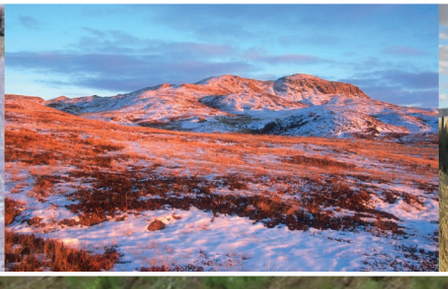
Grasslands

National Park of Canada

State of the Park Report

2007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GRASSLANDS NATIONAL PARK OF CANADA

STATE OF THE PARK REPORT
2007

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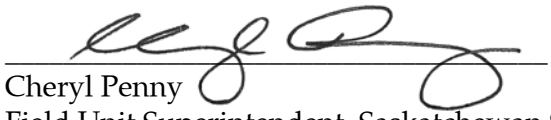

Cheryl Penny
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EXECUTIVE SUMMARY

Located in southwestern Saskatchewan, Grasslands National Park of Canada (NPC) was established in 1988 with the Federal-Provincial agreement to conserve, protect and present a portion of the Prairie Grasslands Natural Region within a proposed park area. In the dry hills, badlands and eroded river valleys of this corner of the prairies, a diversity of wildlife, including pronghorns, sage grouse, rattlesnakes and the only remaining black-tailed prairie dog colonies in Canada, can still be found. The park is also abundant with archaeological evidence of Northern Plains First Nations history that has been lost elsewhere from cultivation of the prairies (Parks Canada, 1997). Park visitors make a special choice to venture off the beaten path to this open expanse to witness and experience Grasslands NPC's unique natural and cultural values. During the last five years, between 6000 and 7000 individuals have probably visited Grasslands NPC each year. It is a challenge to get an accurate estimate of visits into the park because the Visitor Reception Centre is outside the park in Val Marie and there are many possible entry points into the park, all of which are unattended.

Since 1988, land for the park has been acquired by Parks Canada on a willing seller – willing buyer basis. The proposed park area is in two blocks (East and West) that covers 92,074 Ha. More than half of this land (50,227 Ha) has been purchased by Parks Canada in a patchwork of eight holdings ranging from three to 204 square kilometres that vary considerably in ecological restoration challenges and visitor experience opportunities. Some parcels of these holdings are undisturbed native prairie, ungrazed for as much as twenty years. Yet, other parcels have been cultivated for annual crops. Still others are infested with exotic, invasive plants. Some areas are accessible by vehicle and offer opportunities for day-use, while others must be explored in solitude on foot or by horse.

Parks Canada policy directs that a *State of* report must be completed for each national park every five years prior to a park's management plan review (Parks Canada, 2008). The *State of* report serves as a public record of the condition and trends of the national park in terms of its ecological integrity, people's connection with the place, the condition of its cultural and paleontological resources, and achievements in the park's management. This *Grasslands National Park of Canada State of the Park Report* assesses the condition and management effectiveness of the park since 2003 when the park management plan was approved by the Minister of Environment and Tabled in Parliament. The evaluation is based on *indicators* and *measures* either developed by Parks Canada for application at all national parks or those found in a similar bioregion, or chosen specifically for the park, and for which monitoring data or other information is available to rate park condition and management. The report is used to inform the Minister of Environment, Parks Canada and the public as to challenges, opportunities and possible park management actions to be considered in the management plan review.

Table A-1 summarizes the condition of Grasslands NPC as of 2007. The indicator ratings are a roll-up of ratings for the individual measures. Parks Canada is still in the process of developing some program-wide indicators and measures, notably for connection to place, and Grasslands NPC is in the process of completing a comprehensive monitoring framework that will guide long-term ecological condition rating for the park. Consequently, some indicators and measures used in this report are provisional and may change for the next State of the Park Report for Grasslands NPC.

Table A-2 summarizes the effectiveness of management actions that the park has been carrying out in the last four years. The ratings come from an assessment of the 2002 park management plan implementation undertaken by professionals in the areas of natural and cultural resource management and visitor services, who are external to Parks Canada or the park (Parks Canada 2007). There are some overlaps between condition and management effectiveness ratings (e.g. selected management practices indicators).

Table A-1. Condition Ratings for Grasslands NPC. The overall state of Grasslands NPC is considered Fair on the basis of the summary ratings for the four aspects of the park being assessed. Arrows identify a trend, when known, in condition as improving, worsening, or remaining stable.

Park Aspect	Indicator	Rating	Measure	Rating
Ecological Integrity **Fair Condition**	Grasslands	Fair ↔	Burrowing Owl Productivity	Good ↔
			Black-tailed Prairie Dogs	Fair ↔
			Grassland Songbird Community	Fair
			Fire	Fair ↑
			Non-native Invasive Crested Wheatgrass	Poor↓
	Shrublands	*Insufficient Information*	Greater Sage Grouse	Poor ↓
	Forest	*Insufficient Information*	Invasive Non-native Leafy Spurge	Good ↔
	Aquatic	Fair ↔	Peak Flow rate	Fair ↔
			Number of Zero Flow Days	Fair ↔
	Riparian	Poor	Riparian Health Assessments	Poor
	Badlands	*Insufficient Information*	*No measures in place*	*Insufficient Information*
Connection to Place **Fair Condition**	Visitor Experience	Fair	Understanding Visitors	Fair
			Providing Visitor Experience Opportunities	Fair
			Offering Quality Service	Fair
			Connecting with Place	*Insufficient Information*
	Public Education and Understanding	Fair	Participating in Learning Opportunities	Good
			Understanding of Park Significance	Poor ↑

Park Aspect	Indicator	Indicator Rating	Measure	Measure Rating
Cultural Resources Fair Condition	Cultural Resource Condition	Good	Archaeological Sites	Good
			Archaeological Artifacts	Good
			Historic Buildings and Structures	*Insufficient Information*
			Oral Histories	Good
	Effectiveness of Communications	Poor	Message Identification and Delivery	Poor
			Message Effectiveness and Comprehension	Poor
	Selected Management Practices	Fair	Inventory and Evaluation	Poor ↑
			Cultural Resource Management Strategy	Good

Paleo-ontological Resources Poor Condition	Paleontological Resource Condition	*Insufficient Information*	*Paleontological (Fossil) Sites*	*Insufficient Information*
	Effectiveness of Communications	Poor	Message Identification and Delivery	Poor
			Message Effectiveness and Comprehension	*Insufficient Information*
	Selected Management Practices	Fair	Paleontological (Fossil) Sites	Poor

Table A-2. Effectiveness of Management Actions Ratings for Grasslands NPC. The management objectives and actions are from the 2002 park management plan (Parks Canada, 2002). On the basis of the proportion of Good, Fair and Poor ratings, overall effectiveness of management actions is rated Fair for Grasslands NPC.

Good = The action is contributing to the objective, maintain current direction
Fair = The action is somewhat contributing to the objective, but adjustment needed
Poor = the action has not been implemented (take action), or is not contributing to the objective (replace).

Management Objective	Management Action	Rating
To restore processes and plant communities of mixed prairie grassland within the park that are under-represented in the regional landscape.	▪ Grazing	Fair
	▪ Wildfire control	Good
	▪ Prescribed burning	Fair
	▪ Revegetation of native species	Fair
To maintain or enhance population levels and habitat requirements of native mixed-grass prairie Species at Risk	▪ Species at risk monitoring, recovery planning and implementation ▪ Reintroduction of bison	Good

Management Objective	Management Action	Rating
To improve the riparian health and water quality of the Frenchman River system	▪ Assess water quality of rivers and streams ▪ Help develop partnered stewardship projects	Fair
To protect and present cultural resources in the park	▪ Recent cultural resources (ranch and farm sites)	Poor
	▪ Aboriginal sites	Fair
	▪ Threatened sites	Good
	▪ Sites in high use areas	Poor
To protect and present paleontological resources in the park	▪ Work with experts to inventory resources and develop management plan	Poor
To integrate the management of cultural and natural resources and ensure their protection for future generations	▪ Inventory, monitor and report on both natural and cultural resources ▪ Train staff in both ecosystem-based management and cultural resource management	Fair
To ensure visitors can access information that enables them to find, enjoy, and learn about the park in a safe, efficient manner	▪ Provide visitor reception facilities	Good
	▪ Provide interpretation programs	Fair
To build constituencies of support and understanding	▪ With Park-adjacent communities, conservation and research communities, and Cooperating Association	Good
To build an awareness of the park as a destination, and to encourage visitation to the park and surrounding area	▪ Tourism partnerships	Fair
	▪ Signage, access, camping	Fair
	▪ Day-use sites, hiking trails	Good
To harmonize management goals and practices across the landscape through arrangements among landowners	▪ Consolidate park holdings	Good
	▪ Cooperate with neighbours to enable more freedom of movement of visitors in and out of the park	Fair
To have an effective consultative structure for the park	▪ Establish a park advisory committee	Good
To respond effectively and efficiently to existing and emerging needs as the park grows and matures	▪ Develop facilities in support of resource management ▪ Assess emerging requirements for visitor reception ▪ Increase visitor services in the East Block ▪ Update public safety plans	Good

On the basis of the indicators, measures and ratings in Table A-1 and Table A-2, reported in detail in the main report, *Grasslands NPC State of the Park Report*, the condition of Grasslands NPC is summarized as:

- Overall State of the Park – Fair

- Ecological Integrity – Fair. Active park management continues to be needed to restore the mixed prairie grassland structure and processes, and some of its extirpated species.
- Connection to Place – Fair. Some improvements to the visitor service offer are needed to better enable people to learn from and experience the park.
- Cultural Resources – Fair. While many of the cultural resources themselves are in good condition, application of cultural resource management principles and practice need to be improved.
- Paleontological Resources – Poor. Not enough is known of the paleontological resources in the park to develop a program to protect and present them.
- Effectiveness of Management Actions – Fair. The 2002 park management plan provides solid direction for park management and is being implemented. There are facets of the plan that still need to be implemented (e.g., paleontological resources), and other areas were plan objectives, actions and targets need refinement.

The following represent major factors that could affect the state of the park and the ongoing management of the park, and will be considered in the review of the park management plan:

- Exotic and Invasive Species: More than fifty exotic plants currently found within the park, notably crested wheatgrass, smooth brome and yellow sweet clover, are of immediate concern to the restoration and sustainability of the native prairie ecosystem. Seventy-eight invasive plants not yet in the park have been identified in the region, including leafy spurge, which is a major concern to the regional economy and environment.
- Loss and Fragmentation of Habitat: Only 19% of Saskatchewan's original mixed grass prairie ecosystem remains intact, and much is fragmented into small parcels. Portions of land within and neighbouring the proposed boundary of Grasslands NPC have been cultivated and more may be, should economic conditions support increased crop production in the region. Increased land under cultivation, as well as increased oil and gas and gravel exploration and extraction, could decrease and fragment suitable habitat for many native species, increase the probability of undesirable exotics invading, and isolate park populations of native species.
- Modified Disturbance Regime: Modified disturbance regimes, particularly wildfire, large herbivore grazing and flooding, are important processes to the functioning and biodiversity of the mixed grass prairie ecosystem. The park's role in reintroducing these disturbance regimes (e.g. prescribed burning and grazing) and managing them in a manner that respects the concerns of park neighbours and regional interests is a major challenge for park management.
- Climate Change: Climate change has wide ranging implications on this semi-arid ecosystem. Prairie climate, including drought and windstorms, is predicted to extend much further north over the next 50-100 years. A north-south system of refuges and corridors may be essential to conserving species during rapid habitat shift. The Great Plains are severely fragmented; many species may have trouble dispersing to new habitats as biome boundaries shift.
- Species at Risk (SAR): Challenges with SAR include species reintroduction, reconciling need to identify and protect critical habitat for species at risk while still achieving broad ecosystem-management goals such as restoring disturbance regimes, and harmonizing SAR with park management and monitoring programs.

- Park Operations: As a relatively new national park, there are inadequate facilities and services for visitors. As well, there are evolving park research and management programs. As these are addressed, the potential for cumulative impacts of these facilities, services and activities on ecological integrity, cultural resources and visitor experiences is a concern.
- Cultural Resource Management: The park is without a Cultural Resources Value Statement for cultural heritage ranging from pre-contact Aboriginal sites to the recent ranching era, which is necessary to incorporate the inventory and evaluation of these resources and better consider them in park management decision-making and interpretation.
- Paleontological Resources: The park has not taken adequate measures to protect and present the paleontological resources.
- Targeting Audiences: The park knows its current visitors, but does not know its potential and evolving target markets. This is particularly relevant as the type of visitors to the park is shifting.
- Learning Opportunities and Visitor Experiences: There is an array of learning opportunities (including outreach) and interpretation programs that most visitors use. However, the 2003 park visitor survey suggests that visitors left with a less than satisfactory understanding of the park's significance. There are not ample learning opportunities and visitor experiences linked with the park's natural, cultural and paleontological themes.

Literature Cited:

Parks Canada. 1997. *National Park System Plan.* Parks Canada (3rd Edition).

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1.0 INTRODUCTION

Every landscape has its champions and detractors. John Palliser, after whom the Canadian wedge of the North American Great Plains is named, described this region as a desert with inadequate grazing and unsuitable for settlement. Less than a century later, John Macoun called it an agricultural paradise. The truth of the prairies, spanning modern day Manitoba, Saskatchewan and Alberta, lies somewhere in the middle. The legacy of natural beauty, human perseverance and dynamic environmental change that the Canadian prairies evoke, is what Grasslands National Park of Canada (NPC) commemorates.

Located in southwestern Saskatchewan, Grasslands NPC was established in 1988 with the Federal-Provincial agreement to conserve, protect and present a portion of the Prairie Grasslands Natural Region. Since that time, land within the proposed park boundary has been acquired by Parks Canada on a willing seller - willing buyer basis. In December 2006, approximately half of the land within the proposed boundaries was owned by Parks Canada (Figure 1).

This is the first State of the Park Report for Grasslands NPC, which will be updated every five years. The report is integral to Parks Canada's management process as it provides a measured understanding of the park's current condition and trends in terms of its ecological integrity, cultural and paleontological resources, and connection to place. It also documents the implementation and effectiveness of the park's 2002 Management Plan, and indicates areas for consideration in the management plan review required every five years in accordance with the *Canada National Parks Act*. This State of the Park Report also contributes to the national State of Protected Heritage Areas Report that reports on the state of all national parks, national historic sites, and national marine conservation areas administered by Parks Canada, and is presented to Parliament and to all Canadians every two years (available in the Library at www.pc.gc.ca).

The information in the report is the best possible description of the current state and trends of various aspects and activities of the park. The information comes primarily from monitoring and research work undertaken by Parks Canada, other government programs and partnering organizations, and universities. While the park has a very active research and monitoring program in the natural, cultural and social sciences, these programs are all relatively young. As a result, many measures may have insufficient data to determine the condition or whether it is improving, stable or deteriorating.

The document is divided into assessments of four main park aspects: State of Ecological Integrity, State of Connection to Place, State of Cultural Resources and State of Paleontological Resources. Each section begins with an introduction to the context and then proceeds to evaluate the main ***indicators*** and ***measures*** representative of and the means to assessing the integrity of that aspect. Also reported on are: the condition of the information used in reporting on the state of the park; the effectiveness of management actions (an assessment of the 2002 plan implementation); and current and emerging ecological stressors and park challenges.

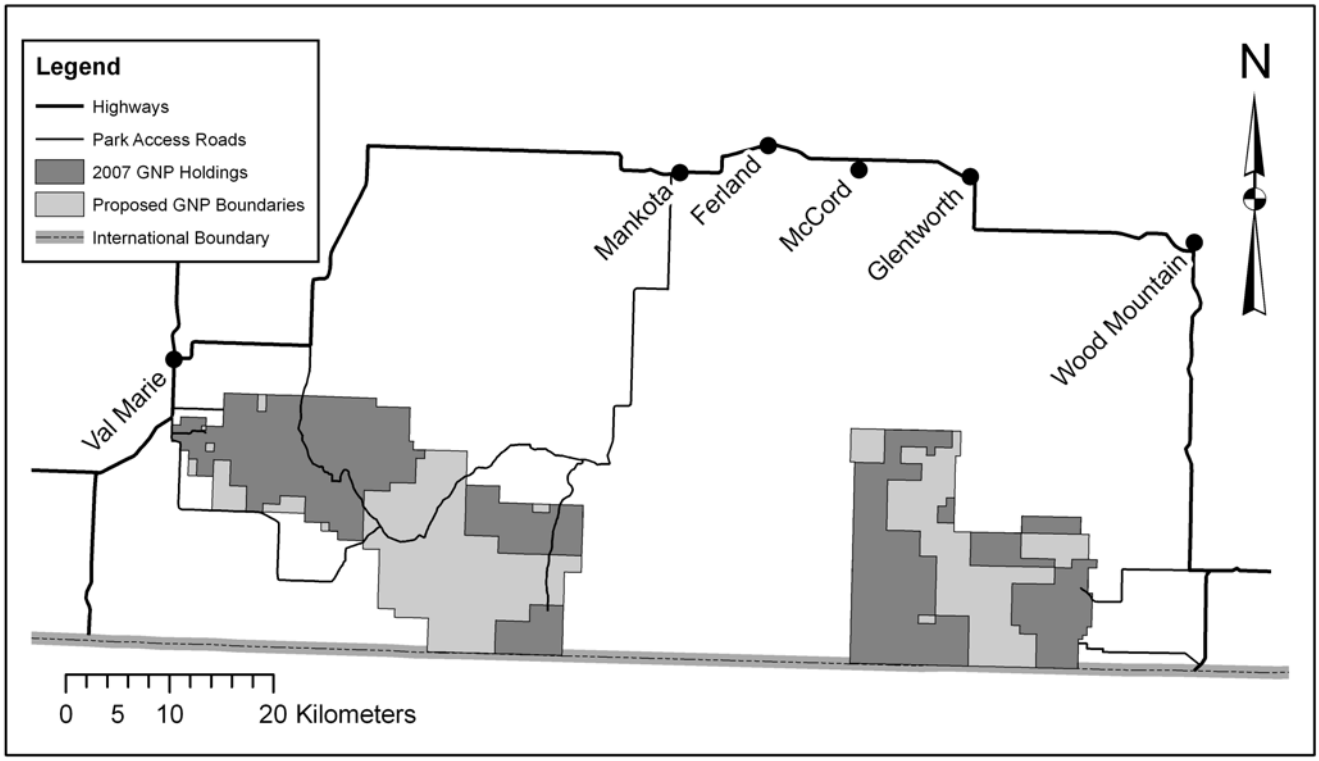


Figure 1 East and West blocks of Grasslands NPC. Current park holdings are in dark grey and proposed park area is in light grey.

2.0 PARK VISION

Grasslands National Park will be a dynamic resilient, and evolving grassland system that maintains its native biodiversity and wilderness character.

The processes that keep the park healthy will all be functioning in harmony with the larger ecosystem of the region. Some of the grasslands species that occupied the area in the past will once again call Grasslands National Park home. Bison raising dust in a wallow, swift fox pups playing in coulees, and prairie vista that stretch uninterrupted to the horizon will be a testimony to the strength of the system and the successful management efforts that brought them back.

The ecological roles of fire and large grazers will be represented and will emphasize aspects that are under-represented in the regional landscape. The result will complement the surrounding rangelands and increase the ecological integrity of the whole.

The vision focuses on the following areas:

Global Role
Grasslands National Park will play an important role as part of a worldwide network of protected areas against which changes in local, regional, and global environments can be measured. As part of this network, Grasslands National Park will serve as an in situ gene pool to protect part of the biodiversity of the planet. It will also be Canada's best representation of the Prairie Grasslands Natural Region and a centre for communicating the importance of grassland conservation.

Inspiration for Research
Grasslands will be renowned for research that contributes to our understanding of mixed-grass ecosystems. It will continue to inspire research into both natural and cultural heritage.

Safeguarding Native Prairie
Native prairie will be conserved and restored in Grasslands National Park. Cooperation among park managers and adjacent land managers is increasing. Parks Canada is supporting conservation efforts outside the park which have complementary management objectives. Adjacent land managers are cooperating to achieve common management and conservation objectives.

Species at Risk
Within the context of ecosystem-based management, population levels and habitat requirements of native mixed-grass prairie species will be maintained or enhanced regionally.

Array of Cultural Resources
Grasslands National Park's vast array of cultural resources will be well understood and recognized for its national significance. Descendants of the region will know that their stories are accurately portrayed and their cultures respected. Sacred sites, artifacts, former residences, and other cultural features will be considered carefully in all park management actions. Visitors will be rewarded with exciting stories and visible features that weave together the tales of human presence on the prairies.

Captivating Vistas
Visitors to Grasslands will be awestruck by the vast prairie landscapes, and the birds, animals, and plants that they rarely have a chance to see. By seeing and learning about the park, they gain a genuine appreciation of the importance of grassland ecosystems.

Visitor Friendly
Visitor services and facilities will meet the needs of visitors to the park. They are provided in ways that minimize interruption of the open prairie and scenic vistas.

Range of Opportunities
The park setting will present opportunities for Canadians to indulge different interests and needs, from touring by car to hiking. None of these activities will impede the needs of those who seek out hidden places of cultural and natural wonder.

Special Arrangements
Where lands have not been acquired, alternative arrangements acceptable for all parties will have been established to achieve park and related conservation objectives.

Sense of Responsibility
All who are touched by the park will also be touched by its messages of ecological and cultural responsibility. Grasslands National Park will enjoy support and mutually rewarding relationships with other government agencies, non-government organizations, industry, the park co-operating association, neighbours and the public at large.

Strong Public Support
There will be strong public support for the park and for the conservation of grassland ecosystems. All who have a vested interest will have adequate opportunity for representation. They will be comfortable expressing their opinions and feel that they can make a difference in how the park is operated.

Local Involvement
Local communities and interest groups will be involved in the management, protection, and presentation of their ecosystem and cultural legacy. In turn, Parks Canada will work cooperatively with Prairie Wind and Silver Sage —Friends of Grasslands Inc. and other groups that share its goals. (Grasslands National Park Management Plan, 2002)

This vision, the heart of the 2002 park management plan, is long-term and wide reaching in its direction. Many of the actions cited in the management plan to achieve the vision are just underway and it may take several more years to evaluate progress in making change. For example, restoring grazing as an ecological process was initiated in 2006, however, years of monitoring are required to evaluate the impact to biodiversity. On the other hand, some of the heritage presentation and visitor programs changes are already in place and being evaluated for effectiveness.

3.0 EVALUATION OF THE STATE OF ECOLOGICAL INTEGRITY

Grasslands NPC is located in the semi-arid climatic zone, dominated by low grasses, herbs and shrubs along the watercourses. It is drained by the Frenchman River (West Block) and Rock Creek (East Block). Cool and warm season grasses cover the upland prairie areas and some of the broad valley lowlands that are also vegetated with sagebrush, greasewood and prickly pear cactus. The treeless, wind swept plains evolved with grazing, drought, periodic fire and a variable continental climate.

Receiving on average 30-33 cm of annual precipitation, with droughts of 50 days or longer occurring during the growing season every five to ten years, it is a landscape dominated by plant and animals adapted to life without water (Parks Canada, 2002). Figure 2 illustrates the key grassland species and ecological drivers for the park. The landscape is characterized by gently rolling hills, coulees, badlands, and wide-open spaces punctuated by ranch houses, small villages and winding roads.

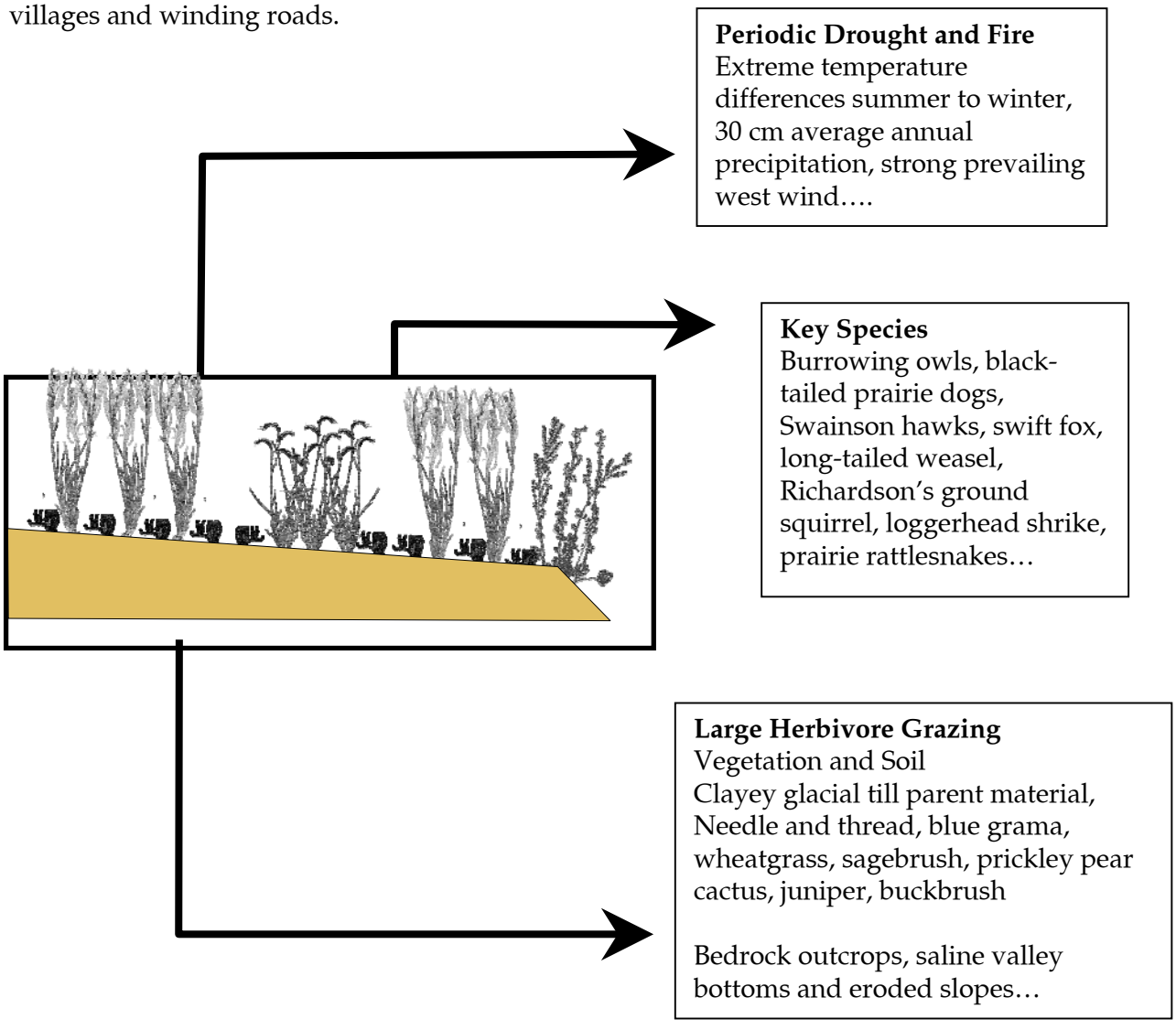


Figure 2: Description of key grassland species and ecological drivers.

Cattle ranching and dryland farming are the most common human land uses in the area. As a consequence, exotic invasive plant species of agricultural origin, some types of grazing management and cultivation occur with undisturbed native prairie inside the park boundaries. There are currently 78 invasive non-native species known to occur in the larger ecological area known as the Frenchman River-Bitter Creek Conservation Area that are not found in Grasslands NPC (Michalsky, 2006). Of these 78 non-native invasive species, one is ranked as an extreme priority (leafy spurge) and two as high priority (spotted knapweed and salt cedar). There are another 50 invasive non-native species that occur within park boundaries. However, only three of these species (crested wheatgrass, smooth brome and yellow sweet clover) were ranked as high priority in the *Non-Native Invasive Plant Species Monitoring Plan for Grasslands National Park of Canada* (Michalsky, 2006).

In this area, as throughout the Great Plains region, a rapid ecological transformation occurred during the mid-1880s when European settlers moved onto the landscape and the bison herds disappeared. Large areas of native prairie were ploughed and converted to agricultural crops. However, the grasslands region around Grasslands NPC includes two provincial community pastures, three federal Prairie Farm Rehabilitation Administration (PFRA) community pastures and many large ranches that, to a large extent, have remained unbroken native prairie that extends into northern Montana (Figure 3). Many mule and white-tailed deer and pronghorn antelope and some elk occur throughout the area. This region is also a haven for prairie endemic species that have had their habitat destroyed elsewhere. As a result, there are numerous species at risk (under the *Species at Risk Act*) associated with Grasslands NPC (Table 1). Plains bison were re-introduced into the park in 2005. The bison are held within a fenced 18,296 Ha area of the park that is a barrier to bison but permits the free movement of deer, antelope and elk.

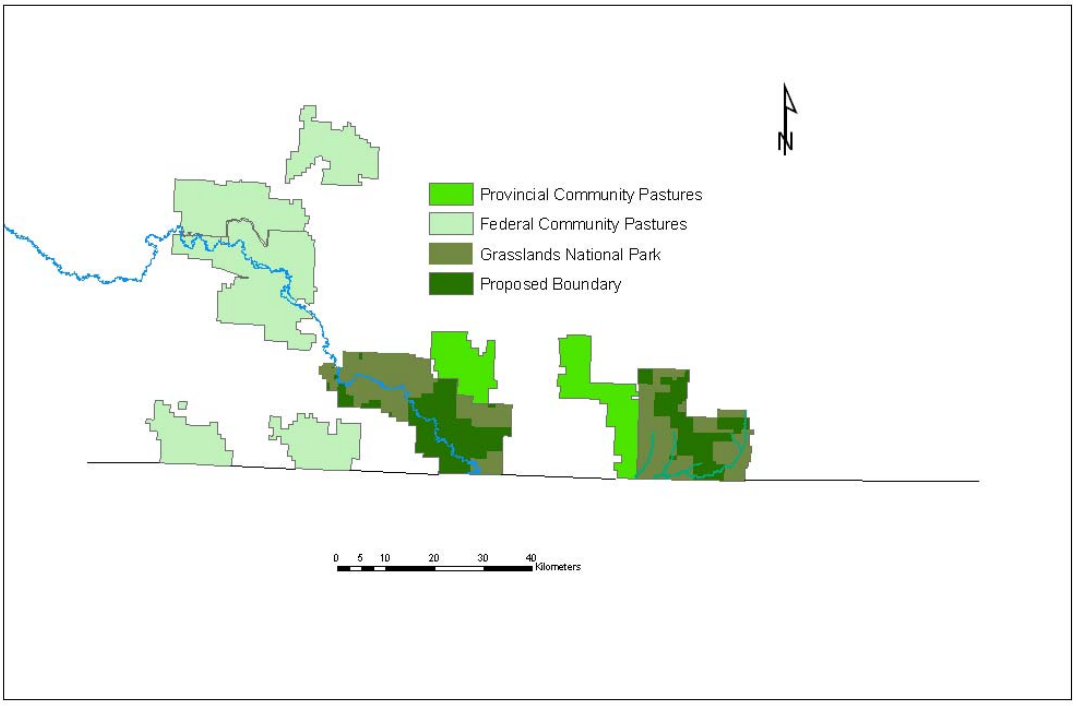


Figure 3: The Grasslands NPC region includes many community pastures and large ranches that to a large extent, have remained unbroken native prairie.

Table 1. Species at Risk Associated with Grasslands NPC			
SPECIES	**COSEWIC STATUS**	**SPECIEIS AT RISK ACT**	**STATUS IN PARK**
Black-footed Ferret	Extirpated	Schedule 1	E
Black-tailed Prairie Dog	Special Concern	Schedule 1	RP
Burrowing Owl	Endangered	Schedule 1	RP
Eastern Yellow-bellied Racer	Threatened	Schedule 1	RP
Greater Prairie-chicken	Extirpated	Schedule 1	E
Greater Sage – Grouse urophasianus subspecies [##]	Endangered	Schedule 1	RP
Loggerhead Shrike excubitorides subspecies	Threatened	Schedule 1	RP
Long-billed Curlew	Special Concern	Schedule 1	RP
Mormon Metalmark – Prairie	Threatened	Schedule 1	RP
Mountain Plover	Endangered	Schedule 1	I
Northern Leopard Frog [##]	Special Concern	Schedule 1	RP
Sprague's Pipit	Threatened	Schedule 1	RP
Swift Fox	Endangered	Schedule 1	RP
Common Nighthawk	Threatened	No Schedule	RP
Ferruginous Hawk [#]	Special Concern	Schedule 3	RP
Greater Short-horned Lizard	Endangered	No Schedule	RP
McGown's Longspur	Special Concern	No Schedule	RP
Peregrine Falcon anatum subspecies	Special Concern	No Schedule	T
Plains Bison	Threatened	No Schedule	RP
Short-eared Owl [#]	Special Concern	Schedule 3	RP
NEW ASSESSMENTS			
Copablepharon viridisparsa (a Noctuid Moth) [#]			RP
Pearl Dace [###]			RP
Western Hog-nosed Snake [###]			RP
POTENTIAL NEW ASSESSMENTS (on SSC Priority Lists)			
Rocky Mountain Dotted Blue			SIPS
Barn Swallow			SIPS
Brassy Minnow			RP
Stonecat			RP
Northern Redbelly Dace			RP
Plains Minnow			RP

Notes:

to be re-examined (or newly assessed) by COSEWIC:

[#] November 2007

[##] May 2008

[###] assessment date not yet determined

E - Extirpated

RP - Regularly present

I - Infrequently observed

T - Present only as a transient

SIPS - Species in Parks

Grasslands NPC is characterized by upland prairie, rolling hills and small rivers and creeks cutting their way through large valleys and coulees. This is particularly so in the West Block of the park. The watercourses and their drainage channels are less distinct in the East Block. The current ecosystem functions with grazing, fire, wind and water erosion, and a semi-arid climate. Periodic droughts are common and temperature fluctuations are extreme between summer and winter. Figure 4 characterizes the many processes that are at work in the grassland ecosystem in the West Block of the park.

The park's ecological integrity is also affected by surrounding land uses. For example, fire is suppressed to protect neighbours pastures, crops and buildings; non-native plant species occur commonly within the park and area; the watershed is manipulated with dams; and habitat outside the park is fragmented.

Figure 5 illustrates intact prairie and cultivated areas within and outside the proposed park boundary area. Beyond the park, intact prairie occurs in other publicly held land such as the PFRA pastures, provincial community pastures and Bureau of Land Management areas in Montana. In addition many privately held ranches in the area operate on unbroken native prairie.

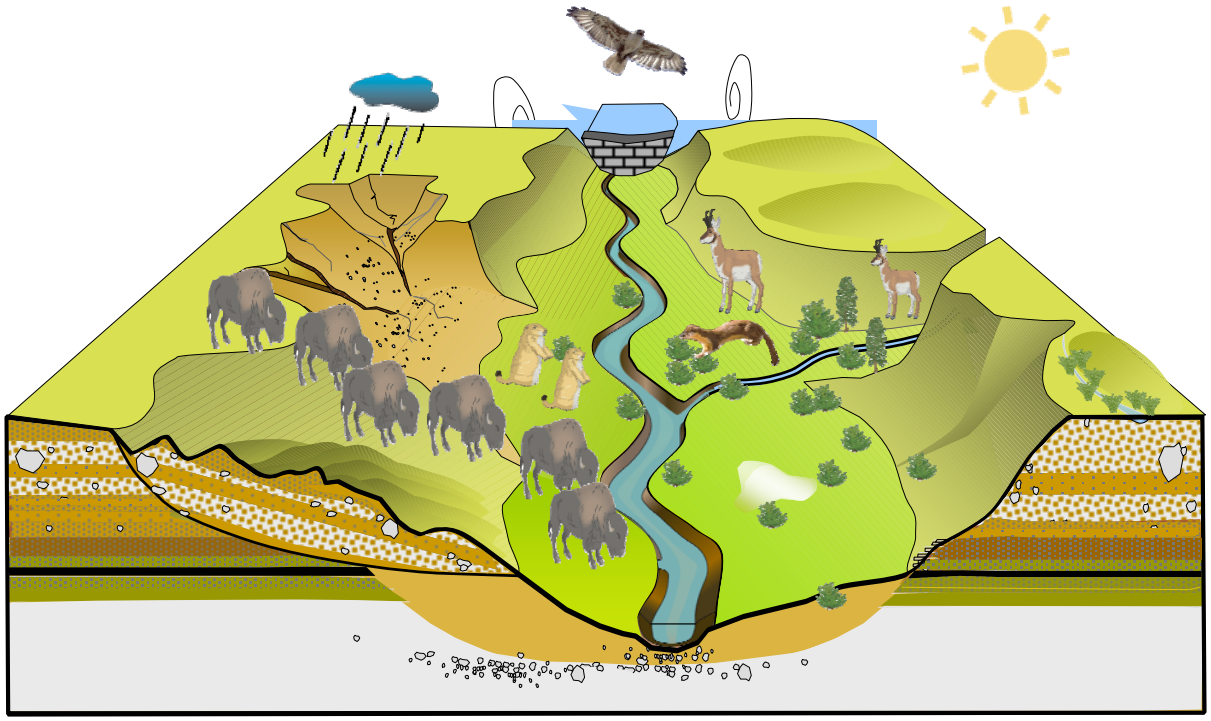


Figure 4: Model representation of ecological components and processes in the West Block of Grasslands National Park, including grazing, fire, flooding, erosion, burrowing, herbivory and predation.

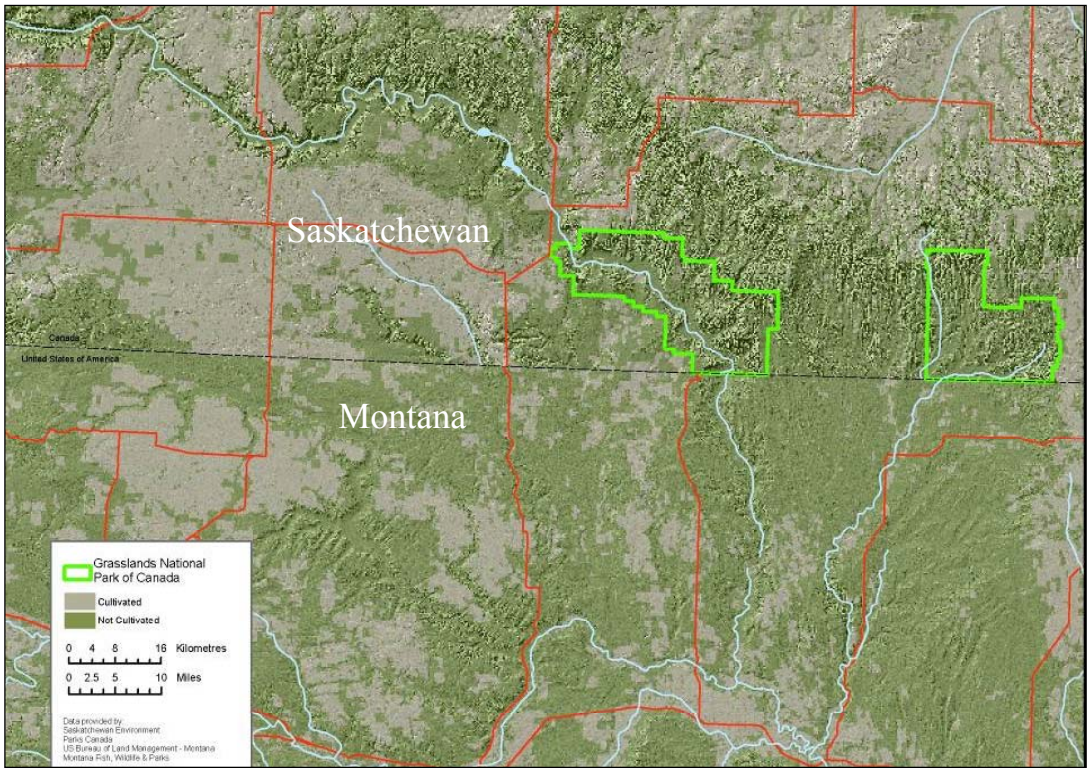


Figure 5: Satellite image of the West and East blocks of Grasslands NPC and surrounding area, showing intact prairie in green and cultivated lands in grey.

To assess ecological integrity over time, a series of landscape ecosystem indicators and measures have been chosen by park ecologists and collaborators in the Interior Plains Monitoring Bioregion which includes Grasslands, Prince Albert, Elk Island and Riding Mountain National Parks. *Indicators* represent the major vegetation and landforms associated within the park and their condition will be monitored over time to track improvements or declines in ecological integrity.

Measures are the specific ecological elements (species, communities, processes) that will be measured within each indicator to provide the information for the overall state of the indicator. *Thresholds* are levels of an indicator or measure that represent high, medium and low ecological integrity; trends that cross thresholds may invoke a pre-described management response. Management actions are enacted to respond to threshold crossovers.

Table 2 summarizes the ecological integrity indicators for Grasslands NPC and their ecological integrity assessment. In some cases there is insufficient information to make an assessment.

Table 2. Ecological Indicators, their Measures and Assessment for Grasslands NPC				
Indicator & Integrity Rating	**Park Area**	**Measure**	**Measure Assessment & Trend**	**Data Quality**
Grasslands Fair	65 %	Burrowing Owls Productivity	Good ←→	Good
		Black-tailed Prairie Dogs	Fair ←→	Good
		Grassland Songbird Community	Fair	Good
		Fire	Fair ↑	Good
		Non-native Invasive Crested Wheatgrass	Poor ↓	Fair
Shrublands Insufficient Information	20%	Greater Sage Grouse	Poor ↓	Good
Forest Insufficient Information	1%	Invasive Non-native Leafy Spurge	Good ←→	N/A
Aquatic Fair	<1%	Peak Flow Rate	Fair ←→	Good
		Number of Zero Flow Days	Fair ←→	Good
Riparian Poor	<1%	Health Assessments	Poor	Good
Badlands Insufficient Information	13%	*No measures in place*		

3.1 Indicator: Grasslands — Overall Rating: Fair

Upland, sloped and valley grasslands comprise the vast majority of the park, about two thirds of it. Combinations of needle-and-thread grass, blue grama grass and western wheatgrass dominate the grassland communities (McCanny, 2000). Understanding the relative health of the grasslands indicator, rated as Fair, is based on five measures for which information is available (Burrowing Owls Productivity, Black-tailed Prairie Dogs, Grassland Songbird Community, Fire and Crested Wheatgrass). Another three measures (Burrowing Density, Vegetation Structure and Productivity, and Ratio of C_3 to C_4 grasses) are under development and may be considered for the next State of the Park Report.

3.1.1	**Measure: Burrowing Owls Productivity**
⟷ Good	***Threshold*:** **Good: > 78 owlets produced annually from greater than 25 nest attempts.** **Fair: 40 to 78 owlets produced annually from 15 to 25 nest attempts.** **Poor: < 40 owlets produced annually from less than 15 nest attempts.** ***Data Quality*: Good**

Burrowing owls are reliant on prairie dog towns, ground squirrel and badger holes for nesting. They rely on healthy native grassland for their small mammal and insect food. Monitoring the integrity of their population can indicate stresses to the small and medium-sized mammal community as well as to the native grassland vegetation communities.

Since 1998, Parks Canada and Canada Wildlife Service staff have monitored known burrowing owl nest sites within prairie dog colonies in Grasslands NPC (Figure 6). Burrowing owls have relatively large clutch sizes - a female lays an average of nine eggs per nest each year, and the owls have a relatively short life span (1-6 years). Therefore, continual recruitment through production and survival of young are important to maintain a stable population over time. Using mean values derived from 10 years of data collected in the park, the thresholds have been set at the following: above 78 owlets a year indicates Good ecological integrity; between 40 and 78 owlets indicates a Fair rating and below 40 indicates Poor ecological integrity for this measure.

In addition to monitoring the number of young produced each year, determining the number of nest attempts can help determine what factors are influencing production and survival rates (Figure 7). Achieving a Fair ecological integrity rating for this measure would occur when there are between 15 to 25 nest attempts; more than 25 and less than 15 nest attempts would result in Good and Poor ratings, respectively.

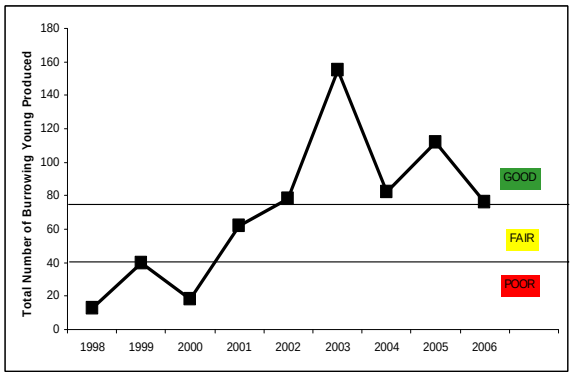


Figure 6: Number of burrowing owl young produced in Grasslands NPC from 1998 to 2006.

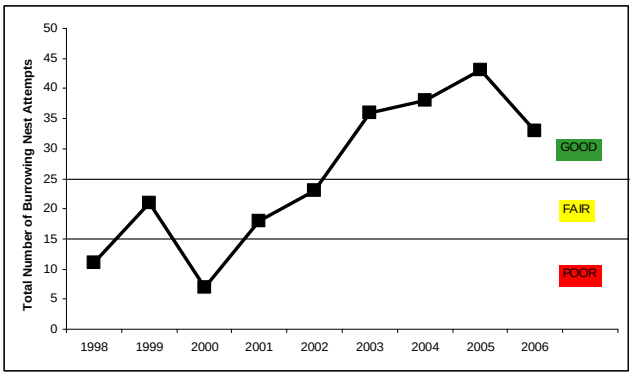


Figure 7: Number of burrowing owl nest attempts in Grasslands NPC from 1998 to 2006.

3.1.2 Measure: Black-tailed Prairie Dogs

Fair

***Threshold*:**

Good: > 615 Ha of active prairie dog colonies within Grasslands NPC.

Fair: 500 to 615 Ha of active prairie dog colonies within Grasslands NPC.

Poor: < 500 Ha of active prairie dog colonies within Grasslands NPC.

***Data Quality*: Good**

Prairie dogs are a species of special concern in Canada where they only occur in the Grasslands NPC area. Prairie dog colonies increase biological diversity and species richness by creating unique habitat for many rare and endangered species, including eastern short-horned lizards (*Phrynosoma douglassii*), swift foxes (*Vulpes velox*) and burrowing owls (*Speotyto cunicularia*; Thompson *et al*, 2004). In addition, the extirpated black-footed ferret (*Mustela nigripes*) is highly dependent on prairie dogs for their food source. A black-footed ferret reintroduction program is currently being assessed for the Grasslands NPC area.

Prairie dogs are a sensitive measure of disease dynamics in the prairies and are a keystone prey species for the predator guild, and so are an effective measure of ecological integrity for the park. Figure 8 shows the total area of active prairie dog colonies from 1998 to 2004. Targets for this measure are based on average values over the past 10 years of data collection. A Poor ranking would result from colony area in the park dropping below 500 Ha, while a Fair ranking would occur for colony areas of between 500 and 615 ha and a Good ranking for greater than 615 Ha of black-tailed prairie dog colonies in Grasslands NPC.

Figure 9 illustrates the location and size of each colony in and around the park. In addition to area measurements, density estimations have been made over the past three years. There was an average of 26 prairie dogs per Ha during the last three years (ranging from 5.1 to 61.2). Low numbers have been attributed to droughts during the previous growing season.

Black-tailed prairie dogs and black-footed ferrets are highly susceptible to the sylvatic plague. The sylvatic plague is a disease that was introduced into North America around 1900. It is a bacteria (*Yersinia pestis*) that is transmitted among mammals through flea bites. In 1995, research on cats and dogs around Grasslands NPC showed that 2% of all cats and 7% of all domestic dogs tested had been exposed to the bacteria that causes sylvatic plague. More recently a study has been undertaken to determine to what extent the fleas that carry the plague occur on the prairie dogs as well as other mammals in the area. During the summer of 2006, black-tailed prairie dogs and neighbouring domestic dogs were examined for fleas. This information will be available for the next State of the Park Report.

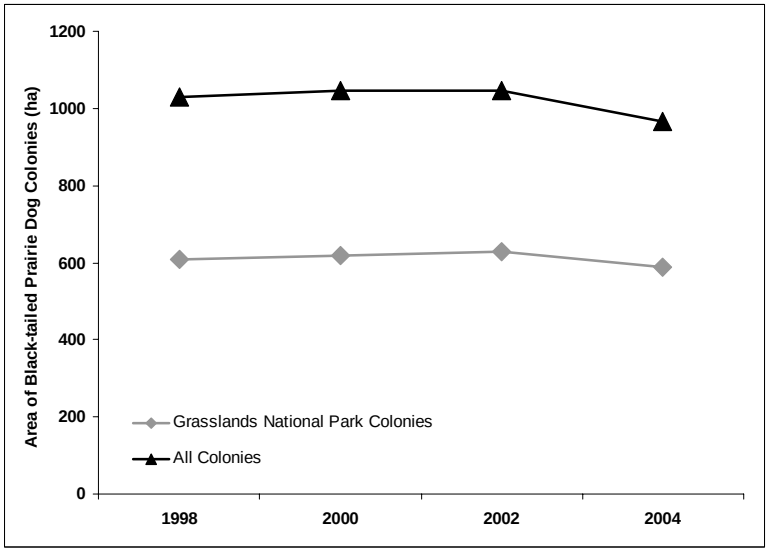


Figure 8: Total area (Ha) of active black-tailed prairie dog colonies in the Grasslands NPC (diamonds) and total Canadian population (triangles) from 1998 to 2004.

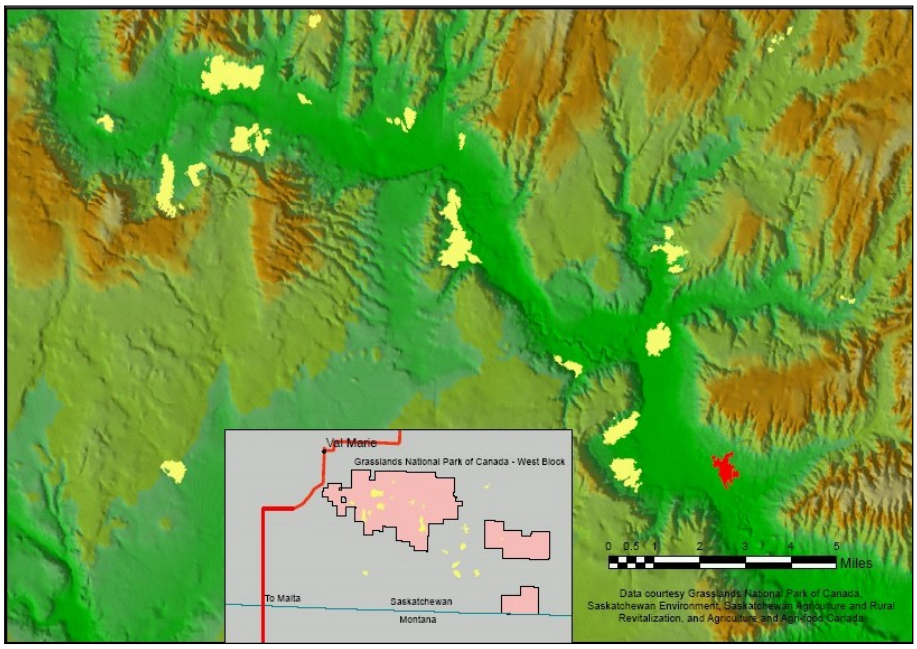


Figure 9: The geographical extent of each prairie dog colony has been delineated every other year since 1998.

3.1.3	Measure: Grassland Songbird Community
Fair	***Threshold:*** **Good: All of the four species (Baird's sparrow, Sprague;s pipit, chestnut-collared longspur and McCown's Longspur) have densities above their respective poor viability targets.** **Fair: One of the four species has a density below its poor viability target.** **Poor: Two or more of the fours species have densities below their respective poor viability targets.** ***Data Quality:*** **Good**

The relative abundance of grassland endemic songbirds is a good measure of mixed grassland integrity as different species prefer different vegetation structure (Figure 10). Changes in density of one species over another indicates a compositional change to the grassland ecosystems that can have far reaching effects. Four species of songbirds were chosen as representative inhabitants of the full range of vegetation structure found in upland native mixed grass prairies: Baird's sparrows are associated with tall vegetation, Sprague's pipit with medium height vegetation, chestnut-collared longspur with short vegetation, and McCown's longspur with very short vegetation and bare ground. Disturbance processes such as wildfires and grazing interact with soil potential and weather to provide a mosaic of grass structure. Grasslands with high ecological integrity should be able to cater to the habitat needs of this suite of birds. To determine the current status of these songbird populations, breeding bird survey data from the park and adjacent grasslands in northern Montana were plotted in a graph comparing the relative abundance of each species in the grazed areas outside the park and ungrazed areas within the park (Figure 11). The viability ranks are first estimates based on breeding bird survey data assessed by Dr. Steve Davis from the Canadian Wildlife Service. The poor viability target densities are 2 per 100 ha for Baird's sparrow, 4 per 100 ha for Sprague's pipit, 9 per 100 ha for chestnut-collared longspur and 4 per 100 ha for McCown's Longspur. In Grasslands NPC, upland grassland species that require taller vegetation are abundant while species requiring shorter structure grasslands are much less abundant.

At the present time grassland songbirds are considered to be in Fair condition because one species, McCown's longspur, has a density below the poor viability target. Trend information is not available. However, with the restoration of grazing and the development of a prescribed burning program, it is predicted that the relative abundance of chestnut-collared and McCown's longspurs will increase.

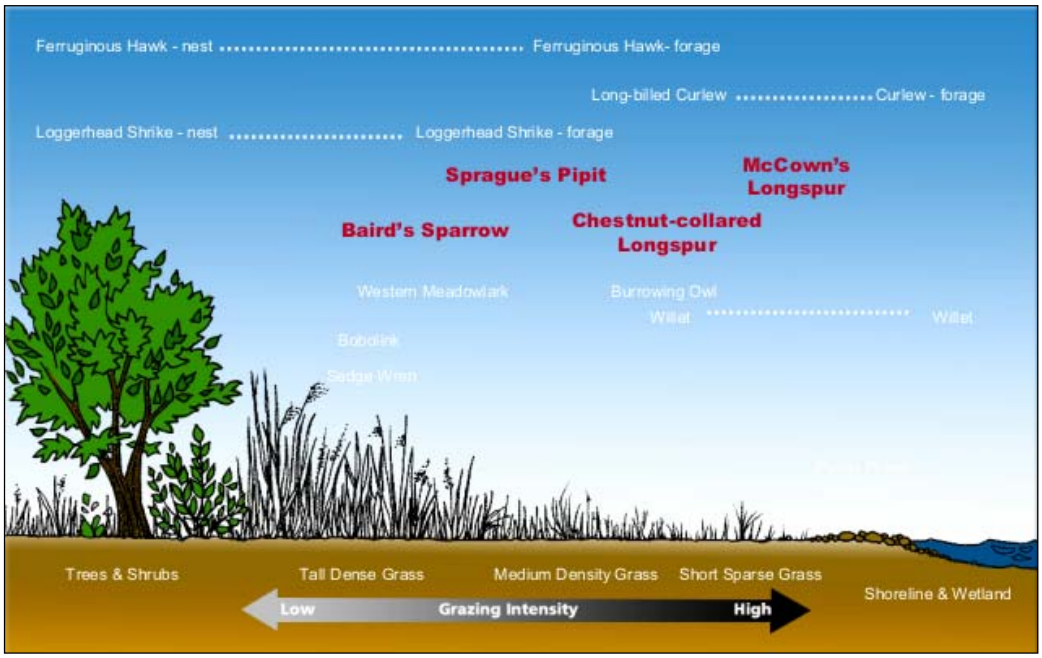


Figure 10: Conceptual diagram showing the relationship between grass height and grassland bird habitat requirements. Adapted from Saskatchewan Watershed Authority (2002).

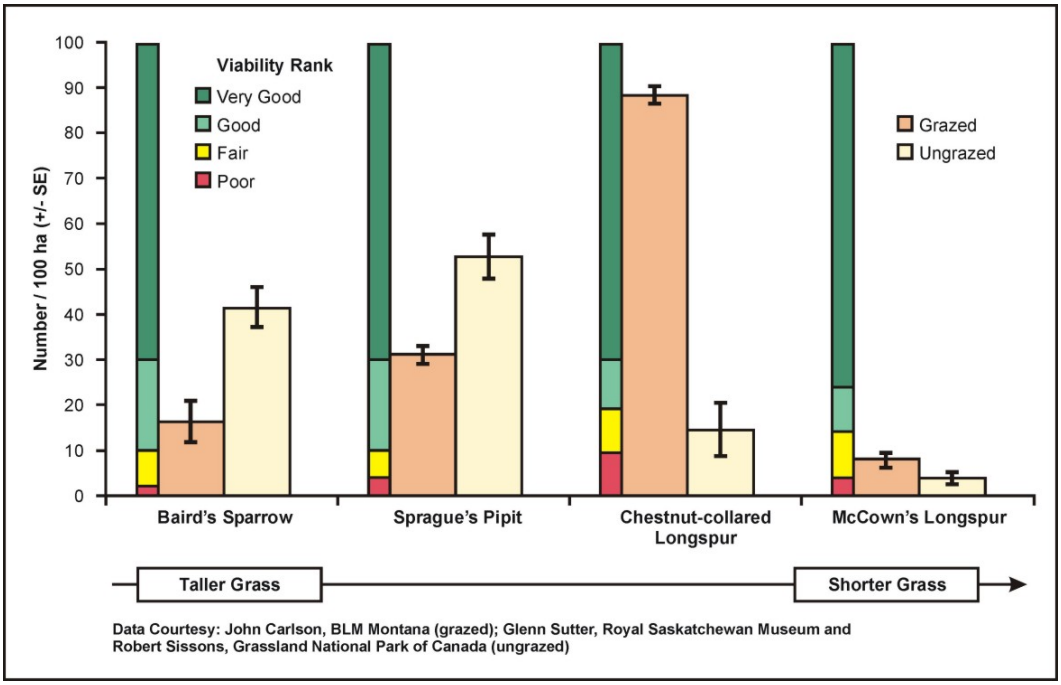


Figure 11: Viability targets for four grassland songbirds in Grasslands NPC compared to adjacent rangelands in Northern Montana (Smith Fargey, 2004).

3.1.4	Measure: Fire
⇧ Fair	**Nationally, Parks Canada maintains a target of restoring 20% of the long-term fire cycle in national parks. To achieve ecosystem management objectives in Grasslands NPC, up to 400 Ha (equivalent to 20% of the fire cycle) could be burned through a combination of prescribed fires and fully suppressed naturally occurring wildfires.** ***Threshold*:** **Good: >20% of fire cycle** **Fair: 5-20% of fire cycle** **Poor: <5% of fire cycle** ***Data Quality*: Good**

Fire is an important disturbance process in grassland ecosystems. It can change the structure and composition of vegetation in ways other than grazing, and it can create habitat for many prairie endemic wildlife. The density of naturally occurring fires can be an effective measure of landscape heterogeneity and ecological integrity. The draft Grasslands National Park Fire Management Plan indicates that the natural fire return interval for the park area is estimated to be 25 years and that during the hot, dry, windy summers naturally occurring fires are frequent. These fires have an effect on future vegetation structure and productivity. Since 1992, ten naturally occurring fires (covering 1473.63 Ha) and six prescribed burns (20.52 Ha) have occurred within the park (Table 3).

Based on the information in Table 3, the average area burned per year over the last 15 years, including prescribed burns was 99.6 Ha. This is significantly less than 20% of the historic fire cycle (i.e., 400 Ha per year) and the upper range for intensive disturbance (fire and/or grazing) identified in the park management plan (2% of current holdings per year).

Table 3: The extent of naturally occurring fires and prescribed burns in Grasslands NPC from 1992 to 2007.		
Year	Naturally Occurring (Ha)	Prescribed Burns (Ha)
2007		16.5
2006	862.11	
2002		1.78
2001	158.5	0.392
2000	168.24	1.75
1999	.43	0.1
1998	1.5	
1997	21.4	
1996	1.64	
1992	259.81	

To date, prescribed fire has been used in Grasslands NPC specifically for achieving ecosystem management objectives as outlined in the park management plan. For example, in 2007, burns were completed to reduce the cover of invasive non-native grass species and to influence the movement of bison. Figure 12 shows the fires that occurred within the park since 1992 and some of the fires that occurred outside the park during the same period. The eight-year rolling average (1999-2006) for both wild and prescribed fires within Grasslands NPC is 149.1 Ha per year, for a total area burned of 1193.3 Ha. This represents, on average, 7.5% of the historic fire cycle burning per year (Table 3).

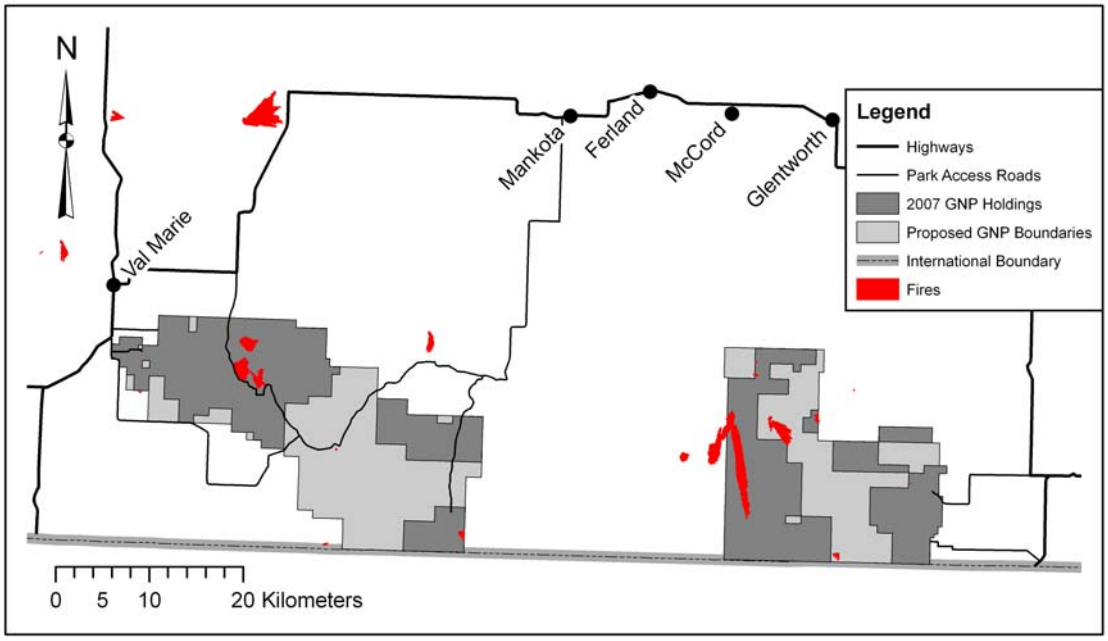


Figure 12: Naturally occurring fires in and around Grasslands NPC, including all fires that occurred in the park and some that occurred outside.

3.1.5	Measure: Non-native Invasive Crested Wheatgrass
Poor 	*Threshold*: A decrease of 10 Ha per year, with reduced spread. Good: >25% decrease in crested wheatgrass distribution over five years Fair: 1-25% decrease in crested wheatgrass distribution over five years Poor: 0% change or an increase in crested wheatgrass distribution over five years *Data Quality*: Fair

Crested wheatgrass (*Agropyron pectiniforme*) is a non-native invasive long-lived cool season perennial bunchgrass, which is both cold and drought tolerant. It is an important measure due to the degree to which it alters the grassland communities that it invades, forming an almost complete monoculture, excluding almost all native species from establishing or proliferating.

It has high germination and establishment rates, strong competitive ability, good seed production, excellent nutritive quality during spring and early summer and a wide adaptability to semi-arid grasslands. Crested wheatgrass can be an aggressive invader of native grassland and a problem in Grasslands NPC where seeded roadsides and abandoned fields are encroaching into the native grass prairie (Sturch, 2005). Crested wheatgrass was assessed as a high priority for active management and monitoring (Michalsky, 2006).

The invasion of crested wheatgrass occurs through two methods. The first is the expansion of hay field margins, generally along their windward margin via seed dispersal. A field can creep upwards of one meter per year. The second form of spread is likely through herbivore dung and can occur over long distances. As a result, crested wheatgrass is found in every vegetation community in the park. Valley grasslands are the most susceptible to crested wheatgrass invasion, while sloped grasslands, shrub communities, upland grasslands are somewhat susceptible and eroded slopes are the least susceptible (Henderson, 2005a). These invasions will be monitored using a transect system extending 2 km out from known occurrences (Michalsky, 2006).

Data from the 1993 vegetation survey indicated that approximately 591 Ha of land was predominately crested wheatgrass (Michalsky & Ellis, 1994). This figure does not include roadsides or spread from planted fields and roadsides. A more precise area measurement of crested wheatgrass distribution in the park will need to be calculated for a baseline measurement. In 2006 approximately 24.2 Ha were sprayed with herbicide and seeded with native grass species. In 2007 another 20 Ha of crested wheatgrass will be sprayed and seeded. In addition, 8 Ha of crested wheatgrass will be burnt in 2007 and exposed to moderate grazing. These management actions are being taken to reduce the area and seed production of the invasive wheatgrass. However, spread of crested wheatgrass continues from roadsides, field margins and satellite plants from these original sources.

Reversing the trend in crested wheatgrass invasion and improving its status, means to eradicate the plant wherever possible and restore the land beneath it to native prairie. This has been the topic of several research projects in Grasslands NPC. This research indicates that eradication and restoration is feasible and that reducing the prevalence of crested wheatgrass is important as it has deleterious impacts on both the structure and function of the mixed grass ecosystem.

3.2 Indicator: Shrublands — Overall Rating: Insufficient Information

Shrublands in Grasslands NPC are restricted to the wettest sites, along river and stream drainages and in flood plains. They include a variety of plant species that are unique to the prairies including silver sagebrush (*Artetemesia cana*) and thorny buffalo-berry (*Sheperdia argentea*). These plant communities are home to endemic and at-risk wildlife including sage grouse and prairie loggerhead shrikes among others. Currently, only one measure (Greater Sage Grouse) is being monitored, resulting in no rating (Insufficient Information) for this State of the Park Report. The following four measures may be considered for evaluating shrubland health in the future: Silver Sagebrush health, shrubland songbird community, and rate of alluvial deposition.

3.2.1	Measure: Greater Sage Grouse
 Poor	*Threshold*: **Good: 6 – 8 Lek complexes and between 300-400 individuals.** **Fair: 4-6 Lek complexes and between 150-300 individuals.** **Poor: Less than 4 Lek complexes and less than 150 individuals.** *Data Quality*: **Good**

Greater sage grouse (*Centrocercus urophasianus urophasianus*) are year-round residents in the sagebrush-grasslands of the semi-arid mixed-grass prairie. In Canada the birds are at the northern extreme of their range. The Saskatchewan population has declined considerably since the 1980s and in 1998 the Committee on the Status of Endangered Species in Canada listed the species as endangered (COSEWIC, 1998). Sage grouse are dependent upon sagebrush shrub habitat for nesting, and valley and sloped grasslands for feeding and are very sensitive to disturbance. Hence they are a good measure of change in these diverse aspects of the shrublands indicator.

The sage grouse congregate each spring at sites called leks, located in flat areas, on ridges or along valley bottoms for courtship and mating. Lek counts of strutting males during courtship displays are used as an index for local population status and trends. The number of males attending leks can be extrapolated to provide a crude estimate of total spring breeding populations; a conservative estimate would be two females for every lekking male (Aldridge 1998, Aldridge and Brigham 2003, Connelly *et al.*, 2004).

Figure 13 shows the decline in lek sites in and around Grasslands NPC since the 1980s. Figure 14 indicates the total number of males recorded at all active lek sites within Grasslands NPC from 1994 to 2005. In 1998 there were six active lek sites while four leks have been active in the last five years. However, of those four remaining leks, only two have been active in some years and only one lek in the East Block has a relatively healthy lekking population. The Poor rating was based on overall population trend and the fact that half of the remaining leks in the park seem to be on the verge of stopping to function. The threshold for the sage grouse measure is consistent with the National Sage Grouse Recovery Strategy (Lungle and Pruss, 2007), which used the sage

grouse population size in the mid 1980s, prior to the most recent population decline, as the recovery goal.

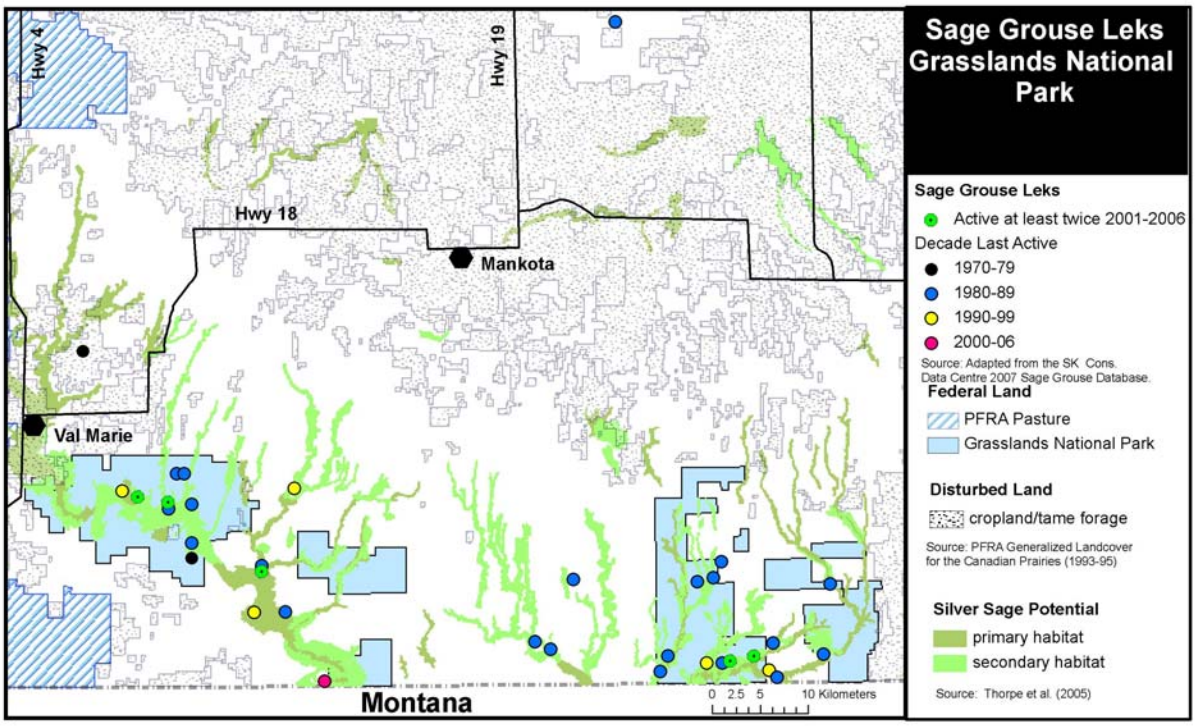


Figure 13: Status of lek sites in and around Grasslands NPC from the 1970s to present.

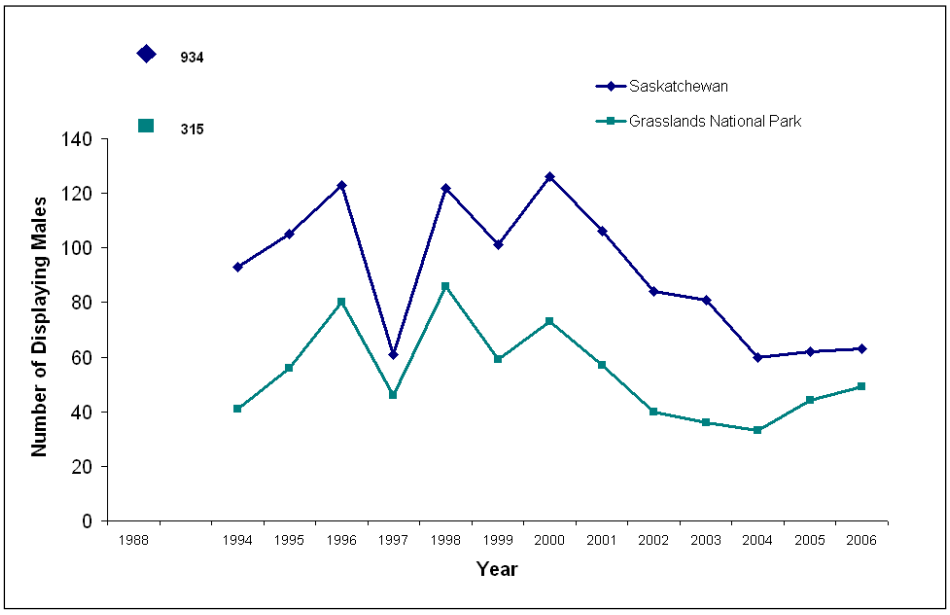


Figure 14: Total number of displaying males in Grasslands NPC and the provincial population in 1988 and from 1994 to 2005.

3.3 Indicator: Forest — Overall Rating: Insufficient Information

Forest constitutes only about one percent of the park area and is represented by wooded coulee communities comprising trembling aspen and Manitoba maple reliant on slope seepage of water. Trembling aspen are found in wooded coulees in the north section of the East Block and Manitoba maple are found in coulees south of McGowan's in the East Block as well (McCanny, 2000). Invasive Non-native Leafy Spurge is the only measure currently identified with a threshold and monitoring prescription, so there is insufficient information to assign an ecological health rating to the Forest component for this State of the Park Report. The following measures may be considered to evaluate the ecological state of this indicator for the next Report: forest songbird community and forest health.

3.3.1 Measure: Invasive Non-native Leafy Spurge (*Euphorbia esula*)

Good

***Threshold*:**

Good: 0% distribution over the next five years

Fair: <0.01% distribution over the next five years

Poor: >0.01% distribution over the next five years

***Data Quality*: N/A**

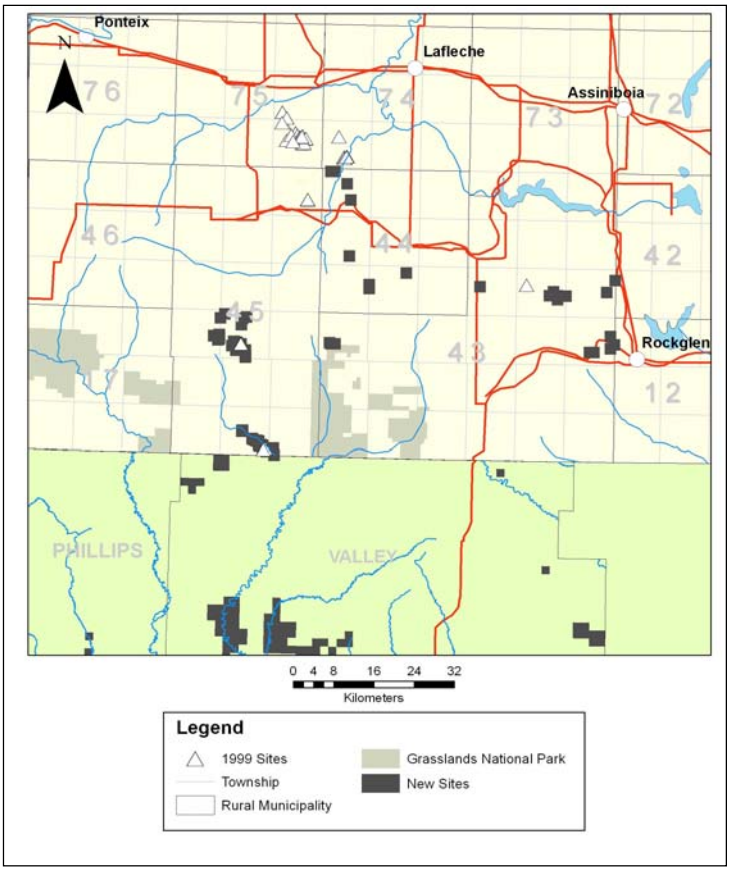


Figure 15: Known locations of Leafy Spurge within RMs 43, 44, 45 and Phillips and Valley County surrounding Grasslands NPC, 2005.

Leafy spurge is a noxious invasive weed of grazed and cultivated lands in the Great Plains. It will form a vast monoculture where allowed to establish, expands aggressively, is difficult to eradicate and degrades habitat value for many native plants and animals. Its establishment in an area is a sign of excessive disturbance and of an ecosystem that is approaching dysfunction.

The extent of leafy spurge outside Grasslands NPC has been mapped. There are no recorded occurrences of leafy spurge within the park. Although this invasive weed is within 100 meters of the park (Figure 15) it has not been documented within park boundaries.

Grasslands NPC and the local rural municipality have been working together with the landowner to control leafy spurge. The occurrence of this plant will be monitored in

conjunction with the work of the recently formed Frenchman River/Wood River Invasive Weed Management Area. Grasslands NPC is a member of the weed management area.

3.4 Indicator: Aquatics — Overall Rating: Fair

The Frenchman River, located in the West Block, is the largest aquatic ecosystem in the park. Water from the river is impounded behind dams three times before the river enters the park. The upstream reservoirs are used for irrigation. There are approximately five small creeks in the East Block, all of which flow into Rock Creek. These systems account for a small area of the park but are important wildlife habitat. Two of the three measures (peak flow rate, number of zero flow days, and water quality) have been assessed, enabling a Fair rating for the Aquatic ecosystem related to the park.

3.4.1 Measure: Peak Flow Rate

⟺ **Fair**

***Threshold*:**

Good: Daily Peak Flow Rate exceeds historic medians for Frenchman River (34.5 m^3/s) and Rock Creek (17.2 m^3/s) in at least 50% of years.

Fair: Daily peak flow rate exceeds historic medians for Frenchman River (34.5 m3/s) and Rock Creek (17.2 m3/s) during 25% to 50% of years.

Poor: Daily Peak Flow Rate exceeds historic medians for Frenchman River (34.5 m^3/s) and Rock Creek (17.2 m^3/s) in less than 25% of years.

***Data Quality*: Good**

Peak flow rates on the Frenchman River and Rock Creek have been monitored daily from March to August since the early 1900s by Canada and the United States. Episodic peak flow events are important natural processes for flowing-water ecosystems. Peak flows create physical habitat disturbance, maintain habitat diversity, facilitate dispersal of organisms and maintain riparian habitats.

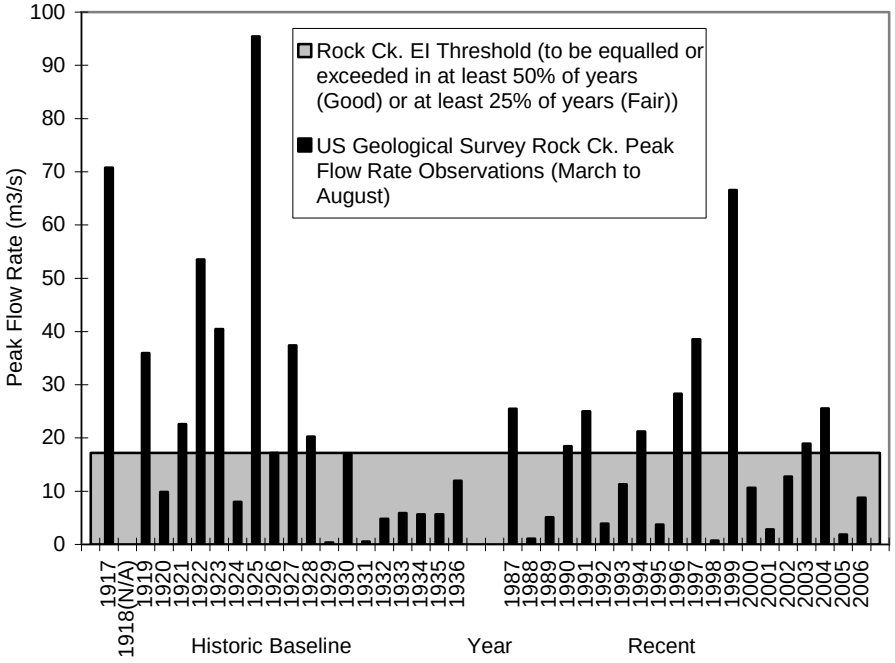


Figure 16: Rock Creek peak flow rates derived from US Geological Survey data for a historic baseline period (left) and recent decades (right). Also shown for comparison is the threshold peak flow rate (gray box) to be exceeded in five years per decade.

The historic median peak flow rates can serve as ecological integrity targets for the Frenchman River (34.5 m^3/s) and Rock Creek (17.2 m^3/s). Peak flow rates exceeding 34.5 m^3/s were 40% less common for the Frenchman River during the 1987 to 2006 period than during the 1917 to 1936 period. In addition, peak flow rates for seven years of the recent period were lower than the minimum for the 20-year historic baseline period (11.8 m3/s). Differences were less apparent at Rock Creek, where peak flow rated exceeded 17.2 m^3/s 10 of 19 years prior to 1937, and 9 of 20 years after 1987 (Figure 16). The conditions of Rock Creek and the Frenchman River are therefore assessed as Fair.

Peak flow rates vary dramatically from year to year due primarily to changes in precipitation. Flowing-water ecosystems in Grasslands NPC may be stressed in the future if peak flows decline further as a result of climatic change and increased water allocations.

3.4.2	**Measure: Number of Zero Flow Days**
⟺ **Fair**	***Threshold*:** **Good: The number of days between ice break-up and 31 August with zero flow to exceed historic upper quartile (75th percentile) for the Frenchman River (6 days) and Rock Creek (17 days) in no more than 25% of years.** **Fair: The number of days between ice break-up and 31 August with zero flow to exceed historic upper quartile (75th percentile) for the Frenchman River (6 days) and Rock Creek (17 days) during 25 % to 50 % of years.** **Poor: The number of days between ice break-up and 31 August with zero flow to exceed historic upper quartile (75th percentile) for the Frenchman River (6 days) and Rock Creek (17 days) in more than 50% of years.** ***Data Quality*: Good**

Periods with zero flow (defined as flow less than 0.1 m^3/s) represent temporal interruptions in the availability of flowing water habitats to aquatic organisms. An increase in the duration of zero flow periods represents an increase in habitat fragmentation. Stagnant water and oxygen depletion can occur when flow is reduced to zero or trace levels. Many aquatic organisms are then forced into refugia near pools and springs and have very limited opportunities for growth, reproduction and dispersal.

For the Frenchman River, there were six or more days with zero flow in four of 20 years during the historic baseline period and in 10 to 20 years during recent decades (Figure 17). Differences were less apparent at Rock Creek, a smaller watershed with more frequent periods of zero flow. There was greater than 17 days of zero flow during five years of the 19-year historic baseline period and six years of the recent 20-year period. The conditions of Rock Creek and the Frenchman River are assessed as Fair.

The dominant influence on flow interruptions is weather variability. From one year to the next the number of zero flow days can dramatically decrease (e.g. 1992 to 1993) or vice versa (e.g. 2005 to 2006). These ecosystems are vulnerable to the effects of climatic change if droughts increase the frequency and duration of zero flow periods. Increases in water allocations and reservoir losses could exacerbate the effects of variations in precipitation by further fragmenting flowing-water habitat during dry years.

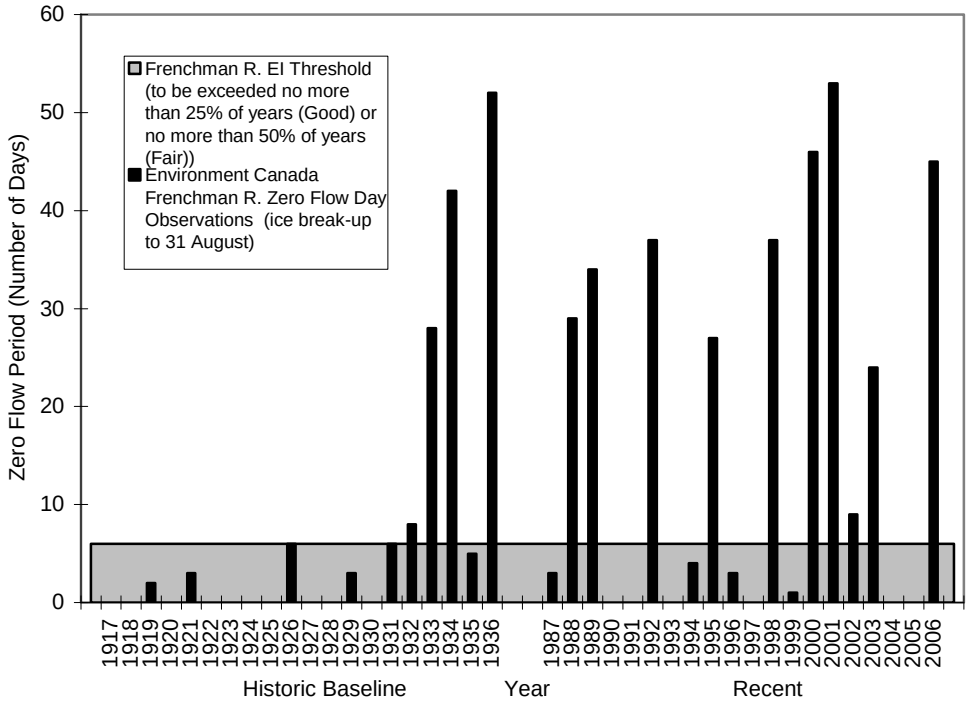


Figure17: Frenchman River zero flow days from Environment Canada data for the historic period (left) and the recent period (right). Also shown for comparison is the threshold for zero flow days (grey box) to be exceeded in no more than 25% of years.

3.5 Indicator: Riparian — Overall Rating: Poor

The riparian zone is defined as the land along the banks of a river or stream and commonly refers to the vegetation community there, although, it includes much more. Riparian areas are extremely sensitive to disturbance as they are populated by species that have adapted to a wet lifestyle and the regular cycles of wet and dry that near-stream life brings. Drought, frequent flooding, cessation of flooding, invasion by exotic species and disturbance by large herbivores can all cause the degradation of the riparian community.

3.5.1	Measure: Riparian Health Assessments
Poor	*Threshold*: Good: At least 70% of sites rated healthy Fair: 21 to 69% of sites rated healthy Poor: 20% or less of sites rated healthy *Data Quality*: Good

Rivers and streams in the East and West blocks of Grasslands NPC support unique communities in the grasslands natural region. The transitional zones between the water's edge and upland grasslands are riparian areas, which are comprised of hydrophytic vegetation types that provide numerous key ecological functions, including:

- entrapment and storage of sediments;
- maintenance and stabilization of banks;
- storage of flood water;
- recharging aquifers;
- filtering and buffering of water;

- dissipation and reduction of stream flow energy;
- maintenance of biodiversity; and
- creation of primary productivity.

Riparian health assessments were conducted along the Frenchman River in 2005 and 2006, and along Weatherall, Spring, Hellfire and Horse creeks in the East Block in 2006. The assessments followed a protocol outlined in Fitch *et al*. (2001). Polygons were established and numerous physical (soil and hydrology) and vegetative features of the riparian area were assessed visually. The features considered relate to the ability of the stream to perform a number of key ecological functions and are scored along a point-scale system, which is weighted according to the relative importance of each feature to riparian health. Photo-points were also established within each polygon. Each feature is awarded a score and these are totaled and reported as a percentage for the site (Table 4).

Table 4. Riparian health rating categories based on assessment percent scores (Fitch and Ambrose, 2003).

Score	Rating Category	Explanation
80-100 %	Healthy	All riparian functions are being performed
60- 79%	Healthy but with Problems	Many functions are being performed but signs of stress are apparent
< 60%	Unhealthy	Most functions have been severely impaired or lost

Permanent riparian monitoring plots were established on seven reaches of the Frenchman River in 2005. Thirty-six polygons along four different creeks in the East Block were assessed in 2006 in conjunction with the grazing research experiment and grazing management areas (Figures 18 and 19). The current condition of the Frenchman River is Poor as less than 20% of sites were rated as healthy (Figure 18). The East Block riparian areas are in Good condition with greater than 70% of sites rated healthy (Figure 19). Invasive species and poor shrub recruitment along the Frenchman River were the primary reasons for the Poor assessment. As the monitoring program matures, additional sites will be selected along streams and rivers within the park for long term condition monitoring. The sites will be assessed every three years, in July or August. As additional information becomes available trends will be identified.

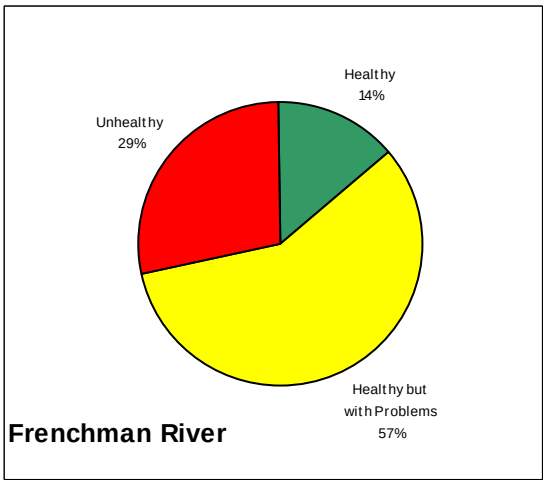


Figure 18: Riparian health assessment for the Frenchman River

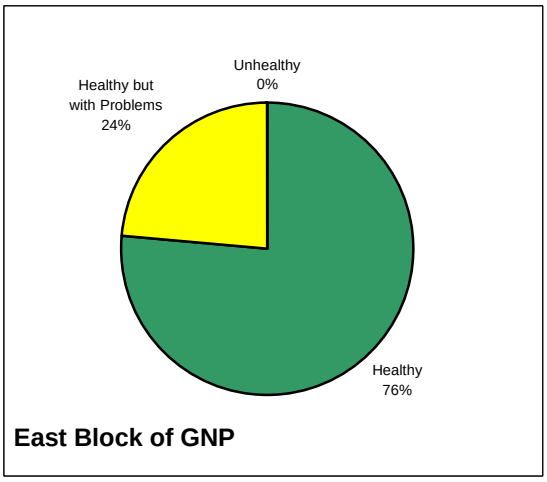


Figure 19 Riparian health assessment for various creeks in the East Block.

3.6 Indicator: Badlands — Overall Rating: Insufficient Information

The badlands of Grasslands NPC, is a landscape of easily erodable soils characterized by sparse, drought resistant vegetation and animals adapted to a dry, hot condition. This is a disturbance-tolerant community that is nevertheless sensitive to changes. Changes to the moisture balance in the area and invasion of exotic species that may hold soil more tenaciously than the native community could irreversibly change the structure and composition of the flora and fauna here. No measures are being monitored at this time to assess this indicator, thus no overall assessment rating is given for the Badlands for this State of the Park Report. The following measures maybe considered for the next Report: trail use, Short-horned lizard, Mormon metalmark, amount of bare soil/erosion, and invasive non-native Sweet clover.

4.0 Evaluation of the State of Connection to Place

Connection to place reflects the relevance and importance of protected heritage places to Canadians. The concept expresses the emotional, intellectual, and spiritual attachment Canadians and visitors to Canada feel toward our natural and cultural heritage places. Parks Canada works to foster this sense of attachment through meaningful opportunities for enjoyment and learning provided on-site and through outreach education. Respecting, understanding, and facilitating the relationship between heritage places and Canadians, including Aboriginal peoples, visitors, partners and stakeholders, helps promote a shared sense of responsibility for heritage places and engage minds and hearts to support their protection and presentation now and for future generations.

Interest in the Val Marie – Killdeer area as a national park began in the 1960s when the area was recognized as largely undisturbed and home to many rare grasslands species. Since that time, visitors have ventured off the beaten path to this open expanse to see mixed prairie, grouse, prairie dogs and badlands. During the last five years, it is estimated that between 6000 and 7000 individuals visit Grasslands NPC each year. It is a challenge to get an accurate estimate of visitation into the park because the Visitor Reception Centre is outside of the park and there are many possible entry points into the park, all of which are unattended.

As a relatively new national park, the idea of tourism and visitor services at Grasslands NPC is evolving while respecting the park's ecological integrity values and objectives. Heritage presentation and visitor experience formed an important part of the 2002 park management plan. In 2003 a survey of park visitors obtained information concerning their stay in the park and area, their satisfaction with facilities, services and programs, and what they would like to see and do (Grigel, 2004). This survey provides a significant portion of the information used to evaluate the state of the connection to place.

Table 5 lists the two indicators and six measures used for this State of the Park Report to evaluate connection to place. However, Parks Canada is in the process of developing program-wide indicators, measures and thresholds to evaluate this aspect of the park. Consequently, the indicators, measures and ratings presented in this section are provisional and may likely be modified for the next State of the Park Report for Grasslands NPC.

Table 5. Connection to Place Indicators, Measures and Assessments for Grasslands NPC

Indicator & Integrity Rating	**Measure**	**Measure Assessment**
Visitor Experience Fair	Understanding Visitors	Fair
	Providing Visitor Experience Opportunities	Fair
	Offering Quality Service	Fair
	Connecting With Place	*Insufficient Information*
Public Education and Understanding Fair	Participating in Learning Opportunities	Good
	Understanding of Park Significance	Poor ↑

4.1 Indicator: Visitor Experience — Overall Rating: Fair

Four measures are used to evaluate the state of visitor experience at Grasslands NPC: understanding visitors, providing visitor experience opportunities, offering quality service, and connecting with place. These measures and the methods to rate them are provisional for this 2007 State of the Park Report and may be revised or replaced in future reporting.

4.1.1	**Measure: Understanding Visitors – the extent to which management decisions are influenced by an understanding of actual and potential visitors' needs and expectations**
Fair	***Threshold*: none applied**

The 2003 park visitor survey identified the following types of visitors based on their reported activities:

- the *Driving Sightseer*, a person engaged in bird watching, viewing and photographing wildlife and scenery, while driving the Ecotour Road;
- the *Exploring Hiker*, someone who visits the Visitor Reception Centre and its exhibits in Val Marie, uses the Ecotour Road and hikes unmarked trails;
- the *Self-Guided Hiker*, who obtains information from the Visitor Reception Centre and hikes the West and East blocks using the park guide book; and
- the *Nature Photographer*, who bird watches and views wildlife without reporting any hiking activity.

This measure is given a Fair rating based primarily on the fact that the 2003 park visitor survey was designed and used early in park management plan implementation to guide decisions concerning the visitor services and opportunities that should be developed first and foremost within the park (Grigel, 2004). The results of the 2003 park visitor survey were used to prioritize the introduction of visitor opportunities including: the release program for the herd of bison in 2006; development of car camping campground and scenic look-outs in the East Block; and improving directional signage to the park. A visitor experience assessment done in October 2007 rated the park's understanding of its visitor markets positively, but identified research needs to identify opportunities and needs of smaller use segments such as horseback riders and cyclists.

Future park visitor surveys, including one for 2008, will continue to be designed to survey visitors' needs, expectations and preferences for services, programs and facilities. Methods other than the visitor survey will be explored and used to identify the interests of current visitor types (including outreach) as well as potential new markets, park neighbours and area communities as well as how their needs and expectations may relate to different opportunities that the East and West Blocks can provide.

4.1.2	**Measure: Providing Visitor Experience Opportunities – audience segments participate in opportunities that are targeted to their needs and expectations**
Fair	***Threshold*: none applied**

A variety of personal and non-personal programs are provided by Parks Canada at the Visitor Reception Centre and at the East and West blocks. The park is supported in its programming by Prairie Winds and Silver Sage (friends organization of the park) and other partners such as the Prairie Learning Centre (in school programming) and Rodeo Ranch Museum (providing visitor reception and orientation for the East Block).

The 2003 park visitor survey indicates that park visitors have participated in park recreational and learning opportunities to a great extent (Figures 20 and 21), which is the basis for the Fair rating (Grigel, 2004). However, the visitor experience assessment done in 2007 noted that, as a relatively new park, some facilities and services are still needed, for example, day-use facilities in the West Block, and exploring opportunities for potential new markets such as equestrians and cyclists and more urban audiences (Parks Canada, 2007b).

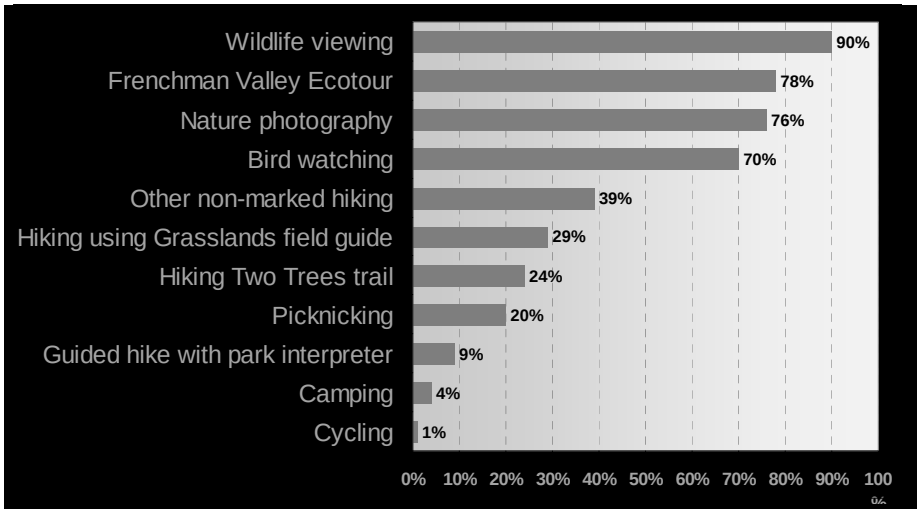


Figure 20
Occurrence of visitor activities in the West Block in 2003 (N=2016 visitors surveyed).

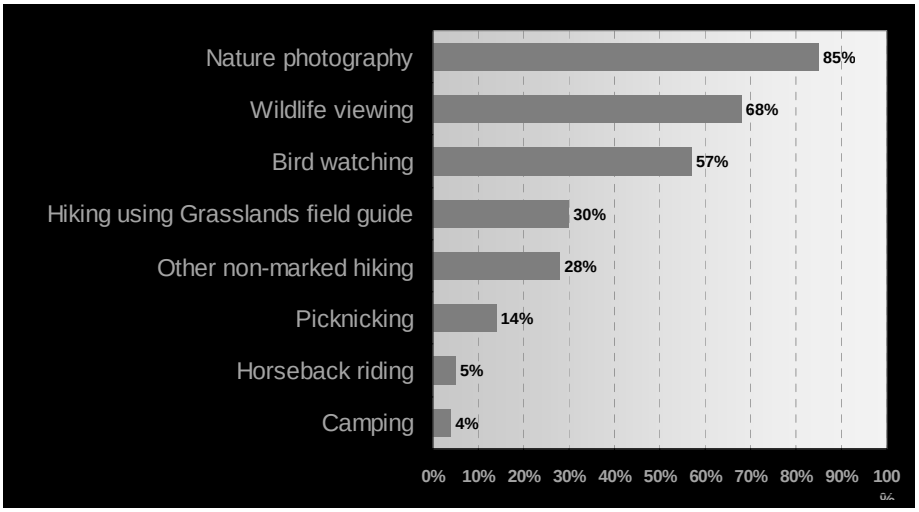


Figure 21
Occurrence of visitor activities in the East Block in 2003(N=359 visitors surveyed).

4.1.3	**Measure: Offering Quality Service – The state of perceived service quality received**
Fair	***Threshold*:** **Good: At least 85% of park visitors are satisfied with their visit including at least 50% being *very* satisfied with their visit.** **Fair: At least 85% of park visitors are satisfied with their visit** **Poor: Less than 85% of park visitors are satisfied with their visit**

Park visitor surveys are used to assess general visitor satisfaction with their park experience. Parks Canada's standard for measuring visitor satisfaction are that at least 50% of survey respondents give a very satisfied rating (five out of five) and at least 85% give a satisfied (four out of five or higher) in regards to services, activities and experiences in the park.

In terms of overall visit, the 2003 park visitor survey identified that 93% of respondents were satisfied, including 68% who were very satisfied (Grigel, 2004). Similar Good ratings were identified for staff courtesy and value for park fees paid. The 2003 park visitor survey also asked visitors to rate their satisfaction with more specific aspects of the park (Figure 22). With these more specific questions there is a split in ratings, indicating that visitors are very satisfied with certain aspects of the park experience, but not as much with learning experiences (discussed in 4.2.1), and recreation, and less so availability of groceries and supplies, which is beyond park management. The recreational experience rating indicates a Fair rating for this measure rather than an overall Good rating suggested above. The 2007 visitor experience assessment identified a number of key challenges and opportunities to improving services related to recreational and learning opportunities at Grasslands NPC that will be addressed in the coming years.

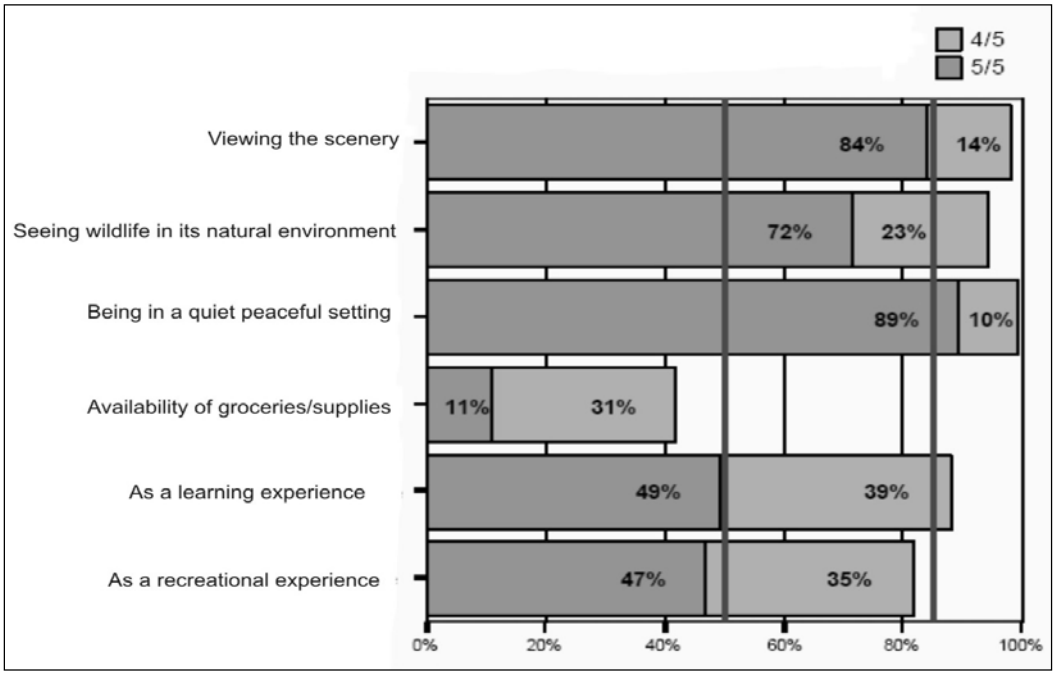
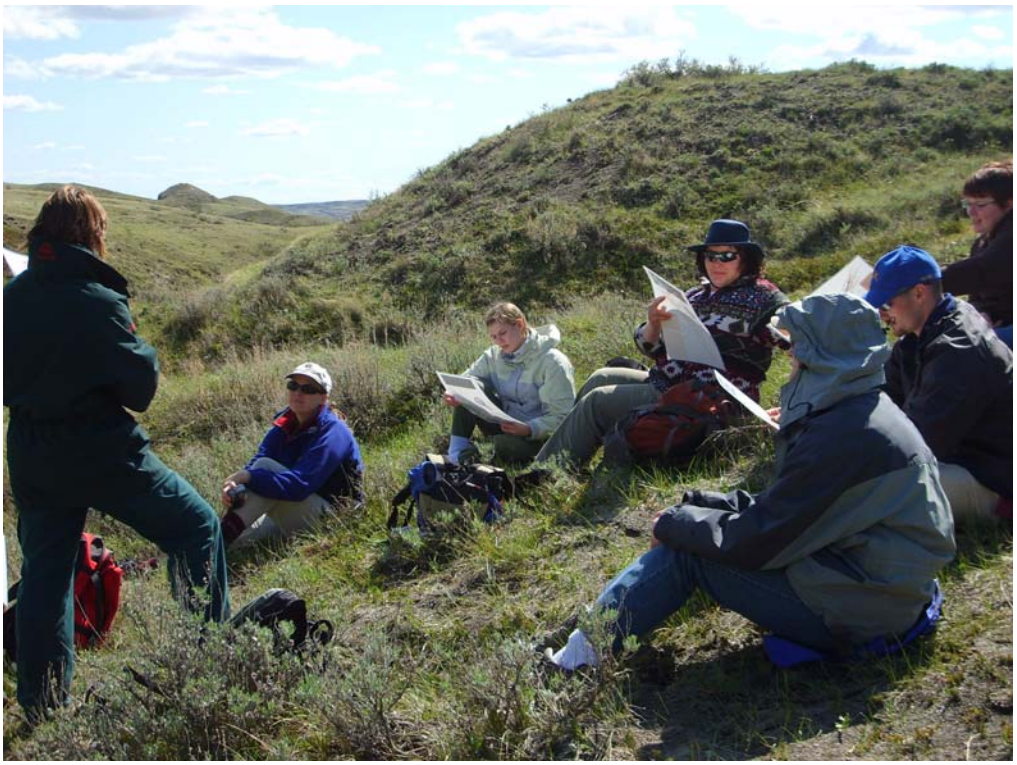


Figure 22 Visitor satisfaction in terms of specific aspects of the park.

4.1.4	**Measure: Connecting with Place – The presence and level of a visitor's personal connection to the park.**
Insufficient Information	***Threshold*: none applied**

No park visitor information is available to rate the personal connection that visitors may feel toward Grasslands NPC. This measure entails the degree to which park visitors are engaged by and support the park's mandate and objectives subsequent to their visit. Number of return visits may be another measure. The 2003 park visitor survey identified 15% of respondents as return visitors which corresponds closely with past visitor surveys for Grasslands NPC. This is reasonable, given its remote location, current service offer and other factors that will influence return visitation. There is however, no threshold or target identified as to an appropriate level of return visitation. Anecdotally, there are numerous cases of return park visitors (annually to a decade apart) who come back for the bird watching, the solitude and the boundless vistas.

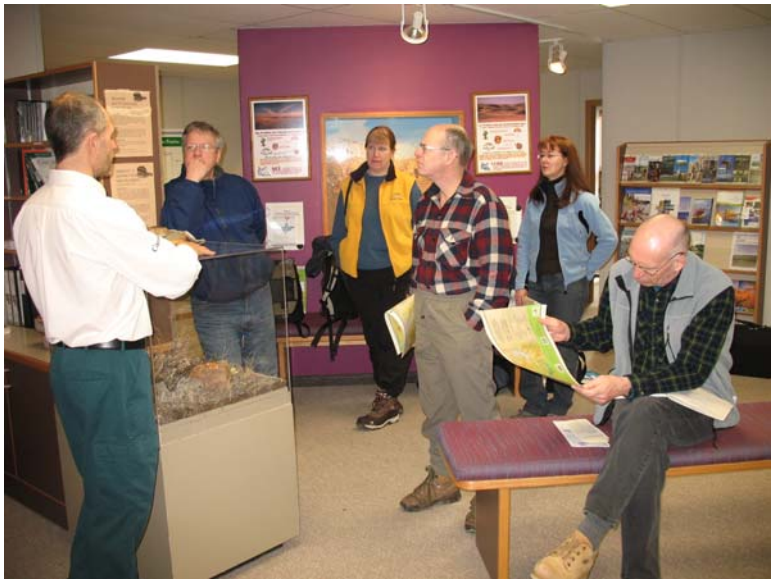


4.2 Indicator: Public Education and Understanding — Overall Rating: Fair

Two measures are used to evaluate the state of public education and understanding at Grasslands NPC: participating in learning opportunities and understanding of park significance. These measures and the methods to rate them are provisional for this 2007 State of the Park Report and may be revised or replaced in future reporting.

4.2.1	**Measure: Participating in Learning Opportunities – the degree to which visitors participate in programs and use facilities and services that inform them of park messages**
Good	***Threshold*: While not a threshold, Parks Canada has a target that at least 50%of visitors to national parks will participate in learning experiences**

Most park visitors (more than 50%) participate one way or another in activities that have an education component provided by way of personal and non-personal means (see Figures 20 and 21 in section 4.1.2). In this respect, the rating for this measure should be Good. The 2003 park visitor survey indicates, however, that visitors are looking for more and/or different opportunities to learn about the park and its messages with 88% being satisfied with their learning experience, but only 49% being very satisfied (Figure 22 in section 4.1.3). Exploring additional opportunities for existing and new markets will be an objective of the forthcoming park management plan review. One particular success in the area of learning is the more than 800 students who have participated in school programs at the park, including those who have participated at the Prairie Learning Centre, of which Grasslands NPC is a partner.



4.2.2	**Measure: Understanding of Park Significance – the level of understanding of the importance of the national park its natural and cultural values**
Poor 	***Threshold*: While not a threshold, Parks Canada has a target that at least 75%of visitors to a national park will understand its significance.**

As part of the Parks Canada Visitor Information Program, park visitor surveys include a set of true and false questions used to query whether visitors are receiving the messages concerning the national park's significance. The Grasslands NPC messages are based on the park's themes outlined in the park management plan, which are:

- the Canadian protected heritage area system;
- the mixed-grass prairie ecosystem;
- endangered spaces and species;
- human – land relationships; and
- geological and paleontological history.

In the 2003 park visitor survey, individual questions were exceedingly answered incorrectly (Figure 23) and only 16% of respondents correctly answered four or more of the six questions correctly (Grigel, 2004), well below the 75% target identified by Parks Canada. Despite the Poor rating indicated, two factors should be considered in weighing the significance of this measure on the public education and understanding indicator and the overall state of connection with place. At the time of the survey, the park's heritage presentation program was in its infancy, only beginning to implement the direction given in the park management plan. The park themes are the basis for a heritage presentation plan being developed and implemented for the park (the basis for the upward trend toward improvement), including new displays for the Visitor Reception Centre and Ecotour Road, and new park brochures. Additionally, the 2003 visitor survey notes that although, in theory the percentage of correct responses is an indicator of communication success between park and visitor, in practice it is difficult to formulate questions that work well for this purpose and test the question of understanding with confidence.

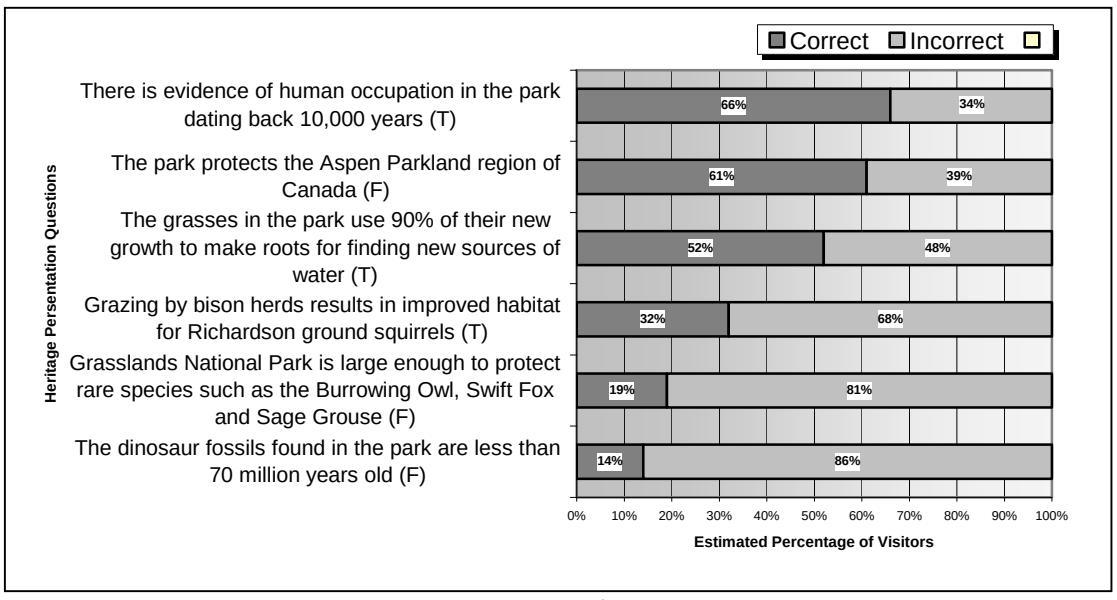


Figure 23 Responses to questions in 2003 park visitor survey.

5.0 EVALUATION OF THE STATE OF CULTURAL RESOURCES

A wide range of cultural influences have left a mark on the land and people of the Grasslands NPC area. To date, the oldest evidence found of human presence in the park is in the form of a projectile point left behind by its maker 10,000 years ago. The many lichen-covered rocks placed in circles, known as "tipi rings", along coulee ridges are perhaps the most ubiquitous vestiges of the past. Other special places include drive lanes, along which bison were herded to their deaths, spiritual sites such as vision quests, ceremonial circles and effigies – rock alignments in the shape of animals or men. More recent cultural remains tell the stories of people who lived in the area during the fur trade, followed by the era of large open range leases, the coming of the railway and finally, the transition to smaller farms and ranches (Loveridge and Potyondi, 1983).

Parks Canada is committed to the protection of cultural resources, both archaeological and historic, in national parks. To be a cultural resource worthy of protection and presentation to the public, an object, feature, landscape or building must have historic value (Canadian Heritage, 1994). In order to protect and preserve remnants of human history in Grasslands NPC, inventories have been undertaken, as well as some monitoring and management. However, evaluations to determine the historic value of these resources have not been completed to date. Although the wealth of information gained from inventorying the park's archaeological resources has provided a basic understanding of past human use of the region, without further investigation of selected sites, our understanding of the park's cultural history and the ability to communicate that history to the public will remain limited. Parks Canada must also balance efforts to restore ecological integrity with the protection of cultural resources. Table 6 summarizes the cultural resource indicators for Grasslands NPC and their assessment (rating).

Table 6. Cultural Resource Indicators, their Measures and Assessment for Grasslands NPC

Indicator & Integrity Rating	Measure	Measure Assessment	Data Quality
Cultural Resource Condition Good	Archaeological Sites	Good	Good
	Archaeological Artifacts	Good	Good
	Historic Buildings and Structures	*Insufficient Information*	
	Oral Histories	Good	
Effectiveness of Communications Poor	Message Identification and Delivery	Poor	
	Message Effectiveness and Comprehension	*Insufficient Information*	
Selected Management Practices Fair	Inventory and Evaluation ▪ Archaeological Sites ▪ Archaeological Artifacts ▪ Buildings and Structures ▪ Oral Histories	Poor ↑ Good Good Poor ↑ Fair	
	Cultural Resource Management Strategy ▪ Archaeological Sites ▪ Archaeological Artifacts ▪ Buildings and Structures ▪ Oral Histories	Fair Good Good Poor Fair	

5.1 Indicator: Cultural Resource Condition — Overall Rating: Good

5.1.1	Measure: Archaeological Sites
Good	*Threshold*: **Good: 85 % or more of archaeological sites are stable with no appreciable damage or deterioration** **Fair: less than 85% of archaeological sites are in good condition and fewer than 15% are in poor condition** **Poor: 15% or more of archaeological sites have major damage or deterioration and require urgent mitigation (conservation or salvage)** *Data Quality*: **Good**

More than 3500 archaeological sites have been recorded within Grasslands NPC. Sites threatened by natural or human agents are revisited at specified intervals to document incremental impacts and assess changes in overall site condition. Currently, 53 sites are being monitored on a regular basis. Since the inception of the monitoring program in 1998, the vulnerability of 34 sites has decreased and the vulnerability of nine sites has increased. Three sites are no longer considered threatened, and have been removed from the monitoring program. In most cases, changes in the rate and nature of impact can be attributed to climatic variation – in periods of prolonged drought, ground cover is sparse and surface erosion is exacerbated, while in wetter years, vegetation provides greater protection from wind and water.

Overall, the park's archaeological sites are in good condition. This is partially related to the minimal amount of land broken for agricultural production and the low park visitation rate. However, the reintroduction of grazing may threaten cultural resources if fencing and water sources are not carefully planned. To evaluate and manage these impacts, a temporary monitoring program has been developed for a sample of cultural sites in grazed areas. Forty-five sites will be revisited over a 10-year period to assess the impacts to cultural resources at high, medium and low grazing rates. The project is significant for its potential contribution to understanding the rate and nature of cultural resource impacts in grazing management areas.

5.1.2	Measure: Archaeological Artifacts
Good	*Threshold*: **Good: 85 % or more of recovered archaeological artifacts are stable with no appreciable damage or deterioration** **Fair: less than 85% of recovered archaeological artifacts are in good condition and fewer than 15% are in poor condition** **Poor: 15% or more of recovered archaeological artifacts have major damage or deterioration and require urgent conservation measures to stabilize** *Data Quality*: **Good**

As new lands are acquired, archaeological sites are documented. Artifacts are collected if the material was sensitive, vulnerable, fragile and/or of special interest to the site and cultural history of the region. To date, 1,364 artifacts have been collected from approximately 200 sites. The vast majority of the artifact collection (1364 artifacts) are stone tools and debitage (tool-making debris) which are in stable condition.

5.1.3	Measure: Historic Buildings and Structures
Insufficient Information	***Threshold***: **Good: 85 % or more of historic buildings and structures are stable with no appreciable deterioration or loss of critical components (e.g., roofing, foundation)** **Fair: less than 85% of historic buildings and structures are in good condition and fewer than 15% are in poor condition** **Poor: 15% or more of historic buildings and structures have abnormal or accelerated deterioration and require urgent mitigation to stabilize**

No ranch or farm buildings and structures have been identified as cultural resources to date (see 5.3.1).

5.1.4	Measure: Oral Histories
Good	***Threshold***: **Good: 85 % or more of oral history records are stored in a safe and accessible manner stable with no appreciable deterioration.** **Fair: less than 85% of oral history records are in good condition and fewer than 15% are in poor condition.** **Poor: 15% or more of oral history records are not stored in a safe and accessible manner and are at risk of loss.**

When land is acquired for the park, oral histories and ranch profiles are completed for the property. A local writer and landowner has interviewed 56 former owners of land purchased by Parks Canada, or people who lived or worked on the land. There are 67 oral histories and ranch profiles in 1337 pages of information. These details help tell the stories associated with the built heritage, yard sites and land use. They provide a great amount of insight into how the land shaped the lives of the people and how the people shaped the land. This wealth of knowledge can also be used for interpretive programs, to determine past grazing regimes and locate resources. The records of this oral history information are in good condition and stored at Grasslands NPC to be accessible for park research.

5.2 Indicator: Effectiveness of Communications — Overall Rating: Poor

5.2.1	Measure: Message Identification and Delivery
Poor	*Threshold*: Under development

A Cultural Resources Value Statement (CRVS) will be developed for Grasslands NPC that will articulate the historic values and human history themes to be incorporated into the park's heritage presentation programs.

5.2.2	Message Effectiveness and Comprehension
Insufficient Information	*Threshold*: Under development

Without the CRVS or comparable identification of important human history storylines for the park, it is not possible to evaluate the measures for Effectiveness of Communications related to the park's cultural heritage.

5.3 Indicator: Selected Management Practices — Overall Rating: Fair

5.3.1	Measure: Inventory and Evaluation
⬆ Poor	*Threshold*: Application the *Parks Canada Cultural Resource Management Policy (2.1 and 2.2)* Good: Inventories and evaluations of all cultural resources are complete and up-to-date Fair: Inventories and evaluations are underway or in need of updating Poor: Inventories and/or evaluations for cultural resources have not been undertaken

Parks Canada initiated a comprehensive archaeological survey of Grasslands NPC in 1985. More than 3,500 sites have been recorded. Archaeological surveys continue to be undertaken on all new lands acquired within the proposed boundary of the park. Each site is documented in the park's archaeological database, with information on site location, condition and a description of the associated cultural resources. The majority relate to pre-contact, Aboriginal presence in the park, with only 145 historic-era archaeological sites documented. The information gathered will enrich the park's interpretive offering, by allowing a further understanding of its human history. The inventory and evaluation of archaeological sites is rated Good.

The collection of 1,364 archaeological artifacts from Grasslands NPC is fully inventoried and securely stored, along with the records of archaeological surveys and investigations, at the Parks Canada Western and Northern Service Centre in Winnipeg. The inventory and evaluation of archaeological artifacts is rated Good.

Approximately 20 buildings and structures, associated with ten different ranch and farm sites, are located throughout the park (Table 7). These structures represent the most recent period of human activity on the land. While there is an inventory of these buildings, they have yet to be evaluated for heritage value. Therefore, it has not been determined which, if any, are cultural resources to be managed according to the *Parks Canada Cultural Resource Management Policy.* All buildings listed in Table 7 have been or are in the process of being submitted for consideration under the *Federal Heritage Buildings Policy* and the park is currently working with a Park Advisory Committee to define criteria for assessing the heritage value of ranch and farm period structures. The inventory and evaluation of buildings and structures is rated Poor since the evaluation aspect is only underway to a limited extent (thus the upward arrow).

Table 7. Former ranch buildings in Grasslands NPC to be evaluated as to their status as cultural resources.

Belza House	Larson Ranch (4 buildings)	Tanter Ranch (3 buildings)
Old Belza House	Gergovia Shack	Syrenne House
McGowan's Ranch (4 buildings)	Gillespie Ranch (4 buildings)	Dawson Barn
Storey Lowell (3 buildings)		

The first oral history interviews were initiated in the early 1990s and have continued on a periodic basis. However, the information is limited to the ranching period of the park. Widening the scope of the oral histories to include Aboriginal history is much needed if we are to appreciate the human history of Grasslands NPC. Thus, the oral history inventory is rated Fair.

5.3.2	Measure: Cultural Resource Management Strategy
Fair	*Threshold*: Application the *Parks Canada Cultural Resource Management Policy (2.1 and 2.2)* Good: CRM strategy is in place and up-to-date for all cultural resources Fair: CRM strategy being developed or updated for all cultural resources Poor: CRM strategy is not in place for cultural resources

A monitoring strategy is in place for threatened sites with impact thresholds defined for each site to serve as milestones that trigger management action. Typical actions include collecting exposed artifacts, replacing rocks displaced from surface features such as tipi rings, or excavating intact cultural deposits such as hearths. In addition, to ensure minimal impact to the resources, the location of cultural resources is taken into account when new facilities and visitor opportunities are planned. Supplementary monitoring protocols for initiatives such as the grazing experiment are developed as needed. Therefore, the management practices related to archaeological sites are based on a well-defined program of inventory and monitoring, giving the CRM strategy for archaeological sites a rating of Good.

The management of archaeological artifacts is rated Good. They are managed in keeping with Parks Canada collections management standards.

Because building and structures have not been evaluated as cultural resources, a Poor rating is given for them and a CRM strategy needs to be developed.

The management of the oral history records is rated Fair. The oral history information is currently stored as paper and digital copies in the Grasslands NPC library. The electronic files are also stored at the Parks Canada Western and Northern Service Centre library in Winnipeg. However, a protocol has not been developed for the long-term protection of the resource. For example, the electronic files may need to be migrated as technology changes, to be kept current and usable.

On the basis that buildings and structures in the park may represent an important piece of the cultural heritage, but that a strategy is not in place for their care and presentation, an overall Fair rating is given for this measure. This is despite the Good rating for the archeological resources. The strategy needs to be developed in conjunction with the CRVS.

6.0 EVALUATION OF THE STATE OF PALEAONTOLOGICAL RESOURCES

"Most bedrock in Grasslands NPC ranges from about 60 to 80 millions years in age. These rocks tell several important stories. Marine mudrocks of the West Block record the last interocean seaway that spread across mid-continental North America…. The youngest bedrock exposures in Grasslands NPC are present in the East Block. Here, there are extensive outcrops of sediments deposited after the time of volcanism on landscapes home to the last of the great dinosaurs. World class deposits of a claystone derived from debris expelled by the impact of a meteorite in the Yucatan Peninsula of Mexico show evidence of extraordinary physical and floristic changes that coincide with an abrupt end of this *Triceratops* fauna. The youngest East Block bedrock exposures include a record of continental scale coal swamps that began just before the meteorite impact and continued into post-dinosaur time" (Sweet *et al*. 2000).

Table 8 summarizes the paleontological resource indicators for Grasslands NPC and their assessment (rating).

Table 8. Cultural Resource Indicators, their Measures and Assessment for Grasslands NPC

Indicator & Integrity Rating	**Measure**	**Measure Assessment and Trend**
Paleontological Resource Condition I I	*Paleontological (Fossil) Sites*	*Insufficient Information*
Effectiveness of Communications Poor	Message Identification and Delivery	Poor
	Message Effectiveness and Comprehension	*Insufficient Information*
Selected Management Practices Fair	Paleontological (Fossil) Sites	Poor

6.1 Indicator: Paleontological Resource Condition — Overall Rating: Insufficient Information

6.1.1	Measure: Paleontological (Fossil) Sites
Insufficient Information	*Threshold*: Under Development

In 1997, representatives from the Royal Saskatchewan Museum prepared a report that described the geology, geomorphology and palaeontology of Grasslands NPC. During the fall of 2000 and 2001 a palaeontological and geological survey was completed by F.H. McDougall on approximately 4900 Ha in the southeast corner of the East Block. This area has very little glacial till and contains some of the largest surface exposures from the late Cretaceous Period in western Canada. The work undertaken in 2000 and 2001 recorded and described 196 significant palaeontological and geological sites. The nature of the sites varied from isolated bones to large concentrations of fossilized fish, amphibian, reptile, mammal and dinosaur remains. In some areas the abundant dinosaur material includes Tyrannosaurus and a potentially complete Triceratops skeleton. Rare fossils of Cretaceous mammals and Hadrosaur dinosaurs are present as well as what appeared to be an extensive horizon of fossilized dinosaur coprolites. The abundant fossil material is of great scientific interest as it can help to reconstruct the ecosystem that existed at the end of the dinosaur age.

As a result of the survey work undertaken over the years, a number of fossils have been collected from Grasslands NPC. These fossils are currently curated with three different organizations. The Royal Saskatchewan Museum has six fish, three mammals, three birds, 14 reptiles and five amphibian fossils collected between 1986 and 1996. In 2000 and 2001, there were 13 collections made and they are also housed at the Royal Saskatchewan Museum. These collections included various fossils including two food deciduous leaf impressions. The Canadian Museum of Nature maintain five fish, one amphibian and 26 reptilian fossils all collected before 1986. The Geological Survey of Canada holds 34 plant fossils from Grasslands NPC all collected before 1935.

Although baseline information has been compiled on some fossil sites, without condition monitoring results, an assessment is not possible at this time and should be considered for the next State of the Park Report.

6.2 Indicator: Effectiveness of Communications — Overall Rating: Poor

6.2.1	Measure: Message Identification and Delivery
Poor	*Threshold*: Under Development

The survey work provides a basis for developing key messages and designing delivery programs. However, interpretation of this aspect of the park has not yet occurred.

6.2.2	Measure: Message Effectiveness and Comprehension
Insufficient Information	*Threshold*: Under Development

It is not possible to evaluate effectiveness of communication as messages about paleontology and geology are not a developed part of the parks' heritage presentation program.

6.3 Indicator: Selected Management Practices — Overall Rating: Fair

6.3.1 Measure: Paleontological (Fossil) Sites

Poor	*Threshold*: Good: A strategy is in place for the protection and presentation of paleontological resources Fair: A strategy is being developed or updated Poor: A strategy is not in place

The 1997 Royal Saskatchewan Museum report included current status and location of fossils collected within the park, and recommended an approach for a systematic surface survey.

Allowing fossil material to erode naturally may result in a loss of valuable scientific information. Once exposed, fossils can be damaged by rain, freezing, drying and bleaching. It is essential therefore, that a complete park fossil survey be completed in order to establish a policy for protection and management.

From the initial work undertaken in 1997, further surveys, in 2000 and 2001 occurred in two rich fossiliferous areas within the park. The survey report included a monitoring approach and work was planned for the summer of 2007.

While there are recommended approaches for surveying and monitoring paleontological resources, an overall plan for protection and presentation is needed, leading to a Poor rating.

7.0 EVALUATION OF MANAGEMENT ACTIONS

This section assesses the effectiveness of management actions taken at Grasslands NPC with respect to the Parks Canada mandate and the 2002 Management Plan objectives. Grasslands NPC is a relatively new park with an evolving land base and four years of implementation towards the first management plan. Management actions outlined in the management plan, such as the reintroduction of grazing with bison and domestic livestock have been initiated. However given the short time frame, there is limited ability to measure performance effectiveness. Established restoration programs to revegetate cultivated lands and reduce agronomic exotic species have been underway for much longer time periods. Furthermore, other management actions have yet to be undertaken, such as interpreting paleontological resources, although these items will start to be addressed in 2007. An external review of the 2002 park management plan implementation was undertaken and determined that overall there is a strong focus on achieving the park vision and significant progress has been made in most areas of research, monitoring and active management (Parks Canada, 2007a).

Ecological integrity issues are actively managed within the park and in the context of the regional landscape. *The Prairie Persists: Restoring Ecological Components and Processes to a Grasslands Ecosystem Project* (Penny, 2004) was initiated in 2004. The *Prairie Persists* program will result in: highly visible prairie restoration through the re-vegetation of native prairie and control of non-native invasive species; application of computer modeling to guide the adaptive management process; facilitating research on the effects of grazing management on prairie wildlife; reintroducing a conservation herd of bison to the mixed grass prairie; and establishing Parks Canada's commitment to restoring ecological integrity to an endangered grassland ecosystem. The program also commits investments to better inform, enlist support, educate and increase Parks Canada's and Grasslands NPC's profile within Canada and internationally.

Through the *Prairie Persists* program and the management plan, active management is being put in place to restore ecological integrity and connect people to the park. Improved management action monitoring and performance measures will be an objective of the next State of the Park Report.

A component of the *Prairie Persists* program, that actually predates its inception, is the Grasslands Ecosystem Management Support (GEMS) program. Born of the need for Park managers to incorporate best available scientific information into decision making, it is a comprehensive ecosystem model of Grasslands NPC that allows managers to forecast some of the possible consequences of their current management decisions. It is an adaptive management tool. A big part of GEMS is a computer simulation model, called TELSA, that integrates all available information on grasslands community patterns (flora, fauna) and processes (grazing, fire, invasion, protection). Managers can then ask questions of TELSA (e.g. what are the consequences of 50 years of bison grazing) and get answers relative to a range of management actions. In this way, managers can consider a range of possible management possibilities, and determine the path that leads to the most desirable outcome before final decisions are made. A recent trial of this approach with the management of the invasive grass, crested wheatgrass, demonstrated that in the absence of a complete understanding of how effective control measures will be, a management strategy of treating many small invaded patches, as opposed to tackling the large infestations, is the most successful in the long term. GEMS is an ongoing collaboration

between Grasslands NPC and the Western and Northern Service Centre that will facilitate effective, science-based decision making into the future.

Table 9 summarizes the 2002 management plan objectives, respective actions, status of implementation and effect on restoring ecological integrity, managing cultural and paleontological resources and connecting people with place. The source for the ratings and comments is *A Review of the Implementation of the 2002 Grasslands National Park of Canada Management Plan* (Parks Canada, 2007a) undertaken by professionals in the areas of natural and cultural resource management, and visitor experience who are external to the Saskatchewan South Field Unit or Parks Canada.

The ratings in the table are as follows:

Poor	The action is not being implemented / not contributing to objective
Fair	The action is somewhat contributing to objective, but adjustment needed
Good	The action is contributing to objective, maintain current direction

Table 9. Review and Assessment of the Implementation of the 2002 Park Management Plan by an External Review Committee (ERC; adapted from Parks Canada 2007a).

Manage-ment Plan Objective	Action & Rating	Implementation Status and Effects on Ecological Integrity, Cultural and Paleontological Resource Management, and Connection to Place
To restore processes and plant communities of mixed prairie grassland within the park that are under-represented in the regional landscape.	Grazing Fair	The grazing management plan and prescriptions are very well conceived. The 10-year cattle-grazing experiment is excellent, with replicated treatments, testable hypotheses, appropriate parameters, and specific test consequences. Fall grazing by domestic cattle began last year, and the results are not yet known. The ecological goals of domestic cattle grazing can be better achieved by identifying specific structural and functional objectives. The reintroduction of bison fills an essential ecological and aesthetic niche in Grasslands NPC. Year round grazing on an area the size of Grasslands NPC, however, might eventually exceed the historical grazing pressure by bison. It would be useful for Parks Canada to identify specific ecological thresholds at which more proactive bison management might be necessary. Similar thresholds should also be established for the fall grazing by domestic cattle, and for the domestic cattle grazing experiment and an action plan to identify what to do if thresholds are exceeded. Successful adaptive management requires these explicit thresholds, combined with rigorous monitoring.
	Wildfire Good Prescribed burning Fair	Grasslands NPC has demonstrated excellent leadership in controlling wildfire. Providing personnel and equipment has done much to establish Grasslands NPC as a good and dependable neighbour within the community. A draft fire management plan is nearing completion and will lead the fire management program over the next ten years. Identifying specific ecological prescriptions will enhance the objectives of prescribed burning.
	Re-vegetation of native species Fair	The restoration of previously cultivated fields back to a mix of native prairie grasses and wildflowers has been very successful. To date, more than 280 Ha of disturbed lands have been revegetated and the remaining cultivated fields are scheduled to be restored by 2012. In addition preliminary results demonstrate success in facilitating crested wheatgrass areas back to native species. The review committee was not able to view smooth brome sites that are being converted to native prairie. Although a two-year study of smooth brome ecology and control opportunities has been completed along the Frenchman River, no results were available. While Parks Canada has identified the need to evaluate the "health" of four abandoned fields in the West Block, such evaluations have not occurred. The ERC strongly encourages Parks Canada to follow through with this monitoring, which is essential for baseline information, and is ultimately required for adaptive management.

Manage-ment Plan Objective	Action & Rating	Implementation Status and Effects on Ecological Integrity, Cultural and Paleontological Resource Management, and Connection to Place
To maintain or enhance population levels and habitat requirements of native mixed-grass prairie species at risk (SAR)	SAR monitoring, recovery planning and implement-ation Wildlife introduction (notably bison) Good	The SAR work has been very successful with the 4 species (sage grouse, swift fox, black-tailed prairie dog, mormon metalmark) for which Grasslands NPC has taken the lead. It would be useful, and would demonstrate due diligence, to begin work and monitoring on the remaining 11 species considered to be at risk. It would also be useful to develop a strategy for protecting prairie dogs from sylvatic plague, which can be carried by domestic dogs entering the park. There has been a very good start toward developing a regional stewardship program, for SAR. Such cooperation among NGOs, government, and private landowners is essential to achieve Parks Canada's goals. The reintroduction of bison has been very successful. Work continues toward developing a strategy for reintroducing black-footed ferrets. The focus group research and cooperative approach appears to be well received by park neighbours.
To improve the riparian health and water quality of the Frenchman River system	Assess water quality of river and streams Help develop partnered stewardship projects Fair	DFO and the park sample water quality along creeks and net fish to determine species richness and abundance. The park should identity more specific ecological goals. For example, what water quality attributes (e.g., pollutants, chemical constituents, species richness) are meant by "ecological integrity"? The park should also develop a long-term strategy to monitor water quality, which changes frequently, quickly, and substantially in response to human inputs and weather events. The management plan indicates that earthen dams on the Frenchman River provide some ecological benefits. These benefits should be identified and assessed before all the earthen dams are allowed to deteriorate. More information is needed regarding the ecological processes along the Frenchman River, and how these processes relate to biodiversity, site stability, and "ecological integrity." The goal to establish multi-partner stewardship projects on the Frenchman River is highly desirable, and would do much to develop community-wide "ownership" of, and concern for the "ecological integrity" of the Frenchman River.
To protect and present cultural resources in the park	Recent cultural resources Poor Aboriginal sites Fair Threated sites Good Sites in high use areas Poor	The park has done a good job of inventorying recent cultural resources. The ranch profiles that have been developed are a wonderful resource, and an excellent example of a community partnership. More work needs to be done in terms of identifying *criteria* to establish the historic values of recent cultural sites and using them to make informed decisions on managing recent cultural resources. It is critical that local communities have a voice in identifying these heritage values. The park has done a good job of inventorying Aboriginal sites. Park management is working towards building relationships with Aboriginal communities and their role in the care and respect of these sites. Progress will continue to be made over time, involving Aboriginal people at a pace and in ways in which they are comfortable. For threatened cultural sites, the archaeological monitoring strategy in place is a good first step, though some benchmarks and actions to be taken once impacts to the site become unacceptable could be stated more clearly. There is no identification or plan for managing cultural resources in high (visitor) use areas.

Manage-ment Plan Objective	Action & Rating	Implementation Status and Effects on Ecological Integrity, Cultural and Paleontological Resource Management, and Connection to Place
To protect and present paleo-ontological resources in the park	Work with experts to inventory resources and develop plan Poor	Although an initial inventory was done, no evidence was found to indicate that those inventories had been updated since the last management plan in 2002, or that new blocks of land had been surveyed. The protection and presentation of these resources has not been a priority area in the first five years of the 2002 management plan implementation.

To integrate the management of cultural and natural resources and ensure their protection for future generations	Inventory, monitor and report on both natural and cultural resources Train staff in crm and e-bm Fair	Integration across values (natural & cultural), across functional areas and across the broader landscape (all ownerships) is key to park management. The park, along with partners, is making good progress in this area in some capacities. However, in most cases the cultural resources and values of Grasslands (Aboriginal and ranching - historical to contemporary) and the information to support their management is not as well developed. There is still an opportunity to take a more integrative approach overall that would be strengthened by thinking and managing the park not solely for its ecological values but equally for its cultural values.
To ensure visitors can access information that enables them to find, enjoy, and learn about the park in a safe, efficient manner	Provide visitor reception facilities Good Provide interpretation programs Fair	The overall quality of visitor reception services is good and continues to improve. Pay particular attention to the East Block and the integration of the community with visitor services and vice versa. There are many excellent examples of learning opportunities and interpretation programs, although more work is needed on preparing a comprehensive interpretation strategy that includes enhancing the cultural component and monitoring results.
To build constituent-cies of support and under-standing	Park-adjacent communities Conservation and research communities Cooperating Association Good	The park should maintain the current direction to achieve the goal of working relationships in the community and with conservation and research groups, with the addition of more emphasis on strengthening Aboriginal involvement and evaluating results from developing and facilitating these relationships. The work of Prairie Wind and Silver Sage is excellent, especially considering the small size of the park and community.

Manage-ment Plan Objective	Action & Rating	Implementation Status and Effects on Ecological Integrity, Cultural and Paleontological Resource Management, and Connection to Place
To build an awareness of the park as a destination, and to encourage visitation to the park and surrounding area	Tourism partnerships Fair Signage, access, camping Fair Day-use sites, hiking trails Good	Partnerships and cooperative approaches in tourism within the region are strong but participation at rodeos, fairs, expos, trade shows, and other promotional venues may still need to be done. Target audience segments need to be defined. A number of facilities and services are now in development or available for park visitors. Visitor survey information was used to identify and schedule facilities and services most needed for the park. Consideration should be given as to park's relationship with campground services available around the park and how that may accommodate variety of target markets.
To harmonize management goals and practices across the landscape through arrangements among landowners	Consolidating park holdings Good cooperate with neighbours to enable more freedom of movement of visitors in and out of park Fair	Lands acquired as of February 2002 are protected by the *Canada National Parks Act*). A provincial / federal steering committee meets annually to discuss legal issues related to the management of lands within the proposed park area. The Nature Conservancy of Canada has partnered with the park and placed a permanent conservation easement on land adjacent to the proposed park area that Parks Canada acquired as part of a package of land within the proposed boundaries. The park has been consulting and working with adjoining landowners to protect their interests on matters of through access.
To have an effective consultative structure for the park	Establish a park advisory committee Good	The Grasslands NPC Advisory Committee provides critical advise and information to the implementation of the park management plan. It meets twice yearly to consider proposed management actions for the park, how they may detrimentally or beneficially impact the region and stakeholder interests and suggest alternatives.
To respond effectively and efficiently to existing and emerging needs as the park grows and matures	Develop facilities for resource management Assess emerging requirements for VRC Increase visitor services in East Block. Update public safety plans Good	A permanent warden station has been established at The East Block providing a 24/7 Parks Canada presence. A new operations compound provides space and facilities for research, equipment and materials necessary for ecological integrity restoration programs. A feasibility study for a new VRC is planned for 2009/10. By 2008 however, new exhibits will be created for the existing Visitor Centre and Ecotour Road to highlight the changes and advances in park management as a result of the *Prairie Persists* project.

8.0 CONDITION OF INFORMATION BASE

This is the first Grasslands NPC State of the Park Report and the park's monitoring program is in the early stages of development. As a result, many of the measures have insufficient data to determine the condition of the measure or indicator and whether it is improving, stable or deteriorating. A comprehensive monitoring framework for the park is in preparation and will be implemented to facilitate improved reporting of the state of the park for future reports.

Threshold development continues to be in the developmental stages. Some measures have long-term datasets from the park (i.e. sage grouse, black-tailed prairie dogs) or are adaptations of well-established programs from adjacent jurisdictions (i.e. riparian health sssessment). Other measures that are in the early stages of development will require several more years of data collection prior to threshold establishment - in the short-term, tentative thresholds will be developed using information from the existing literature or through adaptation of data collected in other parks in the bioregion (or within the Parks Canada system when appropriate).

The park has a well-developed Access template for storage and retrieval of ecological data and associated metadata. However fully utilizing this resource has been delayed to ensure its compatibility with the Parks Canada national data management framework that is under development. Grasslands NPC was also chronically lacking the capacity to effectively utilize this database and was consistently falling short in making the transition from data collection to data storage and converting the data into useable reports. The park has made improvements through the addition of a term position to help with monitoring of species at risk and to subsequently manage the data and write reports on the results. A new full-time position with data and GIS management responsibilities will greatly improve the park's ability to develop and run an effective monitoring program from data collection to report preparation. In partnership with the science and conservation communities, the park has developed a cutting-edge computer model (GEMS) for use in guiding adaptive management processes.

9.0 KEY ISSUES AND CHALLENGES

The following represent major challenges for park management.

Exotic and Invasive Species: More than fifty exotic plants currently found within the park, notably crested wheatgrass, smooth brome and yellow sweet clover, are of immediate concern to the restoration and sustainability of the native prairie ecosystem. Seventy-eight invasive plants not yet in the park have been identified in the region, including leafy spurge, which is a major concern to the regional economy and environment.

Loss and Fragmentation of Habitat: Only 19% of Saskatchewan's original mixed grass prairie ecosystem remains intact, and much is fragmented into small parcels. Portions of land within and neighbouring the proposed boundary of Grasslands NPC have been cultivated and more may be, should economic conditions support increased crop production in the region. Increased land under cultivation, as well as increased oil and gas and gravel exploration and extraction, could decrease and fragment suitable habitat for many native species, increase the probability of undesirable exotics invading, and isolate park populations of native species.

Modified Disturbance Regime: Modified disturbance regimes, particularly wildfire, large herbivore grazing and flooding, are important processes to the function and biodiversity of the mixed grass prairie ecosystem. The park's role in reintroducing these disturbance regimes (e.g. prescribed burning, water management and grazing) and managing them in a manner that respects the concerns of park neighbours and regional interests is a major challenge for park management.

Climate Change: Climate change has wide ranging implications on this semi-arid ecosystem. Prairie climate, including drought and windstorms, is predicted to extend much further north over the next 50-100 years. A north-south system of refuges and corridors may be essential to conserving species during rapid habitat shift. The Great Plains are severely fragmented; many species may have trouble dispersing to new habitats as biome boundaries shift.

Species at Risk (SAR): Challenges with SAR include species reintroduction, reconciling the need to identify and protect critical habitat for species at risk while still achieving broad ecosystem-management goals such as restoring disturbance regimes, and harmonizing SAR with park management and monitoring programs.

Park Operations: As a relatively new national park, there are inadequate facilities and services for visitors. As well, there are evolving park research and management programs. As these are addressed, the potential for cumulative impacts of these facilities, services and activities on ecological integrity, cultural resources and visitor experiences is a concern.

Cultural Resource Management: The park is without a Cultural Resources Value Statement for cultural heritage ranging from pre-contact Aboriginal sites to the recent ranching era, which is necessary to incorporate the inventory and evaluation of these resources and better consider them in park management decision-making and interpretation.

Paleontological Resources: The park has not taken adequate measures to protect and present the paleontological resources.

Target Audiences: The park knows its current visitors, but does not know its potential and evolving target markets. This is particularly relevant as the type of visitors to the park is shifting.

Learning Opportunities and Visitor Experiences: There is an array of learning opportunities (including outreach) and interpretation programs that most visitors use. However, the 2003 park visitor survey suggests that visitors left with a less than satisfactory understanding of the park's significance. There are not ample learning opportunities and visitor experiences linked with the park's natural, cultural and paleontological themes.

10.0 CONCLUSIONS

Data gaps for most of the ecological integrity indicators prevents a thorough, comprehensive assessment of the state of ecological integrity for Grasslands NPC, although significant active management is involved in restoring critical processes and species to the native mixed prairie grassland and the park and its region face several key challenges. A comprehensive monitoring program is being developed for the park and will be underway to enable a more detailed assessment of the state of ecological integrity for the next State of the Park Report.

On the basis of the indicators, measures and ratings in Table A-1 and Table A-2, the condition of Grasslands NPC is summarized as:

- Overall State of the Park – Fair
- Ecological Integrity – Fair. Active park management continues to be needed to restore the mixed prairie grassland structure and processes, and some of its extirpated species.
- Connection to Place – Fair. Some improvements to the visitor service offer are needed to better enable people to learn from and experience the park.
- Cultural Resources – Fair. While many of the cultural resources themselves are in good condition, application of cultural resource management principles and practice need to be improved.
- Paleontological Resources – Poor. Not enough is known of the paleontological resources in the park to develop a program to protect and present them.
- Effectiveness of Management Actions – Fair. The 2002 park management plan provides solid direction for park management and is being implemented. There are facets of the plan that still need to be implemented (e.g., paleontological resources), and other areas were plan objectives, actions and targets need refinement.

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