



Parks Canada National Best Management Practices for Fire Management Operations

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Approval Page

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Table of Contents

Approval Page	ii
List of Acronyms	v
Introduction	1
Scope of Application	2
Exceptions	3
Approved Geographic Area of Application	3
Components of the Environment That May Be Affected	3
Mitigation Measures	4
1. Mitigations for All Activities – General	5
General	5
Communications	5
Public Safety	5
Project Timing	5
Site Visits	6
Contractors	6
2. Mitigations for All Activities - Environmental	7
Species at Risk	7
Wildlife	7
Vegetation	8
Non-Native Plants	8
Soils and Terrain	8
Aquatics and Hydrology	9
Air Quality	10
Reclamation	10
Cultural or Spiritual Sites	10
Archaeological and Cultural Resources	10
3. Activity Module	12
Briefings	12
Tactics and Strategies	12
Camps and Staging Areas	12
Access	12
Equipment Operations	13
Aircraft Operations	13
Ignition Operations	14
Sprinkler Systems	14
Fuel and Hazardous Material Management	14
Spill Response	15



Use of Retardant and Foam _____	15
Tree Removal _____	15
Hand Falling _____	16
Mechanical Falling _____	16
Falling Near Power Lines _____	16
Ground-based Yarding Systems _____	17
Skyline/Cable Logging _____	18
Helicopter Logging _____	18
Log Loading and Transportation _____	18
References _____	19
Appendix 1: What to Include in a Briefing Package? _____	21
Appendix 2: Fire Management Start-up Briefing Checklist _____	22

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List of Acronyms

CEAA	Canadian Environmental Assessment Act, 2012
CRIA	Cultural Resources Impact Analysis
CRM	Cultural Resource Management
EIA	Environmental Impact Analysis
BIA	Basic Impact Analysis
BMP	Best Management Practice
DIA	Detailed Impact Analysis
FMO	Fire Management Officer
IAO	Impact Assessment Officer
MOU	Memorandum of Understanding
NFMIS	National Fire Management Information System (Fire Management Sharepoint site online)
PF	Prescribed Fire
SARA	Species At Risk Act
WFMP	Wildland Fire Management Plan



Introduction

Best Management Practices (BMP's) are pre-determined environmental management and mitigation measures for defined routine, repetitive projects or activities with well understood and predictable effects. BMP's are an acceptable Environmental Impact Analysis (EIA) pathway as they fulfill Parks Canada Agency's (PCA) obligations under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) as a manager of federal land ([Guide to the Parks Canada EIA Process](#)).

The [Parks Canada Agency Wildland Fire Management Directive \(draft 2016\)](#) 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. Ecological restoration and appropriate wildfire response, preparedness and risk reduction priorities of parks and sites are identified within the WFMP. Specific, on the ground, activities and fire management projects are developed to address priorities identified within WFMP's.

The Parks Canada wildland fire management program conduct various fire management activities including application of prescribed fire, development of fireguards, values protection, wildfire management and fuel management projects throughout the year. Many of the operational practices and impact mitigations implemented in the various projects are similar in nature and can be standardized across sites.

This national BMP was developed to mitigate potential impacts of fire management activities 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.

This BMP can be used in the following ways:

- Direct application: use as is, if the proposed project falls within the scope of the BMP(s) and its application will ensure all potential impacts have been mitigated and there are no significant residual adverse environmental effects.
- Application with supplemental mitigations to ensure all potential impacts are mitigated and provide project-specific clarifications (e.g. critical timing windows, contact information, SAR considerations, avoidance of cultural values, etc.).
- Application as part of a Basic Impact Analysis (BIA) or Detailed Impact Analysis (DIA): where one or more BMPs may not address all the potential adverse environmental effects of a proposed project, Field Units can apply the BMP(s) as part of a BIA or DIA.
- Alternate process: once the alternate process for assessing prescribed fires is approved the mitigations from this BMP may be used in whole or part to mitigate impacts of specific prescribed fire plans ([Alternate Process for Prescribed Fire](#)).
- Develop a Field Unit specific BMP: use the National BMP as a resource to create a BMP to address site-specific needs. In this case, the new BMP must be approved by the Field Unit Superintendent.

To use this BMP, the impact assessment officer (IAO) will review a proposed project and advise the project manager if the project falls within the scope of the BMP, and if application of the mitigation measures in the BMP will adequately address all of the potential adverse effects of the project. If minor additions are needed the IAO may add supplemental mitigations to ensure site specific considerations are addressed.



The IAO will ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Assessment Tracking System.

The project manager (eg. Fire Management Officer or Visitor Safety Fire Coordinator) in conjunction with the IAO must ensure all species at risk and cultural resources potentially impacted are identified early and assessed through the appropriate means, ie, Critical habitat destruction assessment, and Cultural Resource Impact Analysis (CRIA).

Project managers must ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

Scope of Application

This BMP provides a consistent set of mitigations to address the environmental impacts of fire management projects like:

- prescribed fire
- wildfire risk reduction
- fireguard construction and maintenance
- management of wildfires

Activities included in the scope of this BMP are:

1. Briefings
2. Tactics and Strategies
3. Camping and Staging Areas
4. Access
5. Equipment Operations
6. Aircraft Operation
7. Ignition Operations
8. Sprinkler Systems
9. Fuel and Hazardous Material Management
10. Spill Response
11. Use of Retardant and Foam
12. Tree Removal
13. Hand Falling
14. Mechanical Falling
15. Falling Near Power Lines
16. Ground-based Yarding
17. Skyline/Cable Logging
18. Helicopter Logging
19. Log Loading and Transportation

This BMP may be periodically updated as new techniques, methods, equipment or technology develop. The most recent version will be posted at:

- the Parks Canada [Sharepoint BMP Library](#)
- the Parks Canada [National Fire Management Information System](#) (NMFIS).



Exceptions

Under CEAA, 2012 Section 70, an assessment is not required in response to an emergency. It is understood that there are constraints during wildfire emergencies and some mitigations may not be implemented.

If the project has the potential for residual adverse effects on a listed species at risk (including effects to individuals and residence to individuals) this BMP may not meet our obligations under CEAA 2012 and a separate EIA will be required. The IAO will determine the appropriate EIA pathway (i.e., BIA or DIA). Contact the [Species Conservation and Management Team](#) to address any uncertainty regarding potential adverse effects to species at risk.

Approved Geographic Area of Application

This BMP is intended for use in all Parks Canada administered protected heritage places where fire management activities occur.

Components of the Environment That May Be Affected

Water Resources:

- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

Soil/Land Resources:

- Soil compaction and rutting
- Slope instability, due to increased soil exposure
- Soil contamination

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 CO₂ 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 chain saw operation, helicopter use, tree removal)
- 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

Mitigation Measures

This BMP has three sections:

- Module 1: General mitigations which apply to all activities
- Module 2: Environmental mitigations which apply to all activities
- Module 3: Activity specific mitigations.

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles. A mitigation specific list can also be built by:

- a. Select the **View** tab, check the **Navigation Pane** box, this allows you to see all the headings. To remove sections right click on it in the Navigation Pane and choose delete.
- b. Keep the mitigations that apply to the project expanded and collapse/delete the others.
- c. Save the document as a pdf or print a paper copy and include with the EIA determination record.

Module

1	Mitigations for All Activities – General
2	Mitigations for All Activities – Environmental
3	Activity Module



1. Mitigations for All Activities – General

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.

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 these best management practices.
- 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.

Communications

- 1.4. An approved communications plan as per National Fire Information Officer Protocols ([Communications](#)) will be in place for all fire management projects and activities

Public Safety

- 1.5. 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.
- 1.6. Closures will adhere to the park or historical site standard protocols and forms.
- 1.7. Evacuations for wildfires will follow the protocols set out in the park/site Visitor Safety Plan and any MOU or agreements with local towns or municipalities.
- 1.8. All signs are to be bilingual or symbolic in nature. Highway signs will comply with provincial standards.
- 1.9. Traffic control and flag persons will be employed for traffic control as required to ensure the safety of all park users.

Project Timing

- 1.10. Critical wildlife timing windows (denning, calving, nesting, roosting, spawning seasons) will be identified in project plans¹. Project planners will work closely with specialists to ensure project timing achieves the greatest positive ecological outcome in consideration of all identified values. Development of a timing chart for reference is recommended for each

¹ Some projects such as prescribed fire are restricted to narrow seasonal and weather conditions to achieve specific ecological restoration or value protection goals. These narrow windows may conflict with other values to be protected. Project planners will work to achieve the greatest positive outcomes possible in consideration of all identified values.



park/site. The example below provides a template option to build from, tables will need to be adapted to include sensitive species and timing windows as appropriate for each park. Planning will consider the timing windows for each species with habitat directly impacted by the proposed project.

Example: Environmental Timing Windows Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fish	AVOID INSTREAM WORK					Least risk window for work in and around freshwater, June 15 – Sept 15				AVOID INSTREAM WORK		
Birds	Reduced risk for harm to birds			AVOID VEGETATION REMOVAL Bird Nesting Period: April - Mid August				Reduced risk for harm to birds				
Calving/lambing/rut					May 1-Jun 30				Elk Rut 15-Oct 15			Sheep Dec1-15 th
Bats	Bat in Hibernacula			Bats Nursing Pups							Bat in Hibernacula	
Turtles	Hibernation		Mitigate Road Mortality	Nesting - avoid disturbance		Road Mortality		Hatchlings – avoid disturbing	Road Mortality	Hibernation		
Snakes	Avoid disturbance of Hibernacula			Road Mortality		Peak : breeding, live young Mitigate road mortality		Migration Road mortality	Avoid disturbance of Hibernacula			

- 1.11. 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.
- 1.12. Project work will be completed in the shortest time frame possible.

Site Visits

- 1.13. The fire project manager, associated team members and park specialists will conduct an initial field visit for all projects.
- 1.14. Species at risk, denning sites, nesting/roosting trees, 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.
- 1.15. Project boundaries 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.

Contractors

- 1.16. A Parks Canada project/surveillance officer will liaise with the contractor to allow for two-way understanding of potential issues and for pro-active problem solving.
- 1.17. An initial project meeting will occur prior to work commencing as per the Briefings section of the Activity Module.
 - o On-site meetings for each management area will be conducted to familiarize the contractor with the details of the stand prescription, unique circumstances, special values or terrain traps, and discuss operational approaches and adjustments.



2. Mitigations for All Activities - Environmental

Environmental values and areas of concern will be identified and displayed on a map and communicated during project briefings. Sensitive cultural areas may not be specifically depicted on maps accessible to all parties. The project manager is responsible to ensure mitigations to protect these areas are implemented in a manner appropriate to the sensitivity of the site as directed in Archaeological and Cultural Resources section.

Species at Risk

- 2.1. Follow regional direction provided in strategic planning documents such as the Wildland Fire Management Plan, and associated Strategic Environmental Assessments.
- 2.2. Follow specific direction identified in the prescribed fire plan for species at risk.
- 2.3. All on-site personnel will be made aware of and report any incidental sightings of species at risk immediately to designated Parks Canada staff.

Wildlife

- 2.4. Specific prescribed fire plans will identify critical/sensitive habitats and timing windows² as outlined in Project Timing mitigation in section 1.
- 2.5. 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.
- 2.6. All food and garbage must be stored in wildlife proof containers.
- 2.7. Any problems including aggressive encounters with wildlife will be reported immediately to the park Wildlife Conflicts Specialist or park designate.
- 2.8. 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.
- 2.9. 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.
- 2.10. Trees with nests or cavities will only be removed if necessary to ensure worker and public safety.

² Consult the Parks Canada [Impact Assessment Intranet guidance](#) page i.e. Factsheets, BMPs for information on Migratory Birds BMP, Bats, etc.)



- 2.11. To reduce noise and disturbance impacts of rotary wing aircraft:
- Establish defined flight paths (to, from, within) the project area with the helicopter contractor;
 - Aircraft will maintain a minimum 2000ft altitude above ground when not conducting long line, bucketing, ignition or any other operations requiring low level flight;
 - Flight operations will only take place during daylight operating hours unless required for emergency response situations;
 - Harassing wildlife is not permitted.

Vegetation

- 2.12. Rare plants will be identified, mapped and protected as required.
- 2.13. Project activities will minimize damage to root systems of remaining plants or trees by restricting vehicle access and disturbance in the immediate area and refraining from parking equipment and vehicles within the drip line of trees.
- 2.14. To minimize windthrow from thinning projects, retain strong rooted, long lived, and wind firm trees. Use tree clumping or other prescriptions to reduce windthrow³.

Non-Native Plants

- 2.15. Non-native vegetation in the project area will be identified and appropriate mitigations will be implemented to minimize non-native vegetation colonization.
- 2.16. 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.
- 2.17. 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.
- 2.18. Methods used to action weeds will follow the park Integrated Pest Management Plan or regional non-native plant guidelines.
- 2.19. Use existing or previously disturbed areas for camps, staging areas, helispots, etc...to minimize the disturbance footprint and reduce the spread of non-native plants.
- 2.20. The project plan will include post project requirements for follow-up monitoring and treatment of weeds.

Soils and Terrain

- 2.21. Clearing or thinning the forest with heavy machinery will be undertaken while the soil is frozen as much as possible to minimize compaction, rutting, erosion and transport of non-native seed. Exceptions may be considered for equipment designed for low ground impact at the discretion of the project manager and IAO.
- 2.22. Heavy equipment will be equipped with high floatation rubber tires or low-pressure tracks with modified grousers.

³ Good guidance on forest thinning practices can be found in: Schroeder (2006), [Considerations for Mitigating Windthrow Due to Forest Fuel Treatments](#).



- 2.23. Limit heavy equipment use on slopes where traction may be inadequate and cause spinning or rutting.
- 2.24. 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.
- 2.25. Minimize broadcast burning on highly erodible soils.
- 2.26. During wildfire suppression, bulldozers will high blade whenever possible and avoid grading to mineral soil. This will maintain native ground vegetation, reduce potential for weed establishment, minimize soil erosion and reclamation requirements.
- 2.27. Where blading has occurred, reclamation of the site must occur as soon as practical following the fire event.
- 2.28. Displaced soils from the site will be retained for site reclamation to minimize the introduction of non- native species.
- 2.29. Re-establishment of native vegetation can be encumbered by debris, residual debris left on sites will be minimal.
- 2.30. Grader Use: keeping the blade angle steep (parallel to front and back tires) and angled away from fire will minimize the depth of mineral soil cut to create an adequate fuel break.

Aquatics and Hydrology

- 2.31. 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).
- 2.32. Plan ignition phase to apply lower intensity fire to riparian areas and forested vegetation immediately adjacent to creeks to reduce riverbank soil erosion, cover and shade loss.
- 2.33. Fish bearing streams used for pump sites will be assessed for spawning habitat and beds during prescribed fire planning (and wildfire operations as appropriate). Pump sites will maintain a 30 metre buffer from spawning beds or known spawning sites during the spawning season.
- 2.34. All intake hoses must be screened according to the [*Measures to Avoid Causing Harm to Fish and Fish Habitat*](#) (Department of Fisheries and Oceans).
- 2.35. Helicopter bucket dip sites will be identified in consultation with Parks Canada Aquatic Biologist or Park designate and where possible, avoid fish spawning habitats and critical pools.
- 2.36. 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*](#).
- 2.37. 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*.
- 2.38. 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, (i.e. the *British Columbia Fish-stream Crossing Guidebook (2012)*).



Air Quality

- 2.39. Communication plans will provide public information to promote understanding and appreciation for the role of fire in park ecosystems and minimize impacts from smoke.
- 2.40. 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.
- 2.41. Fuel load will be reduced where possible through mechanical removal (thinning) or chipping, with transport of wood chips for other uses. Alternative uses for the wood should be considered.
- 2.42. Prescribed fires and pile/slash burning will take place under atmospheric conditions that minimize the potential for inversions trapping smoke in valley bottoms.
- 2.43. 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.
- 2.44. 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.
- 2.45. Dust abatement techniques (ex: water truck) shall be used on unpaved, un-vegetated surfaces to minimize airborne dust.
- 2.46. Speed limits will be posted and respected to reduce airborne dust.

Reclamation

- 2.47. Reclamation of disturbed sites will start as soon as practical to promote native re-vegetation and reduce soil losses and weed establishment.
- 2.48. A reclamation plan shall be developed in consultation with the IAO for impacts resulting from fire management activities. The plan will identify reclamation sites, activities, responsibilities and timing. Examples of reclamation plans are available on the [National Fire Management Information System](#).
- 2.49. Reclamation practices or manuals specific to fire management may be consulted as per the recommendation of the vegetation specialist or IAO.

Cultural or Spiritual Sites

- 2.50. Cultural and spiritual sites within the project and associated areas will be identified and mapped with Indigenous people and appropriate mitigation measures identified and implemented for each.

Archaeological and Cultural Resources

- 2.51. 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.
- 2.52. 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.



- 2.53. Information concerning all cultural and archaeological sites will be considered confidential unless otherwise identified; including any new finds.
- 2.54. The location of new sites or resources will be immediately relayed to either the CRM Advisor. 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.
- 2.55. Fire line, access trails and road construction will avoid known archaeological and cultural resources.
- 2.56. To protect cultural resources:
 - Archaeological sites will have appropriate buffer zones identified.
 - Protection measures will be identified in consultation with the Parks Canada Terrestrial Archaeologist and CRM Advisor (i.e. avoidance, buffer zones, sprinkler systems).
 - Removal of debris and thinning of trees in areas of high archaeological potential may be applied to lessen the potential impacts.
 - 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.
 - 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.
 - Stockpiles and/or wood debris will not be permitted to damage or bury known cultural resources.
- 2.57. A post-burn archaeological survey should be conducted with the assistance of the Terrestrial Archaeologist and CRM Advisor, as appropriate.
- 2.58. If wildfire threatens known sensitive cultural resources the CRM Advisor, or designate, will contact the Parks Canada Terrestrial Archaeologist for advice and liaise with the appropriate cultural group as soon as possible.



3. Activity Module

Briefings

- 3.1. The project manager will provide a briefing package to all parties including the contractors, environmental surveillance officer, supervisors and any other project personnel, (*What to include in a briefing package*, Appendix 1).
- 3.2. Conduct an initial project start-up briefing prior to work commencing to ensure all project partners are aware of project objectives, sensitive sites, concerns and mitigations, (*Fire Management Start-up Briefing Checklist*, (Appendix 2).
- 3.3. Project personnel will sign pre-work document indicating their understanding of the items discussed in the start-up meeting and that project activities must follow the work plan.

Tactics and Strategies

- 3.4. During suppression efforts, impacts on the environment will vary depending on the tactics used to manage the fire. Fire managers will choose the least intrusive tactic(s) whenever possible. This is commonly referred to as *minimum impact suppression tactics* (MIST). MIST is:
 - How to suppress wildfire while minimizing the long-term effects of the suppression action
 - Using the minimum tool to safely and effectively accomplish the task ([NWCG 2004](#)).

Camps and Staging Areas

- 3.5. Existing or previously disturbed areas (ex: gravel pits, backcountry campgrounds) will be used as camps or staging areas.
- 3.6. All sites (tents, buildings, washrooms, privies) will be maintained in a sanitary condition.
- 3.7. Camps will be located, constructed, equipped and maintained free from any condition that may endanger the health or safety of the workers.
- 3.8. All food, garbage and litter must be stored in wildlife proof containers. Consult the Wildlife Conflicts Specialist to determine if a bear fence is necessary for certain camp areas.
- 3.9. Portable toilet facilities will be provided and regularly maintained. Contents will be disposed at approved treatment facilities.
- 3.10. Recycling of drink containers, cardboard, paper, plastic etc. will be completed. Recycling programs vary by region.
- 3.11. Camps will be subject to the Work Camp Regulations for the province of jurisdiction.

Access

- 3.12. Transportation methods that reduce the required disturbance footprint will be chosen. Access routes will be designed to carry smaller trucks with lower load-carrying capability when possible.
- 3.13. All other options must be considered prior to the development of any new temporary access routes for fire management projects.
- 3.14. Route design and development for any new temporary access routes will be done in consultation with the contractor, the project manager and IAO.



Equipment Operations

- 3.15. Ensure heavy equipment arrives onsite in a clean condition (power washed) free of invasive species, noxious weeds and soils from off site.
- 3.16. All equipment must be properly tuned, free of leaks, in good operating order and fitted with standard air emission control devices and a fire extinguisher.
- 3.17. Complete daily inspections of heavy equipment, particularly hydraulic lines, and conduct preventative maintenance.
- 3.18. Minimize idling of engines at all times to reduce air and noise pollution.
- 3.19. Heavy equipment will be equipped with high floatation rubber tires or low-pressure tracks (LGP – low ground pressure distribution with wide tires and/or track pads).
- 3.20. Use vegetable-based oils where possible and in particular when machinery will be used near water bodies.
- 3.21. Major maintenance of equipment will take place at local garages or maintenance yards. Maintenance will be conducted on hardened or impermeable surfaces such as mini-berms where it is not possible to transport to a garage.
- 3.22. Repairs requiring draining or replacement of petro-chemical based fluids will be conducted over impervious containment at least 100 metres from any watercourse.
- 3.23. Heavy equipment will be parked on tarps overnight to detect and contain leaks.
- 3.24. Harvesting heads will be placed in mini-berms to catch dripping oil.
- 3.25. Used fluids and other hazardous wastes must be disposed at federal, provincial, or municipal approved recycling centers or transfer stations.

Aircraft Operations

- 3.26. Flight watch protocols will be set up with local park dispatch or other radio control centre.
- 3.27. In accordance with the *Canadian Aviation Regulations (CARs)*, the issuance of a NOTAM will be completed for prescribed fire operations where smoke and/or aircraft operations may be an issue.
- 3.28. NOTAMS are automatically implemented for wildfires, size of NOTAMS will be enlarged as necessary to ensure secure airspace around wildfire events.
- 3.29. Maintenance of helicopters will be conducted at hangers or helipads. Maintenance will be conducted on hardened or impermeable surfaces such as mini-berms where this is not possible.
- 3.30. Predetermined flight routes will be used to avoid sensitive wildlife areas (ex: woodland caribou calving and rutting areas, mountain goats and active raptor nests) or other areas identified by park staff.
- 3.31. Use of drones within Parks Canada sites is by special activity permit only, signed by the Field Unit Superintendent or Site Manager.



Ignition Operations

- 3.32. Select ignition methods which minimize the application of fossil fuels while achieving ignition objectives.
- 3.33. Ignition patterns will avoid dropping ignition spheres and heli-torch fuel into riparian zones, water bodies and sensitive areas.
- 3.34. Mixing fuel and Flash 21 will take place over an impermeable surface (containment berm).
- 3.35. All spills with-in the containment berm will be immediately cleaned-up and disposal procedures followed.
- 3.36. Heli-torch testing:
 - Will be done a minimum of 100m from riparian zones, water bodies and sensitive areas.
 - Use existing or previously disturbed sites where possible for testing and minimize the size of the testing spot.
 - Remove contaminated soil after ignition operations and follow disposal procedures described in 3.51, 3.52 and 3.53.

Sprinkler Systems

- 3.37. Monitor sprinkler systems to prevent soil erosion, slumping, soil saturation and weakening tree roots.
- 3.38. Monitor sprinkler systems deployed for facility and cultural resource protection for potential water damage to buildings and foundations.

Fuel and Hazardous Material Management

- 3.39. Equipment will be fuelled on hardened or impervious surfaces.
- 3.40. Refueling motor vehicles and heavy equipment will be done on level terrain at least 100m from water sources, riparian zones, and sensitive sites.
- 3.41. All fuel storage containers/tanks shall be free of leaks. Fuel nozzles will be equipped with automatic shutoffs and hoses will have breakaway couplings.
- 3.42. All fueling trucks must be equipped with adequate spill clean-up materials.
- 3.43. Fuel, lubricants, petro-gels or oils will not be stored within 100 m of streams, wetlands, or sensitive sites unless absolutely required for operational capacity. Fuel cans for pump sites should be secured to avoid spills; use a mini-berm where possible.
- 3.44. Stationary stores of liquid hazardous material (e.g. fuel) and stationary operating equipment with fuel tanks or hydraulic systems (e.g. pumps) will be located in an impervious secondary containment area (e.g. a bermed area with impervious liner) capable of holding 110% of the contents of the largest container in the area.
- 3.45. Re-fuelling and maintenance of chainsaws shall be performed over impervious mini-berms with small (18"x 18") spill pads onsite.
- 3.46. All hazardous materials transported to or from the project area and stored on-site will comply with Transportation of Dangerous Goods (TDG) and Workplace Hazardous Material Information System (WHMIS) labelling legislation.
- 3.47. All service vehicles will carry a hydrocarbon spill kit suitable for a small spill clean-up on ground and water surfaces.



Spill Response

- 3.48. Contractors are required to provide a spill response plan.
- 3.49. Spill kits of sufficient size to contain and clean up 110% of the site's largest possible fuel/chemical spill must be retained on site at each location of potential spills (sites where equipment is working). All personnel on site must be aware of the kits, their location and proper use.
- 3.50. Spills of greater than 5 litres, or any spills in water, of fuel, lubricant, oil, hydraulic fluid, chemical or solvent must be contained, cleaned up and immediately reported to Parks Canada.
- 3.51. Disposal of contaminated soils and material will be outside the park at certified landfills. Documentation demonstrating proper disposal must be provided to the parks environmental management specialist.
- 3.52. If contaminated material is encountered during project work or field visits (ex. near buildings) the Park or site Impact Assessment Specialist will be notified immediately.

Use of Retardant and Foam

- 3.53. Fire retardant chemicals (short and long-term retardants) will not be applied unless absolutely necessary such as emergency response. Water is the preferred method of fire suppression.
- 3.54. All fire chemical concentrate and solution spills must be cleaned up immediately.
- 3.55. Field personnel will be informed of the potential danger of fire chemicals, especially foam concentrates, in streams or lakes in training and briefings.
- 3.56. Locate mixing and loading points at least 100m from water bodies.
- 3.57. Use check valves on equipment to prevent release of foam concentrate or contaminated water back into water body.
- 3.58. Establish dip operations to avoid run-off of contaminated water back into the stream.
- 3.59. Dip from a tank rather than directly from a body of water, to avoid releasing foam into these sensitive areas.
- 3.60. Avoid direct drops of retardant or foam into wetlands, rivers, streams, lakes, or along shores. Use alternative methods of fire line building in sensitive areas.
- 3.61. Notifying FMO, IC, Operations Chief, Safety Officer or IAO promptly if any fire chemical is released where there is a likelihood of negative impacts.
- 3.62. Ensure aerial retardant drops comply with park FMP zones guidance on use of retardant (intensive, intermediate or extensive zone).
- 3.63. Avoid retardant drops within 100m radius of any known active raptor or sensitive bird nesting areas.

Tree Removal

- 3.64. Safety of the workers and the public is the first priority during all operations.
- 3.65. Treatment boundaries, riparian zones, as well as the locations of sensitive ecological features will be clearly marked and communicated to fallers as per the project briefing and site visits.
- 3.66. Felling, limbing or bucking trees within riparian zones or other sensitive ecological areas will be avoided to the greatest extent possible.
- 3.67. Trees will be cut flush to the ground, unless the tree removal prescription requires a variety (number and distribution) of stump heights be left as wildlife trees.



- 3.68. Felling breakage will be minimized where possible, but not at the expense of the remaining stand and site ecology. For example, a tree should not be felled into an ecologically sensitive area as defined in the project planning phase or into the residual stand simply to avoid breakage.
- 3.69. Some trees can be girdled to create standing wildlife trees in areas that will not create future public hazards and if specified in the tree removal or harvest plan. Wildlife trees will not be created immediately adjacent to roads, trails or any public facilities.
- 3.70. As specified in the tree removal or harvest plan, quantity and distribution of slash remaining on the site will not to impede wildlife movement, create a significant fire hazard or cause excessive nutrient flush.
- 3.71. Fallers will assess each tree individually. If a tree contains critical wildlife features (e.g.: raptor, owl nest) it will be left unless it poses a risk to worker or public safety. Direction will be provided by the appropriate Park Specialist on how to manage trees containing critical wildlife features.
- 3.72. Environmental monitoring will take place throughout the tree removal process to ensure all conditions and mitigations are met.
- 3.73. All trees will be limbed and bucked to meet the specified end use. This may include non-commercial purposes such as providing woody debris for stream and terrestrial rehabilitation projects.
- 3.74. Logs may be cut to shorter lengths if it will significantly help reduce site impacts or damage to residual stems during yarding and loading.

Hand Falling

- 3.75. Fallers will be certified as per the current Parks Canada recognized training standards.
- 3.76. Fallers must be especially cautious to fall trees in a direction, which causes the least impact to the understory plant community, standing trees and other sensitive ecosystem components, such as streams and riparian areas.
- 3.77. Chainsaws will be kept in good working condition and free of oil and fuel leaks.
- 3.78. Chain oil will be vegetable-based when possible. Exceptions may be due to availability or working on active fire lines.

Mechanical Falling

- 3.79. Mechanical falling may be used on suitable soil and slope conditions where machine use will cause minimal site degradation or on sites to be developed for approved future use.
- 3.80. Mechanical falling may be preferable, for worker safety reasons, on sites with numerous hazard trees to be retained for habitat value.
- 3.81. Mechanical falling equipment may be used where it will provide better control and less impact than hand falling.

Falling Near Power Lines

- 3.82. Work adjacent to power lines will be done in consultation with local power companies.
- 3.83. Utility tree workers/fallers certified at the provincial standard for utility line falling are required for tree removal within 1.5 tree lengths of power lines.
- 3.84. Leave select habitat trees that are technically within striking distance of the power line but leaning away from the line.



- 3.85. Topping selected habitat trees to avoid hazards is the preferred treatment over complete removal.
- 3.86. Retain strong rooted, long lived and wind firm trees in the thinned forest adjacent to the power line to reduce the probability of line strikes.
- 3.87. Debris from felled trees will be removed from the power line corridor to minimize ignition potential.

Ground-based Yarding Systems

- 3.88. Log transport from harvest areas should be completed with flexible multi-terrain tracks or eco-tracks log forwarders.
- 3.89. If skidders are used, they should be equipped with flexible track systems unless operating on paved or hardened surfaces.
- 3.90. Forwarder/skid trail layout and design will:
 - follow natural contours to reduce soil erosion;
 - minimize overall length, straight lines, sharp turns, identified sensitive areas and damage to the residual stand;
 - be at grades less than 15%, to the extent possible;
 - where steep grades are unavoidable, break the grade, install drainage structures and use soil-stabilization practices to minimize runoff and erosion;
 - be at least 30m away from streams, ponds and marshes;
 - include construction of temporary crossings for all stream channels, springs, seeps, and sinkholes;
 - avoid back spar and bladed trails, if necessary will only be constructed in approved locations.
- 3.91. General forwarder/skidder operation will:
 - in general forwarders are preferred over skidders;
 - be completed when the soil is frozen, dry or snow covered;
 - restrict operation on slopes greater than 35%, away from the tops and toes of banks and slopes;
 - cover skid trails with logging slash and organic debris (wood chips) to minimize site degradation, particularly at the landing site and in areas where machinery must turn around;
 - use floatation mats where debris does not provide adequate protection;
 - avoid repeated use of the same skid trail to prevent rutting and soil compaction;
 - elevate the lead end of the log during skidding to minimize soil gouging;
 - not operate in identified sensitive areas; aerial or skyline systems will be used in these areas if necessary.
- 3.92. All site impacts caused by ground-based transportation will be rehabilitated according to the tree removal prescription including:
 - closing obvious site-lines and possible access with placement of woody debris, with special consideration given to visible site lines from visitor sites and facilities;
 - replacing salvaged vegetation (sods, top organic layer);



- seeding as deemed necessary by the IAO.

Skyline/Cable Logging

- 3.93. Conduct yarding uphill to control the unsuspended end of the log and reduce “rubbing” of residual trees, log drag, soil disturbance and resulting water runoff down the drag tracks.
- 3.94. Avoid downhill yarding unless there is sufficient space for logs to come to a standstill within the landing area.
- 3.95. Place slash debris or mats adjacent to the landing to avoid heavy soil disturbance.
- 3.96. Minimize the required number of access roads and landings with longer yarding distances.
- 3.97. In wide right of ways, use line loaders over hydraulic loaders because of the extended reach of the machine.
- 3.98. All landings will have suitable guyline anchors.

Helicopter Logging

- 3.99. Where possible/feasible helicopter logging will be used over ground or cable systems as it provides one of the best systems for removing trees with the least amount of environmental impacts.
- 3.100. Only industry approved helicopter logging equipment (cables/yarders) will be used during helicopter logging operations.
- 3.101. Helicopter logging will only be performed by experienced and trained personnel in this activity.

Log Loading and Transportation

- 3.102. Landings will be:
 - chosen and marked by Parks Canada in consultation with contractors, and will avoid all ecologically and culturally sensitive sites;
 - use the minimum number possible and be located in disturbed areas, preferably along roads or rights-of-ways, existing forest openings or openings created as part of thinning;
 - as small as possible while accommodating forwarding skidding activity and truck loading;
 - managed carefully and efficiently to minimize disturbance footprint;
 - be rehabilitated to ensure re-establishment of native vegetation and control of non-native vegetation.
- 3.103. Log sorting locations will be chosen to minimize long term impact on the site and will avoid undisturbed sites to the greatest extent possible.
- 3.104. Equipment for loading and hauling will be chosen primarily to ensure logs can be safely removed while decreasing the area impacted. Swing loaders are recommended because they can operate on smaller landings than front-end loaders.
- 3.105. Loaders with rubber tires will be used as appropriate for the site.
- 3.106. Loading from landings adjacent to highways will require cautionary traffic signs and flag person(s) as per provincial highway regulations.



References

- Alberta Environment. 2000. *Guide to the Code of Practices for Watercourse Crossings*. May 2000 (revised April 2001). <http://aep.alberta.ca/water/legislation-guidelines/water-codes-of-practice.aspx>
- B.C. Ministry of Forests. 2002. *Forest road engineering guidebook*. Forest Practices Branch, B.C. Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook. Canadian Aviation Regulations. SOR/96 – 433. <https://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/FREE/EFG-Car-print.pdf>
- Canadian Environmental Assessment Act, 2012. (S.C. 2012 c. 19,s.52). <http://laws-lois.justice.gc.ca/eng/acts/C-15.21/index.html>
- Dallyn, Chris. 2002. *Reclamation Manual – Concerning Impacts Caused by Wildfire Suppression*. Saskatchewan Environment and Parks Canada.
- Department of Fisheries and Oceans. 2016., *Measures to Avoid Causing Harm to Fish Habitat*, <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>
- Department of Fisheries and Oceans. 1995. *Freshwater Intake End-of-Pipe Fish Screen Guideline*. <http://www.dfo-mpo.gc.ca/Library/223669.pdf>.
- Diamond Head Consulting Ltd. 2004. *Best Management Practices for Tree Removals in Parks and Protected Areas – Planning*. British Columbia Ministry of Water, Land and Air Protection, Ecosystem Standards and Planning, Biodiversity Branch. April 2004.
- Diamond Head Consulting Ltd. 2004. *Best Management Practices for Tree Removals in Parks and Protected Areas – Harvesting Operations*. British Columbia Ministry of Water, Land and Air Protection, Ecosystem Standards and Planning, Biodiversity Branch. April 2004.
- Diamond Head Consulting Ltd. 2004. *Best Management Practices for Tree Removals in Parks and Protected Areas – Road Design and Engineering*. British Columbia Ministry of Water, Land and Air Protection, Ecosystem Standards and Planning, Biodiversity Branch. April 2004.
- Ministry of Water, Land and Air Protection. *Standards and Best Practices for Instream Works*. British Columbia. March 2017. <http://www.elp.gov.bc.ca/wld/instreamworks/introduction.htm>
- Parks Canada. 2016. *Memo: Whirling Disease and Fire Operations* <http://mcdc-sp-portal.apca2.gc.ca/sites/fm/ops/sopops/default.aspx>
- Parks Canada. 2016. *Parks Canada Management Directive 2.4.4 Fire Management*. (Draft at time of publication).
- Parks Canada. 2016. Various *Standard Operating Procedures for Fire Management* available at: <http://mcdc-sp-portal.apca2.gc.ca/sites/fm/ops/sopops/default.aspx>
- Parks Canada. 2017. *Guidance on How to Comply with the Migratory Birds Convention Act, 1994*. Parks Canada Agency. <http://intranet2/our-work/natural-resource-conservation-branch-test/environmental-assessment/guidance-and-tools/?lang=en>
- Parks Canada. 2015. *Guide to the Parks Canada Environmental Impact Analysis Process*. June 2015 http://intranet2/media/2864699/pc_guide_to_eia_english_wcag.pdf



Parks Canada. 2015. *Parks Canada Directive on Impact Assessment*. April 9, 2015. http://intranet2/media/2404349/2015_pca_impact_assessment_directive.pdf

Parks Canada. 2015. *Parks Canada's Memo: Managing Risk of Invasive Mussels through Fire Operations*, <http://mcdc-sp-portal.apca2.gc.ca/sites/fm/ops/sopops/default.aspx>

Parks Canada. 2015. *Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure*. May 2015. <http://collaboration/sites/ea/Pages/BMP-Library.aspx>

Parks Canada. 2005. *National Fire Management Strategy Strategic Environmental Assessment*. Parks Canada Agency. March 2005.

Quinn, D. 2015. *Parks Canada Guidelines and Best Practices for Managing Wildland Fire in Whitebark Pine Stands*. Parks Canada Agency.

Schroeder, D. 2006. *Considerations for Mitigating Windthrow Due to Forest Fuel Treatments*. Forest Engineering Research Institute of Canada. 2006

Species at Risk Act. 2002, C 29. <http://laws-lois.justice.gc.ca/eng/acts/s-15.3/>



Appendix 1: What to Include in a Briefing Package?

Briefing packages for *prescribed fires* could include:

- List of contacts
- Work schedule outlining project stages, timelines and timing windows
- Maps
- Weather information
- Fire behaviour forecasts and indices
- Objectives
- Assignments
- Identification of all critical site features (clearly marked in the field and on the accompanying maps) before the pre-work meeting. Features to include:
 - Project boundary and all treatment zone boundaries
 - Riparian areas and ecologically sensitive areas to be avoided
 - Sensitive ecological features such as significant wildlife trees, rare plant communities, wetlands, fish habitats and denning sites
 - Sensitive cultural/archaeological features as appropriate
 - Area closures
- Protocols for discovery of archaeological, cultural or ecological sites of interest
- Fuel and chemical storage, fuelling procedures and locations
- Review mitigations and methods of deployment
- Communications protocols and procedures
- Radio frequencies
- Safety and emergency response procedures

In addition to the applicable elements listed above briefing packages for *fire/fuel management projects* could also include:

- An overview of all safety concerns and standard safe operating procedure
- The tree harvesting system and related operational activities
- A review of the fire preparedness plan during harvesting operations
- Roads, helipads, trails, water crossings, and access routes
- Terrain and soil issues
- Debris management
- Public safety and area closures



Appendix 2: Fire Management Start-up Briefing Checklist

Park or Site:

Project Name:

Date:

Reporting, Communications, Response and Responsibilities

- How to report new features found, spills and incidents
- Communications protocols
- Who to call or how to respond for specific incidents, contact numbers
- Roles and responsibilities of project staff

Wildlife:

- Dens - bear, wolf, coyote
- Nests – raptors, woodpeckers
- Wildlife Reminders:
 - Bears – storage of food & garbage, safety info
 - Elk – calving, rutting season
- Report all bear or carnivore sightings in project area
- Report all aggressive encounters with wildlife

Aquatics

- Fish spawning sites
- Sensitive wetlands/riparian zones
- Use of foam & retardant

Vegetation

- Rare plant sites – protection if required
- Park on roads or designated sites

Species At Risk

- Identify species at risk, sensitive locations and mitigations

Weeds

- Pressure wash all equipment before entering the park
- Heavy equipment to minimize ground disturbance

Helicopters

- Identify flight routes to avoid sensitive wildlife areas and high use areas

Air Quality

- Signs – Smoke in Area, Prescribed Burn in Progress
- Monitor: atmospheric venting, winds
- Keep pile/slash fires hot to reduce smoke
- Dust control on roads, helispots, staging areas if required

Soil & Terrain

- Identify sensitive terrain features (ex: hoodoos)
- Identify highly erodible or easily compacted soils
- Stream bank erosion

Archaeological & Cultural

- Archaeological & cultural sites identified – protection if required
- Monitor sprinkler systems for potential water damage or erosion.

Public Safety

- Area Closures – posted for trails, roads, area
- Signs on roads & Hwys
- Traffic control – flag person, pilot vehicles
- Report any incidents with public

Fueling & Spills

- Inspect fuel containers, equipment, & vehicles for leaks or damage
- Storage of all fuel on a containment berm
- Spill kits – onsite, vehicles, heavy equipment
- Report all spills, contact numbers
- Clean up spills immediately

Ignitions & Mixing

- Mixing over containment berm
- Identify the helitorch testing site

Staging Area

- Identify portable toilet site
- Maintain site clean & tidy
- Recycling