

# Plains Bison Reintroduction in Banff National Park

## Pilot Project 2017-2022:

### 2018 Progress Report



Photo: K. Heuer/Parks Canada

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# Introduction

2018 was the second year of a five-year pilot project to reintroduce wild bison to Banff National Park (Figure 1). This year's highlight saw Parks Canada release the small herd of bison (31 animals) from the soft release pasture into the 1200 km<sup>2</sup> reintroduction zone (Figure 2). More calves were subsequently born since the release and two bulls were lost to dispersal. At the close of 2018 the herd in the reintroduction zone numbered 34 animals.

This report tracks progress on the project using performance measures defined in the Detailed Environmental Impact Assessment (Heuer 2017; see Table 1 below for summary). These measures track the major issues and concerns raised by stakeholders during consultations prior to the start of the project. They will be integral to the 2022 assessment of whether or not longer term restoration of bison in the area is feasible at the end of the pilot project.

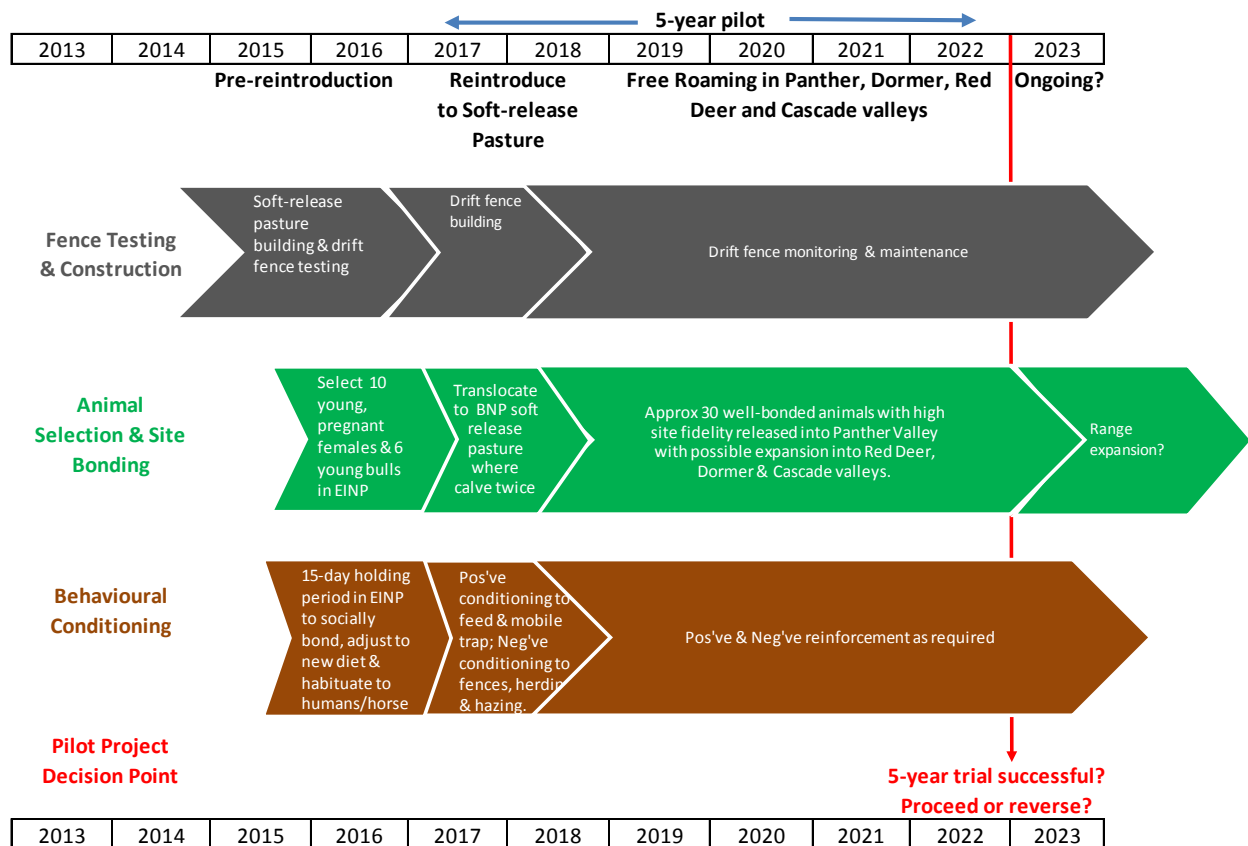
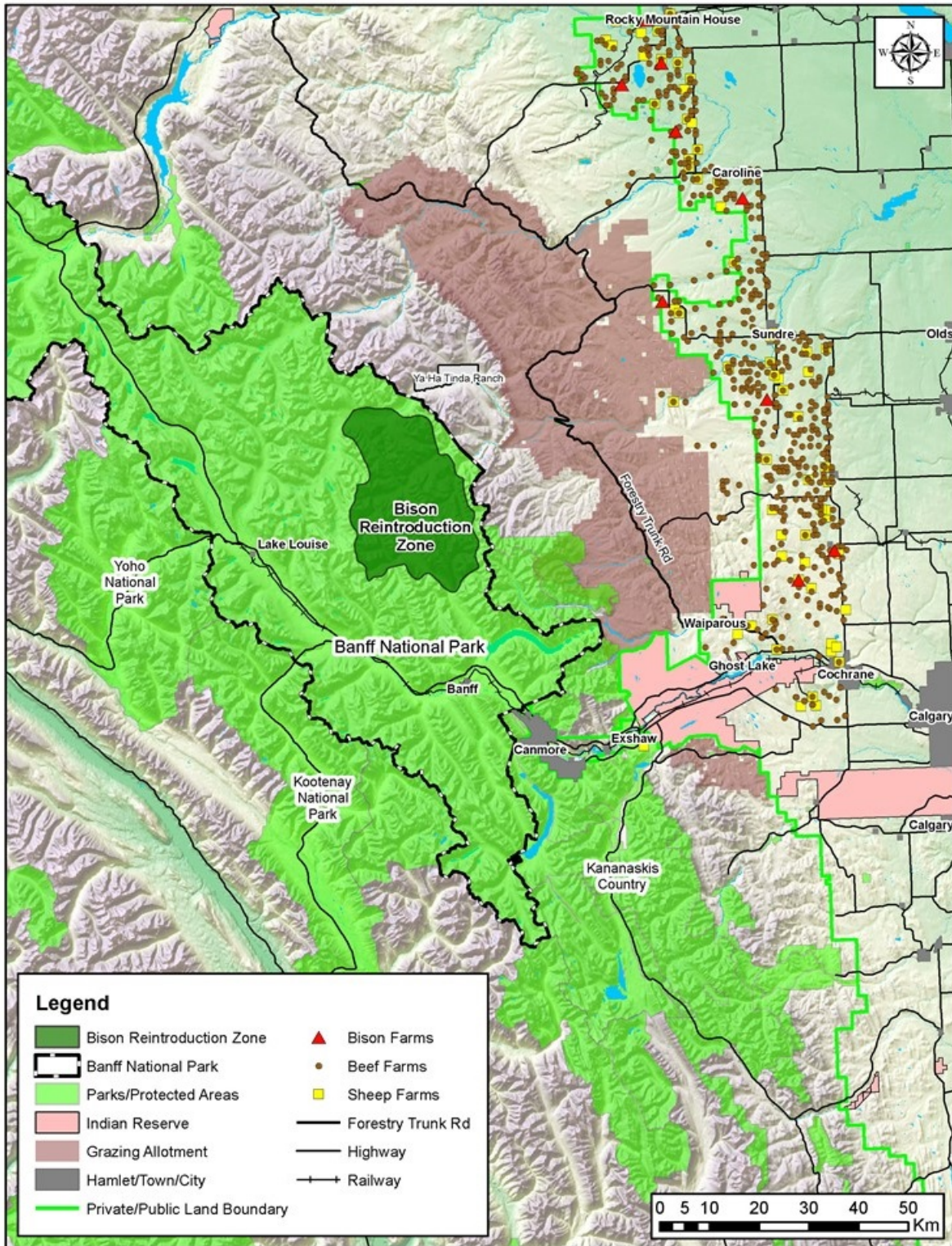


Figure 1: Timeline for 5-year bison reintroduction pilot project, Banff National Park.



**Figure 2:** Bison reintroduction zone, Banff National Park (only westernmost farms and ranches identified north of Trans Canada Highway and west of Highway 22).

## 1.0 Summary of Performance Measures

A total of 29 performance measures are being tracked for the pilot reintroduction project. Progress for each one is summarized in Table 1. Details follow in subsequent sections of this report.

**Table 1:** Performance measures for Banff Bison Reintroduction Project up to December 31 2018.

	<b>ISSUES</b>	Detailed Environmental Impact Assessment <b>TARGET</b>	<b>STATUS (as of December 31 2018)</b>	<b>Section of Report</b>
<b>Wildlife</b>	Bison Movements	No excursions of bison outside of reintroduction zone; Breeding population of wild bison remains in reintroduction zone	<ul style="list-style-type: none"> <li>• 31 of 36 animals (86%) have stayed inside the reintroduction zone and within 20km of the release site in the initial 5 months since being released;</li> <li>• 3 excursion events involving a total of 5 animals occurred during this time; of these 5 animals, 3 returned of their own accord, the other 2 males were lost to the population;</li> <li>• 10 bison interactions occurred with two drift fences in the initial 5 months since the animals were released. Of these, 4 interactions saw the animals go around or through the fences (see above excursions). The remaining interactions (N=31 animals) successfully deflected animals back into the reintroduction zone. Over half the animals (N=19) interacted with a drift fence only once in the initial 5 months since being released.</li> </ul>	3.1
	Bison Health and Reproduction	Bison remain healthy with no detection of brucellosis or tuberculosis in bison or other species; Breeding population of wild bison remains within the reintroduction zone	<ul style="list-style-type: none"> <li>• All 16 adult bison tested clean for brucellosis prior to translocation and again prior to release. All 10 yearlings were also tested and were clean prior to release. All other blood chemistry normal.</li> <li>• No notable bison injuries and no mortalities to date on project;</li> <li>• All bison were treated twice for parasites and were tested prior to release (2017). Only Eimeria protozoa (which is universally present in the environment) was detected prior to release.</li> <li>• Slight dip in body condition of adult animals immediately after release but recovering since. No animals have been given supplemental feed since being released.</li> <li>• All 10 bison cows have given birth to 10 calves for each of the last 2 years (2017/18). The founder herd of 16 animals has now more than doubled to 34 individuals (includes loss of 2 bulls due to dispersal).</li> </ul>	3.2
	Bison & other Wildlife	No negative bison effects on other wildlife	<ul style="list-style-type: none"> <li>• Radio collared members of two wolf packs interacted with lone bison bulls and the main cow-calf herd approximately a dozen times in the five months since the bison were released. GPS collar data did not register a detectable movement response from any bison and no bison have yet been injured or killed by predators;</li> <li>• Radio-collared migratory elk overlapped minimally with the bison in the 5 months since the bison were released;</li> <li>• Anecdotal observations of bison within 200m of Bighorn sheep were made on 3 occasions; neither showed signs of disturbance. A Bighorn sheep study for the area is in the proposal stage and will likely receive funding;</li> <li>• Bison were anecdotally observed within 200m of grizzly bears on 2 occasions.; neither showed signs of disturbance.</li> </ul>	3.3

	<b>ISSUES</b>	Detailed Environmental Impact Assessment <b>TARGET</b>	<b>STATUS (as of December 31 2018)</b>	<b>Section of Report</b>
<b>Vegetation</b>	Non-native Vegetation (NNV)	No net increase in number and extent of NNV infestations	<ul style="list-style-type: none"> <li>• 10 of the identified 16 original infestations in the reintroduction zone were visited and controlled in 2018; 8 of the sites were controlled in 2017;</li> <li>• The yellow toadflax identified at the Windy soft release pasture in 2017 was visited three times in 2018 and found not to be present. The site will be visited again in 2019 and future years to confirm eradication success;</li> <li>• A new infestation of yellow toadflax was identified and controlled at an old horse outfitter camp in the lower Panther Valley. Its discovery predates free roaming bison.</li> </ul>	4.1
	Rare Plants	Conduct a rare plant survey of the reintroduction zone prior to releasing bison and mitigate for any rare plants	<ul style="list-style-type: none"> <li>• Rare plant survey completed in August 2017;</li> <li>• 54 transects were surveyed over 5 survey days for a total survey area of 21.6 km<sup>2</sup> (54 transects x 100 m length x 4 m wide);</li> <li>• Only two rare plant species identified (Pink false dandelion and Narrow leaved blue grass);</li> <li>• No rare plant mitigations are required given the low incidence of rare plants, coupled with the native status of bison and the low concentrations they will occur during the course of the pilot project.</li> </ul>	4.2
	Soft Release Pasture	Aggressively rehabilitate soft-release pasture as soon as practical once bison are released.	<ul style="list-style-type: none"> <li>• Half of the page wire and posts surrounding the summer portion of the soft-release pasture were removed in fall 2018; remaining sections are scheduled to be removed in June 2019;</li> <li>• A targeted pasture restoration program, including soil de-compaction and native seeding of a handful of heavily impacted areas, will be implemented in early summer 2019 (Yakiwchuk, 2018);</li> <li>• Removal of fencing around the winter portion of the soft release pasture will occur after restoration of vegetation is well progressed, likely in fall 2019 or summer 2020.</li> </ul>	4.3
	Riparian Vegetation	Bison will not damage riparian habitat	<ul style="list-style-type: none"> <li>• Bison spent 12.6% of their time in riparian areas (30m buffer around all waterbodies) in first 6 months since being released;</li> <li>• Bison used 7.9% of available riparian areas in the valleys they occupied during this same time period.</li> </ul>	4.4
<b>Aquatics</b>	Water Quality	Water quality monitoring	<ul style="list-style-type: none"> <li>• Water quality measurements were taken for watersheds within the bison reintroduction zone (treatment) and outside the area (control) for 3 years prior to the reintroduction of bison (2014-2016);</li> <li>• Post treatment samples will be collected and analyzed once bison have been on the land for a couple of years in 2020/21.</li> </ul>	5
<b>Cultural</b>	Vulnerable Archaeological Sites	Fence off three high-vulnerability archaeological sites to exclude damage from bison	<ul style="list-style-type: none"> <li>• Unnecessary at this time - No bison locations at known vulnerable archaeological sites in 2018 - all but one lone bull using entirely different drainage.</li> </ul>	6
		Monitor all moderately vulnerable sites every two years and assess for newly exposed artefacts.	<ul style="list-style-type: none"> <li>• First assessment to be completed in 2020.</li> </ul>	
		Monitor Federal Heritage Buildings due to bison rubbing behaviour	<ul style="list-style-type: none"> <li>• No bison locations within 100m of Heritage Buildings in 2018.</li> </ul>	



	<b>ISSUES</b>	Detailed Environmental Impact Assessment <b>TARGET</b>	<b>STATUS (as of December 31 2018)</b>	<b>Section of Report</b>
<b>Visitor Experience</b>	Outreach and Education	Increase awareness and appreciation of bison and Parks Canada's role in restoration and conservation.	<ul style="list-style-type: none"> <li>Reached over 117 million people in 2017 &amp; 2018 with the bison reintroduction story using a variety of communication channels, including digital storytelling, traditional media, documentary projects, and outreach events, including Indigenous blessing ceremonies, the Calgary Stampede, and partnership programming with the Calgary and Toronto zoos.</li> </ul>	7.1
	Visitor Safety	Post Bison Safety Signage at all Trailheads and at Bison Fence Gates	<ul style="list-style-type: none"> <li>Completed in spring 2018; updated signs in 2019 and being posted at trailheads in Spring 2019.</li> </ul>	7.2
		Integrate human-bison conflict prevention and response into BNP's existing human-wildlife conflict management program.	<ul style="list-style-type: none"> <li>Bison Safety messaging has been integrated into all BNP handouts and websites in 2017 and 2018;</li> <li>Several BNP Wildlife staff are trained in bison handling/stockmanship, monitoring protocols, chemical immobilization, destruction and necropsy of bison and are familiar with the reintroduction area and BNP Bison Excursion Response Plan.</li> </ul>	
<b>Wilderness Values</b>	Human Use & Grizzly Bear Habitat Security	Minimally maintain trails	<ul style="list-style-type: none"> <li>Maintenance of designated trails in reintroduction zone continues to be limited to annual clearing of deadfall and windfall.</li> </ul>	8.1
		Manage human use to <100 human events/month on trails in reintroduction zone in the Panther and Red Deer valleys.	<ul style="list-style-type: none"> <li>Human use in 2018 was &lt; 50 events/month on trails in the reintroduction zone in the Red Deer and Panther River valleys; an area closure has been in place for the Panther River Valley since July 2018.</li> <li>Grizzly bear activity in the area is substantially the same as in past years.</li> </ul>	8.2
		Reduce staff presence to 2 wks/month in Wilderness Zone once bison are free-roaming	<ul style="list-style-type: none"> <li>Since September 2018, staff have been in the reintroduction zone fewer than 9 days/month.</li> </ul>	
	Helicopter Use	Reduce helicopter use to <2.5hrs/month in Wilderness Zone once bison are free-roaming	<ul style="list-style-type: none"> <li>Targets were greatly exceeded (9 hours/month) due to bison excursions. Since then helicopter use has declined (i.e. no helicopters were used in November and December).</li> </ul>	8.3
		Infrequent helicopter flights (average of one 1-hour flight every two months during 45-month free-roaming phase of project)	<ul style="list-style-type: none"> <li>Targets were greatly exceeded for the first 3 months of free-roaming phase of the project because bison left the reintroduction zone and had to be hazed/recaptured; therefore 24 helicopter flights occurred in Aug, Sept and Oct 2018;</li> <li>Helicopter use has since decreased: no flights occurred in November or December 2018</li> </ul>	8.3
		Maintain flight elevation over 500 m above ground level	<ul style="list-style-type: none"> <li>Best practices for flight paths and elevations have been shared and are discussed with helicopter companies annually;</li> <li>All flight elevations were at least 500m above ground level.</li> </ul>	8.3
		Concentrate helicopter use in winter months	<ul style="list-style-type: none"> <li>Majority of helicopter use in 2018 occurred in winter and fall.</li> </ul>	8.3

	<b>ISSUES</b>	Detailed Environmental Impact Assessment <b>TARGET</b>	<b>STATUS (as of December 31 2018)</b>	<b>Section of Report</b>
<b>Fencing</b>	Drift Fences	Construct and maintain a total of 7.9 km of wire drift fencing in 15 sections ranging in length from 38m long to 2.5 km long.	<ul style="list-style-type: none"> <li>Total of 7.3 km of drift fencing in 13 sections constructed by Oct 2018; 2 sections (totalling 600m) deemed unnecessary and never built;</li> <li>3 short sections of drift fencing removed Fall 2018 after bison released. Total of 7.16 km of drift fencing remains on the landscape.</li> </ul>	9.1
		The average percent of time that all fences are expected to be in bison holding mode is 1.02% in summer (range 0.27-2.09%) and 3.95% in winter (range 0.02-18.06%). Collectively, all 15 fence sections will be deployed in bison-holding mode <5% of the time.	<ul style="list-style-type: none"> <li>Average percent of time fences in bison holding mode in 2018: 13.32 % in summer (range 0-92%) and 15.49% in winter (range 0-100%);</li> <li>Collectively, all 15 sections were deployed in bison holding mode 15% of the time</li> </ul>	9.1
		No negative fence effects on other wildlife	<ul style="list-style-type: none"> <li>No wildlife injuries have been incurred along the fences.</li> </ul>	9.1
		Install gates wherever wire fences cross trails	<ul style="list-style-type: none"> <li>Completed in 2017 and 2018</li> </ul>	9.1
		Keep gates open when fences are in wildlife-permeable mode	<ul style="list-style-type: none"> <li>All gates are kept open when fences are in wildlife-permeable mode.</li> </ul>	9.1
		Do not install fence posts in wetted channel.	<ul style="list-style-type: none"> <li>No fence posts occur in wetted channels.</li> </ul>	9.1
		Ensure hanging chains and/or planks on river fences do not impede flow of water or fish	<ul style="list-style-type: none"> <li>Chains/planks abandoned for high-visibility netting which spans rivers and streams. The soft netting is strung above the water so it does not impede flow of water or fish;</li> <li>This netting is deployed only when fences are in bison-holding mode. They are pulled back like a curtain at all other times.</li> </ul>	9.1
	Soft Release Pasture Fence	Decommission fence around the primary soft-release pasture as soon as possible after bison are released	<ul style="list-style-type: none"> <li>Half of the summer soft-release pasture (12 ha) was decommissioned in Fall 2018; remainder will be decommissioned in summer 2019;</li> <li>Winter portion of soft release pasture (6 ha) will remain fenced until rehabilitation of vegetation is well progressed. We expect to remove fencing in summer 2020.</li> </ul>	9.2

## 2.0 Wildlife

### 2.1 Bison Movements

#### 2.1.1 Bison GPS Radio Collars

All 10 bison cows and all 6 bulls from the founder herd were collared with Vectronics GPS radio collars in spring and early summer 2018 (Figure 3). One bull (M2) and another cow (F14) ripped off their collars prior to the release and two other bulls (M5 and M19) were lost to the population during dispersal events (see below). The remaining 12 collars are functioning well so far. They are programmed to record a location every two hours and to upload these locations every 22 hours to an Internet-based platform (depends on satellite reception). In actuality, these uploads occur for each animal approximately every 1-3 days. Battery life is expected to be approximately 3-4 years.



**Figure 3:** Radio collaring one of 6 bulls prior to their release in June 2018 (photo: K. Heuer/Parks Canada).

We also fitted the 6 bulls and 10 yearlings with Sirtrack VHF eartag transmitters. Antennas broke on the majority of these transmitters in the initial months after release. As of December 31, 2018, only 3 of the 16 VHF eartags remain functional.

### 2.1.2 Movements of Main Bison Herd

Parks Canada's investment in a 1.5-year-long soft-release pasture phase appears to be working so far: since the July 29, 2018 release, the vast majority of animals (31 of 36 (86%)) have stayed entirely within 20km of the release site (Figure 5). This includes 4 bulls, 9 cows, 9 yearlings, and 9 young-of-year calves. They have ranged mostly in the Snow Creek, Elkhorn Summit and middle Panther areas of the Panther River drainage (Figures 4 & 5). The three animals that dispersed down the Panther Valley (an adult female with her yearling and young-of-year calf), immediately returned to the core bison re-introduction zone. Several groups of animals, ranging from 1 to 33 individuals, revisited the soft release pasture site 11 times (where mineral blocks remained available to them) (Figure 6). No supplemental feed has been put out since the animals were released.



Figure 4: Main bison herd in upper Snow Creek drainage in late August 2018 (photo: K. Heuer/Parks Canada)

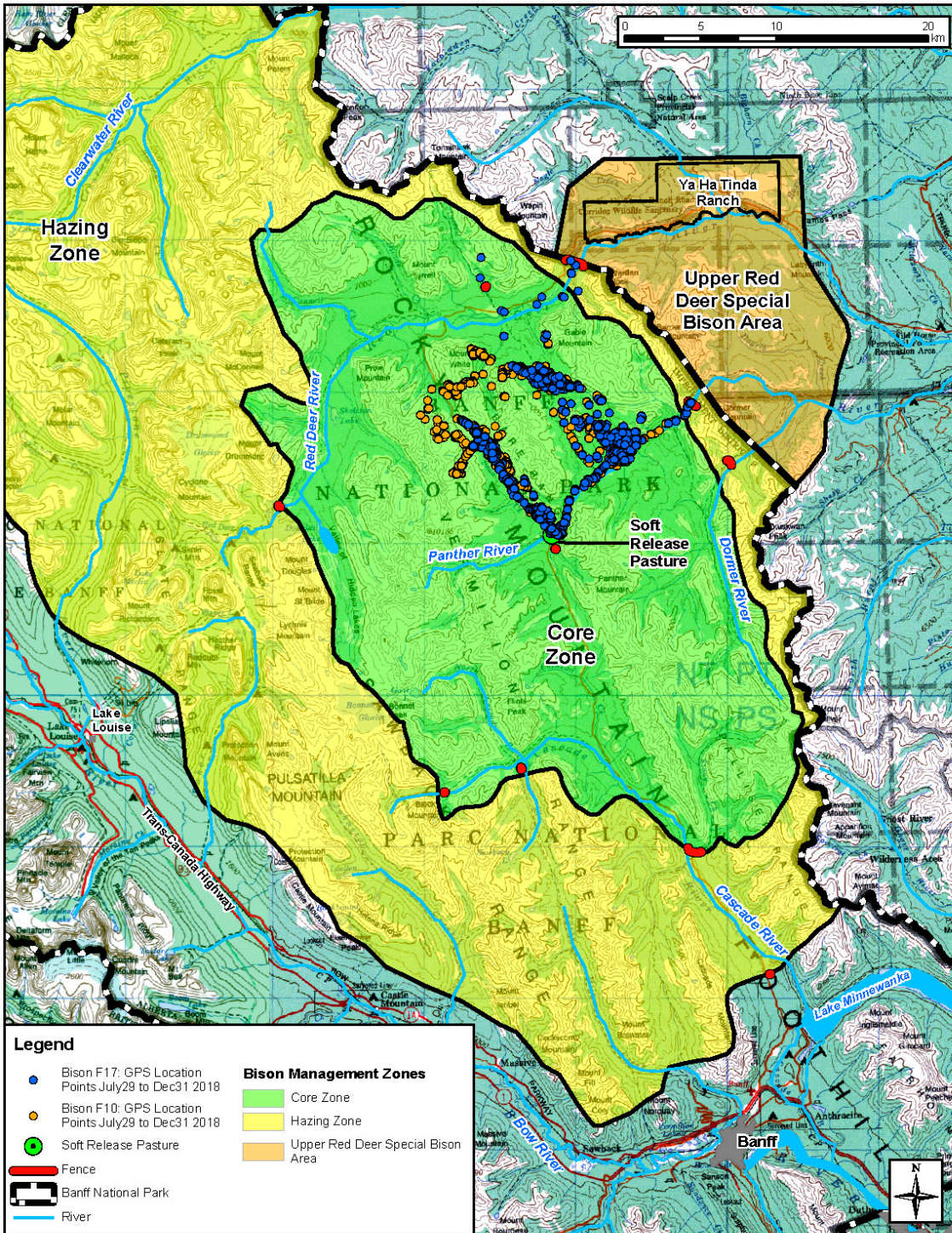
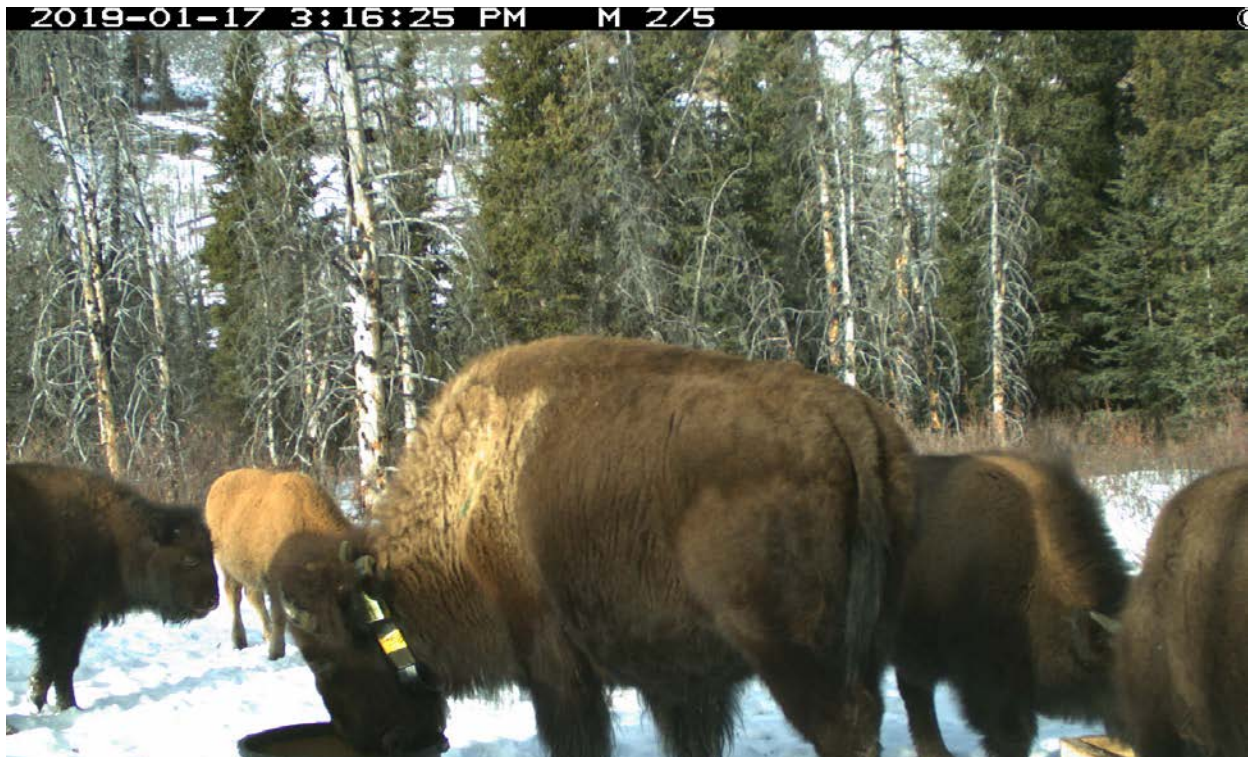


Figure 5: Movements of the main herd July 29-Dec 31 2018, as represented by two bison cows (F10 and F17).



**Figure 6:** Remote camera photo of bison at mineral blocks which remain at the soft release pasture site. Such photos are being used to track body condition since the release (see Section 3.2.2). No supplemental food has been provided to the bison since they were released in late July 2018.

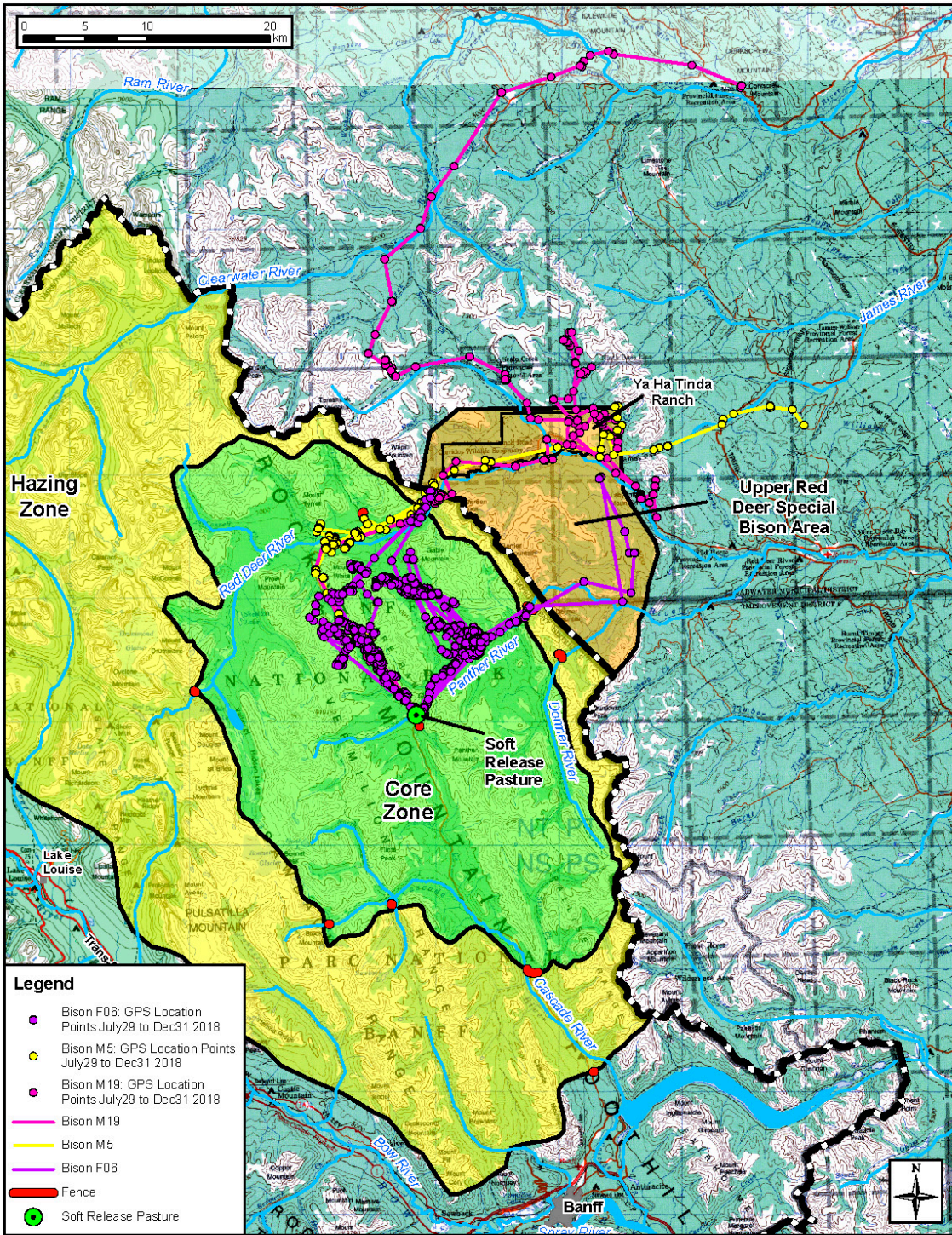
### 2.1.3 Excursions

One of the main goals for the 5-year pilot project is for all the reintroduced bison to remain within the reintroduction zone (area denoted in green in Figure 5). This occurred on 112 of 143 days since the animals were released in 2018 (78%). One or more animals were within the hazing (yellow) zone on 13 days (9%) and one or more animals were beyond both these zones on 18 days (13%).

These latter incidents equated to three excursions from the reintroduction zone since the animals were released at the end of July 2018 (Figure 7). Two of these events involved lone bulls (M19 and M5) in August 2018. The third event involved a cow (F6) with her yearling and her young-of-year calf in October 2018.

The speed and trajectory of M5's excursion onto grazing allotments, combined with our commitments to agricultural stakeholders to keep bison and cattle separate during the pilot project, resulted in us having to destroy him. We were able to recapture M19 alive a week later when he, too, ventured east onto grazing allotments. He was subsequently translocated to the bison pasture in Waterton National Park because we were concerned he would repeat the excursion and possibly bring other animals with him if we returned him to the herd. Both bulls, therefore, were lost to the Banff population.

F6 and her two young exited the reintroduction zone to the east along the Panther River in early October but returned of their own accord a day later (Figure 7). They quickly rejoined the main herd and have remained with the main group of other animals in the reintroduction zone in the months since.



**Figure 7:** Bison excursions from BNP in 2018. M19 was recaptured and translocated to Waterton National Park, M5 was destroyed and F6 and her two young returned to the reintroduction zone on their own.

### 2.1.4 Lone Bull

A lone bull (M30) isolated himself from the other animals soon after the release and has spent most of the past 5 months alone within the reintroduction zone (Figure 8). His movements have mostly centered around the Red Deer Valley near Tyrell Creek.

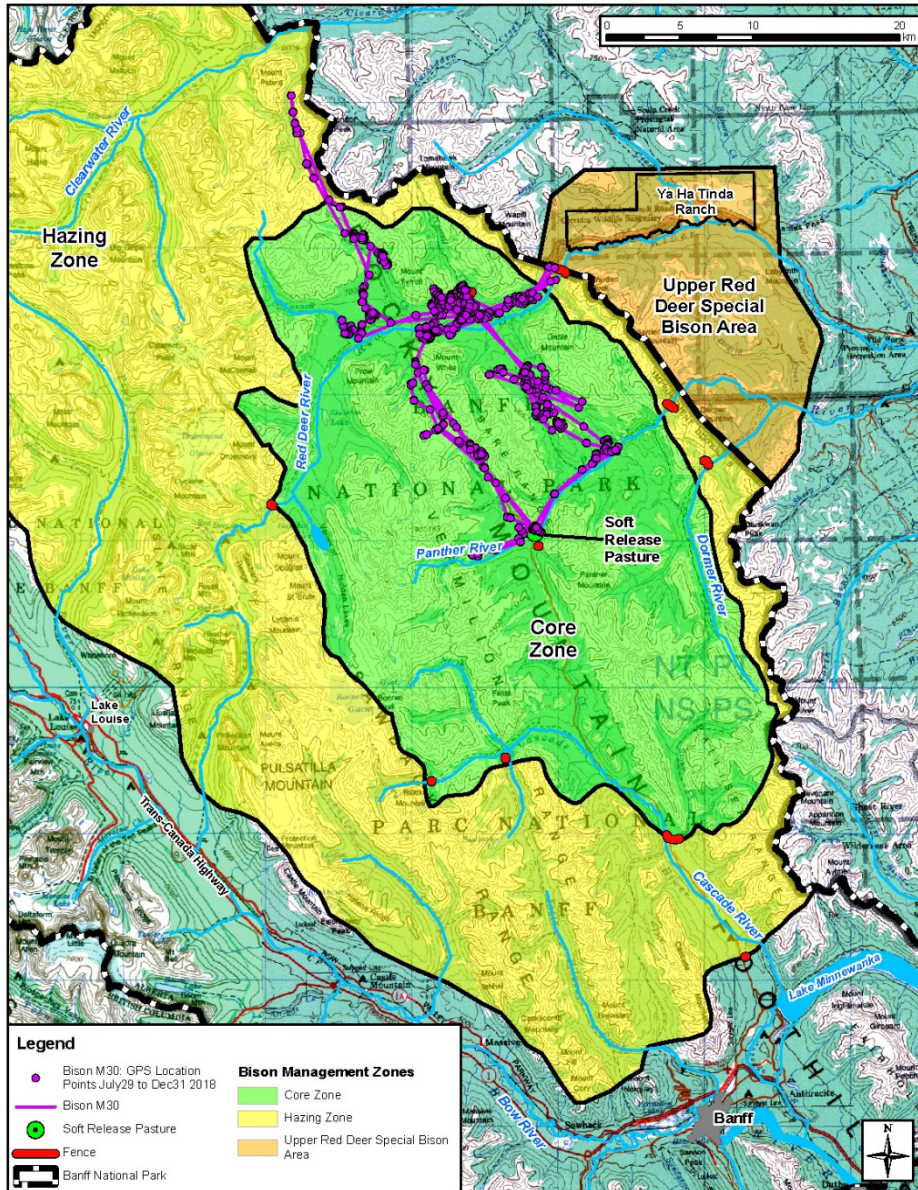


Figure 8: Movements of M30, July 29 - Dec 31 2018



## 2.2 Bison Health and Reproduction

### 2.2.1 Diseases and Parasites of Concern

Parks Canada staff collected blood from all 10 cows, all 6 bulls and all 10 yearlings while fitting radio collars and ear tags onto the animals between February and June 2018 in the soft release pasture. All blood chemistry results were normal and clean, including brucellosis testing by the Canadian Food Inspection Agency (CFIA). This confirms, and is additional to, the clean results from testing prior to translocating the animals from Elk Island National Park in 2017.

Weekly visual health monitoring checks were completed for all bison during the remainder of the soft-release pasture phase of the project (until releasing them on July 29, 2018). Testicular bumps were noted on two bulls (diagnosed as benign testicular fibrosis when inspected by veterinarians during later collaring) and an eye on another bull went cloudy due to direct trauma (possibly scratched by a stick or another bull's horn). No other injuries or abnormalities were noted.

As reported in 2017, all bison were treated twice for parasites and were tested prior to release. No parasites of concern were detected prior to releasing the animals. Bison carried the *Eimeria* protozoa, which was not a concern because it is universally present in the environment.

### 2.2.2 Body Condition Monitoring

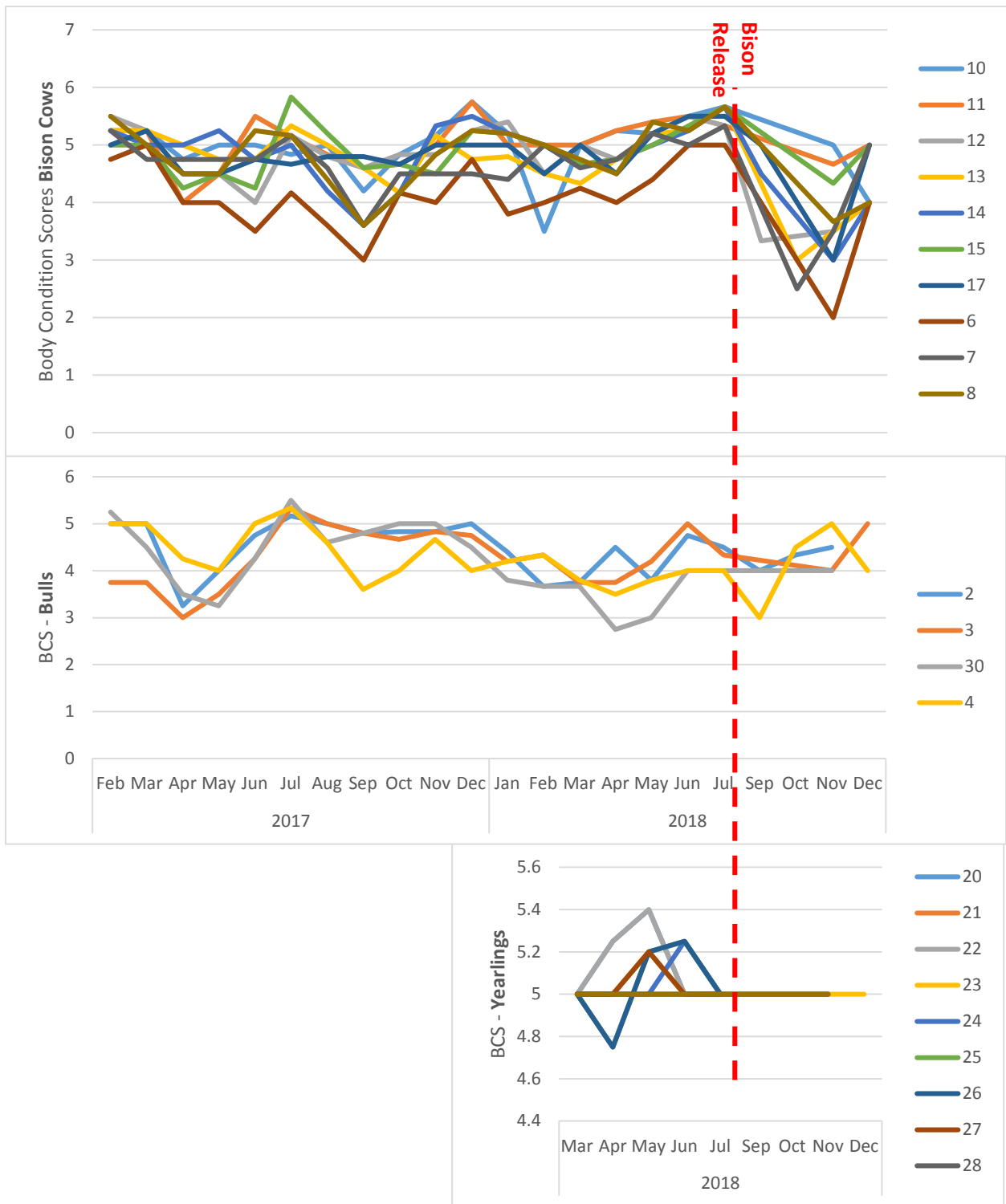
The body condition of each animal was assessed weekly during the soft release pasture phase of the project and then opportunistically via remote cameras and direct observations once the animals were free roaming. This involves assessing the extent to which ribs and hip bones are visible, as per standards developed by the National Farm Animal Care Council (2017).

As expected, there was a slight dip in body condition for adult bison shortly after they were released (Figure 9). Such a dip was not visible for the yearlings.

### 2.2.3 Bison Calving

All ten adult females had calves in both 2017 and 2018. Parturition dates in 2018 were much later than 2017. In 2017, cows gave birth between April 24 and May 24. In 2018, cows gave birth to healthy calves between July 14 and late September. The delayed births are normal for 2<sup>nd</sup>-time-bison-mothers as their body condition is often poor due to the demands of lactating for their young while also still growing themselves. This can prevent some bison from going into estrus. However, after giving birth to their first calves in 2017 the body condition of the cows improved quickly in the fall once they were returned to the winter pasture and fed hay. They were subsequently bred in late fall 2017, which led to the 2<sup>nd</sup> crop of late-born calves. As a result, half of 2018's calf crop (5 of 10 calves) were born outside of the soft release pasture, after the herd was released. Even though they were born late, all calves survived their first winter.

As of December 2018, the founder herd of 16 animals has more than doubled to 34 individuals.



### 2.3 Bison and Other Wildlife

**Figure 9:** Average monthly Body Condition Scores (BCS) for 10 bison cows (top), 4 bison bulls (middle) and 10 yearlings (bottom). 6= Excellent, 5=Very Good, 4=Good, 3=Fair+, 2=Fair, 1=Poor and 0=Emaciated. Red dotted line denotes time of release.

### **2.3.1 Wolf-Bison Interactions**

The territories of at least two wolf packs overlapped with the area used by bison in 2018 (Red Deer and Panther-Cascade packs). Parks Canada deployed 4 GPS radio collars on these wolf packs in early 2018 but one collar failed, one wolf died of natural causes, and the other two collared animals were legally snared and killed by a trapper east of the Park in Dec 2018 and January 2019.

Approximately a dozen wolf-bison interactions were noted between July 29 and the end of December 2018 before the wolves were snared. Lone bison bulls and the main cow-calf herd were all approached by wolves on numerous occasions but no discernible bison displacements were noted. There has been no evidence of bison injuries and no animals were killed.

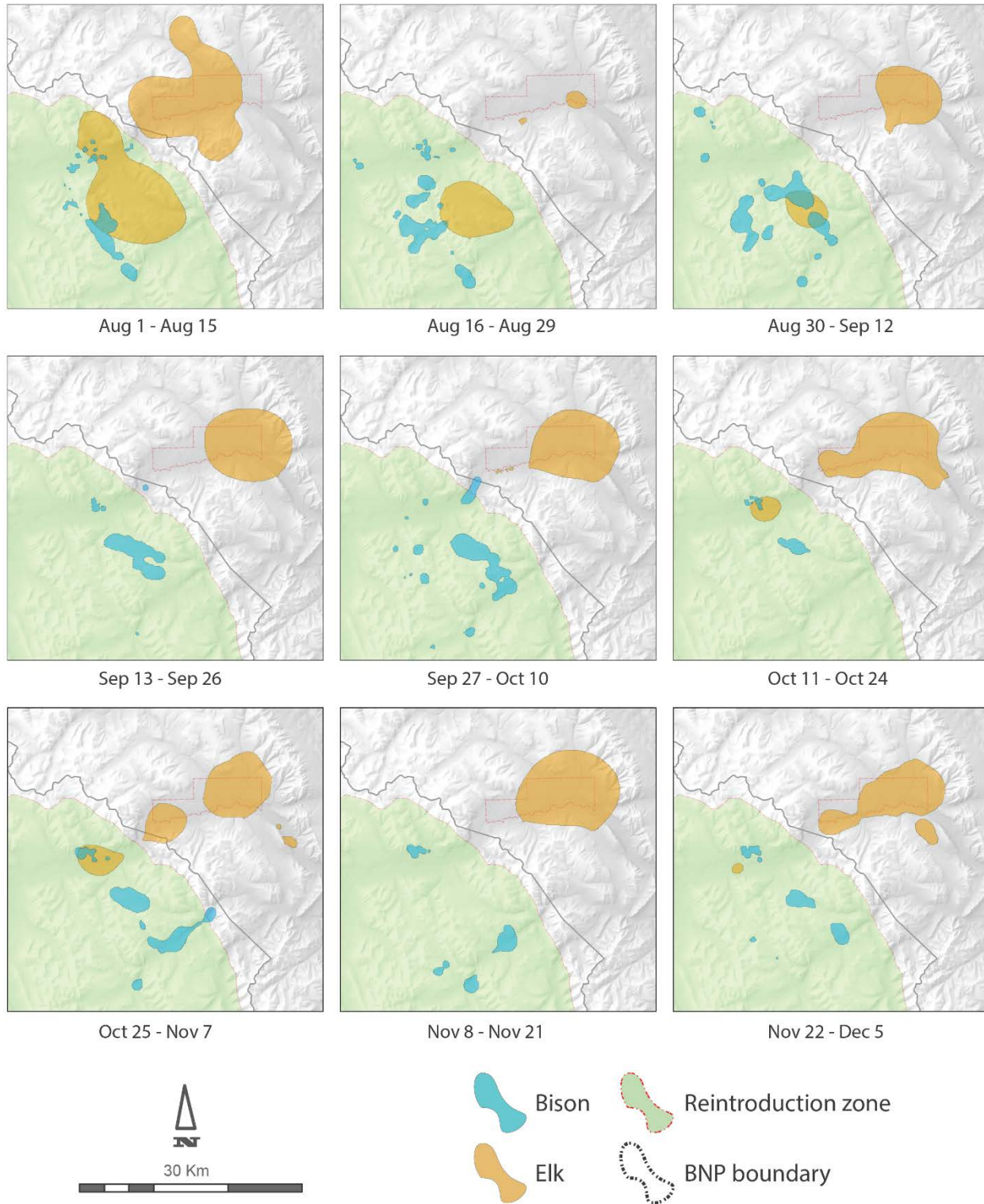
### **2.3.2 Other Species Interactions with Bison**

Forty-two radio-collared elk were also monitored in the bison reintroduction zone as part of the long-running study of the Ya Ha Tinda elk herd. Several elk migrated into the bison reintroduction zone in summer and fall 2018. They overlapped minimally in space and time with bison (Figure 10). The interaction between these species will continue to be monitored and will be further studied and assessed in future years.

Bighorn sheep and bison were anecdotally observed within 200m of each other on 3 occasions in 2018. No avoidance behaviour was observed. A long term Bighorn sheep study is planned for the area, pending funding.

Anecdotal observations were also made of bison and a grizzly bear sharing the same meadow on 2 occasions. The two species calmly grazed in close proximity to each other and did not seem affected by each other's presence.

## Co-occurrence of bison and elk within the reintroduction zone



**Figure 10:** Co-occurrence of bison and elk inside and east of the bison reintroduction zone July 29-Dec 5, 2018. Species locations were derived from 14 day averages of GPS collar telemetry with 80% probability of an individual being within the polygon boundaries.

## 3.0 Vegetation

### 3.1 Non-Native Vegetation

Sixteen infestations of non-native vegetation were identified in the reintroduction zone as part of the Detailed Environmental Impact Assessment (Heuer 2017). Parks Canada vegetation specialists visited and controlled 10 of these infestations in 2018 using mechanical and chemical methods. A yellow toadflax infestation identified and controlled at the Windy soft release pasture in 2017 was also visited three times in 2018 and found to no longer be present. This site will be visited again in 2019 to confirm eradication success.

A new infestation of yellow toadflax was identified and controlled at an old horse outfitter camp in the lower Panther Valley in early summer 2018. Its discovery predates free roaming bison.

### 3.2 Rare Plants

Parks Canada contracted a rare plant survey for the bison reintroduction zone in August 2017 (DeLong, 2017). Fifty-four transects were surveyed over 5 days for a total survey area of 21.6 km<sup>2</sup>. Only two rare plant species were identified: Pink false dandelion (*Agoseris lackschewitzii*) in an open subalpine grassy meadow and Narrow-leaved bluegrass (*Poa stenantha*) in a high elevation alpine meadow.

No rare plant mitigations are required given the low incidence of rare plants, coupled with the native status of bison and the low concentrations they will occur during the course of the pilot project.

### 3.3 Restoration of Soft Release Pasture

2018 marked the end of the 1.5-year soft-release pasture phase of the project. Decommissioning of the pasture infrastructure is already underway: staff removed half of the page wire and posts surrounding the summer portion of the soft-release pasture in fall 2018; remaining sections are scheduled to be removed in June 2019.

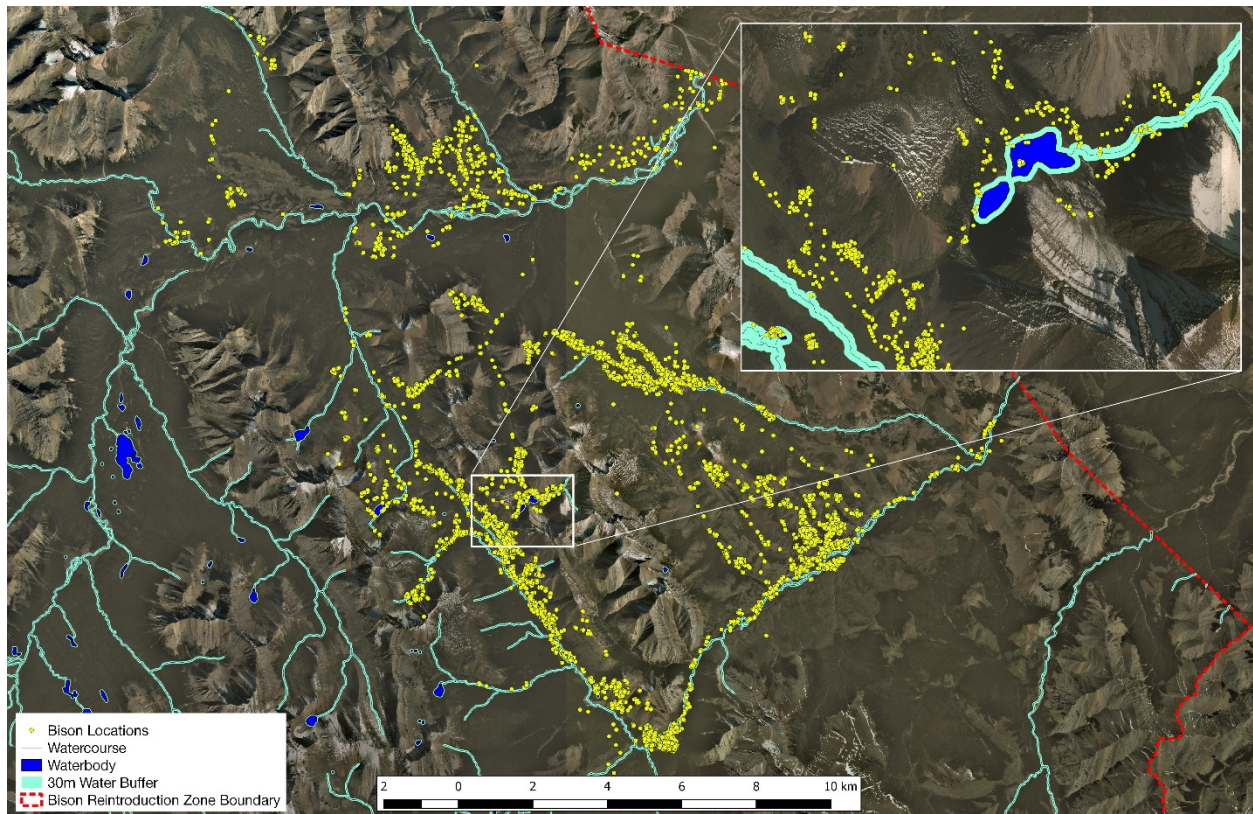
Several areas of the winter portion of the soft release pasture were affected by one-and-a-half years of bison feeding, wallowing and bedding behaviour, and manure stockpiling (Figure 11). A targeted pasture restoration program, including soil de-compaction and native seeding of a handful of heavily impacted areas, will be implemented in early summer 2019 (Yakiwchuk, 2018). Removal of fencing around the winter portion of the soft release pasture will occur after vegetative restoration is complete, likely in fall 2019 or summer 2020.



**Figure 11:** Aerial view of backcountry bison soft-release pasture in Panther Valley of Banff National Park (photo: A. Taylor/Parks Canada).

### 3.4 Riparian Vegetation

The impact of bison on riparian areas is of concern to some stakeholders. A preliminary analysis of 20,334 bison locations between July 29, 2018 and January 29, 2019 suggests bison are not spending an inordinate amount of time in riparian zones (defined as 30m or less from water bodies – see Lee et al 2004). Only 12.6% of all bison locations occurred within riparian areas (Figure 12) and they occurred in 7.9% of the riparian habitat available to them in valleys they occupied (e.g. Snow and Tyrell creeks, Panther and Red Deer rivers). The relative similarity between these two percentages suggests they didn't use any particular riparian area for a long period of time.



*Figure 12: Bison locations (yellow points) and riparian zones (light blue, 30m-wide buffers around water bodies) for areas frequented by bison in 2018. Inset is of the Grouse Lake area of Snow Creek).*

## 4.0 Aquatics

### 4.1 Water Quality Monitoring

Water quality measurements were taken for watersheds within the bison reintroduction zone (treatment) and outside the area (control) for three years prior to the reintroduction of bison in 2014, 2015 and 2016. Samples will again be collected in 2020/21 and analyzed to assess if there are any effects due to bison.

## 5.0 Cultural Resources

Concerns about the vulnerability of archaeological and historic sites to bison wallowing, trampling and rubbing behaviours were articulated in the Detailed Environmental Impact Assessment (see Appendix 6, Heuer 2017). Bison did not use areas of the Red Deer Valley where the 4 highly vulnerable sites were identified nor are they coming close to any heritage structures (cabins or graves). An assessment of known cultural sites for damage and/or exposure of new artefacts is scheduled for 2020.

## 6.0 Public Outreach and Visitor Experience

### 6.1 Outreach and Education

A key goal of the project is to increase awareness and appreciation of bison and Parks Canada’s role in restoration and conservation. In 2018 we continued to bring the Banff bison reintroduction story to Canadians via a variety of communications channels, including digital storytelling, traditional media, documentary projects, outreach events, an Indigenous blessing ceremony, and bison-themed outreach at the Calgary Stampede and Calgary and Toronto zoos. Collectively, we have reached an estimated 117 million people with the Banff Bison story (Table 2).

*Table 2: Outreach and Education Initiatives - Banff Bison Reintroduction Project, 2017 & 2018*

		2017 & 2018	Estimated Reach
<b>Digital Storytelling</b>	Video webisodes	7	70,000 viewers
	Social Media and Blogs	50 posts and 21 blogs	1.7 million
<b>Traditional Media</b>	Press conferences	3	
	Media requests	111	Over 107 million
<b>Documentary Projects</b>		11	Over 5.9 million
<b>Outreach</b>	Indigenous ceremonies	3	
	Out-of-park events (e.g. Calgary/Toronto zoos, Calgary Stampede)	28	485,770
<b>TOTAL</b>			<b>117 million</b>

### 6.2 Visitor Safety

Bison safety signs were posted at all trailheads from which the reintroduction zone can be accessed in spring 2018. They will be replaced with updated versions in 2019.

Bison Safety messaging was integrated into all BNP handouts and websites in 2017 and 2018.

BNP Wildlife staff are continuing to receive training and hands-on experience in bison handling/stockmanship, monitoring, chemical immobilization, and necropsy of bison. Training in backcountry horse travel and familiarization of the reintroduction zone continued in 2018, and several wildlife staff assumed roles in an Incident Command Structure during our three excursion responses.



## **7.0 Wilderness Values**

### **7.1 Maintenance and Use of Trails**

Trails in the bison reintroduction zone continue to be primitive in character with many unbridged river crossings and some poorly defined sections. Maintenance of designated trails was limited to annual clearing of deadfall and windfall.

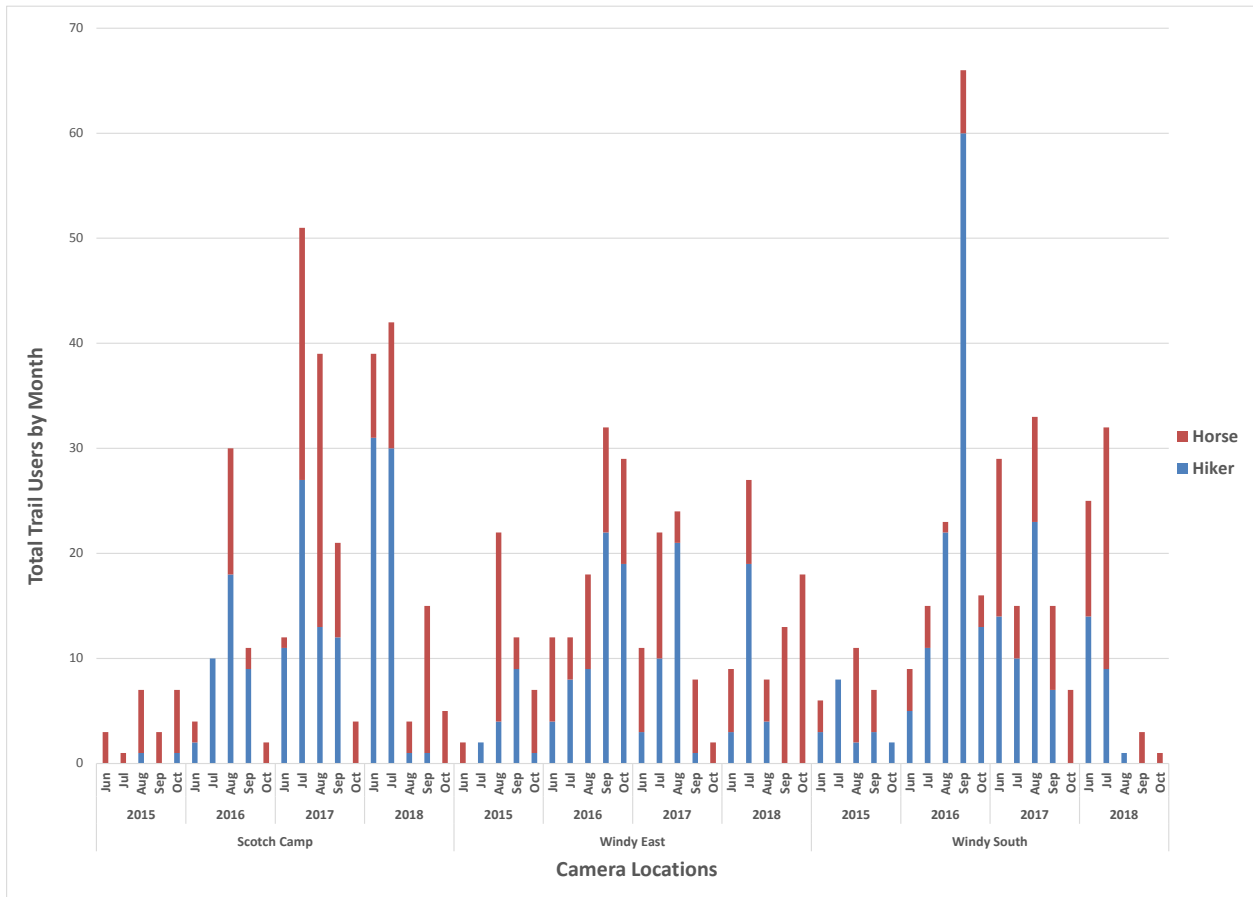
### **7.2 Human Use and Grizzly Bear Habitat Security**

A temporary closure of the Panther Valley was implemented from July 25, 2018 to May 30, 2019 to allow the newly released bison additional time to adjust to the area with minimal human disturbance.

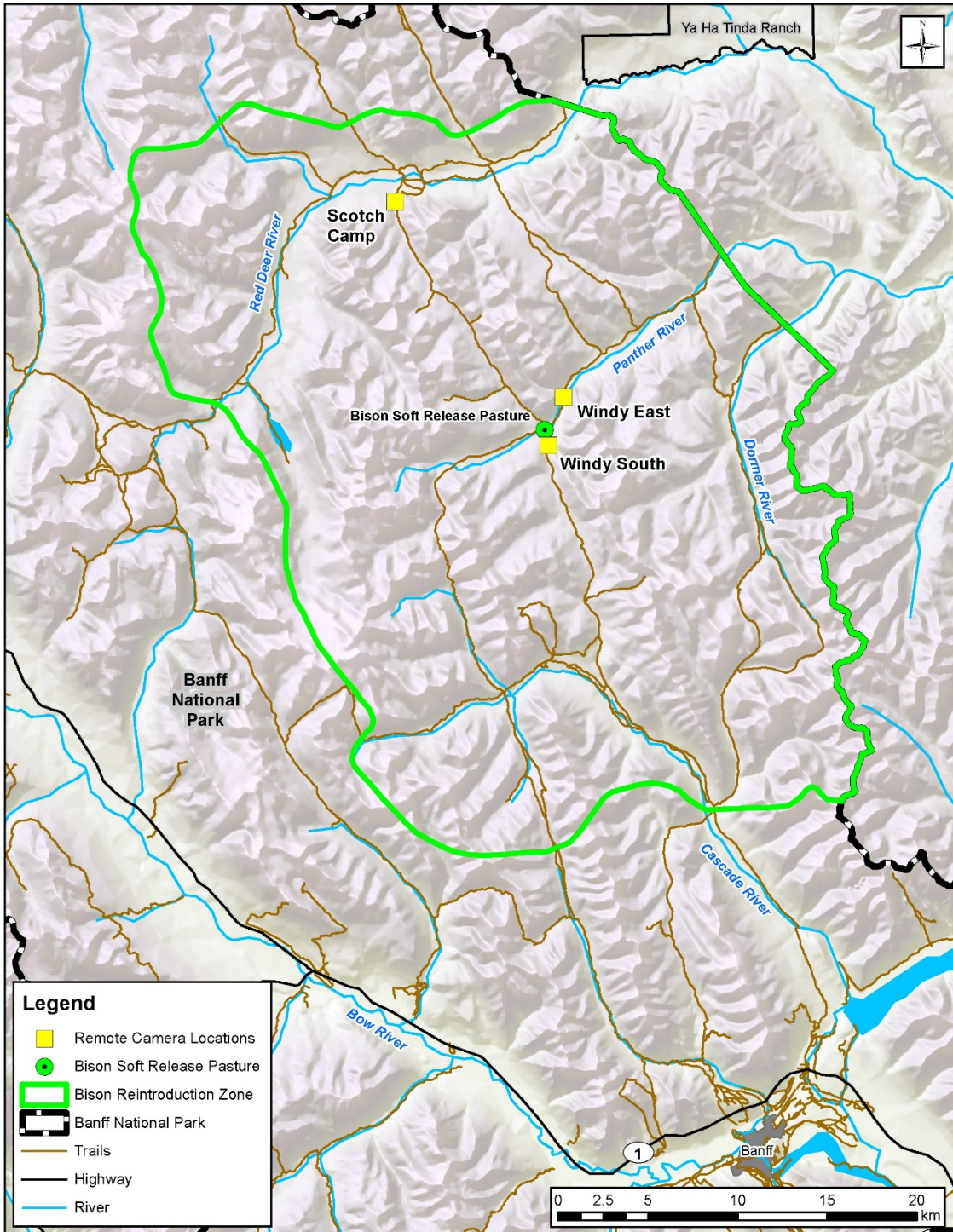
Three remote cameras monitoring hiking/horse trails in the heart of the bison reintroduction zone recorded low levels of human use in the area (Figure 13). This includes Parks Canada staff. Two of these cameras were located inside the temporary closure (Windy South and Windy East cameras) and the other was outside (Scotch Camp) (Figure 14).

Monthly human use (including Parks Canada staff) remains well below the 100 human events/month threshold for grizzly bear habitat security as per the BNP Management Plan (Figure 13)). Grizzly bear use of the area was similar to previous years (Figure 15).

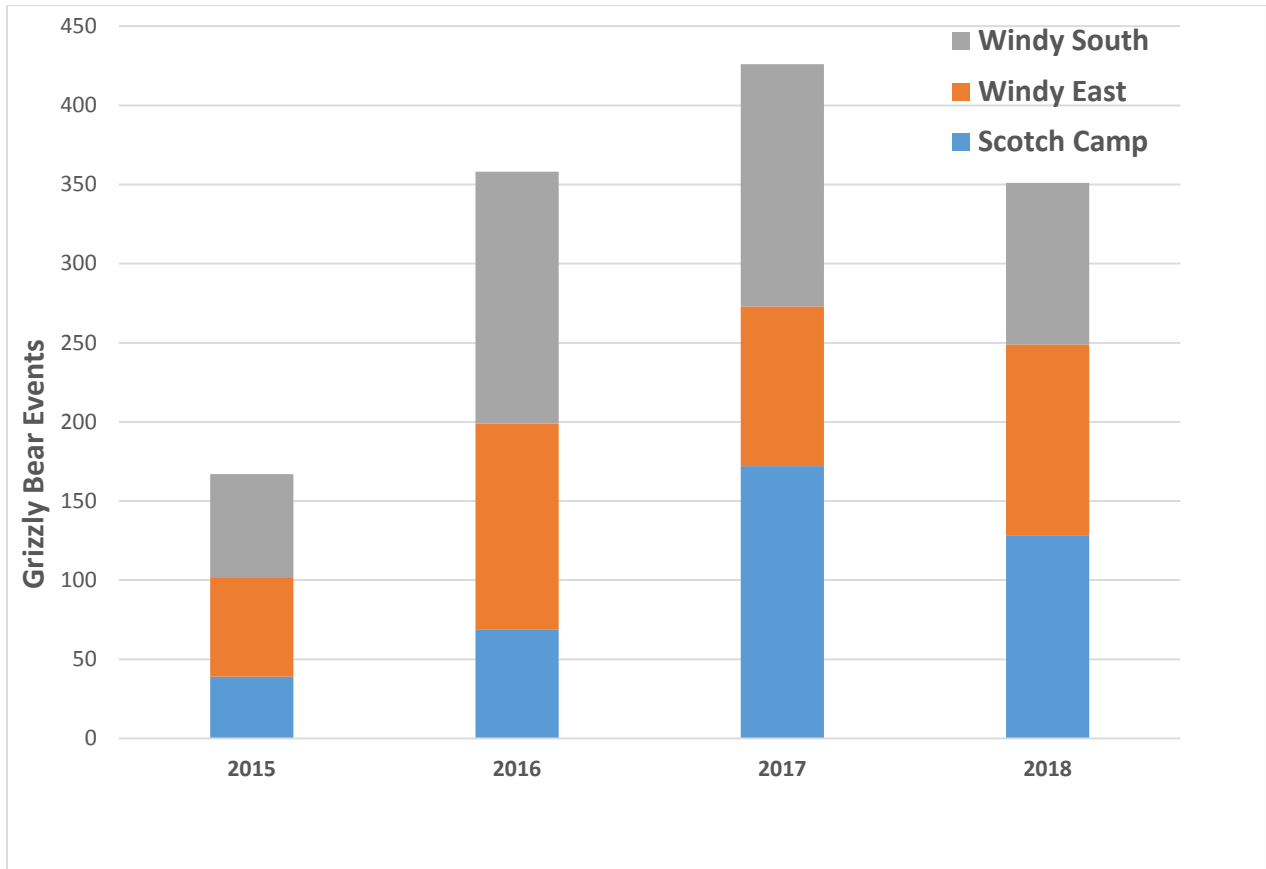
Staff presence in the reintroduction zone was steady in the weeks after the release due to hazing efforts to prevent excursions from the reintroduction zone. This activity diminished in the fall and, by October, staff were in the reintroduction zone fewer than 9 days per month, well below the DEIA target of 2 weeks/month once the animals were free-roaming.



**Figure 13:** Trail users (including Parks Canada staff) at 3 remote cameras in the bison reintroduction zone, 2015-18.



**Figure 14:** Locations of three remote cameras monitoring Park trails in the heart of the bison reintroduction zone.



**Figure 15:** Grizzly bear activity at three remote cameras in the bison reintroduction zone, 2015-2018.

### 7.3 Helicopter Use

Helicopter hours in 2018 exceeded targets set in the Detailed Ecological Impact Assessment (Heuer 2017; Figure 16). Instead of the targeted 16 hours of helicopter time in 2018, the project consumed 132 hours. The 825% overrun occurred due to:

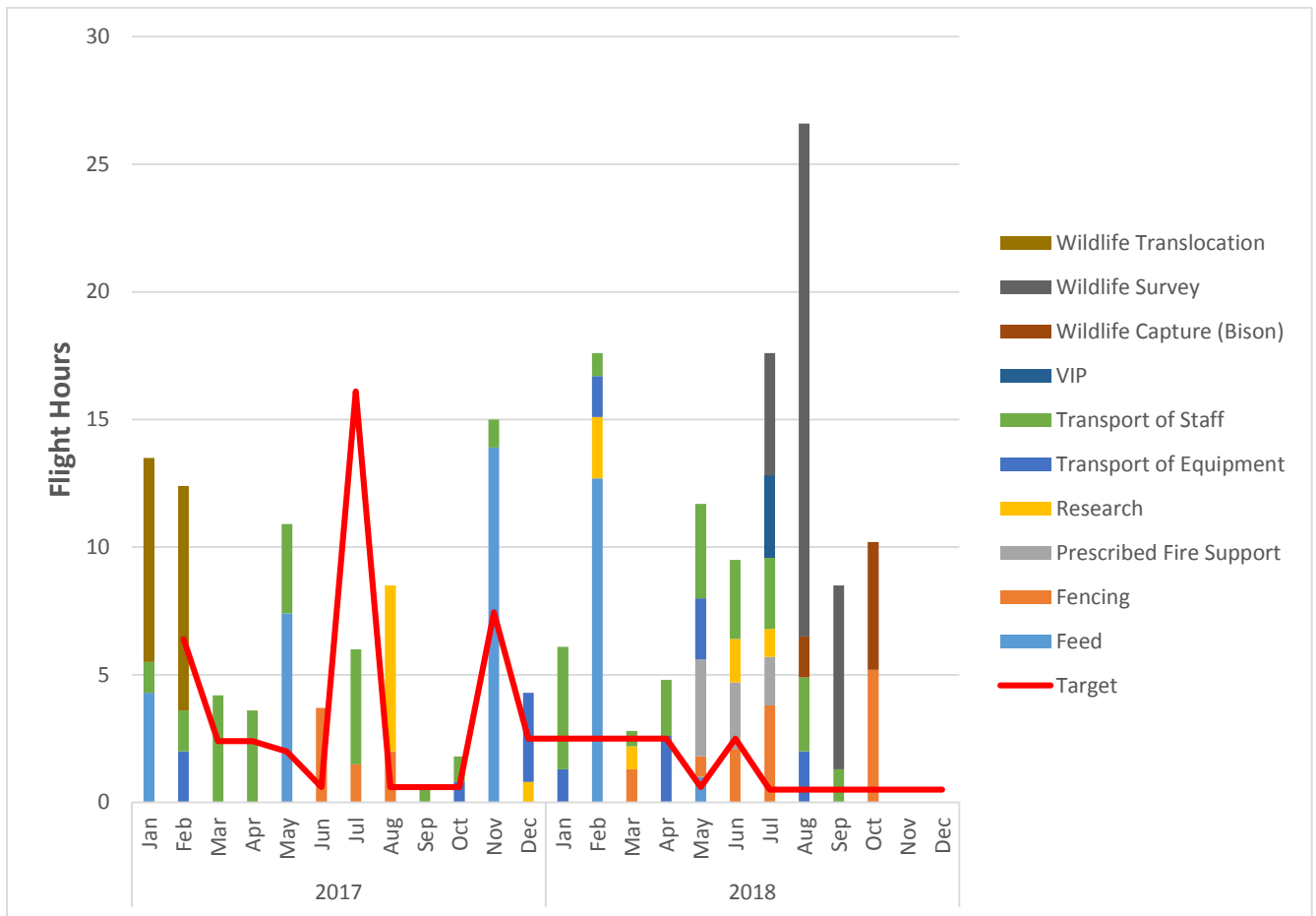
- Flying in more feed than was anticipated in the DEIA while bison were still in the soft release pasture (February);
- Unanticipated mop-up following a prescribed fire (May and June);
- Unanticipated bison movements and excursions from the reintroduction zone that demanded rapid responses after the animals were released (July, Aug, Sept and Oct).

Where we had more control (i.e. staff shift changes at the soft release pasture) helicopter hours were minimized. Staff tended to bison 365 days a year during the soft-release phase and 15 of 31 shift/crew changes (48%) occurred by horseback and ski.

All financial costs of the 2018 helicopter overruns were absorbed by reallocating funds from elsewhere in the project budget. An overall increase in project costs did not occur.

Use of helicopters dropped dramatically in the latter months of 2018 as the animals began to settle into the reintroduction zone. For example, no helicopters were used in November and December, and only 1 hour has been flown in the first quarter of 2019.

Nonetheless, we expect slight overruns in helicopter use versus forecasts again in 2019 as we begin to demobilize and remove the soft release pasture. However, discrepancies between target and actual helicopter flight hours will be much smaller (in the order of 20%).



**Figure 16:** Actual helicopter use compared to targets for the Banff Bison Reintroduction Project, 2017-2018.

## 8.0 Fencing

The Banff Bison Project employs two types of fencing to steer bison movements: 1) 5-foot-high wire drift fencing in 13 locations throughout the reintroduction zone, and 2) 8-foot-high page wire fencing around the 18-hectare soft release pasture. Locations are depicted in Figures 7 and 8. Details about fence designs are in the Detailed Environmental Impact Assessment (Heuer 2017).

## 8.1 Drift Fencing

The final 2 sections of drift fence were constructed in spring 2018 (Red Deer Boundary and Dormer Boundary). Three other sections of drift fence were deemed unnecessary soon after the bison were released and were removed in fall 2018 (Scotch Camp, Divide Creek and Windy East). Two other sections of drift fences listed in the DEIA (Heuer 2017) were never built (Elkhorn Summit and N Fork of Cascade Pass). As a result, there is less drift fencing on the landscape now than was originally planned (7,160m across 9 sites instead of 7,923m across 13 sites – see Table 3).

That said, several of the existing drift fences were deployed in bison holding mode in 2018 more than we forecasted in the DEIA (Table 3). This is due to having nearly all fences deployed in the initial days of the release (until we saw where the bison moved and began to settle), and, in the case of the Red Deer and Panther fences, having to leave the fences deployed more than expected because of the speed and unpredictability by which bison moved to the edge of the reintroduction zone in those valleys. Bison moved to the eastern edge of the reintroduction zone 10 times in 5 months. Bison sometimes moved from the middle to the edge of the reintroduction zone within a few hours (GPS collar data uploads occur every 22 hours, at best). Therefore, the Red Deer and Panther drift fences have been left in bison containment mode 100% of the time, whereas other fences were left in wildlife permeable mode soon after the bison were released. When considered collectively, all fence sections were deployed in bison-holding mode 15% of the time between July 29 and December 31, 2018, instead of the DEIA annual target of <5% (Table 3).

The effects of fence design and containment mode on other wildlife was evaluated using 40 remote cameras installed along fence lines and GPS data from the Ya Ha Tinda elk predator-prey project (Watt et al. 2016, Watt et al. in prep). Fences were permeable to other wildlife, even when deployed in bison-holding mode (5-wires, 5-feet-high). For example, comparisons of crossing and movement rates for radio collared elk and wolves before and after fence construction in the Red Deer, Panther and Dormer drainages shows no significant change in crossing and movement rates through these areas (Figures 17 and 18). Meanwhile, the fences were very effective at deflecting bison (Figure 17, Table 4). They remain a vital tool for encouraging bison to explore and anchor to the target reintroduction zone.

**Table 3: Drift fence status and time deployed in bison holding mode in 2018.**

Fence Name and Length	Purpose	Status as of Dec 31 2018	Annual Target time in bison-holding mode	Actual time in bison holding in 2018*
<b>Red Deer Boundary (2,400 m)</b>	Discourage bison from venturing east of reintro zone onto provincial lands.	Active – Constructed June 2018	1.17% summer 18.06% winter	92% summer 100% winter
<b>Tyrrell Creek (230 m)</b>	Discourage bison from exiting northern edge of reintro zone onto provincial lands.	Active – Constructed August 2017	1.55% summer 13.65% winter	0.03% summer 18.8% winter
<b>Panther Boundary (610 m)</b>	Discourage bison from venturing east of reintro zone onto provincial lands.	Active – Constructed June 2016	0.87% summer 7.20% winter	50% summer 100% winter
<b>Dormer Boundary (870 m)</b>		Active – Constructed June 2018	0.65% summer 5.15% winter	0% summer 2% winter
<b>Stoney Creek (2,500 m)</b>	Discourage bison from venturing south of reintro zone into high-use areas of BNP.	Active – Constructed Oct 2017	1.08% summer 0.24% winter	1% summer 0% winter
<b>Sawback Creek (230 m)</b>		Active – Constructed Sept 2017	1.31% summer 0.19% winter	1% summer 0% winter
<b>Cascade 3-mile (50 m)</b>		Active – Constructed Oct 2017	N/A - outside of reintro zone.	0% summer 0% winter
<b>Wigmore Creek (70 m)</b>	Discourage bison from venturing into Cascade EZ in initial years of free-roaming.	Active – Constructed Oct 2016	1.34% summer 0.94% winter	1% summer 0% winter
<b>N Fork Cascade (- 100 m)</b>		<b>Not constructed</b>	0.27% summer 0.06% winter	0% summer 0% winter
<b>Elkhorn Summit (-500 m)</b>	Discourage bison from venturing north into EZ for first few years.	<b>Not constructed</b>	1.05% summer 0.35% winter	0% summer 0% winter
<b>Scotch Camp (- 38 m)</b>		<b>Removed – Oct 2018</b>	0.56% summer 0.02% winter	36.0% summer 11.6% winter
<b>Divide Creek (-82 m)</b>	Discourage bison from venturing north of reintro zone into BNP's Clearwater Valley.	<b>Removed – Oct 2018</b>	2.09% summer 3.57% winter	5% summer 0% winter
<b>Drummond Creek (100 m)</b>	Discourage bison from venturing west of reintro zone into high use areas of BNP.	Active – Constructed Sept 2017	1.01% summer 1.85% winter	2.5% summer 0% winter
<b>Badger Pass (100 m)</b>		Active – Constructed Sept 2017	0.29% summer 0.10% winter	2% summer 0% winter
<b>Windy East (- 43 m)</b>	Temporary drift fence in unlikely event bison escape soft-release pasture.	<b>Removed – Oct 2018</b>	N/A	6.6% summer 0% winter
<b>TOTAL (7,160 m)</b>		<b>Average % of time all fences in bison holding mode</b>	<b>1.02% in summer (range 0.27-2.09%) and 3.95% in winter (range 0.02-18.06%)</b>	<b>13.32 % in summer (range 0-92%) 15.49% in winter (range 0-100%)</b>

\* summer = May-Sept inclusive; winter = Oct-April inclusive

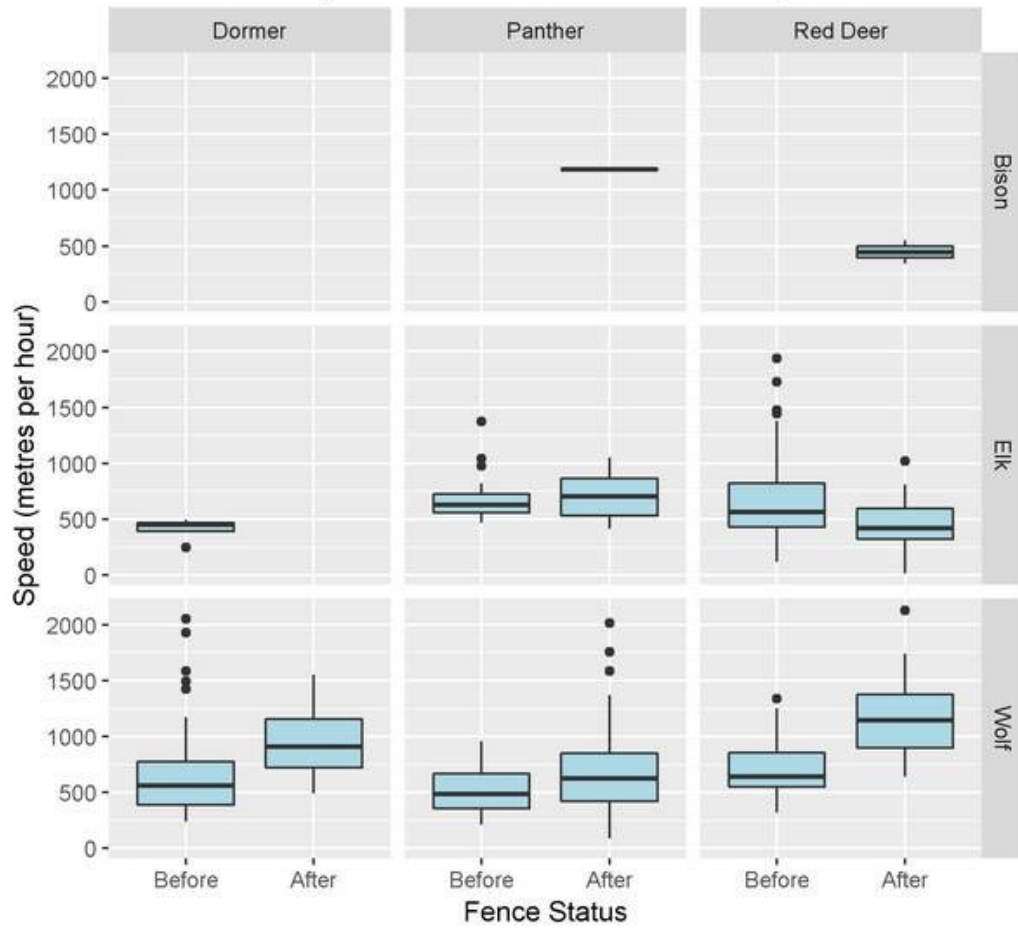


**Figure 17:** Proportion of animal movements that crossed the fence line compared to the number of movements within 1 km of the fence line. Numbers indicate sample sizes. GPS radio-collar data was collected from elk and wolves both before and after fence construction.



### Travel Speed vs Fence Status

Data includes steps within 15 hours of a fence crossing



**Figure 18:** Boxplots showing the speed at which radio collared animals crossed the fence line before and after drift fences were installed and deployed. Travel speed was calculated using GPS data collected within 15 hours of crossing the fence line. GPS data for elk and wolves was collected both before and after fences were constructed.

**Table 4:** Summary of bison interactions with drift fences, July 29-Dec 31, 2018.

	Location	Date	Bison Tag #'s	Hours at Fence	Outcome	Hazing
1	Red Deer Boundary	2018-08-03	M19	24	Around	No
2	Red Deer Boundary	2018-08-11	M5	24	Over	Yes
3	Red Deer Boundary	2018-08-21	M30	2	Deflected	No
4	Panther Boundary	2018-09-09	F17	24	Deflected	No
5	Red Deer Boundary	2018-09-13	F17,F14, 2YOY	2	Deflected	No
6	Red Deer Boundary	2018-09-27	F6, F7, F13, YLY29, 3x YOY	48	Deflected	No
7	Panther Boundary	2018-10-04	F6, YLY29, YOY <sup>1</sup>	1	Through	No
8	Panther Boundary	2018-10-05	F6, YLY29, YOY <sup>1</sup>	1	Through*	No
9	Panther Boundary	2018-10-04	M2,M4	1	Deflected	No
10	Panther Boundary	2018-11-06	M3, M4, F6, F7, F8, F10, F11,F12, F13, F15, F17 and likely M2 and F14 and YLYs and YOYs	12	Deflected	No

1 – Group returned to reintroduction zone on their own.

## 8.2 Soft Release Pasture Fencing

Half of the 12-hectare summer soft-release pasture was decommissioned in fall 2018 with page wire fencing and posts removed. There are no heavily impacted areas requiring seeding or other rehabilitation measures. The remainder of the fencing around the summer portion of the soft-release pasture will be decommissioned in summer 2019.

The 6-hectare winter portion of the soft release pasture will remain fenced until rehabilitation of vegetation in heavily trampled feeding and bedding zones is well progressed (see Section 4.3 above). We expect to remove fencing in summer 2020.

## 9.0 Conclusion

Parks Canada's approach to reintroducing bison to Banff National Park is working so far; after 5 months of free-roaming, 34 of a possible 36 animals (94%) remain in good health and within the 1200 km<sup>2</sup> reintroduction zone. The majority of these animals have interacted with a peripheral drift fence only once.

Much of this initial success is likely due to starting with young animals and pregnant females and holding and supporting them in a soft-release pasture for 18 months so they could calve twice. The availability of high quality habitat close to the soft release pasture, coupled with strategic drift fencing, has also contributed to the animals remaining in the reintroduction zone. Their relative invulnerability to wolf predation has helped as wolf investigations of bison did not trigger large movements and all calves and yearlings survived their first winter in the wild.

Parks Canada has invested much time and effort into baseline inventories and research prior to the releasing bison so we can monitor, investigate and learn from the effect they have on the ecosystem. This research and monitoring will be our emphasis in the remaining 3 years of the pilot project, not just to inform the 2022 assessment of whether or not bison restoration in this landscape is feasible, but also to share what we have learned about species reintroduction and restoration and hopefully inform and inspire others about the conservation value of free-roaming bison.

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