Preapproved Routine Impact Assessment
PRESCRIBED FIRE

Grasslands National Park
IAA 2019

Preapproved Routine Impact Assessments (PRIA) are pre-determined environmental management and mitigation measures for a defined class of routine, repetitive projects or activities with well understood and predictable effects. Approved PRIAs are an acceptable Impact Assessment pathway as they fulfill Parks Canada's obligations as a manager of federal lands under the *Impact Assessment Act* (IAA).

Fire is an intrinsic part of the mixed-grass ecosystem and an essential process that maintains ecosystem integrity. Fire return intervals in Grassland National Park (GNP) were calculated to be between 8 and 40 years, with an average of about 25 years (Ponomerenko 1998). A reasonable management benchmark for the average fire return interval for Grasslands National Park is 25 years (Parks Canada 2008). Although fire at times can adversely affect individual SAR species, their residences, or their critical habitat, it is also necessary for the creation of habitat for SAR. Therefore, the presence of fire on the landscape is necessary to ensure the continued presence of SAR within GNP mixed-grass prairie ecosystem.

This PRIA is specific to Grassland National Park (GNP) and provides the conditions necessary for the Species at Risk Act Authorization (no. SSFU-2020-001-GNP) issued for prescribed fire activities in critical habitat (Appendix A). The authorization will expire in 10 years. This PRIA will need to be reviewed in ten years to ensure it still meets conditions required for subsequent authorizations. This PRIA is not for emergency fire response.

The *Parks Canada Agency Wildland Fire Management Directive (2017)* provides national strategic direction to parks and sites on wildland fire management within Parks Canada managed lands. *Wildland Fire Management Plans* (WFMP) are developed to provide strategic direction for wildland fire management at the park and site level. Specific, on the ground, activities and fire management projects are developed to address priorities identified within WFMP's.

Definitions:

Eroded plant communities as defined by the 1994 Westworth Vegetation Inventory for Grasslands National Park, which described eroded communities as typically undisturbed, having a high % of bare ground primarily from erosion, and having slopes normally greater than 5%.

Road refers to any road that is paved, oiled, graded or levelled using heavy machinery and that is for the use of motor vehicles.

Waterbody includes a lake, a canal, a reservoir, an ocean, a river and its tributaries and a wetland, up to the annual high water mark, but does not include sewage or waste treatment lagoon, a mine tailings pond, an artificial irrigation pond, a dugout or a ditch that does not contain fish habitat as defined in subsection 2(1) of the Fisheries Act.

Scope of Application:
This PRIA includes activities associated with prescribed fire, wildfire risk reduction, and fuel break construction and maintenance.

Conditions and Exceptions:
This PRIA does not apply under the following exceptions/conditions:

Location:

- Operating a grader off of existing roads;
- Grubbing roots and stumps;
- Within 5 km of an active sage-grouse lek;
- In front country visitor areas;
- In eroded plant communities;
- Within 500 m of a known snake hibernacula;

General:

- Emergency fire response;
- When the project results in residual adverse effects to sensitive natural or cultural resources (e.g., nests, dens and roosts, cultural resources, riparian areas, wildlife corridors, rare ecotypes, or areas of management concern);
- If the project results in residual adverse effects on migratory birds or their nests (refer to the draft- Parks Canada Guidance on Reducing Risk to Migratory Birds and associated draft- Conservation Measures for Minimizing Impacts to Migratory Birds During the Nesting Period);
- If the project results in adverse residual effects to an individual, a residence or the critical habitat of a listed species at risk under the *Species at Risk Act;*
- The project involves the removal of or causes damage to cultural resources of heritage value, for example, heritage buildings designated by the Federal Heritage Buildings Review Office, archaeological sites, historical and archaeological objects, or cultural landscapes;
- The project involves the removal of or causes damage to paleontological resources; and

- The project adversely impacts sites of significance to Indigenous peoples or current access and use of areas where hunting, fishing or gathering rights are exercised by Indigenous peoples.

Approved geographic areas of application:
This PRIA is applicable to Grasslands National Park, in areas that are part of an approved prescribed fire plan.

This PRIA is applicable for the length of the current Species At Risk Act authorization #SSFU-2020-001-GNP. This PRIA will need to be reviewed in 10 years to ensure that it still meets conditions required for any new authorizations.

Valued Components and Effects Analysis

Water Resources:

- Changes to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)
- Changes to water temperature and stream characteristics (i.e. from removal of riparian vegetation)

Soil/Land Resources:

- Soil compaction and rutting
- Slope instability, due to increased soil exposure
- Soil contamination
- Increased potential for soil erosion

Air quality:

- Decreased ambient air quality due to smoke from fire management operations
- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO_2 and other pollutants

Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests, dens, roosts/disruption of nesting animals
- Mortality from project activities

Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource or a heritage place, including:

- Impacts to archaeological resources (known or potential) from displacement or destruction resulting in loss of heritage value
- Adverse effects on cultural landscapes or landscape features of heritage value

Visitor Safety and Experience:

- Reduced quality of visitor experience from noise and equipment operation (e.g., heavy equipment and leaf blower operation, helicopter use)
- Visual impacts and landscape changes
- Reduced accessibility to portions of the site where work is taking place
- Hazard to visitors and staff due to construction activities

Socio-Economic:

- Adverse effects on socio-economic values from decreased use within and adjacent to Parks Canada administered sites

Species at Risk – General (all spp.):

- Disruption, displacement or destruction of species at risk, their residences and/or nests during fire operations (e.g. through human presence, operating vehicles and machinery, the fire itself)

- Temporary or permanent destruction or damage to vegetation in the immediate or adjacent areas, altering seral stage and ecosystem function, impacting biophysical attributes required for critical habitat

Species at Risk – Species-specific Effects Analysis:

Eroded plant communities and prairie dog colony habitat complexes (*Greater short-horned lizard, Mormon metalmark, black-tailed prairie dog, black-footed ferret, mountain plover, burrowing owl)*: The park does not typically burn eroded plant communities as the fuel load is too low, therefore prescribed fire will not impact this community type and associated species at risk. Prescribed fire may be used to promote expansion of prairie dog colonies, which may benefit the species.

Species at Risk - Burrowing Owls: The majority of breeding pairs nest on prairie dog colonies. These pairs are unlikely to be impacted by prescribed fire. However, because some burrowing owls may nest outside of prairie dog colonies, prescribed fire may negatively impact this species.

Species at Risk - Little Brown Myotis: No critical habitat has been identified for this species in Grasslands National Park at this time. However, the species is present and likely breeds in the park. Maternity roosts are important for the survival and recovery of Little Brown Myotis populations. Maternity roosts may be located in natural or man-made features, and could be active from May to August.

Species at Risk – Chestnut-collared Longspur: This species prefers disturbed native grassland, and has been observed to opportunistically breed in recently burned areas (Owens and Myres 1973; Huber and Steuter 1984). Prescribed fires can be conducted in a manner that enhances this species' critical habitat.

Species at Risk – Common Nighthawk: No critical habitat has been identified for this species at this time. As a ground nesting species, the common nighthawk can be vulnerable to disturbance on the landscape during the breeding season.

Species at Risk – Eastern Yellow-bellied Racer: Prescribed fire at or near hibernacula may lead to collapse of the hibernacula, impeded entrance to the hibernacula or changes to thermal momentum of hibernacula (Government of Canada 2016). Motorized vehicle use during prescribed fire operations could damage to hibernacula or nearby egg-laying sites. Hibernacula are highly active in the spring when snakes emerge from hibernation and again when the snakes return in the fall. Therefore, operations within close proximity to hibernacula during these seasons could result in mortality of individual snakes. Some individuals are known to use the area within 500m of a hibernaculum for at least a week following spring emergence, but others can remain at the site for up to a month (Laura Gardiner, pers. comm.). Young of the year have also been found within 200 m – 500 m of hibernacula and therefore it is likely that some snakes nest in the vicinity of hibernacula as well. Burning the area within 500m of a hibernaculum could lead to a significant negative impact on the snakes using that hibernaculum. Burning also leads to a loss of vegetation and loss of cover to hide from predators, therefore critical habitat destruction is likely to occur from prescribed fires.

Species at Risk – Ferruginous Hawk: Fire is a necessary component in maintaining grassland foraging habitat required by Ferruginous Hawks (Environment and Climate Change Canada 2016b). Prescribed fire could result in the loss of elevated structures such as relatively isolated trees that enhance the quality of critical habitat, however mitigations exist to reduce these impacts. Therefore, the use of prescribed fire as a tool to enhance ecological integrity is consistent with the Recovery Strategy for this species.

Species at Risk – Greater Sage-grouse: The Emergency Order for the Protection of the Greater Sage-grouse (EPO) prohibits destruction or moving native vegetation. Prescribed fires are unlikely to negatively impact the sparse vegetation and/or mudflats typical of leks. However, burning silver sagebrush communities surrounding leks might make lek sites less attractive to sage-grouse. In Idaho, male attendance at leks was significantly reduced following large prescribed fires adjacent to leks (Connelly et al. 2000). However, this study explored the effects of ~60% sagebrush removal on a very large scale (5000 ha treatment area), representing a 25% reduction in nesting habitat within 8 km of the lek. In contrast, the largest fire conducted to date in GNP was 125 ha representing <1% of the 8km nesting area surrounding leks. Therefore, effects of prescribed fires in GNP on male attendance of leks are expected to be reduced.

Fire does temporarily reduce nesting cover for hens, and if conducted too late in the season, also reduces available winter forage (Beck et al. 2009; Rhodes et al. 2010). However, fire removes litter and encourages growth of some forb species, which are important food sources for young during the brood rearing stage (Wrobleski and Kauffman 2003); though not all studies agree with this finding (Beck et al. 2009; Rhodes et al. 2010). These studies were conducted in big sagebrush ecosites and in GNP the dominant sagebrush is silver sagebrush. Therefore, effects of fire may be different on sage-grouse habitat in GNP as silver sagebrush is able to regenerate from roots and rhizomes protected by the soil during fires (Walton 1984; Wambolt et al. 1989).

Sage-grouse require access to sagebrush year round for food and cover, therefore, at any time of year, the killing or moving of sagebrush results in direct habitat loss, reduced food availability and nesting cover, and increased exposure of sage-grouse to predation and inclement weather. In addition, activities that do not result in the complete loss of sagebrush, but that significantly increase the proportion of bare ground, significantly decrease the proportion of native grasses and/or native forbs, or remove most of

the leaves off sagebrush plants, may cause habitat degradation to the point where habitat is no longer functional for sage-grouse. The population impact from such forms of habitat destruction can range from low to very high, depending on the amount of habitat removed or the severity and extent of habitat degradation by the given activity. Based on visual observations following the 2013 wildfire in GNP, we expect that prescribed fires will result in temporary impacts on functional attributes (limited noise and human disturbance) and biophysical attributes (native prairie plants, forbs and particularly silver sagebrush). However, it is not expected that burning the above ground biomass under controlled conditions will result in the permanent destruction of prairie plants, including sagebrush, as plants are expected to regenerate form unburned shoots, roots and crowns. Due to the temporary reduction in habitat quality, Species at Risk Act Authorization (no. SSFU-2020-001-GNP) has been issued for prescribed fire activities to be undertaken in critical habitat for the greater sage-grouse.

Species at Risk – Loggerhead Shrike (Western subspecies): Burning natural grasslands is unlikely to destroy critical habitat and will contribute to the maintenance of large natural grassland areas that will improve habitat for Loggerhead Shrike in the long-term. Burning shrubs 2-3 m in height may remove potential nest trees and/or perches and could destroy critical habitat. Insufficient information is available to provide thresholds of levels of different activities that would result in destruction of critical habitat. The recovery strategy for Loggerhead Shrike lists continuous annual burning as a threat to the species, but as prescribed fires rarely occur in the same places every year, these effects are unlikely to persist and shrub regeneration is expected.

Species at Risk – Long-billed Curlew: Environment Canada (2013b) lists fire suppression as a threat to this species as it facilitates shrub encroachment. Long-billed curlews avoid nesting in grassed areas that are close to surrounding shrublands or forests (Cannings 1999). Using fire to reduce shrub presence or maintain open grasslands enhances long-billed curlew habitat. With standard mitigations to prevent harm to individuals, residences or nests, prescribed fires should not have adverse effects, and should benefit the species.

Species at Risk – McCown's Longspur: McCown's longspur prefer habitat with vegetation averaging only 5 cm in height, and are tolerant of up to 52% exposed soils (Creighton and Baldwin 1974). In the mixed-grass prairie, McCown's longspur habitat is produced and maintained by disturbances such as grazing and fire (Knopf 1994). Environment Canada (2014b) lists fire suppression as a threat to this species. Therefore, fire is an effective tool for enhancing McCown's longspur habitat. With standard mitigations to prevent harm to individuals, residences or nests, the project should not have adverse effects, and will likely benefit the species.

Species at Risk – Northern Leopard Frog and the Western Tiger Salamander: The effects of fire on amphibians are not fully understood and studies have produced contradictory results (Pilliod et al. 2003). While several studies suggest fire is a necessary component for creating or maintaining habitats for amphibians, others have reported superficial burns on dorsal skin or even mortality of individuals (Vogl 1973; Phillliod et al. 2003; Humphries and Sisson 2012). The Canadian management plan for Northern Leopard Frogs suggests that grazing applied in an appropriate manner can reduce density of vegetation, which may positively affect foraging and dispersal abilities (Waye and Cooper, 2001). Theoretically fire could be used for the same purpose. In the U.S., single event fuel reduction, via prescribed fire, has been found unlikely to negatively affect amphibian or reptile abundance (Greenberg and Waldrop 2008).

Prescribed fire can cause mortality of adults and juveniles, which strongly influences population dynamics (Biek et al., 2002). Industry standards have suggested 15 m to 30 m buffers surrounding breeding water bodies when conducting a prescribed fire (Phillliod et al. 2003). However, this buffer is

likely insufficient protection for most amphibian and reptile species, and a more conservative minimum protection zone of 340 m has been recommended (Semlitsch and Bodie 2003). Even this setback distance, however, may be inadequate for species that migrate longer distances (Humphries and Sissons 2012), such as Northern Leopard Frogs.

Species at Risk – Short-eared Owl: The potential negative effects of fire/fire suppression on Short-eared Owls are negligible (Environment Canada 2016). This species is highly mobile, has low site fidelity, and its distribution on the landscape appears to be linked to the distribution and abundance of its key prey, the meadow vole. With standard mitigations to prevent harm to individuals, residences or nests, prescribed fires should not have adverse effects for this species.

Species at Risk – Sprague's Pipit: Although prescribed fire can have adverse short-term effects on Sprague's pipit abundance and occurrence (Pylypec 1991), the use of fire to manage invasive species or limit the expansion of woody vegetation could enhance habitat for this species in the long-term. Sprague's pipits prefer native prairie in fair to excellent range condition with increased litter levels and grass height (Richardson et al. 2014). However, recovery of litter and grass height following fire can be rapid (Shay et al. 2001; Collins and Smith 2006; Richardson et al. 2014). Therefore, although prescribed fire may result in temporary destruction of critical habitat, it can be managed in such a way as to avoid excessive increases in bare ground, ensure native vegetation is not permanently destroyed, and that range condition is not permanently reduced to poor.

The installation of permanent fire guards in critical habitat might "destroy and fragment native grassland habitat, facilitate invasion of native grassland by exotic plant species, concentrate activities of certain predators and increase the chance of pipits colliding with vehicles" thereby lowering habitat suitability (Environment Canada 2012).

Species at Risk – Swift Fox: Fire is not likely to negatively impact biophysical attributes for critical habitat, and is not listed as a threat to the recovery of Swift Fox. Fire will reduce vegetation height and density, thereby improving Swift Fox habitat. Fire can also be used to manage invasive plant species, which benefits this species. Therefore, the use of prescribed fire as a tool to enhance ecological integrity is consistent with the Recovery Strategy for this species. Activities that are a threat to the species recovery include: 1) activities that collapse den sites or reduce prey abundance, and 2) installation of permanent fire guards that fragment habitat.

Mitigation Measures

Potential impacts on environmental and cultural resources, aboriginal interests, socio-economic and health conditions of both aboriginal and non-aboriginal peoples, as well as, the ability to achieve key visitor experience objectives will be assessed during the planning stage, prior to project approval. Consultation with specialists will help determine the feasibility of continuing with the proposed project. These consultations will be documented in the impact assessment section of the project plan, Alternate Process, BIA or DIA.

1. General

1.1. All work must be performed in accordance with the ordinances and laws set out in the *National Parks Act* and Regulations and any other applicable legislation.

1.2. All work is subject to the identified mitigations in the project plan and this PRIA.

1.3. Modification to identified mitigations may be required in response to any unforeseen problems that may arise. These will be brought to the attention of the Project Manager, Fire Management Officer, Incident Commander, Section Chiefs, etc. to be addressed as appropriate.

1.4. Potential impacts on SAR will be assessed during the planning stage, prior to project approval, in the prescribed fire plan. Consultation with specialists will help determine the feasibility of continuing with the proposed project. These consultations will be documented in prescribed fire plan.

1.5. All work must be performed in accordance with the ordinances and laws set out in the National Parks Act, Species at Risk Act, Migratory Bird Convention Act, Fisheries Act, Emergency Order for the Protection of the Greater Sage-Grouse, and be consistent with the direction outlined in applicable SAR Recovery Strategies, this Best Management Practice, and the Grasslands National Park Multi-species Action Plan.

1.6. Species-specific mitigations (section 6) will be applied when the proposed prescribed fire overlaps with a species' bounded polygon of critical habitat, or for some species (e.g. sage grouse) where it is near the bounded polygon of critical habitat.

2. Communications

2.1. An approved communications plan as per National Fire Information Officer Protocols will be in place for all fire management projects and activities (consult Parks Canada Agency. 2019. National Communication Strategy for Fire Management).

2.2. Prior to prescribed fire activities all SAR issues identified in the prescribed fire plan and BMP will be clearly communicated to the Project Manager, Fire Management Officer, Incident Commander, Section Chiefs, etc. to allow for mutual understanding of potential issues and allow for pro-active problem solving.

2.3. During the initial incident briefing for a prescribed fire site any SAR considerations will be outlined for all staff involved with prescribed fire.

2.4. Environmental values and areas of concern described within the prescribed fire plan will be identified and displayed on a map and communicated during project briefings.

3. Public Safety

3.1. Closures will be put in place, as required, for trails, roads, and areas to inform and protect the public during fire or fuel management activities. These closures will be coordinated between fire management personnel and local site or field unit staff responsible for visitor safety.

4. Project Timing

4.1. Critical wildlife timing windows (denning, calving, nesting, roosting, spawning seasons) will be identified in prescribed fire plans (see Table 1 and Table 2, below). The project manager will work closely with specialists to ensure project timing achieves the greatest positive ecological outcome possible in consideration of other values and constraints. Prescribed fire will be avoided in the breeding bird window.

Table 1: Critical Wildlife Timing Windows – prairie

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>Amphibians</td><td colspan="3">Hibernation at overwintering sites</td><td colspan="3">Migration to and concentration of individuals around breeding pools (esp. ephemeral ponds)</td><td colspan="2">Migration and dispersal from ponds</td><td colspan="2">Migration to over wintering water bodies</td><td colspan="2">Hibernation at overwintering sites</td></tr>
<tr><td>Bats</td><td colspan="4">Overwintering in Hibernacula</td><td colspan="4">Avoid maternity roosts. Bats Nursing Pups</td><td colspan="4">Overwintering in Hibernacula</td></tr>
<tr><td>Birds</td><td colspan="4">Reduced risk for birds</td><td colspan="4">Nesting April 15 – August 15</td><td colspan="4">Reduced risk for birds</td></tr>
<tr><td>Snakes</td><td colspan="4">Overwintering in Hibernacula</td><td colspan="2">Migration</td><td colspan="3">Avoid ground disturbance. Population peak following breeding and emergence of young.</td><td colspan="2">Migration</td><td colspan="2">Overwintering in Hibernacula</td></tr>
<tr><td rowspan="2">Sage Grouse / EPO</td><td colspan="3">Overwintering habitat</td><td colspan="3">Lekking, Nesting</td><td colspan="3">Brood-rearing</td><td colspan="4">Overwintering habitat</td></tr>
<tr><td colspan="4"></td><td colspan="2">Seasonal EPO prohibitions April 1 – May 30</td><td colspan="6"></td></tr>
<tr><td></td><td colspan="12">Year-round EPO Prohibitions</td></tr>
</table>

Table 2: Avian SAR nesting periods in nesting zone B4 grasslands (Nesting Calendar Query Tool, Bird Studies Canada, 2017)

To request a copy of this document with this table, please contact ia-ei@pc.gc.ca.

4.2. Timing windows will be scheduled as best as possible to minimize impact on indigenous and non-indigenous cultural activities, socio-economic activities and key visitor experience objectives. Park or regional specialists as well as the Visitor Experience Manager will be consulted to assist in determining appropriate project timing windows.

4.3. Project work will be completed in the shortest time frame possible.

5. Site Visits

5.1. The fire project manager, associated team members, and park specialists will conduct an initial field visit for all projects.

5.2. Species at risk and their critical habitat, known sensitive wildlife features (e.g. denning sites, nesting/roosting trees, hibernacula), archaeological and cultural sites, and any other sensitive features will be identified and recorded during the project planning phase. Park or regional biologists, conservation technicians, and local specialists will be consulted to assist in identifying sites and features. Site-specific protection measures will be employed as appropriate.

5.3. Project boundaries and sensitive features will be identified using temporary non-permanent markings such as biodegradable flagging tape that will be removed following project completion. Trees will not be scarred or spray-painted.

5.4. During the site visit, park specialists will confirm the presence/absence of biophysical attributes for SAR whose bounded polygons of critical habitat fall within the prescribed fire site, and which are most likely to be impacted by fire (e.g. pipits, sage-grouse). Park or regional biologists, conservation technicians, or local specialists will be consulted as necessary to assist in this determination.

5.5. If SAR are encountered within 100 m of the proposed fire perimeter during the site visit, the observer(s) will note behaviours or other indications of territories, breeding, nesting, etc. and report to resource conservation. If observation suggests the individual's territory falls within 100 m of the prescribed fire site or they are present for specific life cycle activities (e.g. breeding indicated by the presence of young or a breeding site) prescribed fire activities will be placed on hold. Consult resource conservation and apply species-specific mitigations to fire plan.

6. Operations

6.1. Use existing or previously disturbed areas for camps, staging areas, helispots, etc. to minimize the disturbance footprint

6.2. Vehicle speeds on site will remain below 30 km/h, unless responding to an emergency (e.g. excursion of the fire beyond established perimeter) to reduce wildlife-vehicle collisions.

6.3. If SAR are encountered during prescribed fire activities, all work will stop and the SAR allowed time and space to move out of the area. Do not harass animals. SAR are considered clear of the area when they are 100 m outside of the proposed fire perimeter. If SAR do not leave the area, consult with resource conservation and species conservation management to determine the appropriate course of action. If observation suggests the individual's territory falls within the prescribed fire perimeter or they are present for specific life cycle activities (e.g. breeding), prescribed fire activities will be placed on hold while project managers consult with resource conservation and species conservation management to prescribe appropriate mitigations.

7. Soils and Terrain

7.1. Heavy equipment must be equipped with high floatation rubber tires or low-pressure tracks with modified grousers.

7.2. Limit heavy equipment use on slopes where traction may be inadequate and cause spinning or rutting.

7.3. Use protective barriers (ex: floatation mats or mat of tree limbs) on harvesting trails, wet, moist areas and areas with sensitive vegetation to reduce soil compaction and disturbance.

7.4. Minimize broadcast burning on highly erodible soils.

8. Aquatics and Hydrology

8.1. All work and activities will comply with the Fisheries Act and the Measures to Avoid Causing Harm to Fish and Fish Habitat (Department of Fisheries and Oceans).

8.2. Plan ignition phase to apply lower intensity fire to riparian areas immediately adjacent to creeks to reduce riverbank soil erosion, cover and shade loss.

8.3. Fish bearing streams used for pump sites will be assessed for spawning habitat and beds during prescribed fire planning. Pump sites will maintain a 30-meter buffer from spawning beds or known spawning sites during the spawning season.

8.4. All intake hoses must be screened according to the Measures to Avoid Causing Harm to Fish and Fish Habitat (Department of Fisheries and Oceans).

8.5. Managing the risk of invasive Zebra mussels from shared fire equipment will be achieved by respecting the mitigations identified in Parks Canada's Memo: Managing Risk of Invasive Mussels through Fire Operations (Consult Parks Canada Agency. 2015. Parks Canada's Memo: Managing Risk of Invasive Mussel through Fire Operations).

8.6. Managing the risk of spread of Whirling Disease from shared fire equipment will be achieved by respecting the mitigations identified in the Parks Canada Memo: Whirling Disease and Fire Operations (Consult Parks Canada. 2016. Memo: Whirling Disease and Fire Operations).

8.7. If work is required in riparian zones or to cross streams it will be undertaken in accordance with the Fisheries Act (Measures to Avoid Causing Harm to Fish and Fish Habitat) and applicable provincial guidelines.

9. Air Quality

9.1. Communication plans will provide public information to promote understanding and appreciation for the role of fire in park ecosystems and minimize impacts from smoke.

9.2. Impacts on human health and disturbance to populated areas from smoke will be minimized during ignition by burning when dispersion and venting conditions are good.

9.3. Prescribed fires and pile/slash burning will take place under atmospheric conditions that minimize the potential for inversions trapping smoke in valley bottoms.

9.4. Pile/slash fires will be kept hot to minimize smoke output. Burning will cease during unfavorable conditions if the smoke has the potential to affect communities or Highways.

9.5. Signs advising of "smoke in area" will be placed in prominent locations near project work to advise and inform the public. Signs along roads or highways will be placed as recommended by the Highway manager or designate.

9.6. Dust abatement techniques (ex: water truck) shall be used on unpaved, un-vegetated surfaces to minimize airborne dust.

9.7. Speed limits will be posted and respected to reduce airborne dust.

10. Vegetation

10.1. Non-native vegetation in the project area will be identified and appropriate mitigations will be implemented to minimize non-native vegetation colonization.

10.2. Pretreatment by chemical, hand or mechanical means prior to work may be required in heavily infested areas to prevent the transmission of weed seed by equipment and vehicles.

10.3. All equipment shall be thoroughly cleaned and pressure washed prior to entering the park so it does not introduce residual soil, seeds or vegetation from outside of the park.

10.4. Methods used to action weeds will follow the park Integrated Pest Management Plan.

10.5. The project plan will include post project requirements for follow-up monitoring and treatment of weeds.

11. Wildlife

11.1. Specific prescribed fire plans will identify critical/sensitive habitats and timing windows as outlined in Project Timing mitigation (consult the Parks Canada Impact Assessment Intranet guidance page i.e. Factsheets, BMPs for information on Migratory Birds BMP, Bats, etc.).

11.2. Work in cooperation with the wildlife specialist to ensure habitat considerations are included in project planning, like:

- Maintaining wildlife movement corridors,
- Retaining residual patches of vegetation for songbirds,
- Retaining shade trees on the south and west sides of standing water to protect amphibian breeding sites,
- Leaving a buffer along park boundaries where hunting activity occurs to ensure preferred grazing and browsing habitat is not created adjacent to the boundary, increasing ease of detection.

11.3. All food and garbage must be stored in wildlife proof containers.

11.4. Any problems including aggressive encounters with wildlife will be reported immediately to the park Wildlife Conflicts Specialist or park designate.

11.5. Observations of wildlife vehicle collisions and discovery of carcasses, wildlife features (e.g. dens, nests), or other wildlife encounters will be reported immediately to the Fire Management Officer (FMO), Project Manager or the Wildlife Conflicts Specialist.

11.6. Heavy equipment access trails will be laid out to avoid habitat trees and snags > 25 cm diameter at breast height (DBH) unless the tree is considered a hazard to worker or public safety. Known habitat trees will be flagged by Parks Canada.

11.7. Trees with nests or cavities will only be removed if necessary to ensure worker and public safety.

12. Species at Risk – General

12.1. All work will comply with the *Species at Risk Act* (SARA) and be consistent with the direction outlined in applicable Species at Risk Recovery Strategies, Best Practices and Action Plans (consult the Parks Canada Species Conservation and Management Division for projects where species at risk may be impacted).

12.2. Follow regional direction provided in strategic planning documents such as the Fire Management Plan, and associated Strategic Environmental Assessments.

12.3. All on-site personnel will be made aware of and report any incidental sightings of species at risk immediately to designated Parks Canada staff.

13. Species at Risk - Species-specific Mitigations

13.1. **BURROWING OWL** When prescribed fire area overlaps with burrowing owl habitat/residence:

13.1.1. Survey site for burrowing owl breeding pair following the Park's monitoring protocol for this species (Monitoring Burrowing Owls (*Athene cunicularia*) in Grasslands national park) to confirm no nest burrow is in use (Consult Parks Canada. 2019. Burrowing Owl (*Athene cunicularia*) Population Monitoring in Grasslands National Park).

13.1.2. If an active nest burrow is present in the area redefine the boundary of the proposed burn to create a 400 m buffer surrounding nest;

13.1.3. If a buffer cannot be confidently maintained, reschedule the burn for a later time following breeding season or for a subsequent year.

13.2. **CHESTNUT-COLLARED LONGSPUR** When prescribed fire area overlaps with chestnut-collared longspur critical habitat/residence:

13.2.1. Conduct prescribed fire outside of nesting periods.

13.2.2. Fuel breaks should be created by mowing and/or burning vegetation (as opposed to grading) to avoid the areas being distinguishable from the larger burn unit following prescribed fire operations (to avoid habitat fragmentation).

13.3. **COMMON NIGHTHAWK** When prescribed fire area overlaps with common nighthawk habitat/residence

13.3.1. Conduct prescribed fire outside of nesting periods.

13.4. **FERRUGINOUS HAWK** When prescribed fire area overlaps with ferruginous hawk critical habitat/residence:

13.4.1. Conduct prescribed fire outside of nesting periods.

13.4.2. Protect isolated large-diameter trees outside of dense bluffs, which have been used consistently by ferruginous hawks for nesting.

13.5. **LONG-BILLED CURLEW** When prescribed fire area overlaps with long-billed curlew habitat:

13.5.1. Conduct prescribed fire outside of the nesting period.

13.6. **MCCOWN's LONGSPUR** When prescribed fire area overlaps with McCown's longspur habitat:

13.6.1. Conduct prescribed fire outside of the nesting period.

13.7. **MYOTIS** When prescribed fire area overlaps with little brown myotis habitat/residence:

13.7.1. The "PCA standards for managing bats in Protected Heritage Places" will be adhered to at all times.

13.7.2. Check prescribed fire location against known hibernacula/maternity roosts.

13.7.3. If potential maternity roost or hibernacula sites exists within the proposed prescribed fire boundary, a survey will be conducted to confirm presence/absence of bats.

13.7.4. Do not burn within 30 m of maternity roosts or hibernacula; consider excluding from fire perimeter.

13.8. **NORTHERN LEOPARD FROG** When prescribed fire area overlaps with northern leopard frog habitat/residence:

13.8.1. If a breeding water body is identified within or near the proposed prescribe fire site, the burn will be postponed until the fall; or

13.8.2. If this is not possible, a minimum protection zone of 340 m will be applied.

13.8.3. Avoid the use of fire retardant foam, as amphibians are extremely sensitive to a variety of chemicals.

13.9. **RACERS** When prescribed fire area overlaps with eastern yellow-bellied racer critical habitat/residence:

13.9.1. Fires within a 500 m radius of a known hibernaculum must be avoided as they could negatively impact the snakes using that hibernaculum and therefore affect the ability of the hibernaculum to function properly.

13.10. **SAGE-GROUSE** When prescribed fire area overlaps with critical habitat for the greater sage-grouse:

13.10.1. Prescribed fires will be planned to have a surface fire intensity <2000 kW/m. This threshold will ensure the fire intensity is low enough to avoid harm to regenerative roots and rhizomes of silver sagebrush.

13.10.2. Do not operate motor vehicles or machines that produce noise excepting 45 dB from 90 minutes before sunset to 90 minutes after sunrise from April 1 to May 30, within 3.2 km of a lek.

13.10.3. Burning the same site in consecutive years will be avoided, and the same site shall not be burned more than two times during a 5-year period to avoid reducing the ability of sagebrush to regenerate following fire.

13.10.4. Do not burn more than 5% of critical habitat that meets biophysical attributes in a 5-year period. Additionally, in the East Block, do not burn more than 5% of critical habitat that meets biophysical attributes within 8 km of lek critical habitat in a 5-year period.

13.11. **SHORT-EARED OWL** When prescribed fire area overlaps with short-eared owl habitat:

13.11.1. Conduct prescribed fire outside of the nesting period.

13.12. **SHRIKE** When prescribed fire area overlaps with loggerhead shrike critical habitat/residence:

13.12.1. Conduct prescribed fire outside of nesting periods.

13.12.2. Avoid repeated annual burning of tall shrub patches.

13.12.3. Protect 2-3 m tall shrubs during prescribed fire operations, which may include altering the perimeter of proposed prescribed fire site to avoid these shrubs.

13.13. **SPRAGUE'S PIPIT** When prescribed fire area overlaps with Sprague's pipit critical habitat/residence:

13.13.1. Conduct prescribed fire outside of nesting period.

13.13.2. Avoid burning more than twice in a 5-year interval.

13.14. **SWIFT FOX** When prescribed fire area overlaps with swift fox critical habitat/residence:

13.14.1. Fuel breaks should be created by mowing and/or burning vegetation (as opposed to grading) to avoid the areas being distinguishable from the larger burn unit following prescribed fire operations (to avoid habitat fragmentation).

13.14.2. If a den is located in the prescribed fire area, the prescribed fire should not happen while pups are being weaned (mid-April to August).

13.14.3. Vehicles must avoid driving over known den locations to avoid collapse or dens and tunnels.

13.14.4. Wherever possible, water should be used instead of foam and retardant to prevent potential reductions in prey abundances (e.g. grasshoppers, beetles). Avoid retardant drops within 100 m of any known den.

14. Cultural and Heritage Resources

14.1. Archaeological and cultural resources within the project and associated areas will be identified and mapped with the assistance of cultural resource management (CRM) Advisor and Parks Canada Terrestrial Archaeologist before any onsite activity. Recommendations from the Cultural Resource Impact Analysis (CRIA) and mitigation measures outlined in the Archaeological Overview Assessment (AOA) and Archaeological Impact Assessment (AIA) will be implemented.

14.2. Personnel directly involved in the fire management operations will be briefed on the location of the known resources, buffer zones and the importance of protecting these cultural features, as appropriate based on sensitivity of the sites. Buffer zones for vehicle use will be 50 m unless otherwise noted in the prescribed fire plan.

14.3. Information concerning all cultural and archaeological sites will be considered confidential unless otherwise identified; including any new finds.

14.4. The location of new cultural sites or cultural resources will be immediately relayed to either of the Field Unit or National Office CRM Advisors. Work will stop in the immediate area and a Parks Canada Terrestrial Archaeologist will be consulted for advice. This process can be expedited by providing the archaeologist with GPS coordinates and images of the newly encountered cultural resources. Site protection and re-routing of work activities will be implemented as needed to protect the site.

14.5. Vehicle travel in the vicinity of known archaeological and Indigenous ceremonial areas may be restricted or prohibited. Parks Canada will visibly mark them as "no go" zones for personnel and equipment as determined by the Parks Canada Terrestrial Archaeologist and CRM Advisor or Indigenous cultural advisor who have site specific knowledge.

14.6. All haul, forwarding and ghost trails will be pre-flagged by Parks Canada to avoid known or potential archaeological features and off-trail travel will be prohibited.

14.7. Removal of debris and thinning of trees in areas of high archaeological potential may be applied to lessen the potential impacts.

14.8. Stockpiles and/or piling wood debris, including brush burning, will not be permitted on known cultural resources.

14.11 A post-burn archaeological survey should be conducted with the assistance of the Terrestrial Archaeologist and CRM Advisor, as appropriate.

Approval

Original signed by Adriana Bacheschi March 10, 2020

Adriana Bacheschi
FUS/Director of Waterway

Date

REFERENCES

Albert, A., K. Drouillard, G.D. Haffner, and B. Dixon. 2007. Dietary exposure to low pesticide doses causes long-term immunosuppression in the leopard frog (*Rana pipiens*). Environmental Toxicology and Chemistry 26:1179-1185.

Beck, J.L., J.W. Connelly, and K.P Reese. 2009. Recovery of Greater Sage-grouse habitat features in Wyoming Big Sagebrush following prescribed fire. Restoration Ecology 17(3):393-403.

Biek, R., Funk, W.C., Maxell, B.A., and Mills, L.S. 2002. What is missing in amphibian decline research: insights from ecological sensitivity analysis. Conservation Biology 16:728-734.

Brockway, D.G., Gatewood, R.G. and Paris, R.B. 2002. Restoring fire as an ecological process in shortgrass prairie ecosystems: initial effects of prescribed burning during the dormant and growing seasons. Journal of Environmental Management, 65(2), 135-152.

Canadian Environmental Assessment Act, 2012. (S.C. 2012 c. 19,s.52).

Cannings, R.J. 1999. Status of the Long-billed Curlew in British Columbia. Wildlife Working Report No. WR-96.

Collins, S.L. and M.D. Smith. 2006. Scale-dependent interaction of fire and grazing on community heterogeneity in tallgrass prairie. Ecology 87:2058-2067.

Connelly, J. W., Reese, K. P., Fischer, R. A., and W. L. Wakkinen.2000. Response of a sage grouse breeding population to fire in southeastern Idaho. Wildlife Society Bulletin 28(1):90-96.

Creighton, P. D., and P. H. Baldwin. 1974. Habitat exploitation by an avian ground-foraging guild. U.S. International Biological Program, Technical Report No. 263. Colorado State University, Fort Collins, Colorado. 139 pages.

Davis, S. K. 2004. Area sensitivity in grassland passerines: Effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. Auk no. 121 (4):1130-1145

Environment Canada. 2012. Amended Recovery Strategy for the Sprague's Pipit (*Anthus spragueii*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vi + 46 pp.

Environment Canada. 2013a. Management Plan for the Northern Leopard Frog (*Lithobates pipiens*), Western Boreal/Prairie Populations, in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 28 pp.

Environment Canada. 2013b. Management Plan for the Long-billed Curlew (*Numenius americanus*) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 24 pp.

Environment Canada. 2014a. Amended Recovery Strategy for the Greater Sage-Grouse (*Centrocercus urophasianus urophasianus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vi + 53 pp.

Environment Canada. 2014b. Management Plan for McCown's Longspur (*Rhynchophanes mccownii*) in Canada [Proposed]. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii+ 20 pp.

Environment Canada. 2015a. Recovery Strategy for Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. viii + 109 pp.

Environment Canada. 2015b. Recovery Strategy for the Loggerhead Shrike Prairie subspecies (*Lanius ludovicianus excubitorides*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. iv + 23 pp.

Environment Canada. 2016. Management Plan for the Short-eared Owl (*Asio flammeus*) in Canada [Proposed]. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. v + 35 pp.

Environment and Climate Change Canada. 2016a. Recovery Strategy for the Chestnut-collared Longspur (*Calcarius ornatus*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. v + 31 pp.

Environment and Climate Change Canada. 2016b. Recovery Strategy for the Ferruginous Hawk (*Buteo regalis*) in Canada [Draft]. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. vi+ 58 pp.

Greenber, C. H. and Waldrop, T. A. 2008. Short-term response of reptiles and amphibians to prescribed fire and mechanical fuel reduction in a southern Appalachian upland hardwood forest. Forest Ecology and Management 255:2883-2893.

Government of Canada. 2016. Species at Risk Act Public Registry. Residence Descriptions. Description of residence for the Eastern Yellow-bellied Racer (Coluber constrictor flaviventris) in Canada.

Hogan, N.S., P. Duarte, M.G. Wade, D.R.S. Lean, and V.L. Trudeau. 2008. Estrogenic exposure affects metamorphosis and alters sex ratios in the Northern Leopard Frog (*Rana pipiens*): Identifying critically vulnerable periods of development. General and Comparative Endocrinology 156: 515-523.

Houston, C.S. and Bechard, M.J., 1984. Decline of the ferruginous hawk. American Birds.

Huber, G. E. and A. A. Streuter. 1984. Vegetation profile and grassland bird response to spring burning. Prairie Naturalist no. 16 (1):55-61.

Humphries, W. J. and Sissons, M. A. 2012. Long distance migrations, landscape use, and nulnerability to prescribed fire of the Gopher Frog (*Lithobates capito*). Journal of Herpetology 46(4):655-670.

Knick, S.T., S.E. Hanser, M. Leu, C.L. Aldridge, S.E. Nielsen, M.M. Rowland, S.P. Finn, and M.J. Wisdom. 2011. Management considerations. Pp. 387–394 in S.E. Hanser, M. Leu, S.T. Knick and C.L. Aldridge (eds). Sagebrush ecosystem conservation and management: ecoregional assessment tools and models for the Wyoming Basins. Allen Press, Lawrence, Kansas.

Knopf, F.L. 1994. Avian assemblages on altered grasslands. Studies in Avian Biology 15: 247-257.

Marquis, O., Millery, A., Guittonneau, S., and Miaud, C. 2006. Toxicity of PAHs and jelly protection of eggs in the common frog *Rana temporaria*. Amphibia-Reptilia 27 :472-475.

McDaniel T.V., P.A. Martin, J. Struger, J. Sherry, C.H. Marvin, M.E. McMaster, S. Clarence, and G. Tetreault. 2008. Potential endocrine disruption of sexual development in free ranging male Northern Leopard Frogs (*Rana pipiens*) and green frogs (*Rana clamitans*) from areas of intensive row crop agriculture. Aquatic Toxicology 88: 230-242.

Owens, R. A. and M. T. Myres. 1973. Effects of agriculture upon populations of native passerine birds of an Alberta fescue grassland. Can. J. Zool. no. 51:697-713.

Parks Canada Agency. 2010. Recovery Strategy for Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*) in Canada. *Species at Risk Act* Recovery Strategy Series. Parks Canada Agency. Ottawa. vii + 22 pp.

Parks Canada Agency. 2016. Multi-species Action Plan for Grasslands National Park of Canada. Species at Risk Act Action Plan Series. Parks Canada Agency, Ottawa. iv + 57 pp.

Parks Canada Agency. 2017. Draft Parks Canada National Best Management Practices for Fire Management Operations.

Parks Canada Agency. 2017. Draft Parks Canada Agency Standards for managing bats in Protected Heritage Places.

Parks Canada Agency. 2016. National best management practices for management of bat maternity roosts in built assets.

Pilliod, D.S., Bury, R.B., Hyde, E.J., Pearl, C.A. and Corn, P.S., 2003. Fire and amphibians in North America. Forest ecology and management, 178(1), pp.163-181.

Ponomarenko, E. 1998. Reconstruction of natural disturbances history for ecosystems of Grasslands National Park by ecosystem archaeology method: Preliminary investigation. Parks Canada, Natural Resource Branch, Laboratory for Ecological Designs. Ottawa, Ontario.

Pylypec, B. 1991. Impacts of fire on bird populations in a fescue prairie. Canadian Field Naturalist 105: 346–349.

Richardson, A.N., Koper, N. and K.A. White. 2014. Interactions between ecological disturbances: burning and grazing and their effects on songbird communities in northern mixed-grass prairies. Avian Conservation & Ecology 9(2):5.

Rhodes , E.C., Bates, J.D., Sharp, R.N., and K.W. Davies. 2010. Fire effects on cover and dietary resources of Sage-Grouse habitat. Journal of Wildlife Management 74(4):755-764.

Semlitsch, R. D., and Bodie, J. R. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17(5):1219-1228

Shank, C.C. and Bayne, E.M., 2015. Ferruginous Hawk Climate Change Adaptation Plan for Alberta.

Shay, J., D. Kunec, and B. Dyck. 2001. Short-term effects of fire frequency on vegetation composition and biomass in mixed prairie in south-western Manitoba. Plant Ecology 155:157-167.

Species at Risk Act. 2002, C 29.

Stabeneau, E.K., Giczewski, D.T., and Maillacheruvu, K.Y. 2006. Uptake and elimination of naphthalene from liver, lung, and muscle tissue in the Leopard Frog (*Rana pipiens*). Journal of Environmental Science and Health Part A 41:1449-1461.

Stabeneau, E.K., Sasser, A., and Schulte, C. 2008. The effects of pyrene exposure on exercise performance, muscle contraction, and mitochondrial O2 consumption in the Leopard frog (Rana pipiens). Journal of Environmental Science and Health Part A 43:576-583.

Vogl, R. J. 1973. Effects of fire on the plants and animals of a Florida wetland. American Midland Naturalist 89:334-347.

Wambolt, Carl L.; Walton, Todd; White, Richard S. 1989. Seed dispersal characteristics of plains silver sagebrush. Prairie Naturalist. 21(3): 113-118.

Walton, Todd Patrick. 1984. Reproductive mechanisms of plains silver sagebrush *Artemisia cana cana* in southeastern Montana. Bozeman, MT: Montana State University. 161 p. Thesis.

Waye, H. L., and J. M. Cooper. 2001. Status of the Northern Leopard Frog (*Rana pipiens*) in the Creston Valley Wildlife Management Area 1999 for the Columbia Basin Fish and Wildlife Compensation Program, Nelson, BC. 51+ pp.

White, R.S. and Currie, P.O., 1983. Prescribed burning in the northern Great Plains: yield and cover responses of 3 forage species in the mixed grass prairie. Journal of Range Management, pp.179-183.

Wrobleski, D.W. and Kauffman, J.B., 2003. Initial effects of prescribed fire on morphology, abundance, and phenology of forbs in big sagebrush communities in southeastern Oregon. Restoration Ecology, 11(1), pp.82-90.