-east of Wood Buffalo National Park.

Data on the prevalence of brucellosis and tuberculosis in the outlier herds (Wentzel and Wabasca-Mikkwa) is incomplete and inconclusive. However, outlier herds have been assumed to be associated with bison from the park, which are known to harbour these diseases. Bison east of Highway 35 are assumed diseased and are classified as non-wildlife under *The Wildlife Act*. As a result, they are not protected and can be hunted year-round except in the Caribou Mountains Wildland Provincial Park. Alberta Health issued a public advisory for the area in 1992, urging anyone handling, processing and consuming potentially diseased bison to take precautions. Regardless of current status, the proximity to the parent WBNP disease reservoir puts all outlier herds at a high risk of infection.

To ultimately assess the risk of disease transmission to livestock and disease-free wild bison and to plan surveillance and containment programs in the future, efforts will be made to determine the disease status for each outlier herd. Sampling will generally be conducted by government staff, but if the opportunity presents itself through the ongoing harvest of bison by hunters in the area, the samples collected voluntarily may still be tested. Hunters may be supplied with a limited number of sampling kits and be provided with information on the two diseases suspected to be in the bison so that the risks can be assessed and the proper precautions can be taken.

3.2.1 Disease Sampling

The proposed disease sampling is a phased approach, with each progressive phase increasing in cost, statistical precision and sample size. Bison will be salvaged opportunistically where interested individuals and ground access are available. The disease-testing program for a given herd will be terminated as soon as one of the two diseases (bovine tuberculosis or brucellosis) is detected. The herd will be ranked as diseased. The disease sampling is based on the following assumptions:

- that outlier herds have similar prevalence of bovine tuberculosis or brucellosis to that occurring in WBNP (40 to 50 per cent);
- that it may take small sample sizes to detect disease presence if it is at high prevalence;
- that detection of either disease is enough evidence to classify a bison herd as diseased.

2011-2014

Phase one will use Government or contract collection of two to four animals from each herd for each year of the program, or until the presence of disease is detected. All collection efforts will focus on sampling older bulls wherever possible. With potentially high prevalence, we may be able to establish disease status in one or two years. This phase will run no more than three years.

If there are no diseased bison detected during 2011 – 2014 sampling, Government will evaluate the option of implementing higher precision sampling phases.

To date disease sampling has entailed:

1. Three separate blood samples and one lung sample were submitted to the High Level Fish and Wildlife office by an outfitter successfully hunting bison in Area 3 in 2011. Serology tests conducted by the Canadian Food Inspection Agency (CFIA) revealed that two adult female bison tested positive for exposure to brucellosis. These results were provided to the public in an Information Bulletin July 28, 2011.
2. One blood and lung sample had been submitted to the Fort McMurray Fish and Wildlife office by a hunter in 2011.
3. A disease sampling program was conducted in December 2011 to confirm disease status in bison in Areas 2 and 3. A total of four bison from the Wabasca/Mikkwa and seven bison from the Wentzel herds were sampled. Laboratory tests conducted on the four samples from the Wabasca/Mikkwa herd were negative for both tuberculosis and brucellosis. These results do not mean that the Wabasca/Mikkwa herd is not infected with either of these diseases as the number tested did not provide a large enough sample to indicate the herd is disease-free. Laboratory tests were conducted on seven samples from the Wentzel herd, all were negative for tuberculosis and three samples had evidence of exposure to brucellosis. The results were provided to the public in an Information Bulletin June 29, 2012.
4. A disease sampling program was conducted in December 2012 to increase the sample size and confirm disease status in bison in Area 2 and Ronald Lake. A total of eight bison from the Wabasca/Mikkwa and eleven bison from the Ronald Lake herds were sampled. Laboratory tests conducted on all the samples were negative for both tuberculosis and brucellosis. These results did not mean that the Wabasca/Mikkwa, or Ronald Lake herds are not infected with either of these diseases as the number tested did not provide a large enough sample to indicate the herd is disease-free. An additional 13 blood samples were collected from the Ronald Lake herd when bison were captured for a collaring program in March 2013. Serology tests were negative for both tuberculosis and brucellosis from these samples.

- Genetic material has been archived for each bison sample to support investigations into the origin of these populations.

Update

The number of disease samples for Area 2 (Wabasca/Mikkwa) herd, Area 3 (Wentzel) herd and Ronald Lake herd is summarized in Table 1. During 2013/14 the number of disease samples was increased from Area 2 by twelve:

- Samples from a bull bison killed in the Agricultural Surveillance Zone Feb. 7. Results were negative for brucellosis.
- Hunter samples provided for a bull and cow bison harvested March 14 and 15.
- Samples from three bull bison lethally sampled during the disease sampling March 26.
- Samples from six mature cows non-lethally sampled during disease sampling March 26.

The disease sampling program on March 26 began with the objective to non-lethally (net-gunning) sample 8 mature cows in Area 2. Given very poor snow conditions and significant hunting activity, sample animals could not be located. The decision was made to lethally sample three bulls in the Lambert Creek area as they were the only bison seen during flights to locate suitable bison for net-gunning. A final search was conducted and a herd of bison was located with suitable animals for testing near Harper Creek. A total of six mature cows were sampled using net-gunning (Figure 5). All bison tested from the interior of Area 2 have been negative for bovine brucellosis.

Table 1.
Number of Disease Samples from Areas 2 and 3 and Ronald Lake

Year	Area 2	Area 3	Ronald Lake
2010/11			1
2011/12	4	10	
2012/13	8		23
2013/14	12		49
Total	24	10	73

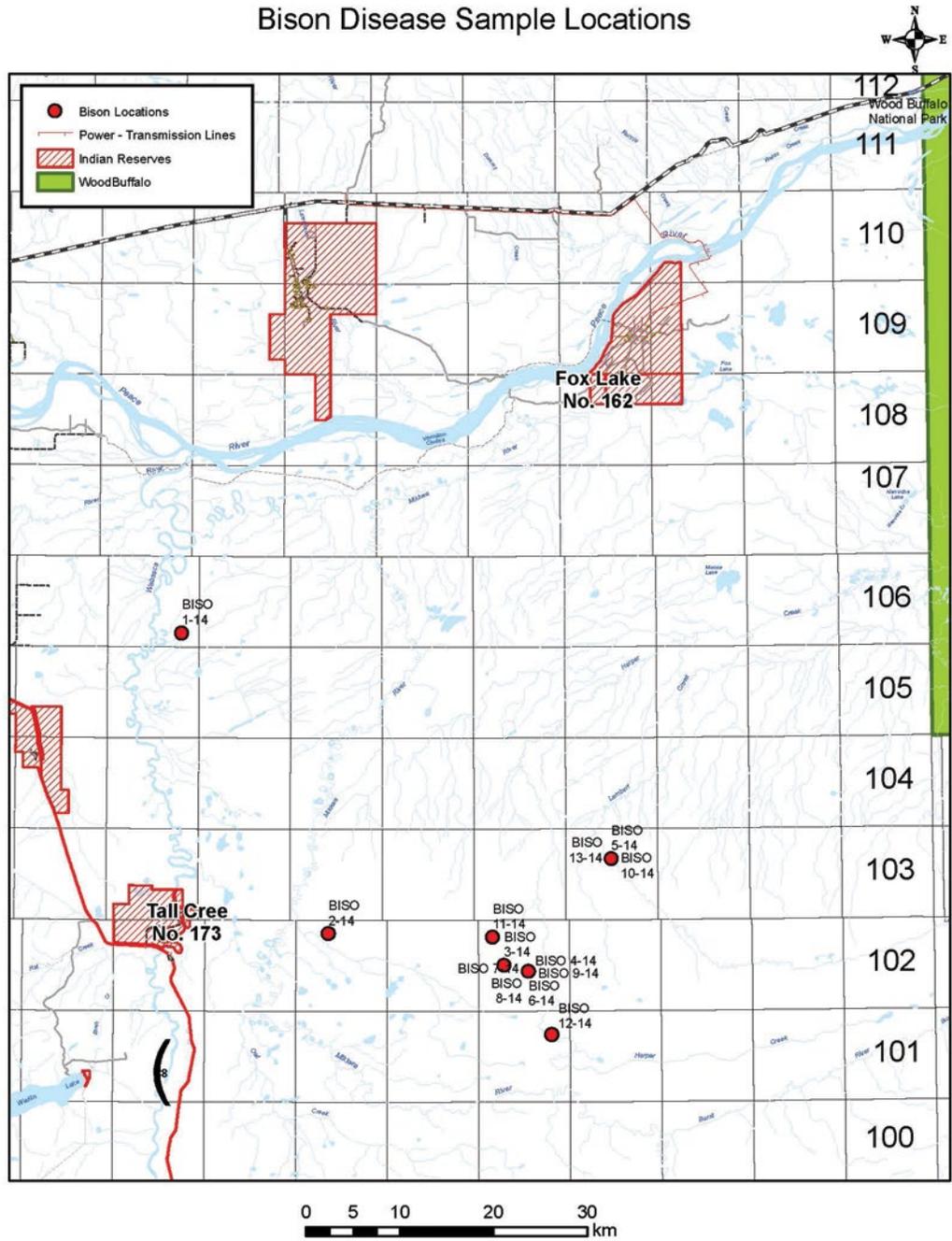


Figure 5. Locations of bison disease samples obtained during 2013/14 in Area 2

Following the 2012/2013 Ronald Lake program, the assumption that disease prevalence at rates similar to those found in WBNP was rejected. In 2013/2014, ESRD began testing the alternative hypothesis that the Ronald Lake Bison are not diseased. The goal was to test for a disease prevalence rate of less than 5 per cent with a 99 per cent certainty for an estimated population size of approximately 200 (Cannon and Roe 1982). Serum samples from five bulls were collected on March 10 and 11, 2014. Serum samples from an additional seven bulls and 37 cows were collected between March 27 and 29, 2014. See Figure 6 for sample locations. All samples tested negative for disease providing further support that if the herd is diseased, the disease occurs at a low prevalence within the herd.

Disease Sampling Summary

The disease status of free-ranging bison, as with any wild population, cannot be determined definitively as almost every animal would have to be tested. In wild populations we estimate the disease status by rigorously sampling enough animals to reach a confidence level well below the expected rate of disease prevalence. Testing within Wood Buffalo National Park indicates that these diseases typically occur at a 30-40 per cent prevalence in similar herds. Disease testing of bison in Area 3 documented the presence of brucellosis. Testing of bison from Area 2 and Ronald Lake did not reveal evidence of brucellosis which indicates 95 per cent confidence that the disease (if it exists at all in the

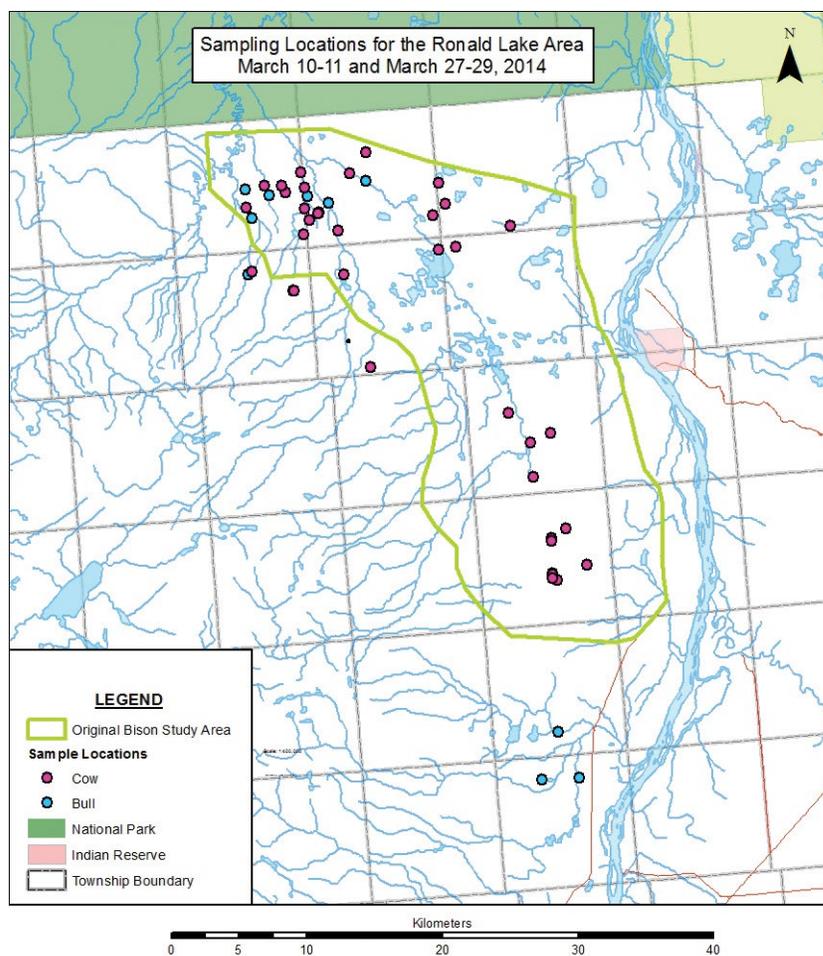


Figure 6. Locations of bison disease samples obtained during 2013/14 in the Ronald Lake area

herd) is below 5 per cent prevalence. Thus we cannot say definitively that brucellosis does not occur in these populations, but we can say if it does occur, it would be there at very low levels. We will therefore manage both the Ronald Lake herd and Wabasca/Mikkwa herds as disease free until we receive other information that indicates the herd is infected. Further testing and higher levels of confidence would be necessary in the future to know if the herd remains disease free.

Northern Alberta Bison Genetics

As reported on in the June 2013 Progress Report, the bison genetic program was implemented in 2012/13 to assist in understanding bison movements and dispersal which has the

potential to shape how local populations are interconnected and subsequently determine how diseases are spread.

Understanding dispersal patterns of Alberta's free ranging bison also is important to identify the natural history of particular bison groups. For example, there is uncertainty in the origin of a group of approximately 200 bison inhabiting an area west of the Athabasca River, east of the Birch Mountains, and south of Wood Buffalo National park, known as the Ronald Lake Bison herd. Currently, ESRD assumes these bison are migrants from Wood Buffalo National Park.

To determine both the fine-scale genetic population structure and inter-population movement, ESRD will analyse genetic markers (microsatellites) specific to the bison genome. The analysis will build on previous efforts (Wilson and Strobeck 1999 a,b), to delineate and characterize bison populations in northern Alberta including Wood Buffalo National Park.

Tissue collection for DNA analysis has been ongoing since 2008 using samples collected from hunter harvested bison during the Hay-Zama disease surveillance program (Table 2). Additional samples were collected from Wentzel Lake, Wabasca/Mikkwa and Ronald Lake during disease surveillance programs in 2011 and 2012. Samples also were obtained from Wood Buffalo and Elk Island National Parks through collaborations with Parks Canada and the Canadian Food Inspection Agency.

Update on Genetic Program

Population genetics were employed on 253 bison individuals from all local bison groups in the province. Results from comparative analyses determined 7 bison groups, which include Elk Island National Park (EINP) wood bison, EINP Plains bison, Wabasca/Mikkwa, Ronald Lake, Mackenzie Bison Sanctuary, Hay Zama/Rainbow Lake and WBNP. Wabasca/Mikkwa bison were the most genetically differentiated

bison group and are genetically isolated from all other groups. This group also showed more genetic similarities to the EINP Plains bison than to any other group. Ronald Lake was genetically similar to WBNP bison; however, the level of differentiation between these two groups was strong, suggesting negligible genetic exchange. Additionally, there was no indication from the results of this report to suggest that any of the peripheral bison populations have maintained genetic integrity to a "pure" wood bison as there were varying degrees of hybridization with plains bison identified.

Update on 2012-13 Recommendations

It was recommended that two new strategies be incorporated into the approach "Managing Disease Risk in Alberta's Wood Bison With Special Focus on Bison to the West of Wood Buffalo National Park."

1. ESRD will work with Tourism, Parks and Recreation (TPR) to amend regulations to facilitate hunting bison in the Caribou Mountains Wildland Park as a mechanism to restrict range distribution and numbers of animals in the Wentzel Lake wood bison herd.

Initial discussions between TPR and ESRD regarding facilitating a bison hunt in the Caribou Mountains WP occurred and will continue based on the need for this potential activity as a risk management tool.

2. Include the Ronald Lake bison herd south and east of WBNP as part of the disease management program. This would include bringing local stakeholders and aboriginal groups up-to-date on the disease management program, establishing good estimates for herd size and distribution, and determining the herd's disease status. Note: Although this herd does not pose any risk to domestic animals nor disease-free bison herds, the status of all herds is required for any long-term solution to eliminating disease sources.

The Ronald Lake bison herd has been added as part of this disease management program. Local stakeholders and aboriginal groups have been included in the general stakeholder list for the Disease Management Program to provide information and opportunity to comment or consult on that program. In addition, a Ronald Lake Technical Team has been formed to share knowledge, and direct further study of that herd.

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References

To find more information on bison disease management, go to:

<http://esrd.alberta.ca/FishWildlife/WildlifeDiseases/WoodBisonDiseaseManagement.aspx>

